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UNITED STATES OF AMERICA
 NUCLEAR REGULATORY COMMISSION
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 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
 (ACRS)
 495TH MEETING
 + + + + +
 THURSDAY,
 SEPTEMBER 12, 2002
 + + + + +
 ROCKVILLE, MARYLAND
 + + + + +

The subcommittee met at the Nuclear
 Regulatory Commission, Two White Flint North,
 Room T2B3, 11545 Rockville Pike, at 1:00 p.m.,
 George E. Apostolakis, Chairman, presiding.

COMMITTEE MEMBERS PRESENT:

GEORGE E. APOSTOLAKIS	Chairman
MARIO V. BONACA	Vice Chairman
F. PETER FORD	Member
THOMAS S. KRESS	Member-at-Large
GRAHAM M. LEITCH	Member
DANA A. POWERS	Member
VICTOR H. RANSOM	Member
STEPHEN L. ROSEN	Member

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1 COMMITTEE MEMBERS PRESENT: (cont'd)

2 WILLIAM J. SHACK Member

3 JOHN D. SIEBER Member

4 GRAHAM B. WALLIS Member

5

6 STAFF PRESENT:

7 JOHN T. LARKINS, Designated Federal Official

8 MARK CUNNINGHAM, NRR

9 ERASMIA LOIS, NRR

10 HUSSEIN NOURBAKSH, ACRS Senior Fellow

11 JAY PERSENSKY

12 NATHAN SIU, NRR

13 MAGGALEANA WESTON, Staff Engineer

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

(1:02 p.m.)

CHAIRMAN APOSTOLAKIS: The meeting will now come to order. This is the first day of the 495th meeting of the Advisory Committee on Reactor Safeguards.

During today's meeting, the committee will consider the following: human reliability analysis research plan, subcommittee report on the proposed resolution of Generic Safety Issue 185, subcommittee report regarding D.C. Cook switch gear fire, CTL fire, subcommittee report regarding the reactor oversight process, subcommittee report on fire protection, and proposed ACRS reports.

A closed session was held this morning in the NRC Auditorium to discuss classified information applicable to DOE/DOD Naval Reactors, Virginia Class Nuclear Propulsion Plan Submarine Design.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Dr. John T. Larkins is the designated federal official for the initial portion of the meeting.

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

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1 of the public regarding today's sessions.

2 A transcript of portions of the meeting is
3 being kept, and it is requested that the speakers use
4 one of the microphones, identify themselves, and speak
5 with sufficient clarity and volume so that they can be
6 readily heard.

7 I will begin with some items of interest.
8 I would urge the members to review at the break or
9 tonight the reconciliation of ACRS comments and
10 recommendations. There are a number of letters here
11 that we have responses to from the EDO's office, and
12 please make sure you read it.

13 There have been some changes to the agenda
14 of today. There will not be any presentation by the
15 NRC staff on GSI-185. Instead, the subcommittee
16 chairman will provide the report.

17 There will be a subcommittee report on
18 fire protection today, and this report was scheduled
19 for Friday between 1:30 and 2:00 p.m. So it will be
20 done today.

21 These reports by the subcommittee chairmen
22 will be transcribed. We will have the Court Reporter
23 here.

24 I would like to introduce our new ACRS
25 Senior Fellow, Dr. Hussein Nourbaksh. Hussein? Dr.

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1 Nourbaksh has more than 20 years of research
2 experience in many aspects of reactor safety,
3 including accident phenomenology and source terms,
4 containment performance, thermal hydraulic analysis,
5 and code development, uncertainty analysis, PRA,
6 accident monitoring, risk integration, and consequence
7 analysis.

8 He has a Ph.D. in chemical engineering
9 from the University of Minnesota, and he has held a
10 number of research positions at Brookhaven National
11 Laboratory, including the group leader of the Safety
12 Analysis Group.

13 Hussein, welcome.

14 (Applause.)

15 CHAIRMAN APOSTOLAKIS: And now we are
16 ready to move on to the first item on the open agenda.
17 This is the human reliability analysis research plan.
18 Dr. Powers is the cognizant member.

19 Please, Dr. Powers.

20 MEMBER POWERS: Thank you, George.

21 It goes without saying that the committee
22 has, especially in its recent research reports,
23 indicated a belief that the issues of human factors
24 and human reliability analysis were of paramount and
25 perhaps growing importance in the safety of nuclear

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1 reactors, especially in an era where risk assessment
2 plays such an important role in the regulatory
3 process.

4 It is interesting that the perception,
5 certainly within the subcommittee on human factors, is
6 that this ubiquitous role of human factors and human
7 reliability assessment will remain, even as we move
8 into an era of advanced reactors where passive safety
9 is emphasized, not so much because of the issues of
10 errors -- human errors of omission as they are of
11 human errors of commission. Also, because the issues
12 of latent errors, attributable either to engineering,
13 manufacturing, or maintenance, are likely to remain.

14 Consequently, the ACRS as a whole has
15 attributed a great deal of significance to the
16 development of the technologies, and the area of human
17 factors and human reliability analysis at the agency
18 is important.

19 But we have, it goes without saying, been
20 somewhat critical of past plans that the NRC has
21 brought forward to coordinate all of the activities in
22 the -- in connection with the word "human" that are
23 going on at the agency. And the agency has, in fact,
24 abandoned those attempts to cross-correlate everything
25 that's going on and, instead, chosen to focus on its

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1 research activities in human factors and human
2 reliability analysis.

3 The staff distinguishes those two
4 activities, though they are closely interconnected,
5 whereas the ACRS tends to lump them all together. And
6 I think the staff forgives us for our inability to
7 make fine distinctions here.

8 We did have a chance to have a
9 subcommittee meeting to discuss the research plans in
10 the area of human factors and human reliability
11 analyses with the staff. My own feeling was that it
12 was an exceptionally good subcommittee meeting.

13 We spent nearly a full day doing that, and
14 as a result the staff is coming before us now to give
15 you at best a synoptic representation of all the
16 material that they presented to us at the subcommittee
17 meeting. I will say that they gave us a very good
18 exploration into many of the activities that are going
19 on. We asked them to emphasize those things they put
20 into a category called "infrastructure," what we might
21 call research to develop the technological
22 capabilities that they have, because they have quite
23 a few other activities that I would class as
24 applications of the technology, where they are
25 fielding the work, using the technology in support of

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1 other major activities within the agency, be they
2 within research or in our -- or other places in the
3 agency.

4 We do not ask them to explore those
5 applications to any great extent, largely because we
6 see the results of their fine work when we explore
7 those applications as topics alone.

8 Nevertheless, they were able to open my
9 eyes into some of the important capabilities that are
10 available to the agency to use, not the least of which
11 is -- was an extraordinary presentation on how we
12 might be able to derive new technological insights in
13 the area of human reliability assessment from the
14 Halden program.

15 Unfortunately, I don't think they're going
16 to have a time to do that particular subject a great
17 deal of justice here. I certainly hope that they
18 will, instead, spend their time exploring for us the
19 research plans, especially the research plans and
20 technological developments that they have in the works
21 here, because I think in our -- in spite of the days
22 of exploration of this that we really did not get a
23 good understanding of what was not being done, and the
24 length and breadth of what was being done in these --
25 you know, what they call the infrastructure

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1 development, maybe some sense of that to the extent
2 that they can augment our understanding there. I
3 think it would be very useful.

4 Nevertheless, I will say that it was one
5 of the most positive meetings on human factors in a
6 broad sense that I've ever participated as a member.
7 And, quite frankly, they seem to have their act
8 together here.

9 With that introduction, I guess -- do I
10 turn to you, Mark?

11 MR. CUNNINGHAM: My name is Mark
12 Cunningham. I'm the Chief of the Probabilistic Risk
13 Analysis Branch in the Office of Research.

14 With me today, starting at the far end,
15 are Nathan Siu of the PRA Branch, Erasmia Lois of the
16 PRA Branch, and Jay Persensky in the -- in a branch
17 with a very long name, including Human Factors --

18 (Laughter.)

19 -- that I can never remember.

20 (Laughter.)

21 MEMBER POWERS: Not a human factors name,
22 right?

23 (Laughter.)

24 MR. CUNNINGHAM: Yes, that's right. Not
25 a human factors name.

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1 (Laughter.)

2 I'm going to provide some of the general
3 background on the work that we've been doing in human
4 reliability and human factors, and following me Jay
5 and Erasmia will do the real work of telling you
6 what's in our program and what some of our plans are.

7 Can we go to the next slide, please?

8 We're here today to provide an overview of
9 the work that we're doing in human reliability
10 analysis research and human factors research, and I'll
11 come back to the distinction we make in a couple of
12 slides.

13 We're going to talk both about the
14 activities that we have underway and the relationships
15 and interactions that we -- that exist between the two
16 programs.

17 We were interested at the subcommittee,
18 and we're interested in today, in getting feedback
19 from the committee on -- to help us better plan our
20 upcoming activities. We're in the position now of
21 updating our human reliability plans and human factors
22 plans for the next couple -- four or five years. We
23 do this about once a year, but it's the right time of
24 the year to do this.

25 And we're interested in getting feedback

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1 from the committee. Like yourselves, we see this as
2 a very important activity in the office, and we want
3 to -- and as you well know, this committee has not
4 been as positive about this -- these programs in the
5 past as they seem to be today. We're interested in
6 getting feedback for all those reasons.

7 Go to the next slide, please.

8 There's really three parts to the briefing
9 today. I'm going to talk a little bit about the --
10 how the two programs and how the two technical
11 disciplines relate to each other, at least in the
12 context of how we do our work around here. Jay then
13 will talk about the human factors activities and
14 needs, and then Erasmia will finish up on human
15 reliability analysis activities and needs.

16 Next slide, please.

17 The human factors and human reliability
18 analysis support a number of activities in the agency
19 in a sense that we want -- we aren't going to talk
20 about today. Human factors work is used in
21 deterministic evaluations of control rooms, many
22 things like that. PRA is used in many areas -- in
23 risk-informed regulation. We're not going to talk
24 about that particular either. What we're talking
25 about today is the relationship between the two

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1 programs.

2 We have a model of an oval here I guess
3 that -- I can start at the right-hand side that -- in
4 our area where Nathan and Erasmia and I are is in the
5 probabilistic risk analysis area. A key component of
6 PRA is human reliability analysis.

7 We use information from the human factors
8 program in a couple of ways. One is basic information
9 and data models on how humans perform. You can think
10 of that as, again, in a deterministic sense of that
11 under a certain set of conditions this is how we would
12 expect individuals or crews to react to certain
13 context or situations.

14 The human factors program also identifies
15 areas where human reliability analysis ought to be
16 focusing some of its modeling, and can tell us of all
17 the things that can cause humans to perform
18 incorrectly, what seem to be the more important areas
19 and where we ought to be spending time in human
20 reliability analysis.

21 Looking back -- going then from HRA and
22 PRA back to human factors, human reliability analysis
23 and PRA give information to the human factors programs
24 on the situations and the scenarios that can be most
25 important in evaluating the risk from a nuclear

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1 facility, or any other facility for that matter.

2 We've talked in the past, and some of the
3 changes in thinking in HRA over the last few years
4 have brought about -- have made us think more --
5 characterize the information more in terms of the
6 context that the operator or the human is put into,
7 that it's -- we shouldn't be thinking so much of the
8 human as being a separate thing out there independent
9 of the situation that he or she is put into.

10 So I think that's an important element,
11 going back to the human factors program and saying we
12 ought to be thinking about how humans, individually or
13 in groups, perform in these types of contexts, put
14 into a situation where they're in -- for example, in
15 the middle of an event. Fire might be an initiator,
16 or something like that, and what would we expect? How
17 would we expect the individual humans or the crews to
18 perform in that context?

19 Like coming from -- like as comes from
20 human factors to human reliability, we identify HRA
21 modeling needs, that we need better information on
22 this aspect of human performance. Through these, we
23 have an opportunity in this sense to help prioritize
24 what the human factors program does, at least a part
25 of -- a segment of what the human factors program

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1 does.

2 In that we can say, "Again, these are the
3 situations or human performance issues that seem to be
4 the most important or most uncertain in the context of
5 a risk analysis of a facility." And that helps Jay
6 and Company to define what types of research ought to
7 be performed in human factors.

8 Next slide, please.

9 Given that general background, that
10 context of how we use -- how the two programs
11 interrelate, I guess it's -- Jay is going to proceed
12 now and talk some more about the human factors
13 research program at NRC.

14 MR. PERSENSKY: Good afternoon. This
15 slide is titled "Role of." I wasn't sure what to call
16 it. We have called it goal. We have called it all --
17 various different things.

18 (Laughter.)

19 The bottom line is this is what we do.
20 Our role, as I see it -- and especially in the human
21 factors group -- is to develop tools for the
22 regulators, for the regulated -- the regulator staff,
23 because they have jobs. They do rulemaking. They do
24 licensing. They do monitoring. And at times they
25 need some sort of tool. That tool could come in

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1 various forms. It could be a rule. It could be a
2 regulatory guide. It could be inspection protocol.

3 We try to develop those things using the
4 best technical basis available. In many cases, that
5 means that we're borrowing or adopting material from
6 other places. When we talk about guidelines,
7 guidance, the military, the transportation, the
8 aerospace industry, have major research programs where
9 they develop a lot of the kinds of things that we use
10 as part of the guidance that we develop. We don't
11 necessarily have to go out and develop our own -- do
12 our own research from the standpoint of a laboratory
13 setting.

14 However, there are times when we either
15 want to test those concepts from these other
16 applications to see how well they fit within the
17 nuclear industry. It's a different setting. One of
18 the things that we're involved with, for instance, is
19 fatigue. The Commission has directed us to write a --
20 NRR to write a rule on fatigue and how we can deal
21 with fatigue in the nuclear setting.

22 Most of the research that's been done in
23 that area has been done in the transportation area,
24 some in the military -- a little bit different. Most
25 cases there you're dealing with one person that's

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1 responsible for keeping that truck on the road,
2 keeping that train moving in the right direction, or
3 flying an airplane.

4 Whereas, we have a situation where you
5 have a number of people; you have teamwork. So you
6 have a little bit different setting. So there are
7 times you have to take that information and adopt it.
8 That might mean we can adopt it directly, or it might
9 mean that we have to go out and try to do some
10 confirmatory research.

11 So that's where the technical basis aspect
12 comes in. So part of what it takes to do that is to
13 have core competence in people in research, to know
14 where to go to get the information and how to take
15 that and adopt it, as well as to develop the research
16 if it's necessary to do something more like a
17 laboratory kind of setting.

18 The bottom line, though, is, why do we do
19 this? And that's to ensure that the nuclear facility
20 personnel have all the right tools that they need to
21 have the information, and the information was going to
22 come through a man-machine interface. That
23 information might come through procedures. That they
24 have the right knowledge. That knowledge is going to
25 come through their training program; again, through

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1 their procedures.

2 That they have the right kind of working
3 environment. That means everything from the
4 temperature, the humidity, the lighting, to the
5 organizational environment, because these all impact
6 on what the people do.

7 And, again, we want them to work -- do
8 their work safely, or, to some extent, efficiently.
9 But our job is primarily in the area of safety. So
10 that's what we do. That's what we attempt to do
11 through developing these tools.

12 MEMBER WALLIS: Hold on a minute.

13 MR. PERSENSKY: Yes.

14 MEMBER WALLIS: I find this interesting.
15 I mean, the most interesting part of your presentation
16 the other day to me was when things began to get
17 possibly quantitative. And to me, if a tool is
18 something like a computer program or a way of
19 calculating quantitative success criteria or
20 quantitative numbers to put into a PRA, or calculation
21 methods which are based on some logical developments
22 -- I mean, you didn't mention any of those things when
23 you talk about tools.

24 The interesting thing to me is all of
25 these other kinds of tools. I think that's the way

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1 you ought -- for me, that's the way you ought to be
2 going, in the quantitative direction.

3 MR. PERSENSKY: Okay. And I don't
4 disagree with you. I feel that that's the
5 infrastructure part of building the tools that the
6 regulator uses. The regulator uses the criteria, the
7 guidance, the inspection protocols that are developed,
8 because that's what they use out in the field.

9 MEMBER WALLIS: Yes. But how does this
10 relate to making the science or whatever more
11 quantitative? So it can be compatible with PRAs and
12 things like that.

13 MR. PERSENSKY: The quantitative aspect of
14 that is in doing the research, for instance, at a
15 simulator we would collect data in these various
16 areas.

17 MEMBER WALLIS: That's the interesting
18 part to me.

19 MR. PERSENSKY: I understand. That is the
20 interesting part to me, but the application of what we
21 do is not solely to put it into a PRA.

22 MEMBER WALLIS: I realize that.

23 MR. PERSENSKY: But to do something for
24 the regulator.

25 MEMBER WALLIS: I realize that. You do a

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1 lot of other things as well.

2 MR. PERSENSKY: Yes. I mean, we do other
3 things as well, but, again, that's our bottom line
4 responsibility is to support our regulator. And as
5 Mark said, there are some loops here as far as as we
6 collect data, for instance, in the laboratory setting
7 that can be used to develop those regulatory tools, it
8 also provides a basis for the kinds of things that are
9 needed for the HRA. And that's what we talked about
10 in terms of how these things interrelate.

11 So that's where -- the quantification from
12 the standpoint of PRA. But that doesn't solve the
13 regulator's problem, until he has something in his
14 hand -- his or her hands to go out and do an
15 inspection.

16 MEMBER ROSEN: My perception, Jay, is that
17 you've spent a lot of time thinking about human
18 performance of individuals, and a little time thinking
19 about performance of people in crews, and practically
20 no time at all thinking about the overall organization
21 context in which the whole thing operates. In fact,
22 you've been enjoined in an organizational context.

23 Is that -- pretty soon it gets into the
24 issues of culture and all kinds of things that
25 happened in the past and something that you've been

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1 waved off of, and that's principally where I think the
2 program is weak.

3 So I think your second bullet is a little
4 bit overstated. It says ensure that you have the
5 tools for physical and organizational --

6 MR. PERSENSKY: You know, that's the wider
7 view, yes.

8 MEMBER ROSEN: But I think as you try to
9 open your perspective out, which I think is essential
10 ultimately, you know, to get a good handle on how
11 important this is, you are actually not focused very
12 broadly. Your focus is fairly narrow, and I'm just
13 trying to broaden the scope.

14 MR. PERSENSKY: I agree with you. In the
15 past we have focused primarily on individuals. We
16 have focused primarily on the operator. But it has
17 not been entirely that. I mean, in terms of even the
18 operator, we have done work on team research, team
19 behaviors, in order to deal with some of the operator
20 licensing concepts where they license the team -- they
21 look at team behaviors in their licensing, and we
22 helped develop some of that.

23 MEMBER ROSEN: Well, after all, that is
24 teams that respond to accidents, not people.

25 MR. PERSENSKY: I understand. And we're

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1 trying to -- we are trying to broaden that whole
2 concept. Some of the work that we've done has then
3 identified that that's an area that we have been weak,
4 and we are hoping to expand in some of those areas.

5 MEMBER ROSEN: But it is organizations
6 that set the conditions for incidents and accidents.

7 CHAIRMAN APOSTOLAKIS: I think that's an
8 excellent point, and maybe in some future
9 presentations, not only to us but also to others, you
10 can have a nice picture, say, as individuals, teams,
11 organizations, because people will appreciate that.

12 I mean, they -- you are educating people,
13 I think, regarding what is needed in this field. And,
14 you know, I don't think that my colleague Mr. Rosen
15 wanted to assign blame here. It's just that that's
16 the way the field evolved; that is, in the nuclear
17 business. But I think now we are wiser, and we
18 recognize that the individuals is not the end for us.

19 But I like this hierarchy -- individual,
20 team, organization. And it's important. I mean, we
21 see -- you know, the recent events show that it's
22 extremely important.

23 Okay. Great.

24 MR. PERSENSKY: Thank you. Any other
25 questions before I go on?

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1 CHAIRMAN APOSTOLAKIS: Oh, don't worry,
2 Jay. Just go on.

3 (Laughter.)

4 MR. PERSENSKY: Well, I mean -- well, I
5 know there are going to be more questions. I just
6 want to make sure before I take off the slide.

7 (Laughter.)

8 Next slide.

9 This slide talks about or tries to depict
10 -- tries to -- we'll see if it worked. These are the
11 primary areas that we're working in in terms of the
12 agency is responsible for developing rules and
13 licensing, because they -- they have -- they license
14 plants, and the monitoring activities includes
15 everything from the inspections to the reactor
16 oversight process.

17 This bottom part, which you can't see very
18 well, is the infrastructure, which is more of that
19 development area of how do we get to these other
20 things. We focused some on our discussions on Tuesday
21 on these areas above the line, above the dotted line,
22 which are, in fact, as Dana mentioned, these are
23 mostly applications.

24 This is where we're working on a rule for
25 fatigue. We're working together. We're developing

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1 technical basis so that there will be a rule that
2 addresses that aspect.

3 In the area of staffing, we're developing
4 a method, a model-based method, computerized model-
5 based method, where we can actually evaluate using the
6 computerized tool as opposed to having a prescriptive
7 rule that says you must have X number of people
8 regardless of what your plant condition is. So we're
9 looking at that from that standpoint.

10 But this -- just to touch on this one a
11 little bit, because I know that was of interest to the
12 subcommittee, we did a report -- 6755 -- which we sent
13 to NRR recently that describes some work that we did
14 in the area of comparing the reactor oversight
15 process. That includes everything -- the PIs,
16 inspection protocols, the SDP -- to events that
17 occurred that were high-risk events out of the ASP
18 program, over a five-year period all of the events
19 that were above 10^{-5} .

20 From that, we identified a number of
21 commonalities, common errors or problems that
22 occurred. Among those were latent errors played a
23 role of about three to one or four to one, depending
24 on how -- where you're counting -- to active errors,
25 where latent errors are something that occurred at

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1 some time in the past and doesn't show up until a
2 piece of equipment is called on.

3 MEMBER POWERS: Jay, aren't those latent
4 errors reflected in the PRA and judgments on the
5 reliability of the hardware?

6 MR. PERSENSKY: That is the theory.
7 That's the concept, and we've taught that, and we
8 have, I think, some difference of opinion on that.
9 That's one of the reasons why we're going to be
10 working in the future, I think, on some -- under the
11 HRA program, a better look at latent errors and how
12 they really do play out in the PRA. So that's an
13 effort that is in the PRA program for the future.

14 But, again, if you go back to the slide
15 that Mark showed, sometimes we identify where there
16 are some areas that HRA might be doing some work, as
17 well as the other way around.

18 MR. SIU: Jay, maybe I could add --

19 MR. PERSENSKY: Go ahead.

20 MR. SIU: Yes. I think we can certainly
21 discuss whether the failure rates, the hardware
22 failure rates, include these -- the contributions from
23 latent errors. I think it's pretty clear that we
24 don't have clear mechanistic models to address the
25 tendencies between latent errors, and, therefore, any

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1 kind of causal mechanism that would eventually link us
2 to organizational issues.

3 MEMBER POWERS: Well, as it is set up now,
4 it seems to me that without being able to make a clean
5 distinction between hardware physics failures and
6 failures due to latent errors that when you analyzed
7 your PRA results you come up with the wrong solution
8 -- I have to buy better pumps when, in fact, you've
9 got to train better maintenance people. I mean, it
10 seems to me you can make errors this way.

11 MR. SIU: Yes, you could. I mean, of
12 course, people -- if they find out that that's indeed
13 driving the risk, typically they go back and look at
14 the data to see what driving it, and, without the
15 mechanistic model, still might be able to come to some
16 reasonable conclusions. But we don't have the models
17 that would predict a priori there's the dependence
18 level between these other than our, as you know,
19 statistically-based common cause failure models, which
20 aren't mechanistic.

21 MEMBER WALLIS: At some level all -- all
22 accidents errors are human errors. I mean, if
23 somebody puts the wrong coefficient in some equation
24 in a computer program to design something, and
25 eventually shows up 10 years later as an accident,

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1 that's also a human error. How far back do you want
2 to go in this cause? I'm sure you don't want to go
3 that far back.

4 MR. PERSENSKY: Not as far as computer
5 programs. But, in fact, in the study when we were
6 looking, I mean, we did go back as far as looking at
7 things like design process and design change packages,
8 because those -- especially the design change
9 packages, that's more immediate. And we found that
10 some of those errors came about because of that
11 process, not necessarily -- even the maintenance error
12 might have been the result of a design package.

13 MEMBER WALLIS: It seems like, for
14 instance, what Steve was saying -- it also does apply
15 in these computer programs. Very often, I think, the
16 computer program, the modeling, goes back to some
17 management who is on some engineer's back to get on
18 with the job and assume something and put it in. That
19 is also a human factors program. But let's go on.

20 MR. PERSENSKY: Okay. Back to the
21 organizational issues --

22 CHAIRMAN APOSTOLAKIS: The latent errors
23 or conditions is one of the major, let's say, advances
24 of the last several years, where people became aware
25 or sensitized to it. Another one that was proposed by

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1 reason also was this idea of circumvention, which
2 ATHENA, in fact, in its early reports talked about.

3 This is when people take shortcuts, you
4 know, and they do this so intentionally. It's not a
5 mistake now. They do skip some steps in a procedure,
6 because they think it's too detailed and tedious, and
7 so on. Airline pilots do it all the time, by the way.

8 I wonder whether you plan to do anything
9 about those. I mean, it's a fact. I think that in
10 industrial organizations, experienced people don't go
11 by the book line by line. I mean, they don't.
12 Period. And most of the time this works out fine. It
13 results in an efficient organization. But sometimes,
14 you know, there are mistakes.

15 Is there something we want to investigate,
16 or is it too much at this stage of development? I
17 mean, looking at latent conditions is already
18 something that's big.

19 MR. PERSENSKY: From an applications
20 standpoint, I know one of the concerns that came up
21 from some regional meetings I've had in the past was
22 the concept of work-around --

23 CHAIRMAN APOSTOLAKIS: Yes.

24 MR. PERSENSKY: -- which might be
25 considered a circumvention. And how do we best

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1 incorporate that in the various tools that we use,
2 including how might we incorporate it in any risk
3 analysis?

4 We haven't gone very far with that yet.
5 We have not had the resources to put it into anything,
6 but I know that is an issue amongst our regional
7 inspectors.

8 CHAIRMAN APOSTOLAKIS: But it could be one
9 item of the infrastructure there. It's just that, you
10 know --

11 MR. PERSENSKY: In any event, back to this
12 particular study, the issue of latent errors came out.
13 There are other aspects of it in terms of the -- all
14 I've got is the acronym, CAP.

15 CHAIRMAN APOSTOLAKIS: Corrective Action
16 Program.

17 MR. PERSENSKY: The Corrective Action
18 Program. Sorry, blocked on that. Corrective Action
19 Program. We found that a lot of the issues that were
20 still coming up -- and, again, these are -- this is
21 archival data before the ROP was in place, but that
22 things that were in the Corrective Action Program were
23 still happening, that there wasn't a good cleanup of
24 that activity.

25 So we proposed to NRR that we look at it

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1 particularly from a risk perspective, a risk-informed
2 approach, to try to improve that process. We have
3 sent a letter to NRR along with the report asking for
4 some feedback from them. I understand they are
5 preparing some response to that. I don't know at this
6 point what that response is. But that's sort of an
7 example of how we've used that kind of information.

8 As far as this under the line here -- by
9 the way, one way you might look at this, by the way,
10 is where there's holes, where there's nothing there,
11 it's an area that might be considered a need in the
12 sense that we have not yet done any work in those
13 areas. So under advanced reactors our focus has been
14 in this area of staffing and also the qualifications
15 of the staff.

16 CHAIRMAN APOSTOLAKIS: Why is it materials
17 and materials?

18 MR. PERSENSKY: Well, it's because it
19 should be materials and waste, and I screwed up when
20 I typed it.

21 CHAIRMAN APOSTOLAKIS: Oh.

22 (Laughter.)

23 MR. PERSENSKY: I made a human error.

24 (Laughter.)

25 CHAIRMAN APOSTOLAKIS: Human failure.

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1 MR. PERSENSKY: Unfortunately, I have a
2 very high probability when I'm at a typewriter to do
3 that.

4 MEMBER POWERS: It's also latent, because
5 it didn't get discovered until much later.

6 MR. PERSENSKY: And plus it had to be
7 discovered by someone else.

8 (Laughter.)

9 I thank you for a big find.

10 MEMBER ROSEN: And the implications are
11 that we will not have any work on waste in the area of
12 rules, licensing --

13 (Laughter.)

14 MR. PERSENSKY: Well, the implication is
15 we are not working in that area. We have not -- as
16 far as the human factors people, though we are working
17 in some of the licensing areas for -- in fact, in this
18 case this is for the MOX fuel and the gas centrifuge
19 facilities. And we're also working on some -- in this
20 case a manual -- inspection manual updates for nuclear
21 waste.

22 MEMBER WALLIS: And working on monitoring
23 in the area of security and safeguards.

24 MR. PERSENSKY: Again, these are -- what
25 I'm trying to say is the blanks are places we are not

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1 working, but --

2 CHAIRMAN APOSTOLAKIS: The human factors
3 problem is when someone is holding the --

4 MR. PERSENSKY: Now, if you look down
5 here, though, there should be something called a human
6 factors -- we're doing a white paper on human factors
7 and security and safeguards. What can we be doing?
8 What should we be doing? So we've been given the
9 authority to get started in that area.

10 The only thing under security and
11 safeguards right now is fitness for duty. Again, that
12 is a rulemaking activity that we've been asked to help
13 with in terms of updating that particular rule.

14 Again, below the line, this is more the
15 researchy kind of things. Erasmia will talk about
16 this data collection and analysis project. It's a
17 cooperative project with HRA. The latent error I
18 mentioned.

19 The Halden reactor project is one which
20 you have discussed in the past and is part of this
21 data collection analysis. It's an ongoing
22 international program. The thing about it from my
23 perspective and from the infrastructure perspective,
24 it is the only research simulator that we currently
25 have access to, and so that's why it's the

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1 infrastructure, because we use it as a tool both for
2 human factors, and we're going to be using it more for
3 HRA as well as for digital I&C areas.

4 The other thing here, what I call human
5 factors tool box and knowledge transfer, really
6 looking into some methods that EPRI is studying now on
7 trying to determine, as the aging -- we have an aging
8 population out there, both in the industry as well as
9 here in the NRC, of how can we put the information
10 that we already know, and especially the undocumented
11 knowledge, and transfer that to new people and put it
12 in a form that it's easy to read and acceptable.
13 That's the kind of thing that we're doing research on,
14 that area.

15 And at this point, I'd like to turn it
16 over to Erasmia, because that's kind of where I --
17 what I wanted to talk about today as an overview,
18 unless you might possibly have some questions.

19 MEMBER POWERS: Difficult to imagine.
20 But, Jay, could you walk through your infrastructure
21 list and just if Erasmia is going to cover it, say so.
22 If she is not going to cover it, give us a thumbnail
23 sketch on it.

24 MR. PERSENSKY: Okay. The data collection
25 analysis Erasmia is going to do. The latent error --

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1 again, that's one of the things that's in the HRA plan
2 that we'll probably do some cooperative work on.
3 You're going to touch on that, I assume.

4 The Halden reactor project I just did.
5 Risk communications is actually a user need from the
6 EOD.

7 MEMBER POWERS: Well, let me come back to
8 the Halden program.

9 MR. PERSENSKY: Yes.

10 MEMBER POWERS: Do you have specific
11 activities that you are participating in following or
12 bilateral agreements that you have undertaken with the
13 Halden project? By "bilateral agreements" I mean not
14 the general Halden program that you participate in,
15 but specific things that -- between you, the NRC, and
16 Halden.

17 MR. PERSENSKY: We do not have any ongoing
18 bilateral efforts. We don't anticipate any in the
19 next year or so, though we are working very closely
20 with the staff to work on a couple of things that are
21 in the general program. One has to do with level of
22 automation. How do you balance automation and manual
23 action?

24 The reason for that is we feel it's going
25 to fit -- feed into some of the advanced reactor

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1 efforts, as well as some of the things that are going
2 on now for the hybrid --

3 MEMBER POWERS: No. I mean, that issue
4 of, when do you need to automate versus when can you
5 have manual action? That particular need arises
6 frequently in front of this committee.

7 MR. PERSENSKY: Right.

8 MEMBER POWERS: Surprisingly frequently,
9 I mean.

10 MR. PERSENSKY: And part of that is
11 because we're also, in some of the plants, one of the
12 other problems we're addressing is the fact that some
13 of the automatic systems are beginning to break down,
14 and we have to replace it with manual action.

15 MEMBER POWERS: Right.

16 MR. PERSENSKY: But, so there's some work
17 going on in that area. It's a particular interest,
18 also, of France. So that's how that got into the
19 general program.

20 From the human reliability standpoint,
21 they are trying to build some programs in human
22 reliability. They haven't had much in the past.
23 We're going to be working very closely with them in
24 that area. Some of the issues that they're concerned
25 about is, for instance, performance recovery.

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1 MEMBER POWERS: One of the criticisms that
2 this committee has leveled at the Halden project as a
3 general entity in this area has been a perception,
4 perhaps incorrect, but a perception that the results
5 are not migrating into the archival literature of the
6 field. Is that a situation that is either an
7 incorrect perception or a correcting situation?

8 MR. PERSENSKY: It is a correct assumption
9 in that because the Halden project is a membership
10 project, as is EPRI, their reports, their detailed
11 reports, especially for the first, I believe, seven
12 years, five to seven years, are held proprietary to
13 the members. So that from that standpoint it doesn't
14 get out very quickly.

15 Now, they do give summary presentations.
16 They do a lot of presentations at conferences, and
17 they do write for journals. It doesn't have the level
18 of detail that you would have at -- you know, from the
19 detailed reports that they do.

20 But because, again, it is a membership --
21 there are 20 countries that pay to belong. And some
22 of those also include some of the vendors, and they
23 don't particularly want the other vendors to take
24 advantage of the free information. So that's their
25 reasoning for it. But they do try to get out and give

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1 papers at conferences.

2 MEMBER POWERS: Go ahead through your
3 list.

4 MR. PERSENSKY: I'm sorry.

5 MEMBER POWERS: We were on communications.

6 MR. PERSENSKY: Okay. Risk
7 communications, user need from the EDO -- they'd like
8 us to develop sort of a handbook for the staff to use
9 when they go out to the public and are trying to
10 better communicate risk information in a public way.
11 We're doing some work with the communications office
12 on that.

13 The human factors infrastructure for
14 advanced reactors -- you've seen the human factors
15 plan or, I'm sorry, the advanced reactor plan. There
16 is an element in there to find out, what are the
17 problems? As you mentioned, passive reactors -- some
18 people believe that there is no human factor problem.
19 In fact, I believe you asked the question the other
20 day as, what keeps me awake at night? And that's one
21 of the things that keeps me awake at night.

22 There's a belief by many people that
23 advanced reactor -- there should be no human factors
24 in advanced reactors, because it takes so long, and,
25 you know, you can call everybody in.

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1 I mentioned the security and safeguards.
2 We're working on a white paper in that area. The tool
3 box and knowledge transfer -- this is trying to bring
4 some technology into taking the knowledge of the
5 people that are moving, retiring, whatever, and
6 putting it into a form that is more useful to new
7 people.

8 The other two things are consensus
9 standards. We are involved with the IEEE and ANS on
10 various consensus standards that they work on in the
11 human factors area, as well as reliability area and
12 international activities through Halden, through CSNI,
13 through IAEA.

14 I mentioned at the meeting that there is
15 going to be a seminar on September 23rd. A member of
16 the IAEA is going to come talk about their safety
17 culture program at the IAEA, and that's open to you,
18 of course.

19 MEMBER POWERS: If you have a chance, I
20 invite you to look at a document one of our fellows
21 put together on safety culture and --

22 MR. PERSENSKY: I'm familiar with that.

23 MEMBER POWERS: And I would characterize
24 it as dismissive of the IAEA view on safety culture.
25 And it would be interesting to -- for me, in

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1 particular, to know how IAEA responds to that. I
2 mean, you know, it's not abusive, but it -- it does
3 not draw a lot from what the IAEA did in safety -- has
4 done in safety culture.

5 MR. PERSENSKY: Yes, I understand.

6 MEMBER POWERS: I'd just to see -- know
7 what their view is on it.

8 MR. PERSENSKY: Okay. Actually, I do have
9 one more slide, just quickly since I've probably hit
10 on all of these things anyway, in terms of this
11 overall vision. Again, our role is to provide
12 regulatory tools, and they're going to come in
13 different forms. But in order to do that, you have to
14 have this infrastructure of technical basis
15 development, and for that you need core competence.
16 You need tools like simulators.

17 But, so one of the things that I think has
18 been a weakness here is there's not enough of
19 appreciation or familiarization of what human factors
20 is, how it's done, what we can do for it. When we
21 work with the regions and all this, you know, we find
22 that the regions are -- that would be helpful. I wish
23 I would have known about this before. Let's do more
24 of it. We're trying to spread the word, so I think
25 part of it is also going to be spreading the word.

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1 MEMBER POWERS: If I were you, or those
2 working on that spreading the word, they should carry
3 along a copy of Admiral Rickover's comment on human
4 factors, just to remind them what the mind-set is of
5 a lot of people in this area.

6 MR. PERSENSKY: All right.

7 MEMBER LEITCH: Jay, I had a question
8 about the previous slide. You don't have to go back
9 there, though. It's just I think I have a picture of
10 what human factors is. I think I understand risk-
11 informing the corrective action program, but I'm not
12 sure I understand the linkage. What are you doing to
13 help with risk-informing the corrective action
14 program?

15 MR. PERSENSKY: Well, I think -- the
16 recommendations that were made had to do more with
17 developing a tool, a type of risk tool that would help
18 them -- help the inspectors go through the items, do
19 a better job of selecting the items. So that really
20 wouldn't be so much of a human factors effort. It's
21 something that we identify that would be turned more
22 towards the HRA/PRA people.

23 MEMBER LEITCH: Okay. So the HRA/PRA
24 people say that this particular system is more risk
25 significant than another risk-significant system.

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1 Therefore, the corrective actions in that system
2 should take a higher priority. Is that -- is that --
3 I'm trying to --

4 MR. PERSENSKY: Again, it would be more of
5 the development trying to test how that system worked.
6 I mean, there's issues -- for instance, how long -- we
7 talked about it again Tuesday. There is other parts
8 to this. How long has something been in the backlog?
9 What is the size of your backlog items? You know, how
10 do you do trend?

11 I think a lot of what might have helped at
12 Davis-Besse would have been the trending of changing
13 out those filters.

14 MEMBER LEITCH: Yes, absolutely.

15 MR. PERSENSKY: He would have seen this
16 great rise, and that might have helped to identify it.
17 So, again, part of it is pointing out what needs to be
18 done. And we build tools for our inspectors, not for
19 the licensees. So our current CAP inspection module
20 says to make a selection from the CAP program.

21 MEMBER LEITCH: Okay. I see.

22 MR. PERSENSKY: And the question is: how
23 do you make that selection?

24 MEMBER LEITCH: Okay.

25 MR. PERSENSKY: And one element of that

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1 should be risk.

2 MEMBER LEITCH: So the deliverable out of
3 that effort might be to modify the inspection module
4 concerning corrective actions program to make it more
5 risk-based.

6 MR. PERSENSKY: Right. And in theory, if
7 we could do it, it could build some sort of
8 mechanistic tool, computerized tool.

9 MEMBER LEITCH: I think that we are doing
10 that, Jay.

11 MR. PERSENSKY: Pardon?

12 MEMBER LEITCH: I think inspectors are
13 already doing that.

14 MR. PERSENSKY: Inspectors are -- the
15 inspection module already does say use risk, but they
16 don't have any tool to -- any way of really making a
17 judgment on what --

18 MEMBER LEITCH: Just go to the licensee.
19 Well, any inspector that's been there more than a week
20 will have found the PRA group and asked them what the
21 most important systems are, what the most important
22 components within that system are. If he doesn't ask
23 that, the SRA from the region will ask him what he --
24 does he know yet which is the most -- I mean, you're
25 way behind. It sounds like you're way behind the

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1 times. Not that it isn't good. Clearly, the
2 inspection --

3 MEMBER POWERS: Being behind the times is
4 a good thing?

5 (Laughter.)

6 I'm confused on that.

7 MEMBER ROSEN: I think he's saying it's a
8 good idea, but --

9 (Laughter.)

10 MEMBER LEITCH: It's a good idea to make
11 sure the risk -- the module has that sort of stuff in
12 it. And if you can edit it to get it, you know, using
13 your techniques and credibility to get that in there,
14 it's fine. But I think the better inspectors are
15 already doing that.

16 MR. PERSENSKY: Yes. Again, it's --
17 sometimes it's just not being done generally across
18 consistently. So --

19 MEMBER ROSEN: I'm not being -- I'm not
20 trying to depreciate what you do.

21 MR. PERSENSKY: Okay. Erasmia is next.

22 MS. LOIS: My name is Erasmia Lois. I
23 work for the Probabilistic Risk Assessment Branch, and
24 I took the responsibility for HRA lately. Nathan Siu
25 was leading it for quite a while. And this is a

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1 transition period, and, therefore, I guess both of us
2 will be speaking.

3 I'll start out with some slides, and we
4 can make comments and add to the conversation.

5 Another purpose of the HRA program is to
6 both perform technical work, supporting technical
7 basis for regulatory decisionmaking, as well as to
8 improve methods and tools and the guidance needed for
9 addressing the concerns that HRA -- people have for
10 HRA regarding the availability and the adequacy of the
11 HRA results used for regulatory decisionmaking.
12 That's the broad scope.

13 Next slide, please.

14 Again, this is a similar table that Jay
15 presented. And Dr. Dana suggested to concentrate on
16 the bottom side of it, which is the infrastructure.
17 I would like to point out that it's not a clear cut
18 between those lines, because work for -- the
19 assumption is that we are going to perform an HRA for
20 an upgrade for advanced reactors. But actually most
21 of the work will include -- will be infrastructure-
22 related work, and that's encompassed into the -- do I
23 have it here? No.

24 So, but it -- I have listed it over there,
25 but actually it belongs in both places. Same thing,

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1 the work that we may do for fitness of duty rule
2 revision. It may need developmental work.

3 What is being done? The infrastructure
4 column presents what we do and what we plan to do. It
5 does not speak well as to what we are not doing.

6 MEMBER WALLIS: Does the color code of the
7 blocks or the squares mean what you have done or are
8 doing, and the others are things you're going to do?

9 MS. LOIS: No. When I leave the -- what
10 is the color code? The bullets is -- if it's more
11 than one thing in the -- I have bulletized it.

12 MEMBER WALLIS: But will these things --
13 are these things you're going to do or you have done
14 or -- I'm not quite sure how this --

15 MS. LOIS: Oh, okay. So let me quickly go
16 down. PPS would -- I'm sorry?

17 MEMBER WALLIS: I don't know that I need
18 the details on it. Just kind of --

19 MS. LOIS: Yes. But that doesn't mean
20 that we -- it's just bullets. It's more than one item
21 on -- yes. Now, the question is if it's -- the
22 bullets are --

23 MEMBER WALLIS: I mean, I need input on
24 upgrades, for instance, to make decisions.

25 MS. LOIS: Yes.

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1 MEMBER WALLIS: And I'm not quite sure
2 whether you've done the work or you're going to do the
3 work or --

4 MS. LOIS: No. And that's why I just said
5 that although I chose here the application, it's part
6 of the work that we have to do as infrastructure.

7 MEMBER WALLIS: It's going to be done in
8 the future.

9 MS. LOIS: Yes. So, then, if we -- I
10 thought that I would focus here on the bottom column.
11 I'm going to talk a little bit more extensively on --
12 on the data development work. We also are doing work,
13 and it probably is near completion, on quantification,
14 including addressing uncertainty. And this is a more
15 formalized process for doing ATHENA analysis --
16 analysis using ATHENA.

17 Latent errors is something that we plan to
18 address. It's how to better account for latent errors
19 in HRA. Now we have a new terminology, which is
20 latent conditions. So then we are going to expand our
21 plan to include conditions in this work.

22 The extended applications include issues
23 that are not typically -- we haven't -- we don't have
24 good methods to deal with, mainly HRA methods that are
25 full power, Level 1 HRAs. Now we need to look at the

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1 shutdown conditions, Level 2 PRAs.

2 Other conditions I have -- probably should
3 -- the synergism work addresses the global changes
4 that nuclear powerplants are going -- are undergoing
5 today. It's the aging, the changes in licensing
6 changes, personnel aging, all of those in use
7 potentially dependent -- have a dependent effect on
8 plant operations, and the PRA reflects operations as
9 -- as are in the books in a way. And, therefore, we
10 have to do -- I guess there is a more -- a bigger
11 program here that looks at the system synergies as
12 part of that, will look from the HRA perspective.

13 Formalized methods includes -- addresses
14 how screening analysis versus how we can limit the
15 number of human actions that are incorporated or
16 analyzed in a PRA, but also address the individual
17 issues that we have talked about in the committee and
18 how we -- actually crews are working in that. The
19 crew performance is more important probably than the
20 individual performance.

21 But that -- that includes the work
22 processes and the culture issues that -- safety
23 culture issues that --

24 MEMBER ROSEN: At the crew level.

25 MS. LOIS: -- have been -- yes.

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1 MEMBER ROSEN: At the team level.

2 MS. LOIS: Yes.

3 MEMBER ROSEN: Now, on the bullet you just
4 mentioned just before that, you know, we talked about
5 earlier, we focused on individual performance, and now
6 you're beginning to focus on team performance or crew
7 performance. And ultimately you need to focus on
8 organization of performance.

9 In that bullet above there, you said
10 you're thinking about aging as a -- well, that's an
11 individual consideration, but it's for all -- all of
12 the people. The stresses on the organizations are
13 very significant, and one of those which is global, at
14 least in the U.S., is the deregulation. And those are
15 -- those kinds of stresses -- stressors on the
16 organization can have very significant effects on
17 teams and individuals and overall.

18 And I -- you know, when you go forward as
19 I hope you will, to consider organizational
20 performance, you'll think globally about the stressors
21 on organizations and come naturally to be thinking
22 about these things that have -- that are having big
23 impacts.

24 If you read, for example, some of the big
25 reports and others, you will understand the impacts on

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1 reactor safety of some of these things. For example,
2 deregulation is changing power flow patterns and
3 placing different demands on switch yard and switching
4 facilities because the power flows have changed
5 because of deregulation. Those are organizational
6 issues that reflect reactor safety, global issues that
7 have impacts.

8 And that's why I've been encouraging you
9 to -- you know, it's fine to think about individuals,
10 and it's good to think about crews operating a team --
11 people operating in crews as teams, but that very
12 important reactor safety impacts are occurring because
13 of these other global issues.

14 MS. LOIS: And these are the issues that
15 we have to work closely with -- with the human factors
16 area, because you have to develop the comprehension
17 and then the capability to quantitatively incorporate
18 that into an HRA.

19 MEMBER ROSEN: Right.

20 MS. LOIS: So it's --

21 MEMBER ROSEN: I'm going to come off my
22 example of the switch yards and come back to
23 deregulation's impacts on organizations through the
24 vehicle of financial pressure and what that does to --
25 for example, work planning during outages.

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1 The real financial pressures say that we
2 need to have a plant back on the line in 29 days, not
3 32 days, and that means that maybe you can't do
4 everything you want to in an outage. And so things
5 that are -- that seem discretionary don't get done,
6 because clearly you have to change the fuel, and
7 clearly you have to do the required tests that are
8 required by tech specs. Clearly, you have to fix
9 things that are known to be broken.

10 CHAIRMAN APOSTOLAKIS: And maybe you will
11 fix all of the flanges all together.

12 MEMBER ROSEN: But maybe you won't fix all
13 of the flanges all at once. You'll fix the ones that
14 are leaking a lot, and maybe the ones that aren't
15 leaking so much you'll get next time.

16 MEMBER LEITCH: I'm still a little
17 confused about just what the deliverable is, for
18 example, from HRA to the SPAR models. In other words,
19 the SPAR models are being used -- are being developed
20 to support the significant determination process,
21 among other things. Is that correct?

22 MS. LOIS: Yes. And there is an HRA --

23 MEMBER LEITCH: There's an HRA input to
24 that, because you need to know what is the human
25 reliability. And so that factors into the SPAR model.

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1 So you're not really developing the SPAR
2 models in HRA. You're just providing the human
3 reliability data into that calculation. Is that
4 correct?

5 MS. LOIS: Exactly. And here the activity
6 is improving the HRA modules that are currently used
7 by SPAR.

8 MEMBER LEITCH: Okay.

9 MS. LOIS: And that's an activity that may
10 not -- you know, it could be done as part of this
11 branch or the division. It includes the HRA part of
12 SPAR.

13 MEMBER LEITCH: Thanks.

14 MS. LOIS: And I guess what I left out is
15 the guidance and standard development, and the plan is
16 to develop guidance for the analyst as well as the NRC
17 staff that is reviewing HRAs and HRA results. And the
18 standard is part of the ASME standards development and
19 IEEE standards development in the HRA area.

20 Are there any questions here? Do you want
21 to add something?

22 MEMBER POWERS: Can you remind me again
23 what you mean by extended applications and formalized
24 methods?

25 MR. SIU: Actually, let me take that. The

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1 extended applications -- there are some specific areas
2 where we were anticipating HRA development needs. One
3 was low power and shutdown. One was Level 2 PSA.
4 Another one was extended outage -- I'm sorry --
5 extended recovery times.

6 MEMBER POWERS: What do you mean by
7 extended recovery times?

8 MR. SIU: Very, very long recovery times.
9 For example --

10 MEMBER POWERS: At D.C. Cook --

11 MR. SIU: -- you might need something for
12 a low power and shutdown PRA where, again, it's a very
13 long time for the evolution of the event because of
14 the power. Or if you're in an advanced reactor space,
15 again, you might need some different way of looking at
16 it.

17 This is an issue that I know the U.K. is
18 very interested in, and it's part of COOPRA. We were
19 thinking of possibly cooperating there. It's been
20 raised at least as an issue.

21 And let me back up a bit. The reason I
22 wanted to jump in here, Dana, you had asked about the
23 length and breadth of the program. So I just want to
24 kind of give you a high level view of that. What you
25 see on this list here, you can see that we've been

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1 focusing on specific situations, and a lot of our work
2 looks at main control room issues. And we do consider
3 the teams performing. We haven't studied the team
4 interactions explicitly in our modeling.

5 Again, we've had some specific issues
6 addressing the extended applications, and another
7 thing we're trying to do is increase the science in
8 the analysis; hence, the discussion on data Tuesday.
9 And also, now getting to the formalized methods, what
10 we lack right now are, indeed, the mechanistic models
11 for performance, for individual performance.

12 So you saw a correlation between
13 performance and performance shaping factors.
14 Obviously, you'd like to fill in that gap, or we would
15 like to fill in that gap. And that's kind of the
16 point here.

17 We learned more collecting data from our
18 applications. We are planning to get back into the
19 modeling efforts. What we are not --

20 MEMBER POWERS: By modeling efforts, do
21 you mean something different than correlational
22 efforts?

23 MR. SIU: That's right. So, for example,
24 we talked briefly about behavioral models, simulation
25 models, a few days ago. Those are being used in some

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1 applications. Jay referred, I think, to them at one
2 point being done in the military. In fact, there was
3 some early work funded by NRC on modeling team
4 performance as a simulation.

5 There is -- so that's the kind of
6 modeling, getting more mechanistic in the
7 representation of how the individuals perform singly
8 and as a team. There is work going on right now in
9 the cognitive simulation with respect to control room
10 operators, not -- we're not doing that, but others are
11 doing that.

12 So, again, these are things where we're --
13 I'm not saying we're doing that right now, but that's
14 the direction I think we'd like to be investigating at
15 some point in time.

16 MEMBER POWERS: I'd sure like to -- I
17 mean, some day if you'd start moving in that
18 direction, I'd sure like to see a defense --

19 MR. SIU: Sure.

20 MEMBER POWERS: -- you know, like a white
21 paper on here's why we should do it. I mean, I can't
22 imagine -- it's difficult for me to imagine
23 criticizing a guy that wants to become mechanistic.
24 But in this case, I think I'm willing to take --

25 (Laughter.)

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1 I mean, I see it as a tour that may exceed
2 your capacity to contribute. If what -- if you came
3 back and said, "What I want to do is keep a foot in
4 the pool of people that do this kind of thing" -- and
5 they do it for the military and things like that --
6 "and I want to stay aware and have some expertise to
7 be able to talk their language," you know, I'm very --
8 I'm much more comfortable with that.

9 MR. SIU: Yes.

10 MEMBER POWERS: The actual doing it
11 yourself, you know, it's a long time between
12 initiation of work and getting a product out the door.

13 MR. SIU: Yes. Well, as Jay pointed out,
14 we hopefully won't be starting from scratch. And
15 George reminded us on Tuesday we're certainly going to
16 build on what others have done.

17 But, again, this is not something that we
18 had even planned for the next fiscal year to do. This
19 is longer term.

20 MEMBER POWERS: But I wanted to talk that
21 late.

22 MR. SIU: Sure. And that will be a very
23 fun discussion, I think, when we get to that point.

24 MEMBER POWERS: Well, I mean, I even
25 thought you brought up the issue of using flatland

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1 models to try to understand --

2 MR. SIU: For example, yes.

3 MEMBER POWERS: -- what the more
4 fundamental driving forces and activities are.

5 MEMBER WALLIS: What is a flatland model?
6 Is it developed in the Midwest or something?

7 (Laughter.)

8 MEMBER POWERS: Actually, they started
9 that at an esteemed institution in -- up in the
10 Cambridge area, where they create very simple computer
11 geese that responded to stimuli.

12 MEMBER WALLIS: It's a two-dimensional --

13 MEMBER POWERS: Yes. They lived in a flat
14 world, and they ate sugar and reproduced. And they
15 have gone on to get sophisticated enough that they see
16 things unanticipated, tendencies for computer geese
17 who operate in a cooperative or competitive nature
18 based on stimuli from the outside.

19 This is kind of the fundamentals that
20 Nathan is talking about, and it -- I mean, the reason
21 one would do it is it is -- it's just like in thermal
22 hydraulics. If you understand the physics better, you
23 know what dimensional groups to use in your
24 correlation a little bit better. And that's how you
25 would I think use that whole mechanistic --

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1 MEMBER WALLIS: Also, you have gained
2 tremendously in being able to explain it to other
3 people.

4 MEMBER POWERS: Yes.

5 MR. SIU: Just as a matter of side
6 interest, in the fire protection community, for
7 example, people are using simulations of individuals
8 and then working with various rules for movement to
9 look at egress during fire events. So there are
10 applications that people are looking at.

11 Let me just quickly, so I won't eat up all
12 of Erasmia's time, you wanted to talk about a little
13 bit what we're not doing and what we're paying less
14 emphasis to. Clearly, as the committee has observed,
15 organizational factors of safety culture is one area
16 we haven't been doing anything.

17 As Scott talked you on Tuesday -- or
18 talked to the subcommittee on Tuesday, that's an area
19 I guess we're going to open up to and at least
20 reinvestigate whether we should go after that.

21 MEMBER POWERS: You know, I think Steve is
22 giving you some language that opens that area up in a
23 nice fashion.

24 MR. SIU: Yes, right.

25 MEMBER POWERS: I like the points he was

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1 making about people working in teams and things like
2 that.

3 MR. SIU: Another aspect we haven't been
4 focusing on is organizations in the little sense, the
5 team interactions within the team. Again, I think we
6 tend to treat, for example, the control room teams as
7 a group, but -- and we talk about how they -- there
8 are different styles, say, for different teams in
9 responding to an event, but we don't talk about the
10 interactions between them in an explicit model sense.

11 MEMBER POWERS: Interactions between what?

12 MR. SIU: Members of the team.

13 MEMBER POWERS: Within the --

14 MR. SIU: That's right. That's right.

15 MEMBER ROSEN: We also need to think about
16 interactions between teams.

17 MR. SIU: Right, right. Yes.

18 MEMBER ROSEN: For instance, the
19 engineering team and the control room team.

20 MR. SIU: Right, exactly. There are all
21 sorts of scales of the organization.

22 MEMBER ROSEN: Maintenance team and the
23 operations team.

24 MR. SIU: Exactly.

25 MEMBER LEITCH: While you're right on that

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1 point, yesterday we had an all-day meeting on fire
2 protection.

3 MR. SIU: Yes.

4 MEMBER LEITCH: And one of the things that
5 I thought I heard at that meeting was that we are not
6 -- inspection reports were not commenting on the
7 performance of the fire brigade because I -- I guess
8 there weren't standards or acceptance criteria for
9 what should be the standards. If I heard the comment
10 correctly, it's a little --

11 MR. SIU: You heard it right.

12 MEMBER LEITCH: It's a little incredible,
13 but I think that's what I heard.

14 MR. SIU: You heard it precisely.

15 MEMBER LEITCH: And I guess it seems to me
16 that HRA should be playing a very significant role in
17 that area as well, and I'm a little surprised that --
18 and I don't know where it would fit on your table, but
19 perhaps under monitoring of conventional reactors
20 something about the HRA of the fire brigade seems like
21 there would be a -- a good -- would be a necessary
22 input.

23 MR. SIU: It's a really nice point. We do
24 have, of course, fire support in that.

25 MEMBER LEITCH: In the licensing.

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1 MR. SIU: Yes. And that's part of -- you
2 heard about the requantification study, and there will
3 be -- HRA is part of that.

4 MEMBER LEITCH: Right.

5 MR. SIU: Now, where fire PRA kind of
6 splits, draws a line -- you also heard the discussion
7 on suppression analysis, where the suppression
8 analysis was basically treated as a statistical -- in
9 a statistical manner.

10 MEMBER LEITCH: Right.

11 MR. SIU: And the fire brigade performance
12 is incorporated into that statistical distribution.
13 So you don't see specifically whether -- if I have a
14 degraded brigade or I don't have a degraded brigade.
15 There is no knob to turn to change that distribution.

16 MEMBER ROSEN: And we know that's a
17 mistake now, because the -- only three percent of the
18 fires are -- or six percent of the fires are put out
19 by fixed actuation. It's the brigade that puts out
20 the fires.

21 MR. SIU: So what's happening, of course,
22 is that whole range of --

23 MEMBER POWERS: Steve, recognize that
24 that's an infinite percent higher than we've always
25 assumed.

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1 MEMBER ROSEN: The brigade puts out fires?

2 MEMBER POWERS: We've always assumed that
3 the brigades put out 100 percent of the fires.

4 MEMBER ROSEN: That's almost true.

5 MEMBER POWERS: I mean, in classic fire
6 analysis, automatic systems are not credited with
7 putting out fires. They suppress fires.

8 MEMBER ROSEN: Oh, okay. Suppress.

9 MR. SIU: They control putting it out.

10 MEMBER ROSEN: Actually, what we heard was
11 that -- that automatic systems I think don't suppress
12 more than six percent of the fires. And that's
13 because most of the fires occur in regions where
14 there's no automatic suppression, because people are
15 much more careful in areas where automatic suppression
16 is installed, because those are the important areas.
17 So fires tend to not start there.

18 You know, this is -- you know, you can
19 draw the wrong inferences from the data if you're not
20 careful.

21 MEMBER POWERS: It's really simple. You
22 just put signs up everywhere that says this is -- this
23 area is served by automatic fire suppression equipment
24 that will hurt you if it goes off. And then you don't
25 have to install it because people are very careful,

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1 right?

2 MEMBER ROSEN: Okay. Kind of like the
3 tanks the British had during World War II in the early
4 days made of cardboard.

5 MEMBER LEITCH: But, Nathan, this dialogue
6 aside, let me make sure my thought is captured here,
7 and that is that we need somehow to facilitate the
8 inspectors being able to comment on the --

9 MR. SIU: Yes, thank you.

10 MEMBER LEITCH: -- on the effectiveness of
11 the fire brigade, fire drills, fire -- their training,
12 and so forth. And apparently, we are unable to do
13 that right at the moment because we don't have
14 criteria, if I understand the situation correctly. I
15 mean, it seems to me that HRA could play a significant
16 role in establishing what the criteria would be.

17 MR. SIU: Okay. So, again, I think in the
18 area of organizations on a whole variety of scales we
19 don't -- haven't yet put in tasks in the plan to
20 address that. So, again, this is where we welcome the
21 committee's input.

22 And the other thing -- again, I indicated
23 we were focusing on main control room activities,
24 although clearly latent errors, latent conditions are
25 -- is an issue outside. So we're -- that's our entry,

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1 if you will, into that -- the general issue of looking
2 outside the control room.

3 We had clearly thought also -- or we are
4 concerned about, as Steve indicated, the interactions
5 between teams -- the control room team and teams
6 outside -- in the evolution of an event.

7 So with that, Erasmia, if you can go on to
8 the data discussion.

9 MS. LOIS: Okay. Next slide, please?

10 The last time we heard a presentation on
11 how we can take advantage of existing status at Halden
12 to develop HRA data. This is the staffing study that
13 Jay mentioned before, and it has been documented in
14 this NRC IA document.

15 The main effort was -- or the objective of
16 the study was to -- to study the effects of staffing
17 levels on true performance. But in actuality, it was
18 a -- what -- it was called imbedded. We call it a
19 follow-on effort to explore the relationships between
20 PSFs, the performance shaping factors, and true
21 performance.

22 The facilities used were the Loviisa
23 simulator and the Halden simulator. And in order to
24 do the work, factors that are important for nuclear
25 powerplant USA experience were evaluated. They looked

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1 at the similarities or how well these simulators could
2 reflect thermal hydraulic characteristics, operation
3 -- operator roles, the training and the procedures
4 used by the operators, training they had, etcetera.

5 So all of these issues were taken into
6 consideration to perform the studies, and, in
7 actuality, where necessary changes were performed --
8 were done at the simulators. And I think the crews
9 were trained so that they -- we can have better data.

10 I'm going to quickly present the results.
11 Can I have the next slide, please?

12 Now, in the viewgraphs I have the wrong --
13 a couple of wrong figures. This figure here
14 demonstrates that relationships between staffing and
15 performance can be developed and based on one that you
16 have in your handouts. And also, and this other one
17 here, its relationship with the situation awareness
18 and workload.

19 So I guess the first one is kind of self-
20 explanatory. Even the other one, but what it shows
21 here -- that the situation awareness becomes better at
22 the beginning, but then as the workload progresses it
23 -- it really -- people do not have a good awareness
24 for a while, and then it starts increasing again.

25 Did I explain it well, or is that --

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1 MEMBER POWERS: That was --

2 MS. LOIS: I got the -- I'm sorry.

3 MEMBER WALLIS: That's to be in a response
4 of the ACRS to a presentation.

5 MS. LOIS: I'm sorry?

6 MR. PERSENSKY: It's actually a fatigue
7 curve.

8 MEMBER WALLIS: That's what he was saying.
9 (Laughter.)

10 MEMBER ROSEN: I have to confess that I
11 don't understand the one on the right, that curve. It
12 says related crew performance? Is that what it says?

13 MS. LOIS: Rated.

14 MEMBER ROSEN: Rated crew performance.

15 MR. PERSENSKY: Rated crew performance.

16 MEMBER ROSEN: Rated crew performance for
17 -- looking just at the red one, red line, that's the
18 minimum crew complement. In the conventional plant,
19 it's five point something. What does this mean?

20 MR. PERSENSKY: The rated crew performance
21 is actually a measure where people who are observing
22 giving a rating on how well the crew is performing.

23 MEMBER ROSEN: So a minimum crew --

24 MR. PERSENSKY: And the minimum crew is
25 the --

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1 MEMBER ROSEN: -- performs much better in
2 an advanced plant, because presumably the task demands
3 are less. The same small crew performs much better in
4 an advanced plant because the task demands in an
5 advanced plant are lower than they are in the
6 conventional plant, is that correct?

7 MR. PERSENSKY: That is part of the
8 reason.

9 MEMBER ROSEN: That's part of what that
10 data shows?

11 MR. PERSENSKY: Right.

12 MEMBER ROSEN: And that for the -- the
13 blue line, the model crew complement, for normal crew
14 complements, it doesn't make much difference in terms
15 of rated crew performance between conventional plants
16 and -- in other words, you don't -- and advanced
17 plants.

18 In other words, you don't get a whole lot
19 of advantage of having an advanced plant where the
20 task demands are lower because you have plenty of
21 people around in both cases.

22 MR. PERSENSKY: Yes.

23 MEMBER ROSEN: That's what that's supposed
24 to tell me.

25 MR. PERSENSKY: And that there's an

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1 interaction. There's actually a statistically
2 significant interaction there. But it shows that, in
3 fact --

4 MEMBER ROSEN: Statistically significant
5 interaction. What do you mean?

6 MR. PERSENSKY: That there is a difference
7 between the shapes of those two lines, the way they
8 are -- how they interact.

9 MEMBER ROSEN: The slopes of those lines.

10 MR. PERSENSKY: The slopes.

11 MEMBER KRESS: Yes. I think you can
12 assume that end point is the same point. I mean,
13 statistically, the uncertainties are so large at that
14 end where the 7.5 and the 8 are, you can't tell the
15 difference between them.

16 MR. PERSENSKY: One way of looking at it,
17 if one were to say, "Gee, can I reduce the size of my
18 staff if I have an advanced reactor?" the answer would
19 appear to be yes.

20 MEMBER KRESS: Yes, without --

21 MEMBER SIEBER: You're better off with
22 less people than with --

23 MR. PERSENSKY: It depends on whether or
24 not those two points are statistically different.

25 The other slope here is a situation of

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1 where it's how well you know what's going on. That's
2 the period of -- during the scenarios, the situation
3 where it drops and then goes -- starts to go back up,
4 but for some reason also drops again, so -- near the
5 end of the cycle.

6 MEMBER LEITCH: Is there one line there
7 for conventional plant and one line for --

8 MR. PERSENSKY: This is actually average
9 data. This would be main effect from a statistical
10 standpoint.

11 MEMBER POWERS: Yes. I think the dropoff
12 at the end is because the situation was being resolved
13 and there was less importance to --

14 MR. PERSENSKY: Well, we would hope that
15 the crew got up to about the same level of situation
16 awareness after an event than -- I mean, because they
17 should be back to a normal situation. They should be
18 closer to where they started off with.

19 MEMBER WALLIS: I would hope they might
20 even be higher. They've been stimulated by the
21 situation that resulted. They really understand
22 what's going on.

23 MR. PERSENSKY: So we weren't able to
24 explain, to be honest, what exactly brought that --
25 that tip down. It's just -- that's data, and

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1 sometimes you have to accept the data and then try to
2 figure it out and do further work to resolve it.

3 MS. LOIS: Next slide, please. Do you
4 want to explain the next --

5 MR. PERSENSKY: No, this is yours.

6 (Laughter.)

7 MS. LOIS: Again, this slide here is --
8 the one that you have in the handouts is the wrong one
9 and --

10 MEMBER WALLIS: How did you make so many
11 human errors?

12 MS. LOIS: Oh.

13 (Laughter.)

14 Probably this one is the first one I did.
15 And this one shows that you can -- if you collect
16 data, the simulator -- on performance shaping factors,
17 you can actually develop a relationship between
18 performance shaping factors and measure performance
19 shaping factors and crew performance.

20 And the line here, it's one of the several
21 ones presented last --

22 MR. PERSENSKY: The horizontal axis is
23 predicted value. The vertical axis is observed
24 values. So it's --

25 MS. LOIS: Observed values. This is

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1 predicted value.

2 MR. PERSENSKY: It's the correlation
3 between the predicted using the model and the observed
4 values from the actual experience.

5 MEMBER LEITCH: And that data point
6 supports that line, is that what we're saying? I
7 mean, the data supports that line?

8 MEMBER POWERS: Let's be absolutely
9 accurate here. This is a research activity underway,
10 and I would say that what the speaker said is
11 accurate. This shows that it might be possible to
12 find consistent trends. I don't think it demonstrates
13 a consistent trend.

14 The fact that the things are all on the
15 same sheet of paper I think is a major --

16 (Laughter.)

17 -- in this field.

18 MEMBER WALLIS: Well, there are obviously
19 some anomalies. You're predicting negative values
20 which are impossible, because there are no known
21 negative values recorded. So you need to stop
22 criticizing, and we should probably move on.

23 MS. LOIS: I guess the thrust here is that
24 we can use -- and what we hope is that we can use
25 simulator experiments to develop more objective data

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1 for HRA purposes. That's what -- and next slide,
2 please. No, next slide.

3 So then on, what is our vision, we would
4 like to have a consensus and a better capability to
5 high level modeling of HRA. We would like to have
6 range of methods and tools to address recognized
7 issues currently, data reference points, interpolation
8 scheme and uncertainties.

9 We would like to develop guidance for HRA
10 analysts as well as others, and the bottom bullet here
11 is we would like to have -- this is the -- do you want
12 to have a simulator at the U.S.? Yes, we do.
13 Capability to identify and address emerging issues
14 include -- rather, would include a simulator in the
15 U.S.

16 That concludes my presentation.

17 MEMBER POWERS: You're done?

18 MR. PERSENSKY: We're done. We have
19 nothing else to say, not at the moment.

20 MEMBER POWERS: Let me ask you just a
21 little bit of speculation. I think when I pose this
22 question to Jay I'm a little bit unfair to him,
23 because I think he is doomed to responding to the
24 crisis of the times, just because of the nature of
25 human factors. It's always different. Everything new

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1 that comes along has some human element into it, and
2 it's a little hard to anticipate what's going to come
3 on, and what not, but maybe there are tools developed.

4 Human reliability analysis, it seems to me
5 that that's a much more inherently quantitative field.
6 It has a character of a certain amount of physical
7 science to it, because you're producing -- in the end,
8 you produce numbers. That I learned at our
9 subcommittee meeting is half the job. The other half
10 of the job is identifying what to produce numbers
11 about.

12 And what we see in the number producing
13 field is a proliferation of models. I mean, that's
14 not terribly surprising, because in the beginning when
15 people first started doing the human reliability
16 analysis, they said, "Well, what really makes a
17 difference is how much time people have to do -- to
18 respond to a stimulus that says do something."

19 So they build a model to look like that
20 but not -- as we got smarter, we identified more and
21 more variables that affected the reliability of humans
22 doing this.

23 And as additional variables got
24 identified, you know, people created models to reflect
25 subsets of them. And so now we've got a whole

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1 alphabet soup.

2 I believe Dr. Apostolakis said references
3 1 through 35. So I assume that there must be 35
4 alphabetical things out there for doing human
5 reliability analysis. And each one of those was
6 developed by an investigator who was dedicated to
7 ignoring, as much as possible, any of the work of his
8 predecessors.

9 It seems to me that maybe we've reached
10 the point where you want to not do that any more.
11 That you want a model that you can refine -- develop,
12 refine, and validate in some disciplined fashion. Can
13 you tell us what your aspirations are along that
14 direction? Noting that the one person that actually
15 understands the meaning of certain Greek words is not
16 here right now, so you can speak freely using the
17 famous Greek word.

18 MR. SIU: Actually, I think in our haste
19 to finish by 2:30, we rushed right through perhaps one
20 part of the answer to your question. The first bullet
21 Erasmia had on her slide was a consensus high level
22 model. We think that -- we completely agree with you,
23 obviously, and the same question was raised in the
24 subcommittee by George. Should we be working with
25 others, building on others' work? Absolutely.

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1 And in conversations with others in the
2 field, there are many others who feel the same way in
3 other organizations. It doesn't help everybody to
4 have this, as you said, plethora of models. It's
5 probably more like a plethora of methods. There
6 aren't that many separate models out there or really
7 distinct models.

8 So I think there is a general desire to
9 work towards some consensus, and that was expressed at
10 a May workshop we had here back in 2001. In fact,
11 outside observers, when they come in and listen to
12 these meetings, they say, "You guys seem to be in
13 violent agreement. What's the problem here?"

14 So I think one of our desires is to help
15 drive towards that consensus. Part of that involves
16 the development of common vocabulary. We like Air
17 Force in context, but, heck, if somebody else, you
18 know, prefers a different term, and everybody can
19 agree to that term, that's great. So there's a
20 vocabulary issue. There's a parsing issue.

21 Part of the variation in these models
22 comes from simply different classifications for
23 performance shaping factors, and that comes from a
24 different organization of some of the same basic
25 issues.

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1 MEMBER POWERS: Well, the fact is that if
2 I define the performance shaping factors, and you
3 define the performance shaping factors, we're very
4 likely to have two sets that cover the entire space
5 within our stats. They're not going to be orthogonal
6 elements of that space.

7 MR. SIU: So there's a desire there also
8 as part of a terminology issue, but also more
9 technically just to come to an agreement on these
10 things. That will be a little bit harder, because
11 everybody has their favorites and they're dealing with
12 it. But I think that some agreement, at least some
13 high level grouping of those factors, would be
14 necessary to support the data collection activity that
15 Erasmia referred to. And I think that's also
16 recognized.

17 So I think the short answer is yes, we
18 agree. We'd like to drive towards that. And I think
19 with the weight that we have as NRC we probably can
20 have some influence there. We just have to see how it
21 plays out.

22 MEMBER POWERS: Well, you emphasized the
23 agreement that exists within the field, and I am
24 reminded of a paper that I once read that I seem
25 unable to find, and I was hoping you'd find it for me,

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1 in which they applied these various methods -- I take
2 it it was done by some Koreans -- in which they
3 applied the various methods and there was, shall we
4 say, a weak correlation between the results derived
5 from the various methods.

6 MR. SIU: You're not referring to the ISRA
7 benchmark exercise that --

8 MEMBER POWERS: Maybe that's what it was.

9 MR. SIU: That was the Italians.

10 MEMBER POWERS: Italians. Italians,
11 Koreans, it's close. They're all part of some axis,
12 I'm sure.

13 (Laughter.)

14 MR. SIU: Part of the world. Right. Yes.
15 And there were a lot of issues raised as a result of
16 that benchmark exercise. It was clear that there were
17 different understandings as to exactly what was being
18 modeled, what was within the scope of the analysis,
19 what was outside the scope of the analysis.

20 We had floated the idea -- again, we had
21 rushed by that I think in the slide on Tuesday, the
22 notion of using simulators to develop data to support
23 a benchmarking exercise, so there is some objective
24 reference that people can look at.

25 And then not to beat people over the heads

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1 why they don't match it, but understand what's the
2 difference, what's driving that. And, again, that
3 could support some sort of common or development of a
4 consensus approach.

5 So, yes, clearly it's possible to generate
6 many different numbers for what appears to be a
7 similar situation.

8 MEMBER WALLIS: Jay, it's essentially the
9 same question, but you may have a very different
10 approach to it, because you live in a different world.

11 MR. PERSENSKY: Well, at the risk of
12 knowing when to keep my mouth shut --

13 (Laughter.)

14 -- the only thing I can say is that human
15 factors has been a profession or a discipline for over
16 75 years, developed around the time of the first World
17 War to help the design of cockpits in airplanes. And,
18 in fact, whether it's quantitative in the terms that
19 we now use when we talk about risk PRA, we talk about
20 risk from the Webster's standpoint back then, and --

21 MEMBER WALLIS: The age of a profession is
22 not a measure of respectability.

23 MR. PERSENSKY: I didn't say it was a
24 measure of respectability.

25 MEMBER POWERS: Witness, thermal

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1 hydraulics.

2 (Laughter.)

3 MR. PERSENSKY: It's a measure of the fact
4 that it's been around for a while, and whereas risk --
5 HRA has only been around for about 20 years. So human
6 factors was able to do some things for about 75 -- or
7 about 50 years before we got into the quantification
8 from the standpoint of risk. I mean, we dequantify
9 many things in terms of error rates, workload
10 situation, whereas other kinds of measures -- in order
11 to help design better tools in the process --

12 MEMBER POWERS: One of the biggest fiascos
13 in the field was when they first started trying to
14 quantify like time-motion studies.

15 MR. PERSENSKY: That was the --

16 MEMBER POWERS: A long time ago.

17 MR. PERSENSKY: Yes, a long time ago when
18 they -- the problem was -- well, actually, it was part
19 of the -- it demonstrated the need to, when you're
20 collecting data, to not make it clear that you're
21 collecting data.

22 (Laughter.)

23 The Hawthorne effect. But, in fact, I
24 mean, the field is a relatively old field. It may not
25 be as old as others, but there has been

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1 quantification. There has been things that have come
2 out of it without that type of -- the same type of
3 quantification we're talking about now.

4 But what we have been doing is trying to
5 grow together, that we can provide information in
6 various forms to the HRA community that will help that
7 quantification effort, which in turn will help direct
8 some of the work that we do. But I do object to
9 saying it's not quantified.

10 The other thing is we're trying to build,
11 as Nathan mentioned -- and I mentioned Tuesday -- more
12 of this model. How do we characterize people in a
13 behavioral sense? Not necessarily just a risk sense.
14 So there are tools that have been developed, primarily
15 in the military but in other places, and we're
16 beginning to make use of those here. We're trying to
17 validate them to make sure that they apply here in the
18 nuclear community.

19 In the long term, there's a possibility
20 that we can link the kinds of models I talk about with
21 the kinds of models that Nathan talks about, and
22 generate some of that data. So that's a long-term
23 vision.

24 VICE CHAIRMAN BONACA: Dr. Powers, want to
25 wrap up this meeting in five minutes?

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1 MEMBER POWERS: We'll wrap it up in
2 probably one sentence.

3 VICE CHAIRMAN BONACA: That's great.

4 MEMBER POWERS: It depends on how they
5 respond to an outrageous comment I'll make here.
6 Okay? But I do think that I will compliment you, and
7 I think that you have done a better job than I've ever
8 seen in the past at showing the linkage between human
9 factors and human reliability analysis in your
10 presentation to the subcommittee.

11 That was my last outrageous comment. I'm
12 sure you're ready to refute me.

13 MR. CUNNINGHAM: I will remain silent.

14 (Laughter.)

15 MEMBER POWERS: Do any of the members have
16 any additional questions they'd like to pose here?
17 Seeing none, I will turn it to the Vice Chairman. I
18 don't know whether he speaks Greek or not.

19 VICE CHAIRMAN BONACA: No, I don't speak
20 Greek, but I think I know how to take a break.

21 MEMBER POWERS: What, by the way, is the
22 Latin equivalent of a misspelled Athena?

23 VICE CHAIRMAN BONACA: Athena.

24 (Laughter.)

25 We've got to take a recess until 3:00 p.m.

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1 Thank you.

2 (Whereupon, the proceedings in the
3 foregoing matter went off the record at
4 2:41 p.m. and went back on the record at
5 3:02 p.m.)

6 VICE CHAIRMAN BONACA: We will start with
7 a presentation by Graham Wallis on Generic Safety
8 Issue 185. We were supposed to have a group
9 presentation from the staff, but for some reason we
10 are not having it. So Graham will give us a
11 presentation.

12 MEMBER WALLIS: And I'll remind you that
13 this is the issue of the water boiling off in the
14 vessel, condensing in the steam generator, but it
15 doesn't take the boron with it, so you build up in the
16 steam generator the slug so-called of non-borated
17 water. And in the early life of these reactors you
18 need the boron worth in order to control the reactor.
19 It's critical.

20 And so your concern is that if this slug
21 of non-borated water comes into the reactor, you can
22 get a criticality. What happens then?

23 We had a meeting in June, and that's what
24 -- the fat handout you have in the documentation is
25 from the meeting. That really is now out of date.

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1 It's very interesting, but there has been work since
2 then which is rather different from what you find in
3 the reading material.

4 We tried to summarize this new work. We
5 were shown some new work earlier this week, on Monday.
6 There are really two concerns. One is when you refill
7 the system enough with HPI, and natural circulation
8 can start this boron slug moving into the reactor, the
9 new work consists of making some conservative
10 assumptions, make an assumption that the slug is as
11 big as it could possibly be, make the assumption that
12 it doesn't mix with borated water in the downcomer and
13 other places, and that it comes through -- so the
14 limiting assumptions, and from that develop the
15 scenario of what is the boron level in the reactor
16 versus time.

17 Give this to the people who can do the
18 neutron behavior and criticality, have them predict
19 the transient and the amount of heat that is dumped
20 into the worst -- the one that's heating up the most
21 and find out if it fails.

22 The conclusion from this we were presented
23 with orally, but it wasn't written up in a formal way,
24 which is one reason it is not coming to this full
25 committee, was that with these worst case assumptions

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1 the worst -- the worst that could happen to the one
2 that was challenged the most was not a problem.

3 So the -- what the staff wished to do with
4 the natural circulation issue was to make it go away
5 by assuming the worst that could happen is showing it
6 was not a problem. In so doing, they may well have
7 made the scenario a lot worse than in reality it would
8 be, particularly with B&W reactors, which are the ones
9 that they analyzed, their event valves, which they
10 neglected. The event valves lead to mixing in the
11 downcomer which puts boron into the pure water soil,
12 and the event isn't as -- anywhere near as bad
13 probably as in the limiting analysis.

14 MEMBER KRESS: I thought those vent valves
15 were putting steam into the system. I thought the
16 vent valves were putting steam into the incoming boron
17 -- the incoming --

18 MEMBER WALLIS: The system is now filled.
19 The natural circulation system is filled. There is
20 steam, as well as water, going through those vent
21 valves. So there is some borated water going through
22 the vent valves, too.

23 MEMBER KRESS: Okay. I thought the
24 problem was unborated water --

25 MEMBER WALLIS: Well, anyway --

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1 MEMBER KRESS: -- being added in.

2 MEMBER WALLIS: -- the approach was, which
3 seemed believable, was to look at the worst that could
4 happen and show that it's not that.

5 In the case of starting the pumps, the
6 pump is started to take the slug of non-borated water
7 and throw it into the reactor, and then I guess you
8 can turn the pump off. Their approach here is called
9 bumping the pump. Their approach here was to say --
10 take the other extreme and say, "Well, let's try to be
11 non-conservative. Let's assume that the pump only
12 pumps in a quarter of the water instead of all the
13 water, or at a rate of -- a quarter of the rate it
14 could pump it in. And let's make some other
15 assumptions."

16 And they show that if they made those
17 assumptions and gave them to the neutronics people
18 that the amount of energy dumped into the -- the water
19 that was heated the worst was enough to challenge its
20 integrity. And they said, "Well, in that case, if
21 other -- the situation could be worse than that."

22 And so there really is a problem with the
23 pump bump, and the way the staff wanted to handle that
24 was to say, "We will work on the procedures, operator
25 actions, training, so that this is resolved by making

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1 sure the pumps are not bumped." And also, using risk
2 analysis to show this event is unlikely, and so on.
3 So the combination would make one say that the GSI has
4 been resolved.

5 This was done for the B&W situation. Now,
6 for the Westinghouse reactors, there was some sort of
7 oral argument presented. Certain volumes were
8 smaller, so that it wasn't so much of a problem.
9 However, you need the boron for a long period of time
10 in the cycle of the reactor. You need the reactivity
11 control of the boron for a much longer period.

12 So there's a combination of things that
13 are different for Westinghouse. And one reason the
14 staff wasn't ready was that they hadn't analyzed these
15 other reactors extensively. It was a kind of
16 qualitative presentation on that.

17 The reasons they weren't ready to come
18 here were that they weren't ready. They weren't ready
19 even with the B&W story. It looked good. It was
20 different from what we heard before. It was a
21 surprise to us, I think. And it hadn't been written
22 up, and it wasn't -- the logic wasn't clearly
23 developed so you could say they are ready to make a
24 presentation to the full committee.

25 We hope they will be ready. I think it's

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1 going to be before the end of the year. And because
2 we have had two meetings with them already, and they
3 haven't been ready to come already, we said, "Before
4 you come to the full committee again, you'd better go
5 through the subcommittee, so you're really sure that
6 you're ready to come to this full committee."

7 VICE CHAIRMAN BONACA: I always thought
8 that the combustion engineering design was the most
9 vulnerable. That's the one you have not mentioned, so
10 that --

11 MEMBER WALLIS: That's the one, again, I
12 haven't mentioned. You see, there's always this
13 curiosity. You've done all this work on Babcock and
14 Wilcox. How about the other designs? And that's
15 certainly an area where they need to get their act
16 together.

17 VICE CHAIRMAN BONACA: As a minimum, I
18 mean, within combustion engineering staff there was a
19 lot of talk about that issue --

20 MEMBER WALLIS: That's right.

21 VICE CHAIRMAN BONACA: -- for --

22 MEMBER WALLIS: We didn't hear too much in
23 detail about this analysis of the other reactors.

24 MEMBER FORD: Essentially, they were
25 sloughed off because of the law of volume, available

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1 volume.

2 MEMBER WALLIS: But that needs to be
3 clear, and we need to show a picture, and it needs to
4 be clear just what the implication is. Something
5 needs to be given to the neutronics people to handle
6 the real transient there.

7 MEMBER SIEBER: There is a large amount of
8 reactor coolant system piping in the B&W in the
9 candlestick area. And that's where the spill is
10 that's removing the boron from the water. So I would
11 just guess by the configuration that that would be the
12 most --

13 VICE CHAIRMAN BONACA: I can only say that
14 it was -- there was a lot of awareness in the CE staff
15 in the early to mid '80s, and they dealt with it
16 slowly. It took a long time to -- to deal with it,
17 the procedures.

18 So I don't know if there is a more limited
19 plant, maybe there is a better time for other plants
20 because nobody raised it.

21 MEMBER WALLIS: It became an issue because
22 it was addressed by the BNW owners. That's how it
23 came to the stop.

24 Maybe there may be a measure there for the
25 staff, you better look in CE reactors and get the

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1 conclusions about that.

2 MEMBER SIEBER: I looked through the
3 slides because I was in another meeting and I verbally
4 heard somebody say well, this has all been covered in
5 the EOP. Part of the slide was pages from the EOP
6 where it supposedly was covered and never really
7 discussed the phenomenon at all in the EOP. So it's
8 not clear to me if operators, if they got out of
9 sequence some place along the line or didn't pay
10 attention to the pressure temperature relations which
11 were restrictions, they wouldn't know that this
12 phenomena was going to take place. It's not obvious
13 that it will just from thinking about it.

14 MEMBER WALLIS: I thought it was explained
15 to us that there were enough steps in the EOP that
16 they wouldn't bump the pump. Even if they know the
17 things that you're saying they might have to know in
18 order to understand what's going on, they still
19 wouldn't bump the pump.

20 MEMBER SIEBER: If it's not spelled out in
21 the basis document why it is you're not supposed to do
22 something or you are, the trainer will not tell him.
23 In the heat of the battle in trying to deal with one
24 of these burdensome situations, there's a presentation
25 here on how to make them stay.

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1 MEMBER WALLIS: I'm a little nervous about
2 saying that it's a problem, but it's all going to be
3 taken care of because the operators will do the right
4 thing.

5 MEMBER LEITCH: Right. They may. But you
6 can assure you will know by not putting the
7 procedures and training.

8 MEMBER SIEBER: Even if they rely on
9 procedures they better beef up procedures why they're
10 doing that.

11 MEMBER ROSEN: Well, the other thing they
12 have to do is, they have to tell them how to get out
13 of that circumstance if they suspect that they're in
14 it.

15 MEMBER RANSOM: It wasn't entirely clear
16 that there was a problem because most of the
17 calculations were made for worse case type situation
18 and if they really wanted to fully resolve the issue,
19 it would seem like you should do a more complete
20 system calculation. And in fact, in the end it might
21 be necessary to even generate some experimental data
22 more than they have with regard to the mixing that
23 occurs in the lower plenum of the vessel and as a
24 result of recirculation through the vent valves during
25 this. The detailed neutronic calculation they had

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1 made assumed boundary conclusions. You had to put
2 them in at the bottom of the core. It had no
3 dilutions as a result of recirculation through the
4 vent valves and so it was very unclear whether that --
5 it was a situation that would ever really exist or
6 not.

7 Now whether they want to go that far, I
8 don't know, but based on the data they have, you can't
9 rule out the possibility of damage.

10 MEMBER WALLIS: Well, they're on a time
11 line. They're supposed to be finished, I think this
12 year, this calendar year. There's no way they're
13 going to do significant experiments.

14 MEMBER RANSOM: Well, I guess I
15 interpreted that. There was a plan that RES had put
16 together that went out to 2003 with a significant
17 effort, but I guess they would rather not do that if
18 they don't have to.

19 MEMBER WALLIS: I talked with Jack
20 Rosenthal who is the manager and he's clear that the
21 story has to be put together really clearly next time.

22 (Off record discussion)

23 CHAIRMAN APOSTOLAKIS: The Fire
24 Subcommittee Chairman, are you going to report today?
25 Because what my request was was that I needed advice

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1 from the Committee regarding the letter in 5069 as
2 soon as possible. Now the presentation by the staff
3 is tomorrow so what we would try to do is to free this
4 time between 1:30 and 2:00 which was scheduled for
5 Steve. So Steve will talk today. It's not so urgent
6 to cover the Subcommittee on the reactor oversight
7 process now. We can do it later.

8 Peter wanted something on research, some
9 time on research and I felt today you wanted some, so
10 we can do it today.

11 MEMBER WALLIS: George, while you're
12 looking at the schedule we have another letter due on
13 this Guide DTL20 which you won't hear about until
14 around lunch time tomorrow.

15 CHAIRMAN APOSTOLAKIS: Right, right.

16 MEMBER WALLIS: And I feel like we're not
17 going to have major comments, but if we do there will
18 be a rush to put them together.

19 CHAIRMAN APOSTOLAKIS: Right, and we can
20 always push the future ACRS activities down a little
21 bit. Let's make sure that tomorrow at 1:30 we give --
22 or you gentlemen give me advice regarding the letter
23 on 5069 and then we go on to give advice to Graham on
24 DG1120 and then we go back to the future activities.
25 Okay?

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1 MEMBER LEITCH: Am I understanding that
2 there's no letter on this then at this time?

3 CHAIRMAN APOSTOLAKIS: No. Let's see.
4 Let's start with Graham, then go to Peter and then
5 we'll go back to Jack.

6 MEMBER ROSEN: I'll go.

7 CHAIRMAN APOSTOLAKIS: The man is standing
8 up. Let's have Graham.

9 MEMBER LEITCH: Recall that our off-site
10 self-assessment meeting last time we met, we said that
11 each meeting we would spend just a few minutes on
12 current operating events and that's what I propose to
13 do here.

14 Let me say that most of this is not at all
15 a detailed discussion of these events, but just to
16 simply say that these are some interesting things that
17 happened and if we want to have a more detailed
18 discussion we can do that in the future. The purpose
19 of this is just a quick 10 minutes in and out, here's
20 some interesting things that happened. Do they pique
21 your interest? Do we want to hear more about them,
22 that type of thing.

23 This may be an unusual way to make a
24 presentation, but the first thing I wanted to say and
25 by the way I'm interested in your comments on this, is

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1 what I'm not generally discussing here are things
2 related to medical misadministrations. There's a lot
3 of those things going on. Lost, stolen or missing
4 small quantities of material. You read every day
5 about the missing, stolen or damaged trucks or gauges
6 and so forth. Minor environmental issues, somebody
7 found a dead sea turtle and generally not radiography
8 issues. So I'm talking mainly about operating events.

9 Now just by way of being aware of things
10 that are going on, this is not a nuclear issue, but
11 there was as fatality at a nuclear plant. At IP-2
12 there was an electrocution of a tree surgeon.

13 MEMBER ROSEN: Was he off-site?

14 MEMBER LEITCH: No, he was on-site.

15 MEMBER ROSEN: In the under controlled
16 area?

17 MEMBER LEITCH: In the under controlled
18 area working on some trees.

19 MEMBER ROSEN: Was he up in the tree?

20 MEMBER LEITCH: I don't know if he was up
21 in the tree or not?

22 MEMBER KRESS: See, I thought maybe
23 somebody got into one of the electrical --

24 MEMBER LEITCH: I suspect it's that kind
25 of thing that happened, but I don't really know.

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1 In other words, we can find out a lot more
2 about these episodes if they pique your interest. I
3 haven't done that research, but really I think this is
4 not a nuclear thing. It just happened at a nuclear
5 plant. It's a sad thing, but I don't know if it's
6 necessarily any of our business.

7 Then I've just listed some scrams here.
8 These may not be all the scrams that occurred, but I
9 guess I was just kind of looking for some common
10 threads and maybe I haven't seen enough evidence yet
11 to seek common threads. I do see a couple of loss of
12 vacuum things. If we continue to see a lot of loss of
13 vacuum maybe we can ask somebody to come tell us why
14 we're having so many loss of vacuum trips.

15 There's a loss of vacuum at Cook, lost of
16 vacuum at Limerick.

17 MEMBER WALLIS: Do these turbine trips
18 have any risk significance?

19 MEMBER LEITCH: Very little. We've heard
20 that the scrams -- that we need 25 scrams to be a --

21 MEMBER WALLIS: Do turbine trips have any
22 risk --

23 MEMBER LEITCH: A normal turbine trip
24 ought to have essentially no risk.

25 MEMBER SIEBER: It depends on the plant.

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1 If you're at 100 percent power, water plants can't
2 withstand a turbine trip.

3 MEMBER LEITCH: Oh yeah, all these turbine
4 trips, in fact, result in a reactor trip, so I mean --
5 I'm sorry if I misunderstood your question.

6 MEMBER SIEBER: If you're at 50 or 60
7 percent, sometimes the reactor will trip.

8 MEMBER LEITCH: Sometimes as low as 25
9 percent, you need to be under 25 percent to avoid a
10 reactor trip. But most -- I think every turbine trip
11 that's on the page here -- these are scrams. That's
12 why they're on the list. These are all scrams.

13 CHAIRMAN APOSTOLAKIS: These now would be
14 counted in the performance indicator, right?

15 MEMBER LEITCH: Yes. These are automatic
16 scrams. I have another list of situations where the
17 plant was removed from service, but these are
18 automatic scrams.

19 MEMBER WALLIS: My question was do they
20 have risk significance. You can scram a reactor, but
21 is there any risk involved --

22 MEMBER KRESS: Only for six of them.

23 MEMBER LEITCH: Uncomplicated scrams, yes,
24 and these all appear to be basically uncomplicated
25 scrams.

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1 MEMBER ROSEN: Oh, I don't know about loss
2 of vacuum scrams means that you have to find a way to
3 reject the heat --

4 MEMBER LEITCH: So they're accommodated by
5 loss of normal heat removal.

6 MEMBER ROSEN: Right.

7 MEMBER LEITCH: So they're a little bit
8 different class.

9 So maybe one comment might be though in
10 the future, maybe I could segregate them as to
11 uncomplicated scrams versus scrams versus scrams with
12 normal loss of heat removal. That might be a valuable
13 thing to do and I'll do that. That's easy enough to
14 do.

15 The next thing is fires, a couple of
16 fires.

17 CHAIRMAN APOSTOLAKIS: We haven't talked
18 about those.

19 MEMBER LEITCH: Not to mention the one
20 that Jack's going to talk about. That was earlier, I
21 think.

22 They had a fire in a 1C service water pump
23 while 1A was out of service. So the 1B was fine and
24 saved the day. By the time the fire brigades arrived,
25 the fire was out and I think it's one of those that in

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1 the terminology of yesterday would be considered a
2 self-extinguishing fire, the relays that was in the
3 motor.

4 MEMBER WALLIS: You don't have a fire in
5 the pump. You have a fire in the motor.

6 MEMBER LEITCH: Motor, yes. You're quite
7 correct.

8 MEMBER WALLIS: You can't have a fire in
9 a pump.

10 MEMBER LEITCH: No, you can't.

11 MEMBER ROSEN: Gentlemen, gentlemen, let's
12 focus on the real issue here. The real issue is that
13 1B was -- 1A was out of service and 1C failed, the
14 only one pump that had access to the ultimate heat
15 safe. That's probably done correctly.

16 MEMBER SIEBER: Well, that's a 305 --

17 MEMBER ROSEN: This was a risk significant
18 event.

19 MEMBER LEITCH: Yes, we were down to the
20 last pump and it fortunately worked okay, but --

21 CHAIRMAN APOSTOLAKIS: What caused the
22 fire?

23 MEMBER LEITCH: What caused the fire? It
24 was an electrical fire in the motor. I don't know any
25 more detail than that and the motor tripped and by the

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1 time the fire brigade got there, the fire was out.

2 CHAIRMAN APOSTOLAKIS: And what was the
3 fire protection system?

4 MEMBER LEITCH: I don't think -- that's
5 what the report said, but I don't think it correctly
6 was a fire protection system. In other words, I don't
7 think there was any kind of an automatic system. I
8 think the motor trips and the fire went out.

9 MEMBER ROSEN: That's not what it says.

10 MEMBER LEITCH: I realize that's not what
11 it says, but reading some more about it, since this
12 was typed, I think this is incorrect. I really was an
13 automatic.

14 MEMBER WALLIS: When you say the system
15 pressure was okay, for me the question would be if
16 there were demands on this system during an accident,
17 would the --

18 MEMBER LEITCH: I'm not familiar with the
19 design of this particular plant, but probably under
20 some circumstances, if they had three pumps, usually
21 there are two 50 percent pumps in a situation like
22 this.

23 MEMBER SIEBER: Now at Cedar Valley we had
24 a third pump because you're pumping water plus a lot
25 of debris and silt and stuff and so they wear out.

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1 One of them you could switch from one bus to the
2 other. The Tech Spec requirement is you have to have
3 two trains. And if you have two pumps out of three
4 out of service, you no longer have diversity so Tech
5 Spec 305 applies which requires you shut down, begin
6 to shut down within two hours and hot standby in six
7 hours and cold shut down in 24 hours. So under these
8 circumstances, unless the A pump was a swing pump
9 which they could put on the other bus, then they have
10 been required to shut down. Do you know if they shut
11 down or not?

12 MEMBER LEITCH: I think they did not.

13 MEMBER SIEBER: Well, that's probably what
14 the status was and A pump was --

15 MEMBER ROSEN: Didn't you invite us to ask
16 if we saw an even that was interesting that we would
17 get more information on it?

18 MEMBER LEITCH: Sure.

19 MEMBER ROSEN: The fire on 8/21. More
20 information. It may have been a risk significant.

21 MEMBER KRESS: Do you know the time of day
22 these occurred? I have a theory that all these things
23 happened in the middle of the night.

24 MEMBER LEITCH: I don't think I recorded
25 that data. I think that's available. We'll find out

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1 a little more about Farley.

2 Next one, McQuire fire in a generator
3 hydrogen dryer. This is a device that sits down under
4 the generator a little gadget that dries the hydrogen.
5 I think they blew out a plug, a grain plug on the
6 bottom of this. They had a fire down there, lasted
7 for 22 minutes, an unusual event was declared. They
8 manually scrambled the reactor.

9 MEMBER SIEBER: Did they purge the
10 generator?

11 MEMBER LEITCH: I think they were able to
12 isolate the hydrogen drier and they extinguished the
13 fire.

14 CHAIRMAN APOSTOLAKIS: Why was it -- why
15 did it take 22 minutes?

16 MEMBER KRESS: That was surprising

17 CHAIRMAN APOSTOLAKIS: Were they trying to
18 put it out?

19 MEMBER SIEBER: You can't put it out.

20 CHAIRMAN APOSTOLAKIS: You can't put it
21 out?

22 MEMBER SIEBER: The fuel is going --

23 MEMBER LEITCH: They had to isolate it.

24 MEMBER SIEBER: You have to isolate it.

25 MEMBER KRESS: Is this like a jet coming

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1 out of a hole and burning --

2 MEMBER SIEBER: I think hydrogen is one of
3 those gases Dana can tell us -- well, maybe not.

4 MEMBER KRESS: Is it the hydrogen.

5 MEMBER SIEBER: Hydrogen coming out of an
6 orifice, I think, generates heat.

7 MEMBER POWERS: It does.

8 MEMBER SIEBER: It will burn. That's the
9 ignition source.

10 MEMBER KRESS: It depends on the orifice.
11 It can go back in.

12 MEMBER SIEBER: Can't go back into -- if
13 it's moving fast enough, the fire won't go back.

14 MEMBER LEITCH: I'm taking too much time.
15 Do you want to hear about the McQuire fire? I don't
16 want to speculate here. I just found out the facts.

17 Other interesting issues. This is a
18 conglomeration of miscellaneous things that may or may
19 not be interesting. We just were working on license
20 renewal for North Anna. It was just interesting to me
21 that during the drought there they had a low lake
22 level.

23 VICE CHAIRMAN BONACA: They have to fix
24 the lake.

25 CHAIRMAN APOSTOLAKIS: Is that a

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1 regulation?

2 MEMBER LEITCH: Also, North Anna and
3 Surrey, there was a potential labor strike. It was
4 resolved.

5 Here's an interesting one. Susquehanna.
6 Dry fuel storage cask-filled with the wrong gas. They
7 filled it with argon and helium versus 100 percent
8 helium. They were concerned about the reduced thermal
9 conductivity of the mixture, versus the 100 percent
10 helium. Evidently did an analysis and concluded that
11 it's okay. This was just an interesting error.

12 Crystal River, cable failure caused loss
13 of off-site power.

14 MEMBER POWERS: What's interesting about
15 the error is how many people buy mixed bottles of
16 argon and helium?

17 (Laughter.)

18 I mean you've got to go out of your way to
19 do that.

20 MEMBER KRESS: You can't hardly get it.
21 You got to make it yourself.

22 MEMBER POWERS: No, you can get any
23 mixture you want to. It's a special order.

24 MEMBER LEITCH: You can ask lots of
25 questions about why did they have this mixture.

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1 MEMBER KRESS: But I thought the storage
2 cask heat transfer was dominated by natural convection
3 internally.

4 MEMBER POWERS: It is natural convection,
5 but it depends critically on the gas.

6 MEMBER LEITCH: Crystal River, loss of
7 off-site power.

8 MEMBER POWERS: When you dump air into the
9 cask, with fuel in there, you get an almost immediate
10 ramp up in the fuel temperature because the thermal
11 conductivity of air is so much less. It amazed me
12 too. The fact is those heat transfer coefficients all
13 have K thermal.

14 MEMBER LEITCH: Let's just run through
15 this quickly. These are other plant shutdowns not
16 scrams. Calvert Cliffs took the unit off because of
17 a -- the number 1 was shut down because of an RCP oil
18 leak. It turned out to be a defect on the valves. It
19 was a good catch by the operators. They were losing
20 the oil level and they took it off.

21 Millstone 2 shutdown due to a rack coolant
22 system leakage. It was a through wall crack in the
23 charging system.

24 Duane Arnold shut down loss of residual
25 heat removal due to high strainer differential

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1 pressure.

2 MEMBER WALLIS: I wonder how long it took
3 them to check the leakage.

4 MEMBER LEITCH: Well, that's pretty well
5 monitored. The instrumentation would tell you.
6 That's why they took it off, yeah. It was approaching
7 on a tech spec.

8 Quad Cities, I think you're all aware of
9 that situation. Maybe we'll talk some more about that
10 later.

11 Duane Arnold, tech spec required shut down
12 due to RCIC out of service.

13 Duane Arnold, high drywell leakage. Of
14 course, they shut down there.

15 MEMBER KRESS: We've got three Duane
16 Arnolds on there.

17 MEMBER LEITCH: They have been having
18 their problems. Yes, they've been having their
19 problems.

20 MEMBER WALLIS: Uprate have anything to do
21 with it?

22 MEMBER LEITCH: Just a couple of quick
23 regulatory issues, just to be sure we're -- the CPPU
24 disapproval. I guess we're all aware of that. New
25 bulletin on plants to inspect heads and head

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1 penetrations other than visually.

2 Now this next one -- these next couple, in
3 fact, are enforcement meetings, I guess, that are
4 going on that I thought were interesting. These are
5 events that occurred some time ago. D.C. Cook,
6 partial plugging of equipment cooling system. Clogged
7 water supply to the diesel generator. This occurred
8 last year and they're having a meeting on that issue.

9 Framatome, criticality protection
10 violation. I just thought that was interesting since
11 some of us are going there in a couple of weeks.
12 We'll find out what happened. I don't know the
13 details.

14 Cooper. This, I thought was interesting.
15 They've had five findings recently. It just looks
16 like there's some interesting stuff going on at
17 Cooper. Four were related to emergency planning and
18 one was an operator requal. issue.

19 CHAIRMAN APOSTOLAKIS: I'd like to know a
20 little more about this and whether there's a change as
21 a result of this.

22 MEMBER LEITCH: At Cooper because of these
23 five findings?

24 CHAIRMAN APOSTOLAKIS: Maybe just a short
25 discussions.

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1 MEMBER LEITCH: I think there were -- I
2 think the answer is yes. Particularly since all these
3 four things were in the EP area.

4 Okay, the last one, I'm taking too much
5 time. Oconee, lack of adequate procedure to close
6 containment door on loss of shutdown cooling. We're
7 going to have a meeting there. This is during an
8 outage where they have a whole lot of stuff strung
9 through the containment door, an inadequate procedure
10 there, to get it out of the way in a timely fashion.

11 Peach Bottom is coming up for license
12 renewal. Two emergency planning issues. One was an
13 inadequate critique. The other, they took 31 minutes
14 to declare an alert rather than 15 minutes of just
15 required.

16 MEMBER WALLIS: So people sometimes take
17 longer than required? That's interesting.

18 MEMBER LEITCH: No, you're not supposed
19 to. It's a violation if you do. You've got to do it
20 in 15 minutes.

21 MEMBER WALLIS: We're always being assured
22 that they always do things on time.

23 MEMBER LEITCH: Point Beach, a RED
24 finding. The aux. cooling water system might fail to
25 function under certain abnormal conditions. This was

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1 licensee-identified. There is some question about
2 whether this should be treated. We were talking about
3 the ROP process a little bit yesterday, day before.
4 There's some question about whether this should be
5 treated as an old design issue. It evidently has been
6 a situation that existed since the beginning of the
7 plant.

8 But it's interesting that this was RED and
9 nothing happened here yet. This is just --

10 CHAIRMAN APOSTOLAKIS: What is the design
11 issue?

12 MEMBER LEITCH: My only comment there is
13 -- I'm not saying that shouldn't be RED, but how long
14 is it going to stay --

15 CHAIRMAN APOSTOLAKIS: What does it mean
16 "might fail"? They did the calculations, I'm sure.
17 I don't understand how a "might fail" would lead to a
18 RED finding.

19 Something must have failed.

20 MEMBER LEITCH: They did a design review.

21 VICE CHAIRMAN BONACA: That's right and
22 they don't meet the requirement. So they say on the
23 best estimate, that is okay.

24 MEMBER LEITCH: Some set of circumstances.

25 CHAIRMAN APOSTOLAKIS: But to go to RED,

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1 you have to go to some sort of PRA and do an estimate
2 of risk.

3 DR. SHACK: So if this system didn't work
4 because of the --

5 CHAIRMAN APOSTOLAKIS: Okay, so it's not
6 "might fail."

7 MEMBER LEITCH: Under some circumstances,
8 it could fail.

9 MEMBER ROSEN: It hadn't failed. It
10 physically hadn't failed. The circumstances hadn't
11 pertained.

12 CHAIRMAN APOSTOLAKIS: So they assigned a
13 probability for failure to the system.

14 MEMBER LEITCH: And I guess when you look
15 at it, it's probably been there for years.

16 MEMBER ROSEN: I think it's the aux. feed
17 system we're talking about.

18 MEMBER LEITCH: It is the aux. feed
19 system, yes. They called it aux. cooling, but I think
20 it's what all know is the aux. feed system.

21 CHAIRMAN APOSTOLAKIS: May that's one that
22 we should look into in more detail. Like the
23 Commissioner said, if it's RED, we're interested.

24 MEMBER WALLIS: They all might fail under
25 normal conditions such as leaving the tail closed at

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1 TMI.

2 MEMBER LEITCH: I think this is a
3 postulated situation.

4 MEMBER WALLIS: It's something that
5 couldn't work just because of the way it was designed.
6 It would be unable to work. It's not through an error
7 or anything.

8 MEMBER LEITCH: That's correct. There's
9 some set of -- not that it would always fail, but
10 there's some set of circumstances that I'm not
11 familiar with. There are some set of circumstances
12 when it's supposed to work and it might not have
13 worked.

14 MEMBER WALLIS: And there isn't anything
15 wrong otherwise.

16 MEMBER LEITCH: No, no. It's a design
17 problem.

18 CHAIRMAN APOSTOLAKIS: It's like an MPSH
19 on the recirculation system.

20 VICE CHAIRMAN BONACA: Something like
21 that, under some limiting condition that you have to
22 assume an analysis. It might not work. It's the
23 likelihood of having those conditions.

24 MEMBER LEITCH: So we will --

25 CHAIRMAN APOSTOLAKIS: That's why I'm

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1 surprised it's RED.

2 MEMBER LEITCH: I was a little surprised
3 too, George, I mean here we have Davis Besse and we
4 don't know what it is.

5 CHAIRMAN APOSTOLAKIS: Okay, so what's the
6 plan now?

7 MEMBER LEITCH: I'll get responses to
8 those at the next meeting and then --

9 CHAIRMAN APOSTOLAKIS: So you will need
10 some time.

11 MEMBER LEITCH: And I will also give you
12 highlights of --

13 CHAIRMAN APOSTOLAKIS: How much time would
14 you need next time to cover these?

15 MEMBER LEITCH: I don't know.

16 CHAIRMAN APOSTOLAKIS: You don't know?
17 Okay, you work that out with --

18 MEMBER LEITCH: I think we'll be on the
19 agenda for half an hour or something like that.

20 CHAIRMAN APOSTOLAKIS: Maybe a little
21 longer.

22 You get the questions, Graham. When you
23 sit in that seat, no matter who you are, you get
24 questions.

25 (Laughter.)

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1 VICE CHAIRMAN BONACA: This is very nice,
2 by the way.

3 CHAIRMAN APOSTOLAKIS: I think it's great.

4 MEMBER KRESS: This is great.

5 CHAIRMAN APOSTOLAKIS: We should be doing
6 this regularly.

7 MEMBER LEITCH: And we've got a plan to
8 put an item on the agenda. The time may be a little
9 flexible or a little different, depending upon how
10 much we have to cover, but we'll put a little time on
11 the agenda to talk about these things.

12 CHAIRMAN APOSTOLAKIS: Very good.

13 MEMBER LEITCH: And I'll try to keep it at a
14 high level. I mean not to waste time with trivia, but
15 I think some of these things are very interesting.

16 CHAIRMAN APOSTOLAKIS: Great. Thank you
17 very much.

18 MEMBER SIEBER: We had a briefing with
19 members of the NRR and research staff on 9/11, the
20 ACRS Fire Protection Subcommittee did. I wanted to
21 have the Subcommittee meeting to hear what was going
22 on in fire research for the purpose of getting myself,
23 Committee Members up to speed and to be able to use
24 the new found speed by adding a vector, to develop a
25 velocity. Maybe we need to have some input to the

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1 advanced reactor research plan.

2 MEMBER POWERS: Getting up to speed only
3 involves the magnitude. It does not involve the
4 vector.

5 MEMBER ROSEN: Well, that's the point. I
6 wanted to impart a vector to it, to use that
7 magnitude.

8 CHAIRMAN APOSTOLAKIS: So the speed is not
9 generally --

10 MEMBER POWERS: You've got to worry about
11 the momentum equation here, sir.

12 MEMBER ROSEN: Really, I just wanted to
13 get some information so I could use it. What I wanted
14 to use it for was to help Peter with his review of his
15 advanced reactor research letter. I learned a lot.
16 I achieved the first objective. I got a lot of
17 information, but not the second, because the minute I
18 went back to the advanced reactor research plan I
19 found they had no explicit discussion in fire
20 research. Maybe that's the null finding. The thing
21 we could say is there isn't anything in the advanced
22 reactor researching plan about fire research.

23 Now that's not to say the things they're doing
24 in fire research area are invaluable to advance
25 reactors. I think they are. But the idea that one

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1 needs to focus the advance reactor research plan in
2 the area of fire still is important. And I think
3 that's going to be one of the inputs I'll offer.

4 There were seven members, ACRS Members who
5 attended the Subcommittee meeting. We started off
6 with a fairly detailed discussion with the staff on
7 fire risk research plan. The status of the current
8 plan, that is the plan that ends the end of this
9 fiscal year. They are considering a new plan, a
10 4-year plan, goes from 2003 to 2006. It only has
11 detail for the next two years, 2003 and 2004.

12 The Committee asked a lot of questions and
13 this is the format I'm going to use to tell you what
14 the subject matter was and then tell you what the
15 Committee's interest seemed to be.

16 With regard to fire risk research plan,
17 the Committee was interested in revision, what was in
18 NRR's or research revision for fire protection
19 research and what is the future, what was desired. We
20 really didn't hear that too clearly, I would have to
21 say. Although there's a lot of good research going
22 on, we were interested in the likelihood of multiple
23 fires. I don't think we heard there was much research
24 going on, although we know that fires have been
25 tending to lead to additional fires and that is this

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1 hot short issue that's been discussed quite a bit.

2 We asked questions, that is, we as members
3 of the Committee asked questions about the cleanup
4 from the smoke effects of fires. Fire risks in
5 nonreactor facilities, including facilities being
6 decommissioned. The fire risk at the mixed oxide fuel
7 fabrication facility. Sometimes the staff had answers
8 to these questions. Sometimes they didn't.

9 The staff doesn't have criteria or a
10 process to decide when testing is needed and
11 furthermore, when -- who should pay for that testing,
12 should it be the NRC or should it be industry. It
13 seems to be a need for definition of when testing is
14 needed to support some conclusions in the fire area
15 and then having drawn the conclusion that you need to
16 have some testing to support some findings that you
17 are trying to make, who should pay for those, that
18 testing.

19 That's all I'm going to say about fire risk research.

20 The next thing we talked, we heard a
21 presentation on something called the fire risk
22 requantification activity. That's an activity the
23 staff is undertaking in cooperation with EPRI. We
24 asked questions about the scope of this effort, the
25 schedule, the process, the participants. It's

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1 basically doing the fire -- re-doing fire PRAs or
2 coming up with methods to do fire PRAs.

3 CHAIRMAN APOSTOLAKIS: Is that going to be a
4 glorified 5 or a real PRA?

5 MEMBER ROSEN: I'll let the staff answer
6 that. I think it's going to be a real PRA. The idea
7 is to come up with a real --

8 MR. HYSLOP: This is going to be better
9 than 5. We're looking at the methods.

10 CHAIRMAN APOSTOLAKIS: Six of 7 perhaps.

11 MR. HYSLOP: We're going to be improving
12 HRA methods, looking at remote shutdown better than
13 has been done before. WE're going to be employing the
14 circuit analysis in sites. We're going to be looking
15 at the FAR modeling.

16 CHAIRMAN APOSTOLAKIS: Are you going to
17 develop a fire propagation model?

18 MR. HYSLOP: We'll be using the codes that
19 are out there. There's EPRI codes. There's MAGIC.
20 There's zone codes.

21 CHAIRMAN APOSTOLAKIS: So you would see
22 whether these codes --

23 MR. HYSLOP: And we'll be looking at
24 those.

25 CHAIRMAN APOSTOLAKIS: And possibly adopt

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1 them?

2 MR. HYSLOP: Pardon?

3 CHAIRMAN APOSTOLAKIS: You may have to
4 change them a little bit to make them useful to a fire
5 PRA.

6 MAGIC, for example, I am not sure it
7 calculates the time for failure of cables. Isn't
8 MAGIC more spread from compartment to compartment?

9 It might be able to with some adjustments,
10 but I don't think a lot of these codes were developed
11 having PRA in mind.

12 MR. HYSLOP: I don't know. I can't
13 imagine using them as you say unless they do give us
14 too much information, things like that, that would
15 lead to fragilities.

16 CHAIRMAN APOSTOLAKIS: When is this
17 project going to be completed?

18 MR. HYSLOP: This project is going to be
19 completed at the end of 2002. EPRI intends to provide
20 an update to their fire implementation guide and NRC
21 will be producing a NUREG also on insights and some
22 methods.

23 CHAIRMAN APOSTOLAKIS: Okay, good. So
24 we'll have other opportunities to review this and
25 supplement the record.

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1 MEMBER ROSEN: Yes, as I said, there's a
2 lot of good things going on. This is one of them.

3 The Committee asked questions about
4 chemical specification resulting in fires and as I
5 said this affects fires, including cleanup and when
6 one cleans up after you've had a fire and areas that
7 were not directly affected, it's a question.

8 We also talked about past work built
9 around operating curves in the event of a fire. At
10 times, other than during the day, when the staffing is
11 minimal at the plant, sometimes some plants the
12 operating crew provides a member to the fire brigade
13 or what may be more than one. So now you have the
14 circumstance of the plants and the transience, does
15 the fire typically cause transience and to shut down
16 the plant. The crew has to shut the plant down, has
17 to fight the fire, has to make emergency plan
18 notifications. It's going to be very busy. And the
19 question was when you get very busy you tend to make
20 mistakes, that's what our human error models tell us.
21 It could be a hazardous situation.

22 CHAIRMAN APOSTOLAKIS: Has ATHENA been
23 applied to it or something else?

24 MEMBER ROSEN: The discussion was just
25 about this is a hazardous -- to identify and ruminare

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1 to each other that this is a hazardous situation. We
2 didn't do an analysis.

3 That's all I'm going to say about the
4 requantification because requantification should be
5 able to handle all of that if it's really good.

6 Fire detection and suppression analysis
7 was the next thing we had presentations on. The
8 Committee asked questions about fire brigade
9 performance and the likelihood of successive fire
10 suppression.

11 The Committee had questions, Members of
12 the Committee had questions about the modeling of
13 self-extinguishing fires. We heard about one today in
14 one of the plants.

15 The Committee had questions about damage
16 to operable safety system equipment caused by
17 actuation of fire suppression equipment, either manual
18 or automatic. Automatic, I've heard often discussed,
19 but manual, not as often. But fire brigade guys with
20 hoses can do lots of different things including cause
21 damage.

22 VICE CHAIRMAN BONACA: They also show a
23 flawed approach from the literature, detection and
24 suppression. They were showing a model that I think
25 you and --

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1 CHAIRMAN APOSTOLAKIS: How comes these
2 guys -- don't they have a conflict of interest when
3 they do that? I have a conflict all the time.

4 (Laughter.)

5 Nathan doesn't have a conflict?

6 MEMBER ROSEN: We were very complimentary
7 of Nathan's work on that project. They even spelled
8 your name wrong.

9 CHAIRMAN APOSTOLAKIS: Nathan?

10 MEMBER KRESS: It wasn't Nathan, it was
11 the guy from Sandia.

12 MEMBER ROSEN: It says here that Siu and
13 Apostalakis event tree modeling is valuable and needs
14 to be extended and used.

15 All right, it was 20 years ago. What have
16 you done since then?

17 The meaning of suppression failure in fire
18 event tree models was discussed. Fire suppression.
19 That's all I'm going to say about the suppression and
20 detection presentation.

21 There was a presentation on circuit
22 analysis and Fred Emerson of NEI was here and also was
23 given time to discuss fire induced circuit failure
24 which was his set of words. It's all about hot shorts
25 and spurious actuations that may be result from hot

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1 shorts.

2 The Committee was interested in the
3 enclosure of the fire tests. There were fire tests
4 conducted at the Omega Point Laboratory in San
5 Antonio. They were conducted and Graham Wallace
6 precisely characterized as he usually does, as an
7 oven. It was actually a plate steel box room. It was
8 not representative of typical rooms in the plants and
9 the Committee was interested in what does that mean
10 with regard to the results? We don't have fires in
11 those kinds of rooms in plants because we don't have
12 those kind of rooms.

13 Questions about the physical failure mode
14 of cables. Were they burning? Were they melting?
15 Were they charred? Questions about times of failure
16 and heat deposition rates in cables. Questions about
17 the validity of using conductor or conductive failure
18 probably of 80 percent. That's a number that was
19 derived. There are only 18 tests, but they derived
20 that number. The question was whether that's a good
21 number because you use it for other cable tray
22 configurations, for instance, vertical cable tray
23 versus horizontal.

24 In general, these tests are only suitable
25 for that limited purpose, that is, how likely are

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1 spurious actuations from hot shorts. That's what we
2 concluded. The testing was done to answer the
3 question and these people believe, oh no, you can't
4 get a spurious actuation from a hot short if you deal
5 with this very rare event. Well, they did the test
6 and they found out it happens about a third of the
7 time.

8 CHAIRMAN APOSTOLAKIS: At Brown's Ferry.

9 MEMBER ROSEN: Brown's Ferry. But I think
10 that has now been dispelled in the industry. If you
11 have a hot tire, you're going to have hot shorts. The
12 question is where.

13 We then concluded there was not enough
14 data to support fire modeling analysis or broad
15 conclusions from these tests, but before we throw too
16 many stones in the direction of the tests, we should
17 remember what their purpose was, which was to get the
18 industry out cheap by proving that hot shorts don't
19 happen. And what happened was they proved, to the
20 industry's credit, that have acknowledged that fact.

21 MEMBER WALLIS: They successfully, George,
22 avoided the irresistible temptation to do any
23 technical analysis based on mechanistic models.

24 MEMBER ROSEN: Graham proposed at least a
25 dozen different homework assignments that he would

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1 have asked --

2 CHAIRMAN APOSTOLAKIS: And he has already
3 graded them too.

4 MEMBER ROSEN: That wasn't the purpose and
5 so we moved on. Let's see, we talked -- there was a
6 long presentation about the SDP process, significance
7 determination process in the ROP in the fire
8 protection area.

9 The Committee was interested in such
10 things as the fact that all fire protection, Phase 1
11 findings, almost all of them seemed to go beyond the
12 Phase 1. Phase 1 doesn't seem to be too good a
13 screening tool. Fifty-two out of 73 Phase 1 findings
14 have moved beyond that.

15 We noted that inspections on associated
16 acceptance is still on hold. Suzanne is here, so she
17 can get up and talk about that if she wants. That is
18 apparently a temporary condition the staff is trying
19 to work through with NEI, the correct way to analyze
20 hot shorts and that's where the associated circuits
21 are, where they happen. And how properly to do that
22 analysis.

23 Suzanne, do you have any idea of how soon
24 that might come to close?

25 MS. BLACK: Our current schedules shows

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1 those inspections in 2002.

2 MEMBER ROSEN: In 2003. The issue will be
3 resolved enough so that the staff will be able to say
4 okay, here's how you captured the analyses if you had
5 a finding in a fire or then here's how you do the
6 inspections.

7 We had a discussion of fire protection
8 findings by Doug Coe of NRR. He told us that there
9 had been 156 fire protection findings at a certain
10 period recently and 29 are in the category called
11 unresolved because there were issues of the inspection
12 standards and they're working to try to get those
13 findings resolved.

14 One of the things that was a little
15 troubling was that we heard that -- and Graham Leitch
16 mentioned this earlier was that there had been -- it's
17 been a hiatus in -- by the staff and the inspection
18 fire brigade performance. I think they're still
19 inspecting fire brigades and how they perform, but
20 they're not putting their results in inspection
21 reports because there are not specific standards.

22 MR. KOLTAY: My name is Peter Koltay and
23 I think yesterday when we discussed this I was told
24 that perhaps my discussion led you to believe that we
25 suspended inspection in this area. And the inspection

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1 requirements are very specific in the inspection
2 procedure. The resident is given time each year to
3 observe and record his observations of fire brigade,
4 at least one fire brigade drill.

5 When we do have problems, there's some --
6 and I again went back and reviewed all the findings in
7 this area and we do have some findings that were
8 recorded as to proponents of fire brigades, but
9 there's really not a good detailed guidance and
10 instructions how to categorize those findings and get
11 them into the inspection process, into the inspection
12 report.

13 MEMBER ROSEN: So you're not being
14 included in this section?

15 MR. KOLTAY: Some regions will include
16 them certain ways and some regions will include some,
17 so there's no uniform -- there's no uniformity there.
18 It's probably because our guidance should be a little
19 better.

20 MEMBER ROSEN: We see that as a
21 significant problem because what we saw was a lot of
22 data on how fires are treated in plants and what we
23 know is fire brigade performance is very important to
24 control and ultimately suppress fire. That seems to
25 be an issue that we want the staff to -- I would say

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1 report back to us on when you get it cleared up and
2 how it's going to be cleared up. It's an important
3 risk significant issue.

4 That's all I had to say about the meeting.
5 It was helpful.

6 CHAIRMAN APOSTOLAKIS: Are you planning to
7 have a letter of some point.

8 MEMBER ROSEN: Not on this, no. The
9 purpose of the meeting, as I said, was to --

10 CHAIRMAN APOSTOLAKIS: Information.

11 MEMBER ROSEN: It was information to the
12 Subcommittee and to me so that I could get -- as a new
13 Chairman of the Subcommittee, understand what's going
14 on and also to get some input, I hope for the advance
15 reactor research. A lot of what's being done is very
16 good and it will be useful in advance reactor analysis
17 and that sort of thing, but none of it is tagged
18 specifically for advance reactors and clearly --

19 CHAIRMAN APOSTOLAKIS: I understand.

20 MEMBER ROSEN: Clearly in advance reactors
21 they have new sets of issues, card and graphite, those
22 kinds of things. So now that I know what's going on,
23 I can make some comments in the report, our report on
24 advance reactors that might be useful to the staff.

25 CHAIRMAN APOSTOLAKIS: Is the staff going

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1 to request a letter any time soon?

2 STAFF: Not at this time. Maybe when we
3 come back to the revised research plan. Maybe at that
4 time we do that. We have to revise the research plan.

5 CHAIRMAN APOSTOLAKIS: What about this
6 requantification project? Are you going to come up
7 with a final product and ask us to comment on it?
8 Before that?

9 MR. HYSLOP: I haven't thought about it.

10 CHAIRMAN APOSTOLAKIS: It's always a fire
11 risk operation to come through with a finished
12 product.

13 MR. HYSLOP: You know --

14 CHAIRMAN APOSTOLAKIS: There is never a
15 surprise at the meeting.

16 MR. HYSLOP: Well, we gave a presentation
17 over an hour yesterday.

18 CHAIRMAN APOSTOLAKIS: Yes, but we are not
19 writing a letter. What I am saying is maybe at some
20 point -- because this seems to be a significant
21 effort.

22 MR. HYSLOP: Yes, it is.

23 CHAIRMAN APOSTOLAKIS: And what I would
24 not like to see is a semi-finished product and then
25 have the Committee say well, we don't like this, we

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1 don't like that. It's an acrimonious confrontation of
2 environment we're trying to avoid. So somewhere there
3 when you think you have something that's presentable,
4 maybe you can request --

5 MEMBER ROSEN: You're going to be done in
6 2003.

7 MR. HYSLOP: We have a couple pilot plants
8 that we're updating the FREs. When we're further
9 along, when we've thrashed out our first series of
10 methods debates. It seems like after we have a little
11 more progress it will be the time to come back then.

12 CHAIRMAN APOSTOLAKIS: We can do that.

13 VICE CHAIRMAN BONACA: I think it would be
14 very valuable for us to see a critical comparison of
15 all the existing analysis that they have with the new
16 analysis to understand how new methods are affecting
17 the differences.

18 MEMBER ROSEN: You might have a conflict,
19 Mr. Vice Chairman, on that because one of the pilot
20 plants is Millstone.

21 VICE CHAIRMAN BONACA: I will sit quietly
22 and silently.

23 MEMBER ROSEN: Comparing the new analysis
24 with your work.

25 VICE CHAIRMAN BONACA: I think it's

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1 interesting to understand what are the improvements,
2 the state of the art with respect to what was there
3 and the reasons why.

4 MEMBER ROSEN: Sure.

5 CHAIRMAN APOSTOLAKIS: Is that all, Mr.
6 Chairman?

7 MEMBER ROSEN: Yes, Mr. Chairman.

8 CHAIRMAN APOSTOLAKIS: I think we have to
9 go back and to be on schedule.

10 Jack, how much time do you need?

11 MEMBER SIEBER: For both subjects?

12 CHAIRMAN APOSTOLAKIS: No, just for the
13 D.C. Cook?

14 MEMBER SIEBER: Probably 15 minutes.

15 CHAIRMAN APOSTOLAKIS: Let's do it.

16 MEMBER SIEBER: Since we're talking about
17 the fires.

18 CHAIRMAN APOSTOLAKIS: What is that?

19 MEMBER SIEBER: An out of focus -- this
20 picture is a little bit out of focus because it's been
21 back and forth a few times. This is at the D.C. Cook
22 Power Plant and you'll see that the device isn't very
23 big that caused the fire. The fire self-
24 extinguished when it ran out of fuel. And the fuel
25 for the fire was basically transformer insulating oil

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1 which is typically pirodol or something like that.
2 It's a -- the modern versions do not have PCBs in them
3 and years ago when I tested the flashpoints of
4 flammability of these kinds of oils they would smoke
5 like crazy at about 600 degrees and usually get to
6 flame somewhere around 675. So from a standpoint of
7 an insulating oil, it's not bad.

8 I brought another overhead with a person
9 in it. That person is probably 60 or 70 yards from
10 the current transformer, but if you can sort of pull
11 together the perspective, you can see the relative
12 size of it. It is not a big device.

13 The capacity of that is about 250 gallons
14 of oil. The purpose of these, if you go into a
15 switchyard, you'll find a number of devices. You will
16 find a lot of bus work. You'll find disconnect
17 switching. You'll find circuit breakers. You'll find
18 step up and step down transformers and you will find
19 current transformers like these and potential
20 transformers that measure voltage rather than current
21 and then somewhere in the switch yard you'll find a
22 concrete block building with a control board in it and
23 a battery room with ventilation and a telephone and
24 maybe fault reporters and things like that.

25 The current transformers and potential

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1 transformers put out AC signals. They go to relay
2 coils and if you are under voltage or over current, as
3 measured by these transformers on any given line or
4 device it will either close or open this relay coil
5 and operate the circuit breakers that isolate what
6 have you. The kinds of things you measure is
7 instantaneous and long term of a current, under
8 voltage.

9 There is a phase differential kind of a
10 set up where you compare the voltage on three phases
11 if they aren't all the same it will trip you up
12 because it's phase on balance and what that does is
13 electrically move the ground away from the real earth
14 ground. And then there are pilto wire types which is
15 you compare the voltage of one end of the line to the
16 voltage of another end of the line, send the signal
17 back and if they aren't reasonably the same, you know
18 that your line is either broken or faulted in some
19 place or hung up in a tree and that will trip it off
20 too. So basically, these are the devices.

21 Now let's talk a little bit about the D.C.
22 Cook. D.C. is in southwest Michigan, fairly close to
23 the Indiana border near Benton Harbor. It's a two
24 unit Westinghouse four loop PWRs. The older unit is
25 a 1,000 megawatts and the new one which is two years

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1 newer is at about 1050 megawatts. And they have the
2 distinguishing feature of having ice condensers which
3 ice condenser containments are pretty small. There
4 aren't too many of them in the United States.

5 DR. SHACK: Not too many of them?

6 MEMBER SIEBER: Not too many of them.

7 MEMBER POWERS: You said it, not me. Let
8 the record show it was Shack and not me.

9 MEMBER SIEBER: I passed out a paper that
10 I wrote to Mag Western and Clifton Martin. They
11 provided me data and I also got data from the website
12 and some of it came in pieces, so I wrote from the
13 licensee event report first and then when I read later
14 reports, I found out there was inconsistency. So you
15 will find in this paper what looks like errors. I'll
16 point out where those inconsistencies are and tell you
17 how I think it's supposed to be.

18 D.C. Cook is, as I said, is owned by
19 Indiana Michigan Power Company which is a subsidiary
20 of American Electric Power. Typically, Cook Station
21 is designed like this and operated like this where the
22 switch yard is operated by one branch of the company
23 and in this case it was AEP's system operations office
24 which is in Fort Wayne, Indiana, believe it or not,
25 150 miles to the east. And the reactor plant and a

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1 few devices in the switch yard are operated from the
2 control room at the plant.

3 MEMBER ROSEN: Let me just say that I have
4 a conflict of interest on this. So I won't comment.
5 AEP is a part owner of South Texas.

6 MEMBER SIEBER: Okay. This is just for
7 Cook.

8 CHAIRMAN APOSTOLAKIS: You have no
9 interest in that, so feel free.

10 MEMBER ROSEN: It's just a disclosure.

11 MEMBER SIEBER: Everybody owns everybody
12 these days, by the way. You have to keep track every
13 week.

14 So anyway, you have people from Fort
15 Wayne, Indiana operating from the switch yard and
16 their traveling operator will go to this concrete
17 block house and he will be directed by the Fort Wayne
18 system operator and the control room doesn't have
19 enough instrumentation generally to tell exactly what
20 it is they did. And they will know bus statuses and
21 things like that. They don't have the instrumentation
22 in the control room they have in the switch yard.

23 At Beaver Valley we solved it, the problem
24 of traveling operators by putting our own locks on the
25 gates in addition to their locks so that they had to

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1 come to our control room before they could get in.

2 (Laughter.)

3 That seemed to work pretty well. At
4 Shipping Port, the station owned the switch board. At
5 Beaver Valley, the system owned the switch board. So
6 that makes a little bit of a communication and
7 coordination problem, particularly since the
8 instrumentation in Forth Wayne is not enough for them
9 to identify exactly where a fault is, okay, in a
10 switch yard. So their directing operations and people
11 are giving suggestions and the plant operator is
12 sitting there wondering what's happening. So that was
13 one of the problems and issues.

14 I will show you a little bit about the
15 switch yard and how it's laid out. I guess you can
16 see that.

17 Here's unit one. This is unit two. And
18 the switch yard has two sections, one in the high
19 voltage area. One of them is 345,000 volts. The
20 other one is 765,000 volts and there is one off-site
21 feed on the 765 side with a disconnect switch and the
22 step out transformer and it's connected to the 345
23 side which has 6 off-site pieces.

24 The preferred power supply for the
25 emergency power or central power where the service

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1 water pumps are, comes from the 345 kV switch yard
2 section found to -- and these are the two, Unit 1, 4
3 kV emergency buses and these are the Unit 2, 4 kV
4 buses. And generally speaking they're tied together.
5 The power is -- who gets the power -- Unit 2 side of
6 the switch yard, Unit 1 gets its power from the Unit
7 1 side of the switch yard. And this bypass breaker
8 right here is normally left open. Now if you lose
9 half of the switch yard -- if you lose one side of the
10 switch yard, you can close that tie breaker and tie
11 the station service from both units together. And of
12 course, you can see the four diesel generators there
13 at the bottom.

14 Now if I look at the initial conditions,
15 either one was operating at 68 percent power, it had
16 been shut down the week before and so they were coming
17 back from an outage. Unit 2 was at 100 percent power.
18 Unit 2's train A essential service water pump was
19 inoperable, in fact, it was in pieces on the floor
20 because they were overhauling it. And it was in the
21 72 hour limiting condition for operation and they
22 expected to finish rebuilding that pump that night.

23 Unit 1's train B essential service water
24 pump was hydraulically tied to the Unit 2 service
25 water header. They had a pipe with a valve in it and

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1 so they opened that valve and that provided service
2 water to both units.

3 And because of the cross tie, however,
4 Unit 1's train B service water pump was declared
5 inoperable. This is also a 72 hour tech spec that
6 when they finish rebuilding the Unit 2 pump, they
7 would close that valve and they will both be operable.

8 Work was on-going in the switch yard. In
9 other words, the traveling operator and the
10 construction crew were in there, getting ready to
11 replace a circuit breaker.

12 The main generator output breaker which is
13 K1 which ties it to this section of the 345 bus was
14 out of service because its associated disconnect
15 switch which is an open air switch was not properly
16 connected.

17 Now a disconnect switch is like a fork and
18 the arm comes up and the head on one side goes into
19 this fork and makes contact for about 180 degrees.
20 What happened is when the operator closed that
21 disconnect switch, it was on the outside of the fork
22 so instead of 180 degree contact, it was a 1 degree
23 contact.

24 You can't operate like that because the
25 resistance is so high you would melt the switch. You

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1 can't open those switches under load, so the only way
2 to take that section out of service is to open the
3 circuit breaker. That meant that Unit 1 was only
4 feeding one of the buses, the 345 buses directly and
5 had to make the cross ties down through either N, M or
6 L branches in order to pick up the other bus. If you
7 lost that other bus, there were a couple of off-site
8 feeds that you would lose. So basically that's the
9 set up.

10 DR. SHACK: That was a known condition,
11 right?

12 MEMBER SIEBER: That was a known
13 condition. It's allowed. It's allowed. What happened
14 is that when the current transformer power started it
15 came down and it damaged one of the circuit breakers
16 and that would be the L breakers. And some degree and
17 stuff also went and damaged the M breaker. So now you
18 had K1 out of service. L was subject to fire and
19 damaged in a trip and M was damaged and it tripped.

20 Also, one of the construction workers was
21 injured. I doubt that it was serious because it was
22 only mentioned once. And so the traveling operator
23 calls Fort Wayne says what do I do? Isolate the
24 fault. So he starts opening breakers and ended up
25 opening up the preferred power supply to the plant.

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1 Okay, and that automatically closed the bypass
2 breaker.

3 There are places in this description where
4 I said things happened automatically, but that was
5 because a control room operator was writing the log.
6 He didn't know whether it was automatic or manual, but
7 the people were actually up there opening breakers.
8 They finally got down to one feed in the 345 yard to
9 the outside and one in the 765 to the outside. That
10 made -- and in addition, that was a very hot day. It
11 was June 12th. It was a little after a quarter to 2
12 in the afternoon. And the whole system in Michigan
13 was under degraded grid voltages.

14 Now even if they could get -- under the
15 condition that they were in right there, they had
16 another problem in the plant. It was an on going
17 problem with space and service transformers or tap
18 changing transformer. They rely on a voltage detector
19 and then you move the taps across the secondary
20 winding to raise and lower the voltage so that the
21 voltage in the plant met the required specification.
22 Tap generators were broken. Hadn't worked for a
23 while.

24 So they couldn't adjust the voltage. That
25 made the service water pumps inoperable because they

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1 didn't meet the minimum voltage requirement. Put them
2 in tech spec 305 which is shut down in two hours and
3 a hot standby in 6. Hot shutdown in another 8 and
4 then cold in 8 and they already had degraded rib
5 voltage and they were going to force them to take on
6 this 2000 megawatts off the system which then would
7 certainly make the voltage so distressed, made the
8 grid unstable, but it would maybe trip other units and
9 this is my speculation. That certainly voltage would
10 be so degraded that if you had a LOCA, you wouldn't
11 have the service water to run the big service water
12 loads that happen on a CIV operation which was
13 containment isolation and spray coolers and things
14 like that.

15 So they went to the NRC, requested a
16 notice of discretionary enforcement so they wouldn't
17 have to fall tech spec 305. That way they could
18 stabilize the voltage, try to restore the system,
19 finish rebuilding the other pump and all of which
20 operations were successful. Because the fire was a
21 switchyard fire, it's outside the protected area, by
22 the way. But it's a switch yard fire lasting more
23 than 10 minutes or 15 minutes, I'm not sure what the
24 regulation is. That put them into a work
25 classification.

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1 MEMBER ROSEN: 15.

2 MEMBER SIEBER: 15. It had to be longer.
3 Because they were in an alert, so -- and they went all
4 the way to the emergency organization that you would
5 have for site area in preparation for things getting
6 worse. Since this was in daylight, it was good
7 because most of the people were already at the site
8 and so manning the emergency --notifications were on
9 time, it appears. There was no violation.

10 Finally, not all the oil burned. Itself
11 extinguished sooner or later, but some of it didn't
12 burn and went on the ground which is a national
13 pollution, you need a permit for that, so they had an
14 oil spill too at the same time.

15 Other than that, things were going pretty
16 good. A pretty good day.

17 So anyway, the units stayed on line.
18 There was a special investigation from Region 3. They
19 did a significance determination and screening for
20 significance determination. It screened a yellow
21 finding and so that caused them to try to do a SPAR
22 model, but a SPAR model doesn't model the switch yard.
23 Okay? So they couldn't get an estimate as to how
24 degraded they really were and I did finally get an
25 e-mail here that describes exactly what it is they

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1 did. And those reviews who went to the Region 3
2 office may remember that the senior reactor analyst is
3 a lady named Sonia Burgess and so she ran the SPAR
4 model, didn't get a result, but they made some
5 assessments as to what the conditions were and they
6 said breaker L which is the generator output breaker
7 had been in this deficient condition for a year. And
8 they gave that an order of magnitude increase in risk
9 for a loop.

10 And they decreased the failure probability
11 of operator recovering the offsite power in a short
12 term because they said and this drawing doesn't show
13 it, but they said there's another 69 kV feed that they
14 could connect directly into the emergency power. The
15 third factor is all four diesels were operable and I'm
16 not sure why they didn't start them. I would have
17 started them and have them running so that all I had
18 to do was close in if anything else opened up.

19 And so that -- when you consider those
20 things the risk turns out to be the same in that
21 condition because of the 69 kV line, so then it was
22 evaluated as a green finding and there was letter
23 writing back and forth between the company and the NRC
24 questioning, for example, the containment
25 vulnerability, the probability of containment failure

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1 under severe accident or an ice condenser. One place
2 is stated as .82 which was pretty high. And in
3 another NUREG which the licensee was trying to use was
4 .28 which to me looks like a typo.

5 But the NRC staff was using .4. The
6 licensee wanted justification, why are you using this
7 number when all these other numbers are out there, but
8 they finally ended up using .4. And once it turned
9 out to be green, everybody agreed that that was it.
10 So that's basically the extent of the event.
11 Eventually, the sun shone brightly again and they had
12 two circuit breakers to repair and they had a new
13 current transformer to buy and some gravel to dig up.
14 And that's the report.

15 MEMBER KRESS: What caused the fire?

16 MEMBER SIEBER: Pardon?

17 MEMBER KRESS: What caused the fire?

18 MEMBER SIEBER: I don't know, but amongst
19 fires, I think that CTs and PTs, they every once in a
20 while commit suicide.

21 They're a small device and they're under
22 a lot of stress. This one is 25 kV on one side and
23 110 volts on the other side. And so if you get a
24 fault in them, since they're so small they generally
25 blow out the low voltage bushing which is on the

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1 bottom. And that's where the fire starts.

2 MEMBER WALLIS: At least it doesn't have
3 enough momentum to go into wall.

4 MEMBER SIEBER: This is lift off right
5 here.

6 MEMBER ROSEN: That because the momentum
7 equation doesn't have that curve.

8 MEMBER SIEBER: I don't think we know how
9 to use it. But in any event that's where they usually
10 blow. I've seen a few.

11 MEMBER POWERS: The problem is there
12 hasn't been any phenomenological analysis prior to
13 this experiment so they didn't want to carry it too
14 far.

15 MEMBER WALLIS: It's interesting the flame
16 didn't burn anything else.

17 MEMBER SIEBER: There's nothing much else
18 to burn.

19 MEMBER WALLIS: That's not so important.
20 There's no transformer or something else.

21 MEMBER SIEBER: You try to separate them
22 in the switch yard for a couple of reasons, fire
23 protection is one, explosion distances is another one.
24 Since you already own the land you can make the switch
25 yard pretty big. The only thing that really costs you

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1 is the extra chain link fence, but some of them are
2 bigger than the power plant.

3 MEMBER LEITCH: Did the potential or
4 current --

5 MEMBER SIEBER: Current.

6 MEMBER LEITCH: The current, did that
7 directly trip any breakers?

8 MEMBER SIEBER: Yes, it did. It tripped
9 L.

10 MEMBER LEITCH: L.

11 MEMBER SIEBER: Right. And apparently
12 pieces came off of that and damaged -- so that's my
13 report.

14 CHAIRMAN APOSTOLAKIS: Any other
15 questions?

16 Great, thank you, Jack.

17 MEMBER SIEBER: You wanted a self-
18 extinguishing fire, don't you?

19 CHAIRMAN APOSTOLAKIS: You have another
20 subcommittee report to do, but maybe we should take a
21 break first.

22 MEMBER SIEBER: I'd love to. I'd also
23 like you to help me with that.

24 CHAIRMAN APOSTOLAKIS: Yes sir.

25 MEMBER SIEBER: Since you were the co-

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1 chair.

2 CHAIRMAN APOSTOLAKIS: Okay, so we'll
3 recess until 4:45.

4 (Off the record.)

5 CHAIRMAN APOSTOLAKIS: Okay, we'll start
6 a few minutes earlier. We have to finish by 5 of 5,
7 right? Okay.

8 MEMBER SIEBER: When it's 5 of 5, I'll
9 just quit.

10 CHAIRMAN APOSTOLAKIS: Wonderful.

11 MEMBER SIEBER: And this will be probably
12 no longer than the Cook report.

13 CHAIRMAN APOSTOLAKIS: Okay.

14 MEMBER SIEBER: Some background. In
15 September, we met with the staff, September of last
16 year, met with the staff on the ROP and we discussed
17 it again in October and wrote a letter. That letter
18 had some comments in it that made recommendations for
19 improvements to the ROP process, pointed out some
20 philosophical conflicts, for example, if you recall
21 there are seven cornerstones in safety. Three of them
22 are risk based.

23 One of the risk based ones had performance
24 based elements in it. And that's the defense-in-depth
25 for containments. And four of them were performance

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1 based. And then you had a conflict between the
2 performance indicators on the one hand and how do they
3 relate to the risk information that comes from the SDP
4 process and since the action matrix uses the same
5 colored system for both their inconsistencies caused
6 by that, for example, a green SDP is not a good thing,
7 whereas a green performance indicator is a good thing.
8 And so that creates some philosophical consternation
9 for anyone thoughtful enough to try to think it
10 through.

11 So we made a number of suggestions. We
12 met with the Commission in December and I gave a
13 presentation there where I reiterated what was in our
14 letter. The Commission turned around and wrote an SRM
15 and that was dated December 20th and it said the staff
16 of ACRS input should provide recommendations for
17 resolving in a transparent manner conflicts of
18 discrepancies between aspects of the revised reactor
19 oversight process that are risk-informed, e.g.,
20 significance determination process and those that are
21 performance based, e.g., the performance indicators.

22 So we had a subcommittee meeting on the
23 ROP. We had a get together about three or four months
24 ago. I guess it was in May, where we gave suggestions
25 and clarifications, how these discrepancies could be

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1 cleared up and this week's presentation from the staff
2 was to show us how they were going to implement those
3 suggestions.

4 On the other hand, the staff, if I go to
5 their conclusions, they have concluded that the ROP is
6 working and that incremental improvements would be
7 done as opposed to changes we suggested which I
8 thought was a disappointment and they're basically
9 telling us they're not going to do our suggestions and
10 it's okay to mix risk information with performance
11 information and it's too bad that green means two
12 different things and they also like the 25 scrams for
13 the threshold for red in the initiating events.

14 MEMBER ROSEN: Because they say it's a
15 communication tool with the public.

16 MEMBER SIEBER: That's right.

17 MEMBER ROSEN: Which I thought was most
18 astonishing lack of miscommunication, the knowledge I
19 heard a long time ago. I've heard astonishing things
20 about risk communication.

21 MEMBER SIEBER: It communicates something
22 to me that I think the public should know which is
23 look how lax we are. We let these guys trip these
24 things all the time. We don't even yell at them until
25 it gets preposterous.

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1 So in any event, I think we're sort of
2 back to square one on our comments, the discrepancies
3 will stay. They are doing some things to improve the
4 process. One of them is they're beginning to conduct
5 a pilot program for the mitigating system performance
6 index and that's a good thing. They say they're
7 continuing to improve and develop other performance
8 indicators and that they're going to improve the SDP
9 processes. There's a whole bunch of them. I think
10 fire is an example where they're doing that. But
11 that's it.

12 So that would be my report of what went
13 on, Mr. Chairman. You may want to add some because
14 you were the co-chair for that.

15 CHAIRMAN APOSTOLAKIS: Yes, the
16 disappointing thing was that the presentation was very
17 high level and did not address, until we asked, our
18 letter of last May, was it. No, before that. Maybe
19 it's because there are new people that are managing
20 and working on this project now and I didn't get the
21 impression that they were really on top of the issues
22 that we raised.

23 So you know, when you have a subcommittee
24 meeting after such a long time and letter and SRM and
25 what they are telling you is that they are trying to

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1 comply or to meet, to satisfy the four strategic goals
2 of the Commission that really is bordering on insult.
3 It's so hard to schedule subcommittee meetings these
4 days, we're already busy and Mario pointed out earlier
5 today that in October we are here every week almost or
6 we're doing something for the ACRS almost every week,
7 we are going to Germany and some people are going to
8 France. We have a full Committee meeting. So to
9 waste a subcommittee meeting on such high level stuff
10 is really very irritating.

11 And you know, the meetings we've had in
12 the Caucus Room that Jack mentioned, it's as if they
13 never took place. They never addressed the issues and
14 after we pressed them a little bit, one of the
15 presenters said okay, let's discuss this issue. Well,
16 discuss again? In September, when they are planning
17 to send the report to the Commission in March? And
18 their plan was to come to us some time in February or
19 December --

20 MEMBER SIEBER: December.

21 CHAIRMAN APOSTOLAKIS: The full Committee.

22 MEMBER SIEBER: And wanted a letter.

23 CHAIRMAN APOSTOLAKIS: And want a letter.

24 MEMBER SIEBER: And I asked them what kind
25 of letter do you want? The only letter I could write

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1 now is one that says we made these recommendations.
2 We met with you and you came back and said you weren't
3 going to do it. And so -- that would be the letter.

4 CHAIRMAN APOSTOLAKIS: So it was really
5 very disappointing, so now we are trying to find
6 another half a day some time before December and they
7 promised to come with written positions. It's very
8 hard to find the time. Mag Weston is working very
9 hard to try to find the time where people can come.

10 MS. WESTON: We have a tentative date of
11 the morning of October 31st.

12 CHAIRMAN APOSTOLAKIS: Okay. And they
13 promised to send written materials to us before then.
14 Because it's one thing to sit around a table and have
15 people express views and quite another to have a slide
16 that says this is what we're going to do. I'm not
17 even sure that they would dismiss our comments. I'm
18 not sure they read them.

19 MS. WESTON: Well, you know, George, with
20 the change of the guard, the agenda was supposed to
21 give us the detail that we have talked about, but they
22 ignored the agenda. And we don't get something in
23 writing the next time. I don't know what we're going
24 to do because this was a complete surprise in terms of
25 the lack of specifics.

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1 CHAIRMAN APOSTOLAKIS: So it was not a
2 very good meeting, I don't think.

3 We have this issue Jack mentioned,
4 performance versus risk based, SDP calculations.
5 These are important issues. And I don't think they
6 were on top of it.

7 VICE CHAIRMAN BONACA: October 31st we
8 should ask for something.

9 CHAIRMAN APOSTOLAKIS: Yeah, we have to
10 have something tangible, otherwise we'll cancel the
11 meeting. We will have to send the letter to the
12 Commission separately.

13 DR. SHACK: Did they address anything in
14 the IG report?

15 CHAIRMAN APOSTOLAKIS: No, no, it was very
16 general.

17 DR. SHACK: Everything was general?

18 CHAIRMAN APOSTOLAKIS: It was as if they
19 were introducing the Committee to the reactor
20 oversight process.

21 And the other thing is that it was not in
22 the SRM, but it's something that we really have to
23 take into account is this Davis Besse thing. You
24 can't ignore it and say well, that's something we'll
25 think about later.

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1 MS. WESTON: The EDO though has
2 established a Committee to look at the IG's report on
3 the SDP, separate from that office.

4 MEMBER LEITCH: I think the IG report had
5 some very significant, I mean the one really
6 significant thing they said was that Phase 2 analysis
7 really needs significant rework or they need to do
8 away with it.

9 MEMBER SIEBER: Phase 1 always appeared to
10 give you the wrong user. It goes straight to Phase 3.

11 CHAIRMAN APOSTOLAKIS: But the other thing
12 that I didn't like was there was a statement there
13 after the generalities slide, the ROPs work. I don't
14 know what criteria they're using. Davis Besse
15 probably, yes. That it's working. How did you decide
16 that when you have greens all over and all of a sudden
17 you have this problem.

18 So I mean people are putting words down
19 almost without thinking.

20 VICE CHAIRMAN BONACA: The other thing
21 about Davis Besse was that he defended the 27 scrams.

22 CHAIRMAN APOSTOLAKIS: Yes, the -- 23.
23 Don't exaggerate.

24 (Laughter.)

25 VICE CHAIRMAN BONACA: As I said, that was

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1 astonishing.

2 CHAIRMAN APOSTOLAKIS: But this again, I
3 don't think it's the position of the staff. It was
4 three guys talking. They don't have a position. They
5 were not planning to have a position and in our letter
6 we said there is a problem here.

7 In fact, I read it back to them and said
8 we use the words "a fundamental flaw." Remember?
9 Intractable flaw.

10 MS. WESTON: And I think Mike had
11 committed to us in our first meeting to look at those
12 things and do something about them.

13 CHAIRMAN APOSTOLAKIS: Yes, Mike Johnson
14 was on top of things and we had two meetings. The
15 first time I thought we were doing great. We said you
16 know, we're going to think about these things. Maybe
17 you're right and all that and all of a sudden we're
18 starting from scratch.

19 Anyway, I think we made our point. Are
20 there any other comments from subcommittee members who
21 are present?

22 MS. WESTON: George, while you have that
23 minute, will you look at your calendar for October
24 31st. Sam is telling me --

25 CHAIRMAN APOSTOLAKIS: Jack, are you

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1 available October 31st?

2 MEMBER SIEBER: Yes, I'm here on the 30th.

3 MEMBER ROSEN: It's a day of a planned PRA
4 subcommittee meeting. You wouldn't want to miss that
5 for the world.

6 MS. WESTON: So the 31st is not?

7 CHAIRMAN APOSTOLAKIS: The security
8 meeting has to be shortened again. The security was
9 November 1st and because we had nothing to do in the
10 afternoon of the 31st we said well, let's extend it to
11 a day and a half. Now we will have to go back to one
12 day. Because we can't find any other time for the
13 ROP.

14 MS. WESTON: So November 1st is going to
15 be security and we're still going to do ROP on the
16 31st? Is that correct?

17 CHAIRMAN APOSTOLAKIS: First we'll do the
18 tech specs in the morning and ROP in the afternoon.
19 The first of November will be security. And it is
20 Friday, but if you gentlemen can stay -- well, you
21 know, maybe you can leave Saturday morning. It's
22 important too, the security briefing.

23 That's why it's irritating. When we
24 finally come down here and we waste our time on this
25 thing. We'll finish in a moment. The subcommittee

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1 was very unhappy.

2 Any other comments? We'll recess for 3
3 minutes and we'll reconvene upstairs somewhere to
4 discuss the naval reactors letter. Somebody will take
5 us there. Thank you.

6 (Whereupon, at 4:55 p.m., the meeting was
7 concluded.)

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