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ADVISORY COMMITTEE ON REACTOR SAFETY)

HUMAN FACTORS SUBCOMMITTEE)

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2 UNITED STATES NUCLEAR REGULATORY COMMISSION'S
3 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
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1 UNITED STATES NUCLEAR REGULATORY COMMISSION
 2 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
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4 In the Matter of:
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 6 HUMAN FACTORS SUBCOMMITTEE
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 Monday,
 March 28, 1988
 Room 1046
 1717 H Street, N.W.
 Washington, D.C. 20555

11 The above-entitled matter came on for hearing,
 12 pursuant to notice, at 8:30 a.m.

13 BEFORE: DR. FORREST J. REMICK
 14 Associate Vice President for Research
 15 and Professor of Nuclear Engineering
 The Pennsylvania State University
 University Park, Pennsylvania

16 ACRS MEMBERS PRESENT:

17 DR. HAROLD W. LEWIS
 18 Professor of Physics
 Department of Physics
 University of California
 Santa Barbara, California

20 MR. CARLYLE MICHELSON
 21 Retired Principal Nuclear Engineer
 Tennessee Valley Authority
 Knoxville, Tennessee
 22 and Retired Director, Office for Analysis
 and Evaluation of Operational Data
 23 U.S. Nuclear Regulatory Commission
 Washington, D.C.
 24
 25

1 MR. CHARLES J. WYLIE
2 Retired Chief Engineer
3 Electrical Division
4 Duke Power Company
5 Charlotte, North Carolina

6 MR. DAVID A. WARD
7 Research Manager on Special Assignment
8 E. I. du Pont de Nemours & Company
9 Savannah River Laboratory
10 Aiken, South Carolina

11 ACRS COGNIZANT STAFF MEMBER:

12 Herman Alderman

13 NRC STAFF PRESENTERS:

14 Brian Sheron
15 Alan Rubin
16 Jim Partlow
17 Jon Olson
18 Brian Grimes
19 J. Persensky
20 Tom Ryan

21 Consultants:

22 K. Gimmy
23
24
25

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P R O C E E D I N G S

CHAIRMAN REMICK: Good morning. The meeting will come to order. This is the meeting of the ACRS Subcommittee on Human Factors. I am Forrest Remick, Chairman of the subcommittee. The other ACRS members in attendance today are David Ward, Charlie Wylie Carlyle Michelson, and Hal Lewis will be coming shortly, and a consultant, Chris Gimmy, from Savannah River Laboratory, and the cognizant ACRS staff member today is here Herman Alderman.

The subcommittee will review and discuss the human factors research program, the draft policy statement, the draft policy statement on training and qualification of nuclear power plant personnel, and proposed fitness for duty role. Good morning, Mr. Lewis.

The rules for participation in today's meeting have been announced as part of the notice of this meeting that was published in the Federal Register on March 14, 1988. This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act and the Government and Sunshine Act.

We have received no written or oral statements from members of the public. It is requested that each speaker first identify himself or herself and speak with sufficient clarity and volume so that he or she can be readily heard.

Do any of my subcommittee colleagues have any

1 initial comments? If ncc, while I have an opportunity, I will
2 mention if you are not already aware of it, we will have
3 another subcommittee meeting on the 27th of April taking up
4 presumably two topics--one, on the professional standards
5 proposed policy statement, and perhaps the proposed policy
6 statement on the access rule if that's within the jurisdiction
7 of this subcommittee. I am not sure of that at the moment.

8 All right. We will proceed first with presentations
9 by the staff on the human factors research program, with Mr.
10 Brian Sheron.

11 MR. SHERON: My name is Brian Sheron. I am Director
12 of the Division of Reactor and Plant Systems in the Office of
13 Research and I am going to just give the introduction to our
14 presentation today on the human factors research plan.

15 You also will hear from Frank Coffman, who is branch
16 chief, Alan Rubin, the section leader, and Tom Ryan, one of
17 our experts in human reliability.

18 Just quickly, an overview of our presentation today,
19 you will hear an introduction from me basically going through
20 the items you see there, which is a little history on human
21 factors in the NRC, where we see the need right now, who our
22 customers are, and how we are coordinating with those
23 customers.

24 We will discuss a little bit our human factors
25 research program plan which we are putting right now in draft

1 and we are going to get it finalized; a summary of our planned
2 research activities, and also describe our ongoing human
3 reliability assessment research.

4 CHAIRMAN REMICK: Brian, what are we about today?
5 Is it your desire that we review the human factors research
6 program plan and provide you with feedback? Is that the
7 intent of our discussing it today? This is nothing you have
8 been going to the Commission with right now, is that correct?

9 MR. SHERON: We are on the hook to go to the
10 Commission. I believe we have a briefing that has been
11 scheduled the week of May the 16th. This was at the request
12 of the Commission, to brief them on our research activities in
13 human factors.

14 We had originally been planning to brief them
15 actually a couple of months ago. However, we were waiting for
16 the National Academy of Sciences report on human factor
17 research needs. That was delayed through no fault of our own,
18 through the National Academy. We only received that on
19 February 29th, and I believe we sent copies down to the
20 Committee.

21 We had told the Commission back in November that we
22 would be prepared to brief them on our plan approximately two
23 months after we received the NAS report. That put it around
24 May the 1st in the scheduling process, so our plan is to get a
25 pretty finalized draft of the human factors research plan down

1 to the Commission I think by about May the 1st, in advance of
2 the briefing, so if there is any input that you could give us
3 on this plan, that we could factor into that already, we would
4 appreciate it.

5 CHAIRMAN REMICK: Thank you.

6 MR. SHERON: The plan is not by any means something
7 that gets cast in concrete. It is a living plan. As our
8 needs change, as things arise, we intend to factor it in.

9 MR. MICHELSON: One of the things that has arisen
10 lately is the maintenance program, the possibility of a rule
11 on maintenance.

12 MR. SHERON: Yes.

13 MR. MICHELSON: And in looking at the program plan
14 for human factors, of course, I could see how maintenance came
15 in here and there, but I am wondering if you are going to go
16 back to re-think the maintenance aspect in view of the fact
17 that we are proceeding with the proposed rule?

18 MR. SHERON: As a matter of fact, when the
19 Commission said that they asked the staff to produce a
20 maintenance rule by I think August, which I am not sure how
21 realistic that date is, to get a rule through the system, but
22 the first thing it was assigned to the Office of Research to
23 Billy Morris' division which is the Division of Regulatory
24 Application, and he has been struggling because it is a matter
25 of resources. You need people to work on it. We have

1 provided two people so far to input--Don Cleary primarily from
2 the area of the license renewal policy development.

3 MR. MICHELSON: Let me tell you what puzzles me.
4 What puzzles me is that you are trying to somewhat cast in
5 concrete a human factors program before the, one of the real
6 users of it has even got an idea of what he is going to do,
7 namely, the maintenance aspect, which I think is an important
8 part of this program.

9 MR. SHERON: I don't see there is any reason why I
10 should just not do a human factors research.

11 MR. MICHELSON: Well--

12 MR. SHERON: As I say, the plan is flexible, okay.
13 If there is needs that arise in the area of maintenance, we
14 assess them just like we do with anything else, establish
15 relative priorities within the agency, and if it comes out
16 high, I would divert resources or we would take, have
17 additional resources given to us to work on it, but I can't
18 sit around not do anything just because someone hasn't
19 identified what they want in maintenance.

20 MR. MICHELSON: That's what led to my puzzlement.

21 MR. WARD: You know one way of looking at it, he is
22 talking here about the research plan. Conceivably the
23 research here could lead to a different sort of maintenance
24 rule or something two years hence, or three years hence, but
25 in the meantime, I guess they want to go ahead.

1 MR. MICHELSON: See, but the question is in my mind
2 in the meantime, are they doing the kind of research that
3 might lead to determining whether or not they have a problem
4 in maintenance?

5 MR. WARD: I don't know what.

6 MR. SHERON: You don't know that, Carl. The
7 Commission wants--

8 MR. MICHELSON: I didn't find maintenance the thrust
9 of their program. I didn't find it in there except as an
10 ancillary thought rather than a thrust and I just wondered if
11 since we are getting the, you know, oriented toward a possible
12 rule, whether or not it ought to be a, more of a major thrust
13 of this program instead of a minor one if that's the case, and
14 I'm not sure--just a thought.

15 MR. SHERON: Number 1, the Commission has asked for
16 a proposed rule by August, okay. There is very little that
17 one can do to start up or get research done that would
18 influence anything that we start preparing.

19 If you look at the internal rulemaking process, just
20 to get it through the system we almost have to have a draft
21 rule in place now, which is not the case.

22 MR. MICHELSON: I don't disagree.

23 MR. SHERON: You will hear later from Dr. Ryan. He
24 has a program, MAPPS program I believe it is, which deals
25 substantively in maintenance activities, and Carl Johnson I

1 believe has a program which is related to maintenance and you
2 will hear more about that, so there are activities going on.
3 Whether they are sufficient with regard to this new rule, we
4 will have to determine.

5 Just to briefly explain how we got to where we are
6 today, if you go back to WASH 1400, around 1976 it identified
7 that indeed human factors problems were related to plant
8 safety and to risk, that the human performance was a
9 contributor.

10 CHAIRMAN REMICK: Excuse me. I suggest that you
11 only pick out the most important aspects of that slide. We
12 can read it. I think we are familiar with a good portion of
13 it.

14 MR. SHERON: Okay. Well, I guess after TMI, as you
15 know, we established a human factors division. There was a
16 human factors program plan that was identified. There was
17 also research started in 1981 on human factors. In 1985, that
18 research was terminated. My understanding because of budget
19 reductions except for work in the human reliability
20 assessment, 1986, NRC terminated its annual record on the
21 human factors program plan, and at the same time, if you
22 remember, RES received a National Academy of Sciences report
23 revitalizing nuclear safety research, and that recommended
24 intensifying our human factors research.

25 In April of '87, just about a year ago, we had the

1 major reorganization within the Commission. At that time, we
2 re-established a human factors reliability and human factors
3 branch. There was a conscious decision made on the part of
4 the senior management to revitalize the research in that area.

5 In February, as I just said, the National Academy of
6 Sciences which had been contracted previously to provide us
7 recommendations on what kind of human factors research was
8 needed, gave us their report which was human factors research
9 nuclear safety. We are reviewing it. In general, we found
10 the report I think very well written, very constructive, and
11 we are trying to do, to incorporate as much of their
12 recommendations as we can. You will probably hear more about
13 that later.

14 One of the first things that we felt we needed to do
15 in the division when we embarked on this program was to
16 develop a program plan rather than just kind of haphazardly
17 run in and start putting a lot of money, and settle up a bunch
18 of different contracts and doing a bunch of different human
19 factors research. We felt that we should have a plan with a
20 heading which had goals which identified who the users were,
21 and how the research was going to be utilized in the
22 regulatory process, gave us a focus.

23 And we are spending a considerable amount of time
24 putting that plan together. The people in the section, Leo
25 Beltracchi, Dennis Serig, Tom Ryan, all contributed very

1 heavily to that plan.

2 And as I said, in May of '88, we hope to send the
3 plan to the Commission and give them a briefing on it.

4 MR. WARD: Can I ask you a question before
5 you--maybe put it back up. But back in '83, NUREG 985 was the
6 first I guess human factors program plan. What you are
7 talking about now is a human factors research program plan,
8 and as I recall, the '83 plan was primarily, was an NRR plan.
9 Right?

10 MR. SHERON: Yes.

11 MR. WARD: And I have forgotten whether the research
12 activity was really under that plan or not. It was?

13 MR. SHERON: I see--yes, it was.

14 MR. WARD: But it included applications through NRR
15 and not just what you are talking about here now is just the
16 research plan and not an application?

17 MR. SHERON: What we are talking about here is just
18 the research plan, okay. This is not the, how NRR plans to
19 apply, although it is related because we have user needs as
20 you will hear on what they would like, so we are focusing the
21 research with an application in mind, but in terms of
22 actually, when somebody actually takes the results and applies
23 it, however, they do, in the regulatory process, I think NRR
24 would do better to describe that program.

25 MR. WARD: Right.

1 MR. MICHELSON: Could you clarify for me the, back
2 in '83, and up to '85, this activity was all in NRR
3 essentially, wasn't it? The human factors activity?

4 MR. SHERON: Most of it was in NRR.

5 MR. MICHELSON: I thought nearly all of it was.

6 MR. SHERON: As I said, there was some work that was
7 being done in Research. It was not very high-level efforts.

8 MR. MICHELSON: What I am leading to, we eliminated
9 the human factors program for a while, and now we are
10 reactivating it. Is it now all in NRR, I mean all in
11 Research, or is a part of it still in NRR?

12 MR. SHERON: The research they are doing is just, as
13 described, it is research. We are also doing the human
14 factors generic issues.

15 MR. MICHELSON: Organizationally where are the
16 people that are worrying about human factors problems?

17 MR. SHERON: They are pretty much split I think.

18 MR. MICHELSON: Is there still a large unit then in
19 NRR on human factors?

20 MR. SHERON: I believe so. Joel or Dan, do you want
21 to say just what kind of capabilities NRR has right now?

22 MR. KRAMER: Joel Kramer, Human Factors Assessment
23 Branch--Research has two sections, total about nine human
24 factors professionals. Across the two sections, one is
25 man/machine interface action, the other procedures and

1 training section in NRR.

2 MR. MICHELSON: Where are the people that were--most
3 of them were at one time in NRR and not much in Research. Now
4 the people that were in NRR, where are they now?

5 MR. KRAMER: Some of them who are in NRR in the last
6 organization divisions are now in Research. Dennis Serig,
7 Lou, Claire Goodman, there are some people who years ago were
8 with us who are no longer with the agency.

9 MR. MICHELSON: Sure.

10 MR. WARD: When he said the program ended in '85, I
11 mean from '80, whatever it was, '81 on, there was a program as
12 I understand it, in both NRR and Research. In '85, the
13 program in research ended, but the program in NRR has been
14 going on all along. Research, what they are talking about now
15 is starting up again with the research program.

16 MR. MICHELSON: Then the people from NRR were moved
17 over to Research recently in the reorganization, and that's
18 what I was getting confused on is what do they have left now
19 in NRR to carry on that end of the activity? And I gather
20 there is still about nine people.

21 DR. LEWIS: Are there different skills required to
22 work on this subject from a regulatory position from NRR than
23 there are in the Research position or are the people more or
24 less interchangeable?

25 MR. SHERON: My perception is they are more or less

1 interchangeably.

2 DR. LEWIS: I see. That's very interesting.

3 MR. SHERON: Why is that?

4 MR. MICHELSON: I had a different perception. I
5 thought the ones in NRR were primarily focusing on operating
6 procedures and that sort of thing as opposed to research,
7 licensing exams and that kind of thing, which it is not.

8 MR. SHERON: Work is being done in NRR, okay, but in
9 terms of the skills, the basic skills.

10 DR. LEWIS: In most fields, there is a difference
11 between the kind of skill and orientation needed to do
12 research and the kind of skill and orientation needed to apply
13 it, so if in fact the people are interchangeable, I am not
14 sure what question that brings to mind, but it certainly
15 brings some question to mind.

16 CHAIRMAN REMICK: I am not sure the people in
17 Research are doing the research. They are doing the program
18 management I think.

19 DR. LEWIS: He says the people have to switch back
20 and forth. Their skills are--

21 CHAIRMAN REMICK: The people in the Office of
22 Research aren't necessarily doing the research. I think their
23 program managers are or the research efforts are contracted
24 out. Am I correct?

25 MR. SHERON: Most of our work is contracted out,

1 yes.

2 DR. LEWIS: That's a second echelon question. As
3 you know, research managers never have done research--you work
4 in the university, so you know the problem as well as I do.

5 CHAIRMAN REMICK: Dave, a comment?

6 MR. WARD: No.

7 MR. SHERON: Getting back to the need for human
8 factors research, as you know, we look very closely now at
9 operating events and LERs, and what we find is that the human
10 place has a large contribution with regard to the errors. A
11 lot of times why these instances occurred were a human error.
12 When we do PRAs, human performance is a significant
13 contributor to risk, and more importantly, I think it is a big
14 source of uncertainty in the PRAs. We can sit there and
15 calculate equipment performance or reliability out to many
16 decimal places from lots of data and everything, but it may
17 be, all be overshadowed by the ability of the human, so one of
18 the things we would like to do is get a handle on that, is
19 what is the contribution of the human to the risk?

20 And when we do the PRAs, as I said before, in
21 December '86, we received the NAS report on revitalizing
22 nuclear safety research which heavily emphasized the need to
23 do research in the human factors area. This was a neglected
24 area. This was emphasized again in our February '88 report
25 from NAS, as I just said.

1 EPRI is also preparing a report, control room
2 deficiencies, remedial options, and future human factors
3 research needs, which I understand should be out shortly, and
4 I think perhaps sometime in the future the subcommittee might
5 like to hear from EPRI and perhaps NUMARC on what their
6 initiatives are in this area.

7 MR. WARD: The second item up there, I guess I
8 always see that as perhaps it is necessary research, and it is
9 not completely illogical to have it as part of human factors
10 research program, but it really is risk assessment research.
11 It is there to service the risk assessment.

12 MR. SHERON: It is categorized in the area we call
13 human reliability, and Tom Ryan will tell you much more about
14 what programs he has to try and develop models that could be
15 used in PRAs.

16 MR. WARD: But the rest of the research program in
17 human factors is directed toward understanding human behavior,
18 and attempting to figure out how to deal with it and
19 accommodate it in nuclear power plant systems, and that one is
20 pretty much limited to, you know, quantifying human
21 reliability which oblique as it may be, as interesting to the
22 main part of the program, but mainly is interesting just to
23 the PRA efforts really.

24 MR. SHERON: That's right, but I think with this
25 agency leaning more and more toward using risk as a, or core

1 melt probability as a measure--

2 MR. WARD: And I think that's fine. I understand
3 you, but I don't, I hate to see that item overshadow the rest
4 of the program because it is probably the least important.

5 DR. LEWIS: The second item is really not an
6 independent item. The things that go into the PRA are in the
7 first item and the other items. The PRA is just a way of
8 putting together the information. It just isn't something
9 separate. It isn't PRAs that have identified performance as a
10 risk. It is the other information.

11 MR. MICHELSON: The problem is, though, if PRA
12 doesn't show a significant contributor risk, then we don't put
13 any money into the research program.

14 MR. WARD: Yes, but it has, and we are pretty well,
15 I think everybody is convinced of that.

16 MR. MICHELSON: Yes, but now I think they are going
17 back to see if it really, how big a contributor.

18 MR. WARD: Find out whether it was 40 percent or 35
19 percent. Who cares?

20 MR. MICHELSON: If the PRA shows it is a
21 non-problem, you don't get money for it.

22 DR. LEWIS: But the PRA doesn't supply independent
23 information. The PRA simply takes the other information, so
24 if it doesn't reflect what the other information is telling
25 you, then it isn't a very good PRA.

1 MR. MICHELSON: And that's the case today because we
2 don't have good numbers for human reliability to put into a
3 PRA, but I assume they are going to get them.

4 DR. LEWIS: In the case of WASH 100, I remember
5 looking very carefully into the source of the numbers that
6 went into it, and it was really not worth mentioning in
7 public.

8 CHAIRMAN REMICK: Do you want to continue?

9 MR. WARD: Another comment--I, you know, I agree
10 that we probably don't really have a real good handle on those
11 numbers, but I suggest that what we know there is probably as
12 good as or much better than what we know about questions like
13 should shift operators have degrees or not, or I mean I think
14 that's where the emphasis on human factors research should be,
15 some of these questions that we have just been wildly guessing
16 about instead of just guessing about.

17 DR. LEWIS: You are probably not even in favor of
18 aptitude testing!

19 MR. MICHELSON: Let's not start that one!

20 CHAIRMAN REMICK: Please continue.

21 MR. SHERON: Okay.

22 (Slide)

23 MR. SHERON: Having worked in NRR for about 11 years
24 and written a number of user need letters, when I came over
25 here naturally I guess the first thing I wanted was user need

1 letters, so we went around and we became obnoxious I guess and
2 asked NRR and AEOD, we also asked within RES and also NMSS, to
3 identify their research needs in the area of human factors.

4 We received letters from NRR, from AEOD, and also
5 from within RES identifying various areas of human factors
6 research where the information was needed to carry out their
7 functions. We initiated a dialogue with NMSS. They are just
8 starting to get into the human factors aspects of nuclear
9 material. They have promised us a user need. We said fine,
10 when it comes over, we will see what we can do to get that
11 research going.

12 CHAIRMAN REMICK: I suspect they are going to need
13 some help. I am not sure it is Research, but I find that they
14 are living 20 years in the past on human factors
15 considerations, and even knowing about something called
16 performance based training, and for the MRS, so forth.

17 MR. SHERON: Well, they have an office director now
18 that has a little bit of experience in this area.

19 The other things we are doing is we are looking
20 ourselves and saying what are, for example, like the NAS
21 report, you know, is there any research that looks like it
22 could be substantial in contributing toward better
23 understanding safety and the like, and to initiate it on our
24 own?

25 The other thing we don't want to do is duplicate

1 efforts, so we are trying to look at all these user needs for
2 various areas and combine user needs into one project to more
3 efficiently use our resources, and again we are trying to
4 coordinate our planned projects with our users. The research
5 results are not going to be any good if they can't be used by
6 people that need them. We want to make sure that as we do the
7 research, the end products that are being produced are indeed
8 what the user wants to see, like to have frequent coordination
9 meetings, briefings on them, and we will be keeping that up.

10 MR. WARD: Do you see the research program as driven
11 100 percent by user starts, identified user needs or 50
12 percent or what?

13 MR. SHERON: I would characterize it at, I think
14 that the user needs, and I really don't know how to put a
15 percentage on it; maybe 75 percent by user needs right now,
16 but I always felt that the Office of Research prime function
17 was as a service organization, to enable this Commission to do
18 its main function which is regulate the nuclear industry, and
19 so my feeling was, is that we should do research that is
20 responsive to the user needs as a first priority.

21 Once we have gotten the proper research in place,
22 which is responsive to all of our customers, then we would do
23 additional research which we feel may be measurement to better
24 understand certain areas of human factors and the like but may
25 not have a specific customer in mind, but my feeling is I

1 can't sit there and tell the customers no, we are not going to
2 do the research that you desire to get your job done because
3 we have something else we want to do, so if you look at our
4 research program plan, as I said, the priorities are, is that
5 we make sure that we have the right programs in place to meet
6 all of our customer needs first, and then if there is
7 additional funds or resources available, we would work in
8 areas that we think may be measurement of our own initiatives.

9 (Slide)

10 MR. SHERON: I don't know if that answers your
11 question, but I am guessing right now perhaps our user needs
12 constitute somewhere 75 percent of our program, maybe 50 to 75
13 percent.

14 DR. LEWIS: The question I was going to ask--

15 MR. WARD: I liked the quantitative answer better
16 than the qualitative answer.

17 MR. SHERON: I am trying to argue that it can
18 change. If I got a new user need letter from NRR that said
19 tomorrow I need the following information, I would probably
20 shift funds from work that was not a user need type of program
21 and the like.

22 MR. WARD: Yes.

23 DR. LEWIS: The question I was going to ask is
24 related to what Dave was asking, because there is a general
25 problem within the agency, of course, in terms of what the

1 objective of research is, but the research program by long
2 tradition, and I, we seem not to be able to change that, is
3 supposed to serve the regulatory needs of the agency.

4 On the other hand, the users themselves are not
5 always the best people to judge what their needs are, so that
6 a program which is responsive only to the expressed user needs
7 or to the user desires may not be the most useful in terms of
8 what the real users needs are. We sometimes don't know what
9 our needs are, and this is prompted in part by a briefing I
10 heard in the last month or so in which at least one user
11 element expressed its needs in terms of support for new
12 requirements and regulation. They said they had dropped
13 working on a particular subject because we couldn't see it
14 leading to new requirements or rules, and it's a very narrow
15 construction of what the need of the user agencies are, so I
16 wonder if that's the context in which you are communicating
17 with the your user agencies or in terms of improving their
18 understanding of the job that they are now doing? I phrased
19 it badly.

20 MR. SHERON: I understand what you are driving at.
21 I think what we are trying to do is what, the way you have
22 described it.

23 DR. LEWIS: That's the 25 percent or--

24 MR. SHERON: Right now, we are at the 25, the 50
25 percent I would say.

1 DR. LEWIS: Directing the user needs and the other,
2 responding to it? I am putting you in a pickle I think.

3 MR. SHERON: I am saying that we have tried to
4 identify what I would call areas where we are just trying to
5 better understand our knowledge. I have described it as
6 looking under rocks. Okay. Part of the research we do is to
7 go out there and to find if there are problems, okay? In
8 other words, we may not even know that there is a problem
9 somewhere in some aspects of human behavior.

10 DR. LEWIS: Not narrowly constructed in terms of
11 support for new requirements and regulations?

12 MR. SHERON: No, not at all. The backfit rule fixed
13 that. It is very difficult to develop whole new regulations
14 or requirements, but I think what we are trying to do is to
15 give the users, as you said, the knowledge that they need to
16 carry out their functions.

17 DR. LEWIS: Except--just to make one more
18 sentence--except that in assessing their needs, at least in
19 the case of one group, they saw their needs really extremely
20 narrowly. They had no interest in anything that would not
21 lead to a new requirement. That was their criterion for
22 usefulness. It is hard to work in that environment.

23 MR. SHERON: I agree. And we have to take that, you
24 know, and again, if we think that Research should go on in
25 that area, even though it may not lead to a requirement

1 because we think there is a payoff, then we would go ahead and
2 do that research.

3 Very quickly to summarize human factors research
4 needs which we got from the various user offices, and I don't
5 want to go into any detail, you will hear more about this
6 during the rest of the morning, NRR asked us to look at
7 organization and management influences on safety, human
8 reliability research, some of the impact of the advanced
9 technologies, for example, expert systems, advanced control
10 room instrumentation, digital computers in the control room,
11 operator and team performance, and areas of dealing with
12 procedures and training. AEOD asked us to look into cognitive
13 error, management questions, and programmatic performance
14 indicators which we have a rather extensive program on right
15 now.

16 Within Research itself, we have the man/machine
17 interface for advanced control rooms, human factors aspects of
18 accident management. This is within our own division. We
19 have an accident management program again which is under
20 development right now, which we would be coming down to the
21 ACRS sometime in the future to describe, and then there is the
22 human error data bank which you will hear more about. As I
23 said before, NMSS is right now trying to put together what
24 their human factors needs are, and so we haven't really had
25 any identified to us yet in that area.

1 CHAIRMAN REMICK: Before you leave this, that one
2 down there under research, I guess I am surprised I didn't see
3 that up in NRR, something like that.

4 Would you say accident management, and I realize it
5 may be in too much depth here, but is that in vessel
6 management, or what is it?

7 MR. SHERON: In vessel, X vessel, we have broken up
8 accident management into three areas right now. The first is
9 that aspect of accident management dealing with preventing the
10 core from melting in the first place. What things can an
11 operator do or what, what changes might be made to the plant,
12 practical changes, that an operator could initiate, for
13 example, putting in cross-connects or fire hoses or something
14 like this to prevent the core from melting in the first place.

15 The second aspect is given that the operator can't
16 prevent the core from melting, what things can he do to
17 prevent the core from penetrating the vessel, creeping it in
18 the vessel and keeping it cooled?

19 And then the third is that I couldn't keep it in the
20 vessel, what can I do to keep it in the containment, or if it
21 fails to containment, how can I manage the releases?

22 CHAIRMAN REMICK: It definitely is emergency plan
23 management, that type of thing. Good.

24 MR. SHERON: No. We have--

25 CHAIRMAN REMICK: You are going to be developing

1 your plan? I saw in one of your references that you have that
2 kind of a draft?

3 MR. SHERON: We are putting together a draft of an
4 accident management research program plan, very similar to
5 this which is going to again define what it is we are trying
6 to accomplish, why, what research is needed, what the
7 questions are. That program Frank is very heavily involved in
8 his branch, so as you can see, there will be a close tie
9 between the human factors portion and the accident management
10 portion.

11 CHAIRMAN REMICK: I would appreciate receiving a
12 copy of that draft when you feel it is ready.

13 MR. SHERON: My guess, it is probably going to be
14 about another month or so before it is to the point and we
15 send one out for comment.

16 CHAIRMAN REMICK: NRR has identified that as a need?

17 MR. SHERON: NRR is right now putting together their
18 part of an accident management program, and we are working
19 very closely with them. There is supposed to be a Commission
20 paper developed and there is a draft floating around
21 somewhere, that will describe to the Commission what NRR's
22 accident management program is and what the research program
23 is, and how the two come together. Why is what we are doing,
24 how does that meet their need? How are they going to
25 implement it and use it and the like? That's being developed.

1 I would guess it will go down sometime when this big
2 interrogation plan on severe accidents goes down there.

3 MR. MICHELSON: Can I ask a follow-up question along
4 the same line?

5 In the case of a severe fire, in other words, one
6 that burns beyond the design basis for fire protective
7 features, is that a, you know, there are a number of human
8 factors involved in how one addresses severe fire, smoke
9 problems and so forth, fighting problems, whatever.

10 Is that going to be a part of what you are going to
11 look at here? Are you thinking of an accident as a cleaner
12 concept than say a severe fire or severe flood? Large pipe
13 break, for instance, might get very interesting in terms of
14 the ability of humans now to do certain things you had planned
15 on doing. Are you going to look into that sort of thing?

16 MR. SHERON: In the context of the accident
17 management, yes. We are looking at in order for an operator,
18 in other words, if an operator has the capability to mitigate
19 an event, okay, or to reduce its consequences, what we want to
20 look at is those factors which can influence the ability of
21 the operator to accomplish that.

22 MR. MICHELSON: You will look at fires because they
23 are, the human factors become extremely important.

24 MR. SHERON: In the area of accomplishment, we would
25 say what are the practical things an operator might do to

1 minimize the effect of a fire? And if one of the means, for
2 example, for example, going into a room that is smoke filled
3 where he can't breathe, we would say a good solution to that
4 might be air packs or something.

5 MR. MICHELSON: But he can't see, either.

6 MR. SHERON: In which then we might say that is not
7 a practical solution.

8 MR. MICHELSON: I just wondered if you are going to
9 get into that sort of thing.

10 CHAIRMAN REMICK: Human performance part of the
11 human factors plan I hope we are going to get to shortly. I
12 would assume that might fall under human performance.

13 MR. SHERON: Yes.

14 MR. MICHELSON: I was mainly interested to see if
15 fire and the effect of fire were going to be included when
16 thinking about human performance.

17 MR. SHERON: Okay. That concludes my 15-minute
18 introduction which went a little longer.

19 CHAIRMAN REMICK: Where along this can we have a
20 discussion of whether you plan to invite expertise throughout
21 the United States and so forth to respond to these things, in
22 contrast to going to the good old stand-by national
23 laboratories for this?

24 One of the recommendations, that of the NAS study is
25 that you should get broad input into this, and get social and

1 behavioral scientists involved in some of these things and so
2 forth. Is somebody going to tell us how you plan to do that?

3 MR. SHERON: Yes. I would, in defense of the lab, I
4 mean I think they have been a little maligned here. We have
5 made sure as a matter of fact to the chagrin of DOE, who sent
6 me a nasty letter about it, but when we have been going out
7 with some of our contracts, we have requested resumes of each
8 of the people working in particular on the human factors areas
9 because we do want to make sure that we have qualified human
10 factors type of people and not just recycled LOFT engineers or
11 something, and as I said, we requested that, and the
12 Department of Energy got a little upset because they didn't
13 want to identify, but we have been insistent that if we do
14 contract at the laboratories the human factors work we want to
15 make sure we have well-qualified people working on it.

16 CHAIRMAN REMICK: You want to get the best possible
17 expertise that you can get, and if it is the national
18 laboratories, fine, but I think you have to be sure if their
19 expertise is also where, that they have an opportunity to bid
20 on this work.

21 MR. SHERON: Yes, and you will hear more about--we
22 are trying to do that. We are trying to get a much better
23 balance with our contracting between the laboratories and say
24 private industry or other than national laboratories.

25 MR. MICHELSON: I hope your discussion with DOE was

1 more encompassing than just human factors. The same problem
2 pertains in a number of other research areas. Are they using
3 recycled people or using people who are reasonably cognizant
4 of the area they are going to deal with it?

5 MR. SHERON: Right now my major concern was in human
6 factors. It was restricted to that.

7 MR. MICHELSON: There is a probability beyond human
8 factors.

9 MR. SHERON: With that, I will turn it over to Alan
10 Rubin, who will now discuss the overall research plan.

11 CHAIRMAN REMICK: Thank you, Brian.

12 MR. RUBIN: Good morning. My name is Alan Rubin. I
13 am section leader in the Human Factors Section in the
14 Reliability and Human Factors Branch in Research.

15 I welcome the opportunity to talk about the human
16 factors program plan this morning. To set the tone a little
17 bit about this overall process, I have a slide that says there
18 are decisions to be made, and there is a general agreement
19 that human factors research should be increased, and that's a
20 calm table, people sitting around and in agreement at that
21 point.

22 CHAIRMAN REMICK: Any similarity with this table?

23 MR. RUBIN: It is not intended to reflect the ACRS
24 subcommittee or Full Committee, by the way.

25 MR. MICHELSON: How come it is not in the handout?

1 MR. RUBIN: I needed something for a surprise! The
2 tough job is to really get down to the brass tacks and
3 determine what the plan is going to be, which I will present
4 this morning.

5 CHAIRMAN REMICK: Looks like somebody has been here
6 on Saturday morning!

7 MR. RUBIN: I don't know who that fellow is right
8 here, but he has got the gavel.

9 DR. LEWIS: I remember Dave Moore tried to improve
10 ACRS meetings by making them more orderly. I would say that
11 was an unqualified failure. Won't you agree?

12 MR. WARD: Yes.

13 MR. RUBIN: What I will cover this morning are
14 objectives of the plan, the overall purpose of why we are
15 developing the human factors research program.

16 For the research areas, I have identified five major
17 research areas that the program plan includes, talking about
18 the objectives of those areas, work that is ongoing, specific
19 projects that we are developing, planned research that we
20 expect to conduct in these areas, and some major expected
21 results.

22 Unfortunately, because of time constraints, I will
23 only be able to give a brief description of the plants,
24 basically trying to talk about the objectives, and the scope
25 of the projects. We will have, we won't have enough time

1 today to get into a detailed review of the projects. However,
2 in the future, if you would like to hear about some, we will
3 be happy to come back and discuss them.

4 The projects are in various states of progress. Some
5 are nearing completion of ongoing work. It has been underway
6 for a number of years. Some have recently been started. Some
7 projects, the plans are well developed but they have not yet
8 let contracts to initiate work, and others are such that plans
9 still need to be developed.

10 The subcommittee has asked to hear about two
11 particular projects that have been ongoing. Then Tom Ryan
12 will present those later. One of those is on a nuclear data
13 base of human reliability, and another one is on cognitive
14 modeling progress, so obviously because of limited resources,
15 need to prioritize the project, that was discussed earlier,
16 and I will get into that as well. We can't support all
17 proposals that there are out there in the human factors area,
18 so we have to pick and choose and select the higher priority
19 ones.

20 Also get into a little bit of how these programs and
21 research areas fit together in the process for resolving human
22 factors concern. This is a systems oriented approach. You
23 will find many similarities between the recommendations of the
24 National Academy of Sciences that you heard Morville Moray
25 present to you about two weeks ago, and you will hear how the

1 areas of research that we have identified impact one upon the
2 other--advanced computers, for example, affects other areas,
3 such as training, need for different training for operators,
4 procedures, staffing requirements. There is an
5 interrelationship between these different research areas which
6 I will get into.

7 Brian mentioned the plan will be updated
8 periodically to reflect changes in the human factors research
9 program as projects are completed, reflect newer needs, and to
10 affect new projects, to present new projects as they are
11 included in the program plan.

12 MR. WARD: Alan, I guess I don't see it in here, but
13 are you going to prepare or are you going to present any sort
14 of a kind of a tick by tick comparison against the NAS panel?

15 MR. RUBIN: I am not today. That was not the
16 objective of this presentation.

17 MR. WARD: Eventually is there going to be some sort
18 of office response to that report?

19 MR. RUBIN: Yes. When we go down to the Commission
20 with the program plan which we will do in May, we expect to
21 have an attachment to a Commission paper which will discuss
22 the NAS recommendations and our response to them. In the
23 process of working on that, it was not the intent of this
24 meeting--the subcommittee asked to hear about our program
25 plan, but I think you will find a lot of similarities.

1 (Slide)

2 MR. RUBIN: The objectives of this plan are to
3 outline a summary of the structures of a human factors
4 research program which is in line with the Commission's policy
5 and planning guidance, which was a commitment to explore
6 methods to better understand the causes of human error, and to
7 reduce its incidents.

8 The results of this research program and the product
9 that we obtained from them are aimed at developing the bases
10 to support recommendations or guidance or requirements to
11 reduce the likelihood of human errors that could adversely
12 affect the public health and safety. This is a systems
13 oriented approach in which people are looked at as to how they
14 are expected to be able to perform their tasks, to say the
15 systems goals which system is considered human, and the
16 hardware.

17 This plan will identify major areas of research to
18 be sponsored by NRC, and some discussion earlier as to what
19 kinds of research we will be supporting. In line and
20 consistent with the research strategy and NRC's research
21 philosophy, plan includes short material tasks, which will
22 support timely regulatory decisions and user needs. That
23 includes the resolution of human factor generic issues, and
24 also includes longer term research to allow NRC to anticipate
25 human factors problems of potential safety significance.

1 Those are the kind that Brian likes to call looking under
2 rocks to see if a problem exists.

3 This research may result in additions, or reductions
4 in regulatory guidance or requirements. If there are new
5 regulations that come out this program or recommendations for
6 requirements, they would need to be justified in accordance to
7 the existing backfit rule considering the cost and benefits of
8 these new requirements. A part of the plan is any plan should
9 have to obtain feedback to confirm the effectiveness of
10 changes from implementing the results of research, and I will
11 discuss part of that when we talk about the programmatic
12 performance indicators that you will hear about when I get
13 into one of the research areas.

14 MR. WARD: With regard to the short-term tasks and
15 USIs or generic issues, are there any generic issues or USIs
16 that are essentially all, you know, human factors related
17 issues, or do you mean that each USI or GI may have a, GSI may
18 have a generic, I mean a human factors component?

19 MR. RUBIN: What I mean here are specifically the
20 human issues that have been identified as human factors
21 generic issues. These were included in the human factors
22 program plan that NRR had and the, in the reorganization in
23 April of last year, there were nine human factors generic
24 issues that were transferred to Research. These are the ones
25 I mean today. I will discuss them as we get into the

1 projects.

2 (Slide)

3 MR. RUBIN: This plan is divided into five major
4 research areas. Wouldn't be too surprised to see these listed
5 as the man/machine interface, procedures, areas of
6 qualifications and training, organization and management, and
7 human performance and human reliability assessment.

8 The question came up earlier about maintenance. We
9 discussed a little bit, quite extensively whether maintenance
10 should have been a separate category or topic in the human
11 factors research program and decided that maintenance was
12 really not a human factors subject. It was an area that was
13 influenced by all five of these research areas. Man/machine
14 interface, the procedures required for maintenance,
15 qualifications and training, organization and management,
16 human performance and reliability, all affect the maintenance
17 activity, so we did not have a separate maintenance, separate
18 maintenance research area as part of the program plan, but it
19 is included and woven into our, the research areas.

20 CHAIRMAN REMICK: That, the order of that list is
21 different than the draft plan that we received. Is there any
22 significance to that?

23 MR. RUBIN: No, there is no significance. The
24 reason that human performance and human reliability is last is
25 because it leads into Tom Ryan's presentation, and I didn't

1 want to separate the two by too much.

2 Also the man/machine interface was put first because
3 that's what I will get into in the traditional, considered
4 the, more the traditional human factors work.

5 For each of these areas, I will summarize the
6 overall objectives and the key anticipated results of
7 research, and overview will be followed by a summary of the
8 discussions, the ongoing projects in each area.

9 The man/machine interface, as I just said, it is the
10 link between people and systems and hardware and software in
11 the nuclear power plant. It is traditional work of human
12 factors, the knobs and dials or displays and controls. The
13 objective of this research area is to identify concerns or to
14 determine if the man/machine interface is compatible with
15 human performance capabilities; for example, if human error
16 rate may be unacceptably high, vital information is difficult
17 to find, if it is hard to read or interpret, or if there is
18 conflicting information that is presented to the operator.

19 Some of the key anticipated results we expect from
20 this program are human performance guidelines for advanced
21 controls, instrumentations, expert systems, which will be used
22 to support reviews of advanced control rooms or modifications
23 or review of modifications of backfits to existing control
24 rooms in nuclear power plants.

25 CHAIRMAN REMICK: Alan, there is some obvious things

1 like control room that obviously fall under here. There is
2 another area that has concerned me for a long time, and I even
3 hesitate to think of whether it is research or not, but
4 research is sometimes hard to identify, and that is a case
5 where perhaps we have regulatory conflicts with physical
6 security. Because of that, we lock up certain things, and I
7 am looking at the Davis-Besse incident where operators are
8 running around trying to make sure they have keys to unlock
9 gratings and so forth so they can get to some important
10 equipment.

11 Is any part of this looking at do we have regulatory
12 inconsistencies which do not enable an operator to perform his
13 job? Is there any effort in that direction?

14 MR. RUBIN: We haven't identified that specific, but
15 I think if you look at the area which I am going to talk about
16 next, there has been a number of events and LERs that look at
17 procedural problems to advanced or to operator errors, and I
18 would think that in looking at whether procedures are adequate
19 or not, one of the things that you might do is consider can
20 the operator actually carry out his task? And that could be
21 covered under that kind of review.

22 CHAIRMAN REMICK: It was important. I think the
23 phobia sometimes of physical security, we lock things up and
24 then expect an operator to be able to get to it and operate it
25 in an emergency, sometimes are inconsistent.

1 MR. RUBIN: Or whether he can get to it, and another
2 part of it in the man/machine interface is considerations of
3 local control stations.

4 CHAIRMAN REMICK: Yes.

5 MR. RUBIN: I will discuss these later on.

6 MR. MICHELSON: The thing that bothers me a little
7 bit on such things as the man/machine interface, and that is
8 that we have understood for a long time, EPRI has done some
9 very fine work on the problem of adequate identification of
10 equipment and so forth, and yet you go into the plants and the
11 problem is the same today in most cases as it was several
12 years ago. You can even talk to the superintendent and ask
13 him where a given valve is and he has to wander around looking
14 at tags trying to figure out is that the one? The tags have
15 meaningless numbers almost on them in some cases, so the
16 people even reading the tags aren't quite sure of what it is
17 he is looking at, and this is very simple, and yet the agency
18 has done little or nothing to really do something about the
19 problem of adequate identification so we don't have these
20 wrong train, wrong pieces of equipment kind of events
21 occurring, so here we are going on with research into the
22 future and we are not even doing things on problems we have
23 already well understand and we know how to cure them, but we
24 are doing nothing about it, so where is that being done since
25 it isn't Research's job I guess to try to fix things that are

1 already well understood, but where else, who does it then. It
2 is a man/machine interface problem, so I guess NRR somehow has
3 somebody that sees this and worries about it, and pushes on it
4 or where is the push coming from for adequate identification?

5 And a classical example is the hydrogen line that
6 goes to the volume control tank inside the reactor building or
7 auxiliary building, and keep going to plants, I ask where is
8 that hydrogen line? People don't even know where it is. And
9 then we finally figure out which one it must be, and there is
10 no identification on it, no warning that says don't
11 disassemble this valve, this is a dangerous situation you are
12 getting into, no unique paint of fire protection, all painted
13 red, but the hydrogen lines aren't painted some unique color

14 What are we, why don't we do a few things on what we
15 already understand?

16 DR. LEWIS: Is that really true, Carl?

17 MR. MICHELSON: Yes. It is amazing.

18 DR. LEWIS: Because in every physics building I have
19 every been in the lines are painted distinctively.

20 MR. MICHELSON: It is very important, but there is
21 no code requirements, no requirements. We were at Surry the
22 other day, and I mean not Surry--Harris, again asked where is
23 the hydrogen line? We knew it was in that room with all the
24 other stuff we were worried about. It doesn't require that it
25 have a unique color or identification.

1 DR. LEWIS: I don't even see why it is necessary for
2 NRC to be involved. Don't the building managers want these
3 identified?

4 MR. MICHELSON: EPRI did a very fine job of pointing
5 these problems out and producing a document that shows what
6 good identification looks like and what poor identification
7 looks like, and they did the necessary things about the
8 problem, but now we go on to the new things on man/machine
9 interface, whereas we aren't fixing old ones yet.

10 DR. LEWIS: You have depressed me.

11 MR. MICHELSON: Does NRR have a comment or Research
12 have a comment on it? Or anybody?

13 MR. COFFMAN: If I understand the question here, you
14 are addressing the implementation of knowledge and, developed
15 from research, and that's just outside, outside our scope.

16 MR. MICHELSON: Whose scope is it in then I guess?
17 I guess we have to ask NRR to come down and explain why they
18 don't require good identification of nuclear plants.

19 DR. LEWIS: It is a deepened knowledge that comes
20 from research. This is sort of long-standing human--

21 MR. RUBIN: We have somebody from NRR.

22 MS. RAMEY-SMITH: I have worked on the wrong unit,
23 wrong train study in NRR. The short answer to that question,
24 the labeling was one of the major contributors to wrong unit,
25 wrong train incidents that we had studied and what the

1 resolution of that if--it is not resolved yet, was to
2 coordinate with INPO rather than us go out and create a
3 regulation. coordinate with INPO to have them start picking up
4 this self-regulation if you will kind of effort because you
5 are right. The guidance is available, and there are some
6 plants have very good plant programs and others that are
7 abysmal.

8 At this point, I am not quite up on the up to the
9 minute status, but I know that INPO has incorporated into its
10 plant inspections a, an aspect to look at plant labeling and
11 so on and provide feedback to the individual plants on their
12 labeling program and presumably give them advice and
13 encouragement to improve those.

14 Other than that, I think that's about it.

15 MR. MICHELSON: Thank you for a very good answer.

16 MR. WYLIE: Might I ask a question? How far along
17 is INPO in that, do you know?

18 MS. RAMEY-SMITH: I really don't know, because I
19 have been moved to another branch and back and forth, and so I
20 haven't followed it for about a year and a half.

21 CHAIRMAN REMICK: She has stated just my gut
22 reaction how it should be done. I would think that this is
23 something that this subcommittee could look into it, and see
24 if it is widespread, and if we are concerned, we could
25 certainly address it, and I think that we could encourage INPO

1 that perhaps take this up in one of their managers workshops
2 where maybe one of us if we feel inspired could get invited to
3 go and talk to the plant managers and raise this, and I think
4 that's probably the most effectively--I am not sure you are
5 going to get it done through regulation.

6 MR. MICHELSON: No.

7 CHAIRMAN REMICK: Inspiration and so forth.

8 MR. MICHELSON: Maybe we can put it on future--it is
9 mainly a human factors problem I think, but it is applied
10 human factor, not research, and I am just a little disturbed
11 that I see some good work having been done and I think EPRI
12 did some good work on it and yet I don't see it happening.
13 Whenever we do make a plant visit, in many cases, it is
14 abysmal.

15 CHAIRMAN REMICK: There are some good examples.

16 MR. MICHELSON: I haven't yet seen real good
17 examples, as good as EPRI shows it ought to be, but I have
18 seen some better examples, yes, and I have seen some abysmal
19 ones.

20 MR. WARD: Carl, are you talking examples you have
21 given, been out in the plant as opposed to control room?

22 MR. MICHELSON: This is out in the plant. Right now
23 in the control room it is a different issue. Some plants do
24 very good control room identification and abysmal job out in
25 the plant. It isn't consistent.

1 MR. WARD: I want to ask you, I mean the NRR I guess
2 did have the program of what they called paint, label and tape
3 a number of years ago to improve identification and so could
4 coherency of control room man/machine interface.

5 Are your observations that this has been reasonably
6 successful?

7 MR. MICHELSON: I never looked from the viewpoint of
8 this, how--I have seen--again, most control rooms in my visits
9 where I have looked at control rooms looked pretty good by
10 comparison with out in the plant. It is out in the plant that
11 I have the problem.

12 MR. WYLIE: My impression is the control room
13 reviews were very well done. I think the problem now is some
14 haven't corrected their problems. You go into a lot of
15 control rooms, they still haven't done it. I can't understand
16 that. The reviews took place three, four years ago and yet
17 they haven't corrected their board yet.

18 MR. COFFMAN: I have might amplify on the point I
19 was trying to make is that yes, it is outside the
20 implementation and individual plants is outside research.
21 However, we do have plans to do research into organization and
22 management that Alan will be describing and certainly
23 management policies as they relate to the implementation is
24 something that is under, is a researchable item, but not the
25 individual plant implementation. I just wanted to clarify

1 what is outside the scope and what is potentially with inside
2 the scope of research.

3 MR. WYLIE: I might point out, Dave, the Sequoyah
4 control room reviews that have been completed, they have not
5 changed their control room and we found that when we went down
6 on our visit. I couldn't understand that as long as it has
7 been shut down, why they haven't changed the control room, but
8 they haven't done it.

9 DR. LEWIS: You need remedial training in human
10 nature if you don't understand it.

11 CHAIRMAN REMICK: I suggest we proceed.

12 MR. RUBIN: I will talk about human factors generic
13 issue and the local control stations that were involved as it
14 relates to your--

15 DR. LEWIS: You mentioned in the context that you
16 have programs in using expert systems, to evaluate new control
17 room designs if I remember correctly.

18 MR. RUBIN: Expert systems, the kind of guidance
19 that would be--

20 DR. LEWIS: I understand. I am hard pressed to
21 understand how one would use an expert system to evaluate
22 those things. Is there a specific--

23 MR. RUBIN: It was not the, using an expert system
24 to evaluate the advanced control rooms. It was criteria for
25 advanced control rooms.

1 DR. LEWIS: Using certain systems to develop the
2 criteria.

3 MR. RUBIN: Criteria for the application of expert
4 systems if they were to be used in nuclear power plant control
5 rooms; you were going back two steps which was saying are we
6 developing expert system for the review? No, we are not. I
7 think if I understood your question--

8 DR. LEWIS: Okay.

9 MR. WARD: Did he answer it?

10 DR. LEWIS: No, but it would take too long to make
11 me happy.

12 MR. RUBIN: Procedures are an obvious important part
13 of human factors program. They are required to provide
14 information and directions to the operators, the operators to
15 assure that they can perform their tasks in a manner that is,
16 satisfies the system goals.

17 The procedures should include identification of when
18 tasks should be performed, sequence of steps required as well
19 as when they should, operator should branch to other
20 procedures.

21 Procedures should contain sufficient warnings or
22 constraints to the operator and should also provide feedback
23 to indicate when the task have been successfully completed.

24 The objective of the research program is to
25 determine how--first of all, to determine if procedural

1 problems adversely impact human performance, and if they do,
2 how they do such as procedures are inadequate or they may be
3 poorly presented to the operator.

4 The results of the research and procedures, we
5 expect that there could be additional guidance to determine if
6 additional guidance is needed such as guidance above and
7 beyond what is already on the books for emergency operating
8 procedures, which would be in place or needed to be in place
9 to improve operator performance. If guidance is needed, we
10 would try to develop recommendations as part of the research
11 program plan.

12 Qualifications and training are very difficult to
13 separate from procedures. From a human factors standpoint,
14 that is an important interrelationship on meeting system
15 performance objectives.

16 Qualifications include the selection of personnel
17 either with the skills or potential capability to obtain the
18 skills needed to perform their tasks and training, obviously
19 would be used to enhance knowledge and skills to improve
20 operator performance.

21 Although this is a very important area from the
22 human factors standpoint, NRC and Research recognize the
23 significant work that has been done by industry in this area,
24 including NUMARC, and INPO. You will find in the Research
25 program plan itself that there is less emphasis on this area

1 than on some other.

2 MR. WARD: Do you think NUMARC and INPO have done
3 research in that area?

4 MR. RUBIN: We have yet to see what particular--

5 MR. WARD: Doubtful.

6 MR. RUBIN: NRC is following the activities of
7 industry in this area. One of the major reasons that NUMARC
8 was formed was to improve industry's qualifications and
9 training of operators from an industry self-regulation
10 standpoint, and current plans are more limited in the
11 procedures area than they are in some of the others.

12 MR. WARD: Procedures?

13 MR. RUBIN: I'm sorry--in qualifications and
14 training.

15 MR. WARD: Well, I guess I agree that INPO and
16 NUMARC have done a lot of, you know, work in this area, and a
17 lot of good work, but I don't think they have done much
18 research. It has been mostly, you know, kind of seat of the
19 pants judgment sort of stuff.

20 It seems to me that NRC might be interested in doing
21 research in this area so that they have an understanding of--I
22 mean NUMARC and INPO kind of have the ball in this area, and
23 are running with it. You have backed off. The agency has
24 backed off, but I don't know how, you know, what sort of basis
25 do you have for making judgments about whether they are

1 running with the ball in the right direction?

2 MR. RUBIN: Let me--in the initial research, the
3 objective of the program right now is to see if improvements
4 are needed to address the human factors concerns with
5 qualifications and training.

6 One research program that we have planned which as a
7 key result is more the confirmatory area of research, which is
8 to evaluate the effectiveness of training programs, that's
9 related to a specific user need that has been identified, and
10 in evaluating the effectiveness of training programs, we may
11 find that there is a need to continue research in certain
12 areas.

13 Also part of programmatic performance indicated
14 programs that I will talk about as part of its objective to
15 determine indicator on training effectiveness, so it is not
16 being neglected. It is just that right now, we don't have
17 specific projects that are planned other than this
18 confirmatory research to determine effectiveness of training
19 programs. That may change in the future. This is depending
20 on user needs and other recommendations.

21 The organization and management activities, it is
22 well known that operator performance can be affected
23 significantly by organizational structure, corporate policies
24 and management practices. For example, the staff size and its
25 composition affect individual workloads, and therefore affect

1 the performance requirements for operators.

2 In the area of corporate policy or practices, does
3 shift scheduling and overtime affect operator fatigue, and
4 therefore affect their performance capabilities.

5 The primary objective of this research and
6 organization and management is to assess how those factors
7 influence human performance, and we expect results in several
8 areas from this program.

9 First of all, we expect research to be able to
10 provide guidance to NRC on significant factors to consider
11 when reviewing licensee organizational structures. We also
12 expect the program to be able to come up with some
13 recommendations or input to develop improved programmatic
14 performance indicators so that NRC can monitor trends in
15 licensee performance.

16 We also expect this activity to be able to provide
17 estimates of the variability of human performance from PRA
18 perspective, taking into account ranges of operator
19 performance accounting for either good or poor organizational
20 management practices at utilities.

21 Tom Ryan has a project going on right now that was
22 particularly focused in this area which is in response to a
23 user need from NRR. He is not planning to talk about that in
24 detail today. That is one of the activities that we started
25 back in the late part of fiscal year 1987.

1 MR. WYLIE: This scope of this program includes the
2 overall organization and management and its effects on total
3 operation?

4 MR. RUBIN: Yes.

5 (A discussion was held off the record.)

6 MR. RUBIN: The human performance and human
7 reliability assessment area are really two objectives. It is,
8 one objective is to develop a data base and human error rates
9 for putting into PRAs. That is not the only purpose, however.
10 Another objective is to model human performance
11 which is to develop causal model of human errors to determine
12 the significant factors that undermine human performance,
13 determine why these errors occur, really get down to the root
14 cause, see what improvements can be made so the results we
15 expect from this program will be to improve PRA estimates,
16 reduce the uncertainty in PRAs, as we, as to provide input for
17 resolutions of generic issues where there are human factors
18 concerns that have been identified, what are the root cause of
19 of events as they have occurred and what improvements can be
20 made?

21 (Slide)

22 MR. RUBIN: Go into the first area, a little before
23 we identified the projects and man/machine interface program.
24 This is a particularly important aspect of the human factors
25 plan as we expect new computers to be, either backfit existing

1 control rooms, new technologies, new technology to be
2 developed and implemented, and there is a need for a guidance
3 and criteria in these areas so that NRC does not become an
4 impediment to implementation of improvements in control rooms
5 or in nuclear power plants.

6 These ongoing projects in man/machine interface area
7 include three factors, generic issues. First one I will talk
8 about happens to be the second one on this list. The issue is
9 a control room design standard. The objective of this issue
10 was to develop guidance for human factors review of control
11 rooms for new power plants.

12 The status is that all operating plants under
13 construction will, operating plants and those plants under
14 construction, have planned or completed a detailed control
15 room design review. NUREG 0700 is a document that provides
16 the guidance for these reviews, and considering the status
17 right now, the results indicate that this generic issue
18 basically has been resolved. We are closing out the issue
19 because the guidance documents already exist. We do have a
20 related research program that is stemming from this which
21 developed review criteria for advanced control rooms.

22 Second generic issue is on local control stations.
23 It is a human factors generic issue whose objective was to
24 evaluate need for human factors review of local control
25 stations outside of the control room. Since detailed control

1 room design review covers control rooms, there essentially has
2 been no systematic review of areas outside of the control room
3 area, something we talked about just earlier today.

4 Many types of procedures will call for operator
5 actions outside the control room--manipulating valves, opening
6 and closing valves, and we have an issue which we are
7 addressing questions of--what is the potential safety
8 significance of making improvements to local patrol stations?
9 How significant are potential operator errors? And if they
10 are significant, we would be looking to develop guidance and
11 criteria for human factors review of local control stations.

12 MR. MICHELSON: Question--stations means to some
13 people a panel, local panel somewhere. To other people it
14 means wherever you might station yourself to make an
15 adjustment.

16 Do you mean by the local station that the latter,
17 where you just go to the, adjust a regulator or to open a
18 valve manually?

19 MR. RUBIN: Generally where an operator is send to
20 perform action, particularly those actions that are required
21 for emergency operating procedures. There is not just a
22 panel.

23 Another generic issue is a review criteria, review
24 criteria for advanced control room and instrumentation, human
25 factor issue No. 5.2.

1 The objective of this project is to evaluate the
2 need for changes or criteria for control board enunciators of
3 operators receiving too many alarms during an event, and is
4 there a need for alarm prioritization? The results of this
5 research is to assess the risk significance of operator errors
6 from information from control board enunciators, and if
7 necessary, to develop guidance and criteria for alarm
8 reduction techniques.

9 This issue at one time covered a broader range of
10 new instrumentation and control rooms. We have, basically
11 have separated the enunciator for in project as a generic
12 issue, and have a research issue which is to look at advanced
13 controls and instrumentations.

14 The objective of this work is to develop review
15 criteria to evaluate the safety implications of human factors
16 associated with nuclear power plant applications of artificial
17 intelligence and expert system, advanced use of advanced
18 computers for either areas of providing additional information
19 to operators through displays, or operator aids, indication of
20 plant status, plant status, disturbance analysis systems as
21 well.

22 First step in this project is to survey the
23 utilities' and vendors; plans for advanced controls and
24 instrumentation, and then to identify and prioritize based on
25 the survey what particular human factors issues are of

1 significance with those advanced instrumentation that we
2 expect to see coming to be applied to nuclear power plants in
3 the future.

4 And we also plan to develop human factors review
5 guidelines for these advanced controls and instrumentations.

6 CHAIRMAN REMICK: Along that line, in some of the
7 DOE proposed advanced reactors, they have some what I would
8 say some real innovation where one operator at one control
9 station is controlling a number of individual reactor units,
10 although admittedly small.

11 Is that the type of thing you would cover?

12 MR. RUBIN: Yes, exactly. We are involved with the
13 DOE review of the advanced plants, and in particular our
14 section has been asked to review the control rooms from a
15 human factors standpoint, and Mr. Beltracchi who is sitting
16 here has been involved in those reviews.

17 One of the things we have found out is the need for
18 the research is because there are no criteria that are
19 available right now, so it is kind of by the seat of the pants
20 the way the reviews are done, and I think it would be of
21 benefit to both NRC and the industry to have a consistent set
22 of criteria. We would like to involve industry perhaps
23 through EPRI in some of these efforts we think are of
24 particular benefit not just to the agency.

25 CHAIRMAN REMICK: I think that would be extremely

1 important to have somebody who knows operations, people have
2 operation help in that decision.

3 MR. RUBIN: In many of these areas we don't think
4 that NRC should focus as research themselves. You will hear
5 from Frank Coffman about the coordination of efforts outside
6 of Research and outside of the NRC itself.

7 We have some planned research going on in the
8 man/machine interface area, one of which is to assess the
9 impact of high technology on control room operators. The
10 issue here is concerned with backfits to existing control
11 rooms which could result in a mix of all the new technologies,
12 digital computers and analogue instrumentation on control
13 boards and it is not clear whether operator performance will
14 improve or may have some negative impacts because it is mixed
15 technologies.

16 The results of this research would be to develop
17 human factors criteria for mixed control rooms, which could
18 affect operator selection, could have impact on operator
19 training, operators' acceptance of high technology and new
20 technologies in the control room.

21 Computer classification is another area. I guess we
22 haven't particularly mentioned which of these plan points are
23 identified as user needs. The last one, control room
24 operations, and computer classification are two user needs
25 that have been identified by NRR. The question here is

1 similar to hardware questions, and the computer
2 classifications is should there be different classes of
3 computers with different requirements based on their
4 functional use and their impact on safety?

5 For example, the SPDS which is currently required is
6 mostly a class 1E system, but it is, has set of requirements
7 on its own. We expect that the results of this research
8 should be able to come up with recommendations or a decision
9 on classification should the current classification system
10 remain the same, whether there is class one E or non-1E, or if
11 necessary, should there be additional guidance for different
12 classes of computers that would cover verification,
13 validation, testing, operability of these systems.

14 MR. MICHELSON: Question--when you look at some of
15 these advanced systems in the operator aids and whatever, we
16 generally have been coming up with single track systems on the
17 argument that this is all backed up by safety grade
18 instrumentation and whatever.

19 Is your planned research going to include looking at
20 what happens when you have an operator well trained on all of
21 these aids and then you suddenly take the aids away from him?

22 MR. RUBIN: One of the areas we particularly are
23 looking at is the question is the operator reliance on the
24 SPDS, as an example. That's listed here.

25 MR. MICHELSON: It was a part of your scope of

1 research?

2 MR. RUBIN: Yes.

3 MR. MICHELSON: Thank you.

4 MR. RUBIN: I may as well cover that now, just skip
5 one and go back.

6 Operator reliance on the safety display system, it
7 is just exactly as you said. The operators overrely on the
8 SPDS instead of on reg guide 1.97, control board instruments,
9 which are class one E, and they are backed up.

10 The SPDS does not meet the same requirements that,
11 as these other instruments do. This issue has been identified
12 and we are planning to address it.

13 MR. MICHELSON: You will look at it in a similar
14 fashion for other aids that are very important and perhaps in
15 single train configuration?

16 MR. RUBIN: This is one that is already in the
17 control room so it is a near-term concern, and it is a
18 consideration for advanced control rooms as well.

19 MR. WYLIE: Do you plan to look at the adequacy as
20 part of that? I mean as you know, the SPDS varies quite
21 widely from one plant to another. Some places it is almost
22 nonexistent.

23 MR. RUBIN: They are not required to--

24 MR. WYLIE: The other end is very elaborate, very
25 efficient installation, so as far as the operator's reliance

1 is concerned, it depends on what he has got.

2 MR. RUBIN: That's right. If he trusts the
3 instrument, he can rely on it, may overrely. If he doesn't,
4 he will forget about it and won't look at it.

5 MR. WYLIE: I assume it was part of what you are
6 going to look at, look at adequacy as well as the reliance.

7 MR. RUBIN: The adequacy of the SPDS would relate
8 directly to the operator acceptance or tendency to rely on it.

9 MR. WARD: Are you sure? It sounds like you have
10 reached the conclusion already.

11 MR. RUBIN: Maybe I overstated the case.

12 MR. WYLIE: We saw that, though, in plants we
13 visited. Some places they are very good, and you know, and
14 they rely on them. Some others, it is stuck off here in the
15 corner. They never look at it.

16 MR. WARD: I guess I got the impression in some
17 cases they might be pretty good and the operators still don't
18 pay any attention.

19 MR. RUBIN: If he doesn't perceive them to be good,
20 even if they are, he won't rely on them.

21 MR. WARD: That is really human factors talk now.

22 CHAIRMAN REMICK: The question, when you say they
23 rely on it, it is a question do the panel operators rely on it
24 or does the STA rely on it or both of them? I am not too
25 convinced that any panel operators rely too much on the SPDS

1 because the STA does.

2 MR. RUBIN: Leo Beltracchi, who is project manager
3 on this, has a response.

4 MR. BELTRACCHI: Beltracchi, Research--there are
5 SPDSs that panel operators do rely on. They are the better
6 type of SPDSs, better designed. I have talked to operators
7 where even when they first come on shift, they will evaluate
8 that SPDS before they walk the control board. There are other
9 type of SPDS, they completely ignore them.

10 MR. WYLIE: Sure.

11 CHAIRMAN REMICK: Thank you.

12 MR. RUBIN: One other project planned for the
13 man/machine interface is expert system verification and
14 validation. The objective is to develop human factors
15 criteria for the V and V of expert systems.

16 The first step is to look at tools or methods to
17 evaluate human computer interface designs, and to develop
18 guidelines once there is some measure of the, of this
19 interface. The guidelines for validation and verification
20 based on work that is ongoing, planned to be ongoing at Halden
21 are going to get into some of the work that NRC has in support
22 of the Halden project and many, the areas at Halden are
23 related to man/machine interface.

24 (Slide)

25 MR. RUBIN: This is the last slide on man/machine

1 interface, and then I think we can take a break. Briefly to
2 discuss the Halden program, we have supported Halden, NRC had
3 supported Halden in the past for fuse research. Currently we
4 are supporting Halden primarily in the area of human factors.
5 There is a man/machine lab at Halden where they conduct
6 experiments and simulator tests of advanced computer based
7 operator aids. These are human factors experiments on
8 simulator, simulator, which is a, simulates a four loop PWR
9 with actual nuclear power plant operators.

10 They have at this laboratory computer based operator
11 aids, planned or currently existing certain systems which use
12 input from logic from process modeling, and explanation of the
13 expert systems at Halden include early fault detection for
14 feedwater systems, diagnosis of plant disturbances, computer
15 based procedures project that will be ongoing very soon, and
16 an overall plan to integrate the surveillance using advanced
17 computers to monitor the plant operations in particular areas
18 that we in Research are looking to get results and benefits
19 from the Halden program.

20 MR. MICHELSON: Would you tell me roughly what you
21 mean by expert systems in the nuclear context?

22 MR. RUBIN: Systems in which the operator can obtain
23 information, at least as good information as if there were an
24 expert knowledgeable in the area.

25 MR. MICHELSON: How does that differ from say an

1 SPDS?

2 MR. BELTRACCHI: Beltracchi, NRC--with respect to
3 how it differs from the SPDS, it is strictly, the SPDS is
4 strictly a monitoring aid. In an expert system, you would be
5 able to provide the operators assistance in diagnosing say a
6 faulty feedwater system. That's achieved by a series of rules
7 that is encoded, activated by sensors and results come out in
8 terms of messages on the screen.

9 MR. MICHELSON: This is sort of putting some of the
10 emergency procedures into the SPDS?

11 MR. BELTRACCHI: Encoding the knowledge on typical
12 failures or anticipated failures and looking for symptoms that
13 measuring the symptoms would activate these rules, and come to
14 conclusions, the results on the screen.

15 MR. MICHELSON: Sort of automating some of the
16 procedures.

17 MR. BELTRACCHI: Automating the reasoning for
18 diagnostics.

19 MR. MICHELSON: Okay. I wasn't quite sure. It is a
20 commonly kicked around word now, but I am not always sure what
21 people mean when they talk if it.

22 DR. LEWIS: There is a difference between encoding
23 the emergency procedures and you have said it exactly right,
24 and encoding the information. It is as if you had somebody
25 standing next to you who really does understand the plant and

1 looks at the symptoms that come out and said oh, by golly,
2 that means that the chim crack is broken. Then you invoke the
3 emergency procedures for broken chim crack.

4 MR. MICHELSON: Developing logic and reasoning into
5 the process.

6 DR. LEWIS: Really not developing, just encoding it
7 the way an expert would have done it.

8 CHAIRMAN REMICK: Coming to a conclusion.

9 DR. LEWIS: That's what all expert systems are.

10 MR. RUBIN: We expect to get out of the Halden
11 project human factors knowledge and the use of expert systems
12 for operator aids, benefit the operator, review criteria and
13 guidance for advanced instrumentation in control rooms, look
14 at the advantages from a human factors standpoint of computer
15 based procedures compared to paper procedures, as well as
16 simulator data on operator performance at the Halden project
17 for input into the human error rates for human reliability
18 assessment.

19 MR. GIMMY: My name is Chris gimmick. Do you have
20 any plan to bring--let's say Halden develops a package, an
21 expert package, and they report some operator performance on
22 that package based on a simulator run.

23 Do you have any plans to bring that package to the
24 United States and try it on one of our simulators with Georgia
25 Power operators or something?

1 And the reason I am asking, this is--back when I was
2 in the research business, I went to Halden twice, and spent a
3 week there each time, and they have superduper operators.
4 Their operators all run around in lab coats and have been
5 there ten years, and/or in a researchy environment. They code
6 FORTRAN in their spare time and things like that, and their
7 response to a computer based system might be quite different
8 than most of the folks that we hire, so do you have, the
9 question is do you have plans to bring it to the United
10 States, put it on a U.S. simulator, try it on U.S. operators?

11 MR. BELTRACCHI: Beltracchi, NRC--the NRC does not
12 have particular plans. However, I am aware of activity within
13 the industry. There is a program by the name of Scorpio at
14 Halden. Scorpio is a computer based program for monitoring
15 the core, reactor core. Currently, Duke Power is, has
16 integrated Scorpio and is currently testing it in one of the
17 reactors.

18 In addition, they are also looking at early fault
19 detection and a program is also being looked at by Duke Power.

20 MR. RUBIN: Before I get into the next area of
21 procedures, maybe we ought to take a short break.

22 CHAIRMAN REMICK: Fine. Let's take a break,
23 reconvening at 20 minutes after.

24 (A brief recess was taken.)

25 CHAIRMAN REMICK: Anything you can do, Alan, to keep

1 it moving.

2 MR. RUBIN: I won't suggest it because it means
3 cutting the questions.

4 I think it is of use to at least just touch on the
5 projects in the various research areas and human factors
6 programs so the subcommittee will get an idea of the type of
7 work that we have ongoing or planned, so I will briefly
8 continue to try and give a summary of the objectives and the
9 status of the work.

10 In the procedures area, we have one ongoing project
11 which is a human factors generic issue. It is called
12 guidelines for upgrading other procedures. The issue here is
13 concerned with procedures and the need to develop guidelines.
14 the process for developing procedure guidelines for emergency
15 operating procedures already exist. However, in NRC's review
16 of some of the implementation for the planned EOPs, they found
17 some problems. There are, questions that have come up with
18 procedures other than EOPs should be looked at as well. Many
19 LERs point to root cause relating to procedures that are not
20 involved with the EOP, so the objective of this project is to
21 determine whether review criteria or guidance are needed for,
22 in the normal or abnormal procedures, including the EOPs. The
23 results of this issue would be an assessment of benefits of
24 improving procedures as well as the human factors review
25 criteria for those procedures.

1 MR. WARD: Let's take EOPs. Several years ago,
2 there was a program that the NRC had a lot of input to for
3 development of the EOPs. The vender owners groups developed
4 process guidelines, and as I recall, INPO developed some of
5 human factors guidelines for how to write good procedures, and
6 each individual licensee was supposed to take those two sets
7 of things, develop their own emergency operating procedures.

8 Now my understanding is that that has been done
9 successfully at some, by some licensees, and not successfully
10 by others, so is, is the research activity here going to
11 include a review of the status and try to determine the reason
12 for success or non-success?

13 MR. RUBIN: The research activity--

14 MR. WARD: What constitute each perhaps?

15 MR. RUBIN: You are crossing the border between
16 research and NRR picking up the regulatory activity, and I
17 think you are talking a regulatory function of implementation
18 of guidance on procedures for particularly the EOPs. NRR
19 people are here, may want to talk about what their status is
20 of those reviews. I think the questions that earlier on the
21 subcommittee asked, human factors that is ongoing in the
22 agency and what NRR's program would be, probably sometime it
23 would be useful for the subcommittee to hear more in-depth
24 what NRR's programs are, but for example, the procedure,
25 emergency operating procedures reviews, the detailed control

1 room design reviews, are all in fact the major part of NRR's
2 human factors program. I think I am missing one the SPDS
3 reviews as we--those are already, you know, kind of out of the
4 research stage, and into the implementation.

5 MR. WARD: I guess I meant my question to be more a
6 licensing--is the research activity on EOP going to review
7 the, what has been learned from experience about the use and
8 application?

9 MR. RUBIN: We don't have research activity on EOPs.
10 We have a research activity on procedures, other procedures.
11 The generic issue is to look at this other, other procedures
12 other than ECPs human factor issue 4.4.

13 MR. WARD: What does that last item say?

14 MR. RUBIN: Presentation of EOPs, that's concerned
15 with the work as supported at Halden, on the presentation of
16 procedures looking at computer based procedures, for example.

17 MR. WARD: Okay. That is just one area.

18 MR. RUBIN: How they are presented, right.

19 CHAIRMAN REMICK: This is an area I used to get
20 distressed at. It has been sometime ago when I used to be a
21 consultant licensing examiner for the NRC, and you would go to
22 a plant and pick up procedures, and there is just a lot of
23 human factors considerations that weren't present.

24 To give an example, you might pick up one procedure
25 and it would talk about plant. Maybe the same procedure,

1 another would talk about facility or site or unit or station,
2 and the question is is that supposed to mean something
3 different or are we talking about the same thing? Just simple
4 things like that; usually people couldn't answer if they knew
5 because maybe one procedure was written by a vendor, another
6 was written by this person, another written by that person.
7 Nobody ever looked at them.

8 Another thing is quite often there would be
9 administrative procedures that operators are supposed to know
10 the first X number of steps in all the emergency procedures.
11 At that time, there were usually 50 some so you would go and
12 let's say there was a first five steps, and you would look and
13 the step No. 1 was one A, B, C so you didn't know if that was
14 four steps or one step. It wasn't a thing like even the line
15 to these five steps you are supposed to know or any kind of
16 designation of that and an operator didn't know. Is it 1, 2,
17 3, 4 5 or is it 1 A, 1 B and 2 and 3 you know, that makes up
18 the five? It is just hundreds of little small considerations
19 that aren't given in procedures that have been written over
20 many years by many different people.

21 I used to say why don't you take a bright, young
22 senior reactor operator who can read and write and give him a
23 couple months to go through the procedures and see if he can
24 somehow make at least consistent language so when you read
25 them you might know what is being referred to.

1 I don't know if that situation still exists or not.

2 MR. RUBIN: There is no question in my mind that's
3 an important area. There has been case studies by AEOD on the
4 causes, root causes of events or significant events, and many
5 of them were attributed to procedural problems. I look at
6 probably at least a hundred LERs a month and many of them are
7 involved with procedures. Now whether they are safety
8 significant or not, it is another question, so part of this
9 review is the importance of, from NRC's standpoint, what is
10 the safety significance?

11 Many of the human performance nature is to recover
12 from procedural areas, so it is not just error occurs but
13 there is recovery that has got to be considered, but there is
14 no question in my mind this is an area that needs to be looked
15 at.

16 Sy Weiss from NRR has a comment.

17 MR. WEISS: Sy Weiss, NRR--the procedures effort and
18 the staff is reviewing procedure generation packages, PGPs,
19 of--all utilities submit PGPs, which provides the staff with
20 their guidance as to how they are being to write their EOPs
21 and that's the extent of our review

22 Then we issue a NUREG, Reg 0899, which provides some
23 guidance in writing procedures. One of the efforts that is
24 going to be taking place in the near future is a team
25 inspection of EOPs. In the order of 16 plants will be looked

1 at to see how well EOPs are today, if they are developed, if
2 they are following the PGPs, that kind of thing. It is
3 difficult to say improving PGPs should be based on a PRA or
4 not, because this is one of the items that would tend to
5 provide additional stress on an operator in an emergency, and
6 I think from the human factors standpoint, we feel as much as
7 possible that we should minimize the stress that the operator
8 is under, and anything you can do to improve his environment
9 is to be encouraged.

10 CHAIRMAN REMICK: While you are up, am I correct
11 that other than something like the PGPs, NRR does not approve
12 specific procedures?

13 MR. WEISS: That is correct.

14 CHAIRMAN REMICK: You might require that they exist,
15 things like that, but in general I think the only exception I
16 was aware was TMI where the office there did actually approve
17 the new procedures, but--

18 MR. WEISS: Yes.

19 MR. RUBIN: There are a couple activities that are
20 planned in the procedures. Procedures are so closely tied to
21 the training, the training that they are hard to separate, but
22 we have a planned project.

23 MR. WARD: That is the second time you have said
24 that.

25 MR. RUBIN: You are talking about how many--

1 MR. WARD: Procedures are on pieces of paper, and
2 you train people.

3 MR. RUBIN: Well, you try to put them in a box that
4 it is only procedures or it is only man/machine interface. I
5 will get into that later, how these research areas are
6 integrated.

7 Procedure violations is a program that we plan to
8 look at. It is a follow-up to the Chernobyl what I call it,
9 event, accident, tragedy. The implications research has come
10 out with implications report on Chernobyl. One of the
11 concerns that may apply is that one of the reasons for the
12 event at Chernobyl was the procedures were being violated left
13 and right, and there is concern, at least a question should we
14 be looking under rocks to see whether procedure violations is
15 a concern for plants here in the United States? Objective of
16 this research will be to determine the extent and the nature
17 of procedure violations, and the potential impact on plant
18 safety.

19 MR. MICHELSON: Question--when looking at potential
20 impact of procedure violations, that means you go into the
21 procedures and then you see how the operator is supposed to
22 respond and then you go in and postulate various other
23 possible re., uses and the consequence thereof? Is that what
24 you have in mind to do?

25 MR. RUBIN: First part of the project what we will

1 do is probably look at events, look at LERs, look at
2 inspection reports, see where procedures have been identified
3 that they have been violated, and sometimes they are
4 significant. Sometimes they are not. Sometimes they may lead
5 to challenges to safety systems, get an idea of frequency of
6 the occurrence, how important it is, so that whether we
7 should--

8 MR. MICHELSON: That part of it I think I
9 understood. The part I don't understand yet is to what extent
10 you are going to go in to see what the potential consequences
11 of maloperations might be and that's the only way of judging
12 the importance of having correct procedures.

13 MR. RUBIN: There will be an effort in looking at
14 events. I don't have a, don't know exactly because this
15 activity is not fully planned yet.

16 MR. MICHELSON: Could be rather an encompassing job
17 to go in and postulate all of the various ways in which you
18 could maloperate to see whether or not certain of them could
19 be quite safety significant. I think it is a worthwhile job,
20 but I'm not sure that is what you have in mind.

21 MR. RUBIN: We are trying to look at the, first, how
22 significant the procedure violations are. I don't think that
23 has been addressed.

24 MR. MICHELSON: In order to determine how
25 significant they are, you have to know the consequences of

1 doing them and not just the set that you see from LERs, but
2 that's the good set. That's the set of things that didn't go
3 too badly. How about the case where having done something
4 else or having done additional item during such an event you
5 could have got into deep trouble? Is that going to be
6 included in your study?

7 MR. RUBIN: I think partly related to this is not
8 the significance but the importance to the organization and
9 management area.

10 MR. MICHELSON: You will come up with a study that
11 says yes, we looked at procedures, and we looked at LERs, and
12 so forth. And let's assume for the moment it turned out to be
13 a no never mind. Well, the reason it turned out to be a no
14 never mind was that you really didn't go in and look at other
15 possible mistakes he could have made but didn't on that
16 particular event to see that if he had gone a little different
17 route, it would have been extremely serious. Are you just
18 going to draw your conclusions from what you see?

19 MR. RUBIN: I can't answer that directly. I imagine
20 that is a never-ending process. All the potential violations
21 an operator could make, certainly that will lead to very
22 significant safety problems.

23 MR. MICHELSON: Yes, but I hope that you don't just
24 look at what happened and draw the conclusion that it is,
25 wasn't a major risk.

1 MR. RUBIN: Your point is well taken.

2 MR. COFFMAN: This will be constrained a little bit
3 by resources, and as Alan said, it is in the planning stages,
4 and it will involve not only looking at LERs, but possibly
5 looking at those things which are not reported to the LERs,
6 those procedures that are violated, don't pass some threshold
7 for reporting in the LER system, and then looking at that set
8 for its importance.

9 I don't think we had conceived of starting the
10 process that is as broad scope as something like the precursor
11 work.

12 MR. MICHELSON: What you are outlining I think would
13 give you a good feel for the level of reactor or operator
14 reliability. In other words, it will give you a frequency of
15 error, but it won't tell you the consequence of errors because
16 you only looked at a small set where the consequences were
17 fairly minimal. If it had been a big consequence event, we
18 would have looked at it as an IIT or something.

19 MR. RUBIN: If there is a large number of small sets
20 of inconsequential events, they maybe raise a flag there is a
21 need to draw attention and the, for example, in the
22 organization and management area, is that something--

23 MR. MICHELSON: It will tell you if operators make
24 errors, but it won't tell you the consequence of error except
25 in those particular cases only and not all the other cases for

1 which a similar kind of error could have led to very serious
2 effects. You won't know that unless you go in and postulate
3 such errors and look for the effects. It is a hypothetical
4 study obviously, but unless you do that, you don't know the
5 consequences of operator error. You only know the frequency.

6 MR. COFFMAN: That we know, we are looking under the
7 rock and we are not saying if we find something we wouldn't
8 conclude that we had caught all the the snakes under the rock.
9 This is initial effort to follow on from Chernobyl to see if
10 this is a safety significant area.

11 MR. MICHELSON: You are back to the same words. You
12 are going to find out if it is a safety significant area. I
13 am saying unless you do the study that I had in mind, you
14 won't know if it is a safety significant area. You will only
15 know that operator errors are of a certain frequency but you
16 won't know their significance because you haven't looked.

17 MR. RUBIN: A part of what we will find out is if
18 there are problems with procedures from a human factors
19 standpoint, because the way they are proceeded, or because
20 they are not followed, and that's an important understanding
21 from a human factors standpoint to determine the root causes
22 of errors.

23 MR. MICHELSON: You will not know the safety
24 significance unless you postulate such errors to be made in
25 cases that they haven't happened yet.

1 MR. RUBIN: I find it difficult to bound a problem
2 if you were going to be postulating all kinds of procedure
3 violations to determine--certainly there are procedure
4 violations that lead directly to severe consequences.

5 MR. WARD: I think it is an important point, and I
6 don't know. In our letter a year or so ago after, on
7 Chernobyl, we asked the staff to take a look at something. I
8 think it is something like what you are saying. Supposedly
9 there is a program at Brookhaven that is setting started and
10 we are supposed to hear about this through another
11 subcommittee, but what it, you know, I think the specific
12 question was well, what sort of, how could an operator create
13 a severe reactivity transient in an LWR?

14 That is one example of the sort of thing you are
15 talking about, and you have to, it seems to me you have to use
16 some means other than PRA to look at this. You look at it
17 with PRA well, it is very improbable, but what we are saying
18 and I think what you are driving at, is there needs to be
19 developed some more, different systematic way of looking at
20 it. For example, how many lines or how many errors have to be
21 made? How many lines of defense are there or something like
22 that.

23 MR. MICHELSON: It is a different approach. It is a
24 more deterministic approach. How could an operator get a
25 plant into serious trouble? Having found such scenarios, then

1 you ask what is the probability? Then you go back, use your
2 operator error data and whatever other knowledge you have, and
3 you try to speculate is this a probable course or not? If it
4 is a probable course, then you have to do something about it.

5 DR. LEWIS: You just described the rationale for
6 fault event tree analysis.

7 MR. MICHELSON: That's right, but that is not, I am
8 not sure that is what they are going to do. They are not
9 going to go and figure out all these potential fault trees
10 that might be of concern. They are going to, rather they are
11 going to take ones that have occurred and analyze them in
12 detail and that's not the whole story. That's a part of the
13 story. That will give you some numbers, but it won't tell you
14 what the potential risk is. It will just tell you how those
15 particular events go. Unless you--because you have to
16 postulate these others because they haven't happened yet. You
17 argue that because they haven't happened in so many reactor
18 years, they are never going to happen. That's a different
19 argument.

20 CHAIRMAN REMICK: If properly done, if they
21 determine the frequency of such things and that's fed into
22 people then doing the risk assessments, it seems to me you
23 have covered it.

24 MR. MICHELSON: No. The reason you don't is that
25 you first of all have to develop the tree.

1 CHAIRMAN REMICK: I am assuming that people doing
2 the risk assessment are going to have a PRA where they develop
3 the fault trees, event trees.

4 MR. MICHELSON: If they develop all scenarios of
5 interest that could be generated by human error, then you are
6 okay. If the model is adequate, then you are okay obviously.
7 Any--PRA can do anything that you dream up. I mean it can
8 come up with numbers for any event.

9 CHAIRMAN REMICK: Manage the proper frequencies of
10 things now.

11 MR. MICHELSON: One of the problems is having come
12 up with a scenario, a fault tree, or event tree. Now the
13 question is examine the numbers you put in for the various
14 branches, but having an idea at how you put numbers in for
15 branches doesn't give you the tree.

16 CHAIRMAN REMICK: Yes.

17 MR. MICHELSON: We have to have some means of coming
18 up with these trees, and they are not mechanical trees any
19 more or electrical trees. They are now human error trees, and
20 I don't think we have begun to dream up all the ways in which
21 you can get in serious trouble for, in order to analyze them.

22 CHAIRMAN REMICK: They are certainly related to
23 mechanical and electrical trees, though, because you say if
24 this valve failed, it is, the operator might turn it the wrong
25 way by mistake.

1 MR. MICHELSON: In good fault tree development, they
2 do have branches wherein there is operator response required
3 and yes, no, goes in, and there is a probability of each, that
4 he does or he does not respond, but that doesn't get you again
5 all the trees because I think these branch points are more in
6 terms of it is time for the operator to do something, does he
7 do it? It is not the kind of a tree where gee, there wasn't
8 time for the operator to do something, he did something
9 anyway. That's the part that I think gets left out, the part
10 where he can go in and intervene without a requirement from
11 him to intervene which in a way was TMI. It was intervening
12 and shutting things off when he shouldn't have been shutting
13 things off, and how do we get these kinds of trees? I don't
14 think we get them quite what we have got in mind here, but
15 correct me if I am wrong.

16 CHAIRMAN REMICK: I don't think that is what they
17 are doing here.

18 MR. MICHELSON: Who is coming up with that part of
19 the story?

20 CHAIRMAN REMICK: I can't answer that. I don't find
21 those people. System interaction people again tend to stick
22 with what they have got in front of them and they don't even
23 put in the human factor very well. They more or less put in
24 the mechanical and electrical responses and not even do that
25 well when it comes to environmental coupling and that sort of

1 thing. This is just a more sophisticated problem which I
2 don't think anybody is working on really. That ought to be a
3 subject of a systems interaction letter where you bring this
4 up.

5 MR. RUBIN: Let me go ahead in the interest of time.
6 There are about maybe a dozen other projects I just wanted to
7 summarize. We could have interesting discussions on each of
8 them I'm sure, and would like to if you would like to get into
9 some of these projects in the future as he mentioned earlier.

10 Another area in the procedures research that is
11 being reviewed is the accident management procedures.
12 Accident management research program plan is being developed,
13 as Brian Sheron mentioned earlier. It is coordinated very
14 closely with the human factors research plan and overlap in
15 all five of the research areas.

16 The procedures, one of the questions relating to
17 accident management is what level of detail are necessary in
18 procedures to deal with severe accidents? The man/machine
19 interface area, this questions of what operator aids might
20 assist, be available to assist the operator. Certainly in
21 qualifications and training, training questions as to what
22 would be additional operator burden to be trained to cope with
23 severe accidents that are unlikely to occur.

24 In the organizational and management area, in the
25 accident management questions that, the capability for

1 management to cope with severe accidents, what kind of a
2 structure should be set up, and human performance area, there
3 are certain questions that relate to accident management such
4 as the stress the operator is placed under, as well as his
5 performance or ability to perform in extreme environmental
6 conditions such as high temperature and heat and humidity, so
7 you will see on several of these slides a relationship to
8 accident management research that is planned in the human
9 factors area.

10 Go on to the next research area.

11 (Slide)

12 MR. RUBIN: Qualifications and training--currently
13 there are no programs ongoing in research at this time in
14 qualifications and training I referred earlier to the large
15 effort by industry which was one of the prime reasons for
16 NUMARC's formation, to be involved with operator training, and
17 NRR is closely following these activities that industry has
18 undertaken.

19 There are two projects that are planned in the
20 training area. One is an issue of training effectiveness.
21 There are questions that have been raised as to how to
22 objectively measure whether or not a training program is
23 producing good or perhaps poor operator performance and how do
24 you objectively measure that? There have been questions
25 looking at operator test scores, and real questions whether

1 test scores adequately reflect success of a training program?
2 It is, one of the research results we expect to get in the
3 human factors plan would be guidelines on how to evaluate
4 training programs as well as some research on training for
5 severe accidents.

6 MR. MICHELSON: Will this include methods of
7 screening people to select them for training or just the
8 effectiveness of the training itself?

9 MR. RUBIN: That will not, that will be more in the
10 qualifications.

11 MR. MICHELSON: That will be a part of, some part of
12 research?

13 MR. RUBIN: That certainly could be. It is not an
14 identified project right now or planned near-term project.

15 MR. MICHELSON: One reads the question of aptitude
16 testing and so forth in this. Thank you.

17 MR. GIMMY: One thing that you might be able to do
18 there would be to cross-tie your study on procedure
19 violations, and at least look back at the training. The man
20 had, for instance, let's say--I've got two points to make. I
21 will finish this one first.

22 Let's say the guy got this fellow that is violating
23 procedures and not following them, and maybe he was almost
24 sort of trained that way because he always trained on a
25 generic simulator where you couldn't use the procedures, you

1 couldn't use the plant procedures, so he is used to saying oh
2 well, it is supposed to do it as close to, but you can't, so I
3 will quit this. And that would be an interesting index.

4 The guys that train on site-specific simulators,
5 with their procedures, do they have less procedure violations
6 down the line? Are they, they have a better feel about that?

7 The second thing I wanted to say was back on the
8 subject of significance, when you do tally procedure
9 violations, it is important to break them down into categories
10 of what, kind of how important do you think the procedure was?
11 One of the striking things about Chernobyl is they just didn't
12 violate procedures, they violated very important procedures,
13 the key procedures on margin of control, rod position, Xenon
14 build-up, not rinky-dink procedures of closing some valve.

15 And I know that, for instance, the, I think the
16 airlines on their audits keep track of this so you know, the
17 take-off checklist, there is 18 items or something, and one of
18 them is set the flaps and the other one is turn off the, turn
19 on the seat belt light. If you violate turning on the seat
20 belt light, you haven't done too much damage, but if you are
21 the guy that persistently doesn't set the flaps, it is going
22 to get you, so are you planning to put some significance
23 rating on, at least break them into two or three categories
24 like the category that violates tech spec.

25 MR. RUBIN: Certainly significant difference in

1 procedure and violation is not used in the term, not only used
2 to say the operator purposely violated procedures. It might
3 have been inadvertently he missed a tech spec, didn't perform
4 a test, performed it a day later and the equipment operated
5 successfully. That is a relatively insignificant procedural
6 violation, yet it gets reported in the LERs. We see a fairly
7 large number of those. Others that report that maintenance
8 operator was not following procedures, and it led to a trip of
9 the plant, a SCRAM, that's more significant. You start now to
10 get into transients and challenge to safety systems.

11 Yes, there would be a definite intent to look at the
12 safety significance of the potential impact of those
13 violations.

14 MR. GIMMY: Cross-ties with training, I can see
15 where training on generic unit would almost condition not use.

16 MR. RUBIN: You get the, to the root cause which is
17 certainly the question to be answered if there are
18 significance in, the procedure violation appearing to be
19 significant, that what is the cause? Because the operator
20 thought he knew the procedures so well and didn't even have
21 them in front of him so he missed some steps, or he just
22 didn't go through the checklist or wasn't trained on them?
23 That is part of the research effort as well.

24 MR. MICHELSON: I hope we don't use LERs, though,
25 very much for this purpose, because LERs are only written when

1 there is something that triggers the reporting requirement.
2 Operator error or maintenance error per se doesn't measurably
3 trigger the requirement. First you have, it is single
4 component failures aren't reported and so if an operator or a
5 maintenance man goes in and screws up a single component, no
6 matter how badly, it isn't necessarily recorded at all unless
7 it led to some kind of a scenario that had to be reported, so
8 a large amount of operator and maintenance error is never
9 reported in the LER system.

10 MR. RUBIN: It is, sometimes a utility might be
11 reluctant to report that they have violated procedures. You
12 won't see it in the LER

13 MR. MICHELSON: Won't go into the NPRDS, just
14 doesn't go to anything. It goes in NPRDS if it led to
15 something that required, you know, a breakdown of the piece of
16 equipment and so--

17 DR. LEWIS: That is true for, to a large extent
18 about component failures.

19 MR. MICHELSON: Single component failures are not
20 reported in the LER system unless they led to reportable
21 scenario. It is all right, but--because presumably we wanted
22 to narrow the LER reporting down, but it isn't all right if
23 you are going to do a research job now using LER as input.
24 You have to recognize up front that there are very serious
25 limitations of that reporting system for this purpose.

1 MR. RUBIN: We understand this, and it is clear we
2 are not only using LERs. That is one indicator. We are
3 looking at other sources of data.

4 CHAIRMAN REMICK: In this particular one, a good
5 example where I am asking a question of what did the staff do
6 to try to get the best expertise possible to address these in,
7 now I can see training effectiveness--I don't think there is
8 any particular urgency. It is a cogent question, but I can
9 see that there is a lot of expertise around the country.
10 There have been all kind of military programs, all kind of
11 questions on how effective is training. I would hope that the
12 NRC would not just automatically say well, we haven't given a
13 blank national laboratory a contract lately and we will give
14 them that, unless that is where the expertise is.

15 I can see in an RFP you could possibly get a lot of
16 people that could respond to that particular type of need.
17 You get down to severe accidents maybe it is a matter we are
18 set, but I hope that the NRC is not locked into this bit of
19 just automatically giving it out to a national laboratory
20 unless they are convinced that's where the expertise is.

21 MR. RUBIN: I am glad you support our approach. It
22 is exactly what we plan on doing in this area. Sometimes we
23 need to go to national laboratory for the urgency of getting
24 the work ongoing. This is one area we plan ongoing the RFP or
25 broad agency announcement route, in the areas of training.

1 CHAIRMAN REMICK: How about in the severe accident?
2 I understand you now have nuclear plant analyzer with the NRC.
3 It seems to me that the nuclear plant analyzer, and some of
4 the codes that have been recently developed and so forth like
5 RELAP and some of those modifications, is there any thinking
6 about whether they would be incorporated into that second one
7 there? What are the capabilities, what are the needs in
8 severe accidents? What are the capabilities of modeling and
9 simulating in vessel management, accident management and so
10 forth? Will those be a part of training for severe accidents
11 do you know?

12 MR. RUBIN: We are not quite that far. Some of the
13 questions, but some of the questions that come to mind
14 immediately in training for severe accidents are how much of a
15 focus should there be on current operator training for severe
16 accidents for instances that are rarely, if ever, likely to
17 occur?

18 CHAIRMAN REMICK: That's right.

19 MR. RUBIN: Do you burden the operator with
20 additional requirements for training, memorization or other
21 where it may be more important that he focus on training for
22 events that could occur in normal operations? Gets into
23 questions of organization and management then as to, as to
24 what do you do? Do you train one crew or do you have a
25 separate organizational structure to look at and have the

1 knowledge and information to handle a severe accident should
2 it every occur?

3 CHAIRMAN REMICK: That is absolutely right. The
4 question of how much should you do and can you do it is a very
5 good one. You can overreact and train them on the wrong thing
6 and then there is a broader question is the operator worried
7 about it or is it the tech staff and manager who should be in
8 some of this, be in their training programs, not necessarily
9 just the licensed operators? How much of it goes into the
10 chem technician? How much goes into the rad protection
11 technician, those type things. There are a lot of related
12 questions that I am not convinced that have been looked at.

13 MR. RUBIN: We are getting into the coordination of
14 the planning in accident management.

15 MR. MICHELSON: From the human factors viewpoint,
16 perhaps the most serious severe accidents are those that occur
17 outside of containment to begin with, the initiator such as
18 rupture of the HPCI steam line or reactor water clean-up line
19 ruptures. It fails to isolate in an adequate fashion, and now
20 you have got a real human factors problem because the areas
21 you thought you were going to run around and do things to are
22 the very area that you may not be able to get to.

23 The real problem is we don't even have ideas of what
24 happens when these lines break and we fail to isolate. The
25 agency doesn't know the scenario that goes on in the building

1 when the HPCI steam line breaks without isolation. The
2 utilities don't know, either, because it is not a design basis
3 accident. It is beyond the design basis, so how can you do
4 human factors studies when you don't really know first of all,
5 what the human is going to be looking at?

6 CHAIRMAN REMICK: Well, if it is beyond design
7 basis, it ought to logically fall in this category.

8 MR. MICHELSON: I keep asking are these going to be
9 a part of severe accident? And we keep coming back to the
10 core is going to melt and we are going to study that kind of
11 severe accident, eventually gets out of the containment. Here
12 it gets out of containment before the core melts. The core
13 melt is an ancillary effect of the initiating event.

14 MR. RUBIN: I will jump ahead a couple of slides
15 because there is discussion in this area in the presentation
16 later on, on the performance. I will just mention now, cover
17 it later, but there is research planned to look at operator
18 capabilities in performance under extreme environmental
19 conditions. Certainly relates to the severe accidents, and
20 the individual plant examinations where the utility may look
21 at a severe accident, try and determine how they are going to
22 cope with it, and take credit for operator actions that may be
23 in harsh environments, and there is currently need for
24 additional guidance as to likelihood of errors of operator
25 performance under those conditions and you should give credit

1 for operator, for operator performance. That is part of this
2 research program.

3 MR. MICHELSON: You might have missed my point
4 slightly on that we need to know how severe the environments
5 are going to be before you can do your research on how people
6 are going respond, and I am asking how do we know or who is
7 going to tell you how severe the environments are? Is that a
8 part of your research, or is that a part of somebody else's?

9 MR. RUBIN: Part of accident management.

10 MR. COFFMAN: There are several broad areas we seem
11 to be sweeping across. Before you can look at severe accident
12 management, you have to in fact do the severe accident
13 research itself to determine environmental conditions in the
14 procedure, and that may then determine the constraints that
15 are on the operator or on the plant to respond, which leads
16 into your severe accident management, and then we seem to have
17 gotten into that by discussing training. How do we train for
18 severe accident management? And I don't know that I want to
19 try and address all of this in any detail, but I would like to
20 go back to what prompted us into this area, and that was the
21 training aspect, and certainly in severe accidents, all the
22 training considerations that apply to normal, in emergency
23 operations, come into account, but they come in in a different
24 balance. You are talking more about cognitive behavior, and
25 not so much rule-based or skilled behavior when you are in the

1 severe accident area.

2 You also have the concern with the interfaces with
3 tech support center, the control rooms, local control rooms,
4 maybe even broader, the interfaces with government agencies
5 outside of the plant. These are all aspects--well, there are
6 other problems. There are some of the more unique human
7 factors for severe accidents, things like the operator's
8 acceptance, denial balance that he is striking as the event
9 takes place, but these things we are proceeding with
10 interfacing with the people in Chattanooga about what kind of
11 training should be developed for operators for severe
12 accidents, and in the accident management research plan, we
13 are addressing, we are dividing up accident management into
14 the pieces that Brian Sheron explained to you, but also
15 something that crosses over to transcend those in vessel X,
16 vessel X containment-type management reactions is the
17 operator, the information available to the operator and what
18 his responses might be given the different condition.

19 It is one of trying to develop strategies for the
20 operators based upon the plant response, and then you worry
21 about training.

22 We are just, we are just not far along in that area,
23 but we are proceeding in the steps of first defining the
24 phenomena that set the conditions, and then defining what are
25 the available responses that are there in the plant for the

1 operator, and then training of the operator.

2 MR. RUBIN: Let me move on to another research area.
3 In the program plan in organization and management which I
4 gave you the overview of the objectives of this research, let
5 me give you a summary of the objectives of some particular
6 projects under organizational management. There are three
7 ongoing projects. One is the human factors generic issue,
8 which is on shift staffing, which is nearly completed.

9 The purpose of this issue was to develop a
10 regulatory guide, provide additional guidance to comply with
11 the rule on licensing operator staffing. It is, the
12 regulatory guide is going out for comment. Public comments
13 were received. There will be a final version of the
14 regulatory guide which will be sent to the ACRS as well as
15 CRGR before being issued in final form.

16 There is a project of management and organizational
17 influence on human performance. The objective of this program
18 is to develop methods to estimate how nuclear plant
19 organization and management factors influence human
20 performance and plant risk.

21 Two aspects we expect to get, both qualitative and
22 quantitative. One is qualitative insights as well as
23 quantitative estimates on the range of human errors in poorly
24 planned or poorly managed or well managed plants. This is a
25 difficult undertaking. The project started back at the end of

1 fiscal year 1987, and we expect it to be completed, initial
2 phases, I think later on the end of this fiscal year.

3 MR. WARD: Where is that being done?

4 MR. RUBIN: That is being conducted at Brookhaven
5 National Laboratory, with subcontractors to a university.

6 MR. WARD: Okay. Brookhaven had some particular
7 expertise?

8 MR. RUBIN: It is an area which focused to a large
9 extent on looking at PRAs and the influence of human
10 performance. I think Tom Ryan is the project manager, can
11 address the particular question on that.

12 MR. RYAN: Tom Ryan, Research--the composition of
13 people working in this are Brookhaven and UCLA. The UCLA part
14 of it, more specifically your friends, Okrent, Castenberg and
15 Polanta on the Brookhaven side, conceptual part of this, it is
16 the Brookhaven staff along with the Dr. Henry Minceburg from
17 the Yale University, very prominent person in the field of
18 organization, has written several textbooks; I will say a few
19 more words about them when I make my presentation.

20 MR. WYLIE: Is this directed mainly at the
21 management, direct management of activities, organization and
22 direct management of activities?

23 MR. RYAN: One of the first steps in the project is
24 to define the organization that we are really concerned about,
25 if in fact we are interested in reflecting the influences of

1 supervisors and managers on performance.

2 The thinking right now is although there is going to
3 be a meeting up at Brookhaven on the 31st of this month, that
4 we include everybody in plant, along with the VP for nuclear,
5 and his immediate staff.

6 MR. WYLIE: Does it include things like what affects
7 the morale of the people?

8 MR. RYAN: That is correct, as it pertains to the
9 characteristics of people managing the plant.

10 MR. WYLIE: Such as employee performance,
11 evaluations, compensation programs?

12 MR. RYAN: We are very much interested in policies
13 and practices established by managers of the plant.

14 MR. RUBIN: Third ongoing project is in programmatic
15 performance indicators, which has the objective to develop and
16 to validate improved indicators to monitor trends in licensee
17 performance.

18 This supports the activity that is headed by AEOD on
19 performance indicators. The results of this research we
20 expect to be improved programmatic performance indicators on
21 maintenance and training, and other areas as well. There is a
22 parallel effort that research is supporting to develop
23 performance indicators, risk-based performance indicators,
24 which is more in the hardware side. The availability and
25 reliability of safety systems; both of these programs are

1 going to be reported on in a Commission briefing, I think
2 within the next couple of weeks.

3 CHAIRMAN REMICK: Are you planning on going out, you
4 know, at individual plants? Individual managers have all kind
5 of performance indicators they use themselves. I am not sure
6 how happy they are going to be to tell the NRC and then have
7 the NRC perhaps make a regulation out of it, but you know, you
8 go out and you ask people how do they know this is being done
9 or you're improving in that? They all have desk drawers, they
10 have their own kind of performance indicator. It seems to me
11 those could be very valuable to know what some of those are
12 without, not having to rediscover the wheel.

13 MR. RUBIN: INPO has their own indicators as well,
14 lots of discussion between--AEOD really had the primary
15 contact with INPO on the performance indicator program. We
16 are trying to look, for example, in the risk-based indicators,
17 that is further along. We have recommendation to develop
18 indicators, but there is not enough data that is currently
19 available to NRC.

20 As I mentioned earlier, LERs report when systems are
21 out of service rather than when trains are out of service.
22 More rapidly occurring indicator can be developed if we had
23 data on when trains were out of service.

24 CHAIRMAN REMICK: Sometimes people could talk to
25 your resident inspectors who know what is going on in the

1 plants who know, perhaps some of those managers have some
2 informal performance indicators that might be pretty good.

3 MR. RUBIN: Pretty hard to apply it on a uniform
4 basis across plants.

5 CHAIRMAN REMICK: You might get some good ideas.
6 All I am looking for is good ideas by people who face the
7 problems day-to-day.

8 MR. MICHELSON: I am trying to understand. AEOD I
9 think is looking at a higher level of performance indicators
10 than you have got in mind. A supervisor uses a different kind
11 of a set, to be sure they relate back up in the effects on the
12 higher level. I don't think AEOD is looking at low-level
13 performance indicators.

14 MR. RUBIN: They are looking at improved performance
15 indicators in training and maintenance areas.

16 MR. MICHELSON: In whatever form they may appear.

17 MR. RUBIN: In terms--I don't know, whatever form an
18 indicator, that is really--

19 MR. MICHELSON: Data base they are looking to
20 develop so far looks like it is going to give you a
21 high-level, maybe some high-level indicators, but not too good
22 for low-level indicators.

23 MR. RUBIN: What do you mean by high or low-level
24 indicators?

25 MR. MICHELSON: Plant capacity factor is what I call

1 high-level indicator. Time of day is what I call low-level
2 indicator, and yet some supervisor may be able to pull out a
3 sheet that says according to the time of the day the job is
4 done, here is his experience. That's a low-level indicator.

5 CHAIRMAN REMICK: Mostly utilities have goals, and
6 you know, the various supervisors and managers have goals and
7 that they are rated on each year. I shouldn't say each year.
8 They are reviewed even more frequently than that, to indicate
9 that they are meeting the goals that they have agreed to
10 performance goals. They have their own. Some of these might
11 be useful as indicators other than the ones that tend to--INPO
12 has been kind of high-level things, but there are lots of
13 performance indicators being used by managers at all levels
14 out there on a day-to-day basis. I am wondering if anybody
15 has any idea what some of those ideas might be? Might be some
16 very good ones.

17 MR. RUBIN: Might be. There is always the question
18 of what data the industry will be willing to share with NRC.
19 Even if it is a good idea, we may or may not be able to obtain
20 that data.

21 MR. WARD: I guess I don't understand what the
22 research activity is here. I see a need for what I guess
23 could be called validating and verifying performance
24 indicators. We got all these performance indicators, but I
25 have the feeling they are kind of seat of the pants things.

1 which might be okay. Get everybody, a lot of people in the
2 room and they agree yes, that's a good performance indicator,
3 but what the NRC should be interested in, of course, is
4 protecting the public health and safety through some sort of
5 regulation of the plants.

6 And are you trying to find out which, if anything,
7 if any of these performance indicators are related to that,
8 that principal objective of your regulations?

9 MR. RUBIN: The research and performance indicators
10 has two purposes. One is to support AEOD, particularly to
11 look for improved indicators. Maybe some different
12 indicators; there are a set of six or seven indicators right
13 now that the Commission reports on, looking at transfer of
14 nuclear plant performance. There is some questions as to
15 whether or not there could be some other indicators, better
16 indicators of training so that there is longer lead times
17 between when there is either improved or declined performance
18 in a power plant, and when problems may actually occur.

19 They go back to the training stage as opposed to
20 being a more leading indicator such as unavailability of
21 equipment, which might be the result of poor training, so
22 that's one purpose of the indicators.

23 From the human factors standpoint, the second
24 purpose is that if we can look at some indicators that can
25 provide some feedback so that we know whether there has been

1 improved performance because there has been some changes or
2 modifications made in areas that they are concerned, they have
3 to do with human factors, and measuring training
4 effectiveness, for example, is certainly one that I mentioned
5 earlier.

6 MR. COFFMAN: Let me amplify just a little from a
7 slightly different perspective. There doesn't seem to me to
8 be any shortage of indicators or indicator candidates. Part
9 of the research work that is, that we have underway in support
10 of AEOD is to in fact screen all the suggested indicators for
11 whether or not there is a sufficient density of data, whether
12 or not it is responsive in the timeframe.

13 There are a couple of other criteria that are being
14 used to validate the indicator, but they are, they do tend to
15 be geared to be the higher level, a level at which the NRC
16 could be, to take action on, the high-level directors, and
17 leaders of the NRC could make decisions on, and there is some
18 overlap with INPO at least on the risk-based indicators, if I
19 recall correctly four of the six, even though there has been a
20 seventh added now, four of the six NRC indicators are
21 coincident with INPO's indicators, but there is no shortage of
22 them. It is which, at which level are they applicable?

23 CHAIRMAN REMICK: That's right. When you say
24 shortage, I hope that these are not just NRC staff generated
25 ideas. My point is that there are lots of them out there in

1 the industry that might even be better, and I would hope that
2 those would be--I don't know how readily you have access to
3 those, but there might be some gems of ideas, very useful
4 ones. That's the point I am trying to make.

5 MR. MICHELSON: Might even be data--I think the
6 classical example is the effect, you know, on safety of shift
7 work, and I bet you there is some utilities that probably know
8 that whether or not there are more errors the off shifts than
9 the day shift and so forth, and those could be good
10 indicators, but that's a lower level indication. I don't
11 think the NRC is thinking of going into that, but that was our
12 question here.

13 Do you think of going into that kind of level and do
14 research, for instance, on for instance, the effective of
15 shift work on operations?

16 MR. RUBIN: You are leading nicely into the next
17 project, which is shift schedule and overtime. I will cover
18 this and then go through the next research area a little more
19 rapidly.

20 Shift scheduling and overtime, there already has
21 been a significant amount of work that has been done in this
22 area. The objective of the research program is more
23 confirmatory in nature which we do to validate NRC's policies
24 on shift duration, shift schedule, including rotation, and
25 overtime. The policies were based primarily on non-nuclear

1 experience and expert opinion and come up with guidelines on
2 working hours of maximum of 16 hours in a 24 hour period, 24
3 hours and 48 hours working, and the maximum of 72 hours
4 working out of a seven-day period, and these are guidelines.
5 We expect to collect data from the nuclear industry on
6 overtime as well as perform some experiments using simulators
7 to look at operator alertness over long period of time.

8 This is consistent in many areas with the
9 recommendations from the National Academy of Sciences where we
10 apply simulators to confirm research in the human factors
11 area. We have simulators that are available currently NRC has
12 at Chattanooga as well as some other potential simulators that
13 that we are aware of.

14 Research will be coordinated with ongoing work at
15 EPRI where they have done a fair amount of work on operator
16 alertness. Again, the results of this research will be used
17 to either confirm or update NRC's policies on overtime.

18 Research plan and team performance has an objective
19 which is to identify what team skills have a significant
20 impact on plant performance, what strategies there could be
21 used to deal with plant emergencies.

22 We also expect this research to involve the use of
23 simulators, teams of operators, and the results we hope will
24 be to provide evaluation criteria to assess the overall team
25 performance of nuclear power plant crews. There are some

1 reviews that NRC performs of operating teams currently
2 already. There are no guidance available, however, to support
3 those reviews.

4 Shift staffing, I think I mentioned that. That was
5 covered earlier. And the last area in organization and
6 management, capabilities to cope with severe accidents, we
7 also touched on.

8 CHAIRMAN REMICK: In that National Academy of
9 Sciences report, there was an indication that simulators were
10 not available to conduct research. That is hard for me to
11 imagine that if properly approached with NRC encouragement and
12 EPRI and INPO type of thing, and particularly if the new NRC
13 simulators are utilized for some of that or made available for
14 some of that research--do you plan to make those simulators
15 available in this research activity?

16 MR. RUBIN: Yes. I was in Chattanooga a couple of
17 months ago, and talked to the people down there. Currently
18 there are three simulators that NRC either owns or is in the
19 process of owning. Both the operators and the simulators are
20 available as we planned research programs. There are also
21 other simulators that may be available or part task
22 simulators.

23 CHAIRMAN REMICK: I know some simulators that are
24 available at universities for nuclear engineers courses in
25 systems, for example, so I think that with the proper approach

1 to utilities and so forth, they can be made available, and
2 particularly if encouraged. I would hope if you send out RPFs
3 on some of these things that you would make known the fact
4 that the NRC simulators would be available for certain times
5 and so forth.

6 MR. RUBIN: We already have some simulators work, as
7 I mentioned earlier, at Halden. We have some indication that
8 there may be some other interest in making simulators
9 available. It is a two-way street; also that the nuclear
10 industry which has a large number of simulators, perform
11 simulator experiments to support industry initiated research.
12 We are in the process of sending out the National Academy of
13 Sciences report to industry groups, find out their response to
14 the recommendations from NAS. It was not just recommendations
15 for NRC research, but for the industry as well.

16 MR. MICHELSON: Would it be reasonable at some
17 future date to have a subcommittee meeting in Chattanooga so
18 we can see on the facilities that are ready? I think they are
19 close to ready.

20 CHAIRMAN REMICK: I think that is an excellent idea.
21 When the simulators are in, perhaps the subcommittee would
22 like to look at them.

23 MR. RUBIN: It is a question of the, not just
24 throwing money. It is expensive to do simulator studies, and
25 we really have to plan well what we are going to do, but we

1 have identified some potential areas where we think it would
2 be useful to use the simulators.

3 MR. MICHELSON: If we understood the capabilities of
4 the simulators--

5 MR. RUBIN: You have to have the operators available
6 who are familiar with the simulators.

7 MR. WARD: That's the question I was going to ask.
8 I think that is one of the problems with the National Academy
9 study, had found that most experts need, you need both, and
10 who are going to be the operating crews at the Chattanooga
11 simulator?

12 MR. RUBIN: The instructors of Chattanooga, some,
13 many of them have been former operators. They will be
14 familiar with the simulators, and they will have been former
15 operators. Many of them have been former operators of nuclear
16 plants.

17 MR. MICHELSON: Maybe too familiar, too well
18 trained.

19 MR. WARD: The point that Chris raised a while
20 back--they may not be typical one way or the other.

21 MR. RUBIN: There is a balance. I don't have a good
22 answer to that question. We are getting into the details of
23 planning this particular project which I don't know we want to
24 do at this time.

25 We move on to the fifth area in the program plan on

1 human performance and human reliability assessment, and I
2 won't go into much discussion on this because you have asked
3 to hear in-depth about two projects in particular, and Tom
4 Ryan will summarize work in many of these areas.

5 Let me just go, briefly touch on some of the ongoing
6 work. The reason you see a larger number of ongoing projects
7 in the human performance and human reliability assessment is
8 because that's the area in which research funding was not cut
9 off in 1985. This work continued and is continuing presently,
10 so there are a large number of ongoing projects as well as
11 planned research in this area. I think maybe I will touch on
12 a couple of these.

13 The purpose of the program is to start data
14 collection on human error performance. There is a data base
15 on human error rates and hardware failure rate that Tom Ryan
16 will talk about. Much of the program is called NUCLARR. The
17 results of that research will be computerized software and
18 documentation for data base of human reliability performance.

19 There are several areas in which data is being
20 collected. Tom will discuss that. There is a grant with the
21 university to collect data from non-nuclear experience? Four
22 tasks can be identified that is similar, that are performed in
23 the nuclear plant industry, particularly useful where data in
24 the nuclear industry are sparse or they don't exist.

25 You will hear about a cognitive model, work which is

1 being conducted at Westinghouse, which is to develop improved
2 techniques to model cognitive performance of nuclear power
3 plant personnel, to focus really again on the causal factors
4 that influence the human decision-making.

5 The subcommittee was particularly interested and
6 raised questions earlier about maintenance. One of the
7 projects under the human performance activity is called
8 MAPPS--maintenance personnel performance simulation. The
9 objective of this research is to improve methods to analyze
10 and evaluate plant maintenance and activities. This program
11 has been ongoing. There is a model that has already been
12 developed, and it is a computer simulation, which we expect
13 the results to be used to assess the effectiveness of changes
14 to maintenance programs in order to improve human performance.

15 MR. MICHELSON: Where is the work being done?

16 MR. RUBIN: This is cooperative effort with the
17 Commission on European Community, CEC in Innsbruck.

18 MR. MICHELSON: Not being done in this country at
19 all?

20 MR. RYAN: Yes. We are going to take three plants
21 from this country, up to five plants in Europe. Simulation is
22 up in the National Institutes of Health computer and also in
23 the computer facility in Innsbruck.

24 MR. MICHELSON: Who is doing the work for is in this
25 country?

1 MR. RYAN: We--this is going to be an international
2 agreement. Funding is going to go to Innsbruck. They are
3 going to hire a contractor which will involve two people that
4 will go to all eight plants. They will form the core group.
5 They will be supplemented by one NRC person and one utility
6 person or plant person from each of the sites.

7 MR. MICHELSON: Maybe sometime when we have a
8 maintenance subcommittee meeting we can get you to come in and
9 give us the details more on this program.

10 MR. RYAN: Certainly. There is a project plan.

11 MR. MICHELSON: Is there any kind of reports out
12 that one can read about?

13 MR. RYAN: Certainly; there is a whole series of
14 reports. I won't get into it, there is a NUREG CR 3626.
15 It is a two-volume report. Volume 1 is a very short
16 description of MAPPS. Volume 2 has all the details, the
17 program logic and everything. And CR 3634 is the user's
18 guide.

19 MR. MICHELSON: 3634, the user's guide, that kind of
20 goes with the other two volumes?

21 MR. RYAN: It is to actually use the simulation. It
22 is the step-by-step procedures for preparing the input and
23 actually executing the simulation and interpreting--

24 MR. MICHELSON: We will look at those first. Thank
25 you.

1 MR. RUBIN: There is also a generic issue in this
2 category of research, which is criteria for safety-related
3 operator accidents. This is sometimes called the ten-minute
4 rule, where the objective of this issue is to determine
5 criteria and when to give credit for operator actions.

6 Currently there is an existing standard, ANS 58.8,
7 which will be looked at to see whether that needs to be
8 updated. That standard is entitled time response design
9 criteria, nuclear service related operator actions.

10 The results of this issue would be to determine
11 whether additional guidance or criteria are necessary and when
12 to give credit for operator actions, or when automatic
13 operations will be recommended.

14 Planned research, human performance, there is a need
15 to collect additional data from events. Many times the root
16 causes of events are inadequately reported. One area of
17 research is to see if there is additional needs. We already
18 have developed a checklist for employers or teams to go out
19 and review events, ask questions, and obtain information as to
20 root causes of errors, human errors, and that data will be,
21 will provide input into the reliability assessment and human
22 performance activities.

23 MR. MICHELSON: Is this, are you saying that you
24 will, as a part of your program, you will send out such teams?

25 MR. RUBIN: No. I am saying that we have developed

1 a, if such teams wanted to use such a list, they are
2 available. It wouldn't be researcher's function to send out
3 the teams. It would be NRR's, for example.

4 MR. MICHELSON: Now the only two teams I am aware of
5 are the AITS and the IITs and this is going to go beyond that.

6 MR. RUBIN: I think there are, some part of those
7 teams also include human factors staff from NRR.

8 MR. MICHELSON: I mean are you talking about teams
9 that go out for things other than AIT and IIT?

10 MR. RYAN: Tom Ryan again from Research--what NRR
11 has asked us to do is to put together a one-page checklist,
12 but at the request of an NRR analyst, a resident employer or
13 someone other than an NRC representative of the plant, could
14 go out and ask some questions of people who were involved in
15 the thing, had been reported as LERs, to get a sense of the
16 degree to which human factors may or may not really have been
17 involved. The form then comes back to the analyst in NRR, the
18 determination by the pattern of responses, we conclude that
19 this is a significant human factors related event. My
20 understanding is that NRR, then the analysts themselves might
21 follow up the investigation of the event, but this is just to
22 do a screening.

23 MR. MICHELSON: This is an informal process?

24 MR. RYAN: As I understand NRR's desires, it would
25 be sort of triggered by an NRR analyst back here reviewing an

1 LER or some other event report that suggested to them somebody
2 should go out and start asking questions.

3 MR. MICHELSON: You are providing some guidelines on
4 what to ask?

5 MR. RYAN: That is exactly right.

6 MR. MICHELSON: Good. Thank you. You haven't
7 written it yet, though?

8 MR. RYAN: I am in the process now of iterating with
9 NRR. We have had a couple of drafts of it, and we hope to,
10 within the next few months to be in a position to maybe go out
11 and do some kind of rough field testing.

12 MR. MICHELSON: Thank you.

13 MR. RUBIN: Research has also been completed on
14 getting an independent assessment or data on the voluntary
15 third party reporting system. There is some questions that
16 need to be asked and discussions between Research and NRR and
17 AEOD on the possible need for or the questions before going
18 ahead with the third party reporting system similar to the
19 kind of thing that the Federal Aviation Administration has,
20 voluntary reporting by operators or others on a nuclear event,
21 that would not normally be reported through the LER system or
22 other mechanisms that currently exist.

23 We talked earlier about human performance under
24 severe accidents, either under states of stress from emergency
25 operations, and under extreme environmental conditions. These

1 both relate to the accident management aspects of the human
2 factors program.

3 That summarizes basically the projects we have near
4 term, human factors research. Again, it is an ongoing
5 program. As projects change and as plans change, we will be
6 updating the plan. Again, because of the first slide, there
7 is some differences of opinion as to what projects should be
8 supported and what level of effort. There is a need to
9 prioritize research in human factors. NRC has limited staff
10 and limited budget, and I have tried to list here items that
11 are considered in prioritizing the research. These are not
12 necessarily listed in order of significance, but they
13 certainly are factors that we consider in supporting research
14 programs. One important area is the potential for reducing
15 risk.

16 CHAIRMAN REMICK: Let me ask because we are running
17 behind, that was, I think is covered in your draft, and does
18 the subcommittee have any questions on any of these items
19 rather than going down item by item?

20 MR. RUBIN: They are listed here. They are in the
21 handout and in the draft.

22 CHAIRMAN REMICK: Okay.

23 MR. RUBIN: There were questions earlier on do we
24 just do research for user needs, and you can see there are
25 other areas, how we prioritize the research.

1 To wrap up with the last slide, how does all this
2 fit together? Kind of a systems approach, and relationship is
3 there between the different research activities in terms of
4 the people and the hardware. This slide outlines a process
5 which we feel is pretty important in resolving issues of
6 concern to the human factors area.

7 The first step would be to identify the task
8 performance requirements. What are operators, maintainers
9 required to do in a nuclear power plant? Next, what are their
10 capabilities? What can he do considering various factors that
11 influence his performance? What factors such as how many
12 tasks he has to complete, what kind of tasks, degree of
13 difficulty, how much time he has, what information is
14 presented to the operator, does he have training in any other
15 questions?

16 The fourth item is particularly kind of a balancing
17 act I call it, to evaluate the performance requirements of an
18 operator against his capabilities, and if there is an
19 imbalance, in other words, if the operator might be asked to
20 perform some tasks that are beyond his capabilities, then
21 there may be a concern from the human factors point of view.

22 If there are concerns then, there would be a review
23 of the significance of these concerns in relation to the
24 overall goals of the system. They relate to safety, which is
25 an NRC concern, relate to availability of the plant and cost

1 factors, which would be certainly in the bailiwick of the
2 utility industry and licensees, so if there is significant
3 concern, what is the significance, and should there be a
4 development of recommendations or guidance or requirements to
5 address these concerns?

6 There are several approaches, certainly alternatives
7 that can be used to address the human factors concerns, and in
8 order to have a systematic approach, it is necessary to
9 compare the impacts of these alternatives on the overall set
10 of the system goals which includes the operator and the
11 equipment. You can't just look at one approach in isolation.
12 If there are advanced computers, it is going to affect the
13 operator's training, which will affect procedures, which may
14 affect staffing requirements, and it cuts across many areas of
15 the human factors plan we talked about earlier.

16 The last step which is necessary is that when there
17 are alternatives that are implemented to improve concerns in
18 the human factors area, it is necessary to get some feedback
19 to see if these goals have been improved upon, and this is the
20 area which we talked about earlier, the need for performance
21 indicators.

22 That completes my presentation. Tom Ryan will
23 present two of the activities that the subcommittee asked for.

24 MR. WYLIE: I would like to ask a question. I would
25 like to back up a little.

1 Bit to qualification and training and the question
2 was asked earlier about the, whether or not you were going to
3 include anything as part of the selection process for
4 operators and maintenance personel, and I think you said no.

5 And I was--in your draft, you make a statement under
6 qualification and training that human performance is related
7 to the innate abilities to acquire knowledge and skills that
8 are brought to a task, and then you expand on that, and it
9 seems to me that this question of personnel selection and the
10 abilities, natural abilities, is very important.

11 Now we mentioned earlier, Glenn Reed who used to be
12 a member of the Committee felt very strongly that natural
13 ability testing should be part of the selection process of all
14 operating personnel at nuclear power plant and maintenance
15 personnel, and I personally feel that is important, and I
16 think that all utilities should use that process in the
17 selection of their personnel. Most utilities do. Some don't.
18 And it would seem to me that the important, it would be
19 important to assess the value or the significance of natural
20 ability testing as part of the selection process and then the
21 selection of operating and maintenance personnel for the
22 plants.

23 MR. RUBIN: I didn't mean to say that is not an
24 important area. It is, as you say--no question about it. Now
25 whether it is a role for NRC or industry, which actually

1 selects--

2 MR. WYLIE: It is the role of NRC to assess what
3 contribution the selection of personnel has to do with the
4 safe operation of the plants.

5 MR. RUBIN: We are certainly involved in that in
6 terms of the rule for degree requirements for operators, for
7 senior operators. There has been work on, in comparing the
8 skills, knowledge and--

9 MR. WYLIE: Skills and knowledge are one thing, but
10 you say right here that human performance is related to innate
11 abilities and then acquired skills and knowledge, and then it
12 says one approach to resolving human factors concerns is to
13 select personnel based on qualification with respect to their
14 performance of tasks. All that says exactly what we are
15 talking about.

16 MR. RUBIN: Right now, for I would say with this
17 year, there is not an identified project to work on that.

18 MR. WYLIE: I am just wondering where it is going to
19 be addressed and where is, the assessment of the value of
20 natural ability testing as part of the selection process is
21 going to be addressed?

22 MR. JONES: The NRC made a conscious decision
23 several years ago to say look, the business of selection,
24 qualification of testing is an industry problem that we won't
25 regulate and that's the kind of policy that has been going on.

1 MR. MICHELSON: That doesn't prevent you from
2 researching it. I mean you don't put your head in the sand
3 because somebody says that it is a matter of policy, we are
4 not going to do it.

5 MR. JONES: And personally, I think that the data on
6 the need for it, the ability to do it, measurement techniques,
7 are very well known.

8 MR. WYLIE: Oh, sure.

9 MR. JONES: There are a variety of industrial
10 psychology--I don't think it would be very profitable to try
11 to research it with NRC. My arm tries to get utilities to do
12 it themselves, but even there it would cost me money.

13 MR. WYLIE: If you look at the LERs, and the things
14 that happen, it is where the maintenance man puts the
15 screwdriver in the wrong place or he does something else, and
16 there is many of these things. I think Carl brought it up,
17 that there is lots of that going on. All it suggests is that
18 there is some poor selection out there in maintenance
19 personnel.

20 MR. RUBIN: There may be other causes as well. May
21 not be selection. It may be carelessness. May be training.

22 MR. WYLIE: It has something to do with natural
23 abilities.

24 CHAIRMAN REMICK: I don't differ with what you are
25 suggesting or one of the problems, we want people to come up

1 through the system and eventually be the VP or the president
2 and the CEO.

3 What natural aptitude do we look for? Just to the
4 guy that can handle the wrench and then--

5 MR. WYLIE: No, I don't say that. That's part of
6 it.

7 CHAIRMAN REMICK: You might want that person to
8 become an operator and so that's different aptitude and we
9 want him to become SRO and maybe a shift supervisor and maybe
10 plant manager. What kind of natural aptitude do we include
11 when we hire them?

12 MR. WYLIE: Maybe that should be identified. I
13 don't know. Maybe that should be part of the identification
14 of what natural abilities the operator should have, be
15 selected for. I don't know why there is such a reluctance to
16 include natural ability testing, particularly mechanical
17 aptitude. I took it in 1943 when I joined the Navy, for God's
18 sake, and they sent me to schools based on those tests.

19 DR. LEWIS: And look what happened to you!

20 MR. WYLIE: I have been taking them all my life.

21 DR. LEWIS: There is another point, and that is that
22 the people, the screwdriver in the wrong place or use the
23 volts meter on the amp meter scale and when they short out
24 circuit boards, that sort of thing is a little bit more than
25 that natural mechanical ability, although I certainly will

1 agree that is relevant.

2 There is the sense of responsibility. There is the
3 question of what the repercussions are if you make a mistake
4 that doesn't lead to a plant accident. And in the aviation
5 case, which I know very well, the maintenance personnel are
6 licensed by the FAA, and the person who actually uses the
7 screwdriver may not be, he may be an unlicensed person, but in
8 the end, a licensed person signs up, and if there is ever a
9 malfunction or an accident that's attributable to that, the
10 guy's license and his livelihood are at stake because they can
11 not function in the industry without a license, and it is that
12 kind of awareness that something terrible will happen that
13 keeps a lot of people from sinning, you know, even if they
14 would prefer to sin, so it is a little bit more I think than
15 natural aptitude.

16 MR. WYLIE: Well, but I think the natural aptitude
17 has a lot to do as to whether he performs correctly or not.

18 DR. LEWIS: Oh, sure.

19 MR. MICHELSON: I think the whole point, Charlie,
20 isn't it that that's what you believe and I may believe it,
21 too, but I haven't seen any kind of a really good piece of
22 work done that establishes the validity of that observation
23 and that's what we need is that good piece of work that
24 decides once and for all, well, helps you to decide whether or
25 not it is an important contributor. Glenn thought it was

1 important. Charlie thinks it is important. I don't know, but
2 I would like to see the work.

3 MR. WYLIE: Here we are talking about the only way
4 we are going to spend the money on research is on training
5 effectiveness, but why not effectiveness of the selection
6 process and along with it?

7 MR. MICHELSON: That's the idea. I think it is a
8 valid point.

9 DR. LEWIS: It would be nice to have really good
10 data for the nuclear business, although as has been said,
11 there is a lot of data out in industry, but you know, speaking
12 as an ignoramus who has watched things happening over the
13 years, I would guess if you did aptitude testing you would
14 want to select a window, minimum grade and a maximum grade,
15 because people with too much aptitude tend to be sloppy
16 because the job is too easy for them, and people with too
17 little will bungle it for other reasons, and if you would go
18 for a window, then I will join you in this crusade.

19 MR. WYLIE: Fine. I think it should be evaluated.
20 That's my point. Glenn used to have some examples of people
21 who worked for him. I have had people that worked for me that
22 had no mechanical aptitude to amount to anything and they
23 forever were making errors.

24 CHAIRMAN REMICK: Charlie--

25 MR. WARD: That used, what I used to tell Glenn, I

1 kept hearing those stories and I thought there was a
2 management problem there. I mean you have got, if a guy has
3 been making errors for 20 years, you might want to do
4 something with him.

5 MR. WYLIE: He was fired. You fire him or you move
6 him.

7 MR. WARD: Make him a committee member or something!

8 MR. MICHELSON: I have not seen a valid basis for,
9 to believe that aptitude testing can predict, predict whether
10 or not these people will be successful mechanics after they
11 have, get done with their training, and that is what I would
12 like to see, some kind of validation that give with reasonable
13 confidence yes, this is an important element and it is a good
14 predictor of future performance. I haven't seen that. I just
15 share these exceptions, these examples, and I don't doubt
16 them, but I, I don't have any good basis to believe you have
17 got to go through aptitude testing as a requirement now
18 because of these particular data points.

19 CHAIRMAN REMICK: I would guess, just a guess, that
20 two thirds of the utilities are using some kind of an aptitude
21 test of some kind.

22 MR. WYLIE: That would be my assessment.

23 CHAIRMAN REMICK: The PASS and the MAST tests, other
24 equivalents.

25 MR. WARD: Are we seeing any evidence that A,

1 problems reported in LERs are caused by clumsy mechanics as
2 opposed to non-clumsy mechanics who get careless or inevitably
3 make mistakes? Every once in a while the most graceful guy in
4 the world is going to make a mistake once in a while. And is
5 that maybe that's all we are seeing in LERs?

6 MR. MICHELSON: You can't tell in the LER whether
7 this was a clumsy mechanic or not.

8 MR. WARD: Okay.

9 MR. WYLIE: But there is a high percentage of errors
10 made in maintenance that knock the plants off the line.

11 MR. WARD: But are those the, I mean there is no
12 such thing as perfection in human performance, so are the
13 errors we are seeing predominantly just from the wonderfully
14 capable mechanics who every once in a while make an error?

15 MR. MICHELSON: That is what Research will have to
16 tell us by researching some of these events, enough of them to
17 be a reasonable sample, find out what kind of test did he take
18 before his training? What kind of training scores did he
19 make? What kind of performance has he had since training?
20 And was this just the day he screwed up, or was this a pattern
21 all the way back to having poor aptitude and flunking his
22 aptitude test or something?

23 CHAIRMAN REMICK: I think I am going to have to
24 interrupt, going to have to come to, try and get the
25 completion of the presentation of staff. We can take that up

1 in our discussion at the full meeting next month when we take
2 up this issue again.

3 Tom, please.

4 MR. RYAN: Thank you. My name is Tom Ryan. I am a
5 senior engineering psychologist within the Office of Research.
6 Today I have been asked to give you a very brief overview of
7 what we call the human reliability research activity, and to
8 acquaint you with two specific research objectives, the first
9 being a computer based data management system known as
10 NUCLARR, or the nuclear computerized library for assessing
11 reactor reliability, and secondly, an artificial intelligence
12 based decision-making or intention formation analyzer which is
13 known as CES, or cognitive environment simulation.

14 (Slide)

15 MR. RYAN: First turning to the activity itself,
16 this activity was initiated with an NRR user request on
17 November 30th, 1982, a user request that has been reiterated
18 several times since, both from NRR and RES risk analysis
19 people, and I should say right here I would like to feel that
20 it was because of my skill and cunning that this didn't get
21 cut off in 1985, but I think a larger reason was that this
22 work has never been sponsored or funded through any human
23 factors budget until fiscal year 1988, so it shouldn't be
24 terribly surprising to you that an attempt has been made to
25 accommodate the PRA community.

1 The program has basically two objectives--to develop
2 methods and data to support doing HRA part of PRA. It has a
3 second objective, and this gets back to Mr. Lewis' comment
4 when we started the meeting, and that is to extend some of
5 these methods and data to larger human factors issues, and
6 this has been brought about by a couple of things--first of
7 all, a recognition that basically anything that has been
8 developed as part of this program since about 1984 has
9 implications far beyond HRA. It just happens that the tools
10 we have developed, the final output and error probability,
11 that doesn't mean these tools cannot be used as design tools
12 to investigate better ways to do a lot of things in the human
13 factors area. I think that may become somewhat clear to you
14 when I talk about CES.

15 The other reason for trying to extend these methods
16 taking into consideration human factors was the fact that the
17 other program was cut off, so I attempted to look at some
18 technologies that might have applications beyond just
19 supporting a very strict interpretation of HRA.

20 (Slide)

21 MR. RYAN: The elements, there are elements, five
22 areas that have been worked. The first has to do with the
23 acquisition of human performance data.

24 The second has to do with tools, model, what have
25 you, to use that data, to estimate error probabilities. The

1 third is a management system or repository for this;
2 probabalistic data so it can be used by the risk community;
3 fourth, procedures for integrating these methods and data and
4 behavioral science expertise into the PRA process which I
5 conten the problem with HRA. It is not--the method, not
6 so much the data. It is the having the right people doing the
7 analysis to get the full benefits.

8 And finally, this end or last objective, is to
9 develop ways of systematically using these tools, methods,
10 data procedures, what have you, in a larger human factors
11 context.

12 DR. LEWIS: One of the things that has always
13 troubled me is that people speak of human performance entirely
14 in terms of human error, and I wonder whether this expertise
15 includes capability for incorporating the occasionally amazing
16 potential for humans to err on the positive side from the norm
17 and to rescue a situation that otherwise looked very
18 difficult. I think you know what I am asking.

19 MR. RYAN: Unfortunately, in this environment, we
20 have people report on negative kinds of behavior. We don't
21 have a mechanism for people telling us new and better way to
22 do things.

23 Alan mentioned earlier third party managed system.
24 That is sort of patterned after FAA. Somewhere between 30 and
25 50 percent of their reports have positive kinds of behavior.

1 I screwed it up, but here is what I should have done, or here
2 is a way that I have been doing things that are outside of the
3 bunch of procedures, but have been saving the day. I feel
4 here is a way that I can share that with the rest of the
5 community. So part of the problem we have here is we tend to
6 have people report things that are negative and not positive,
7 and I am sure there are all kinds of things going on out in
8 the plants that probably should be shared with the rest of the
9 community, much better ways.

10 DR. LEWIS: I actually think this is one of the very
11 important conservatisms in all our estimates of accident
12 probability, that we don't really accommodate the fact that in
13 unusual situations, every now and then people behave like
14 people and it would be very nice if there were some kind of
15 effort to try to quantify that within the system. I have
16 mentioned this to the commissioners occasionally, and they all
17 say gee, that's a great idea, we ought to do something about
18 it, but nothing ever happens.

19 MR. RYAN: When I talk about CES here, although this
20 is an artificial intelligence-based simulation, there are
21 probably some things that can be investigated. In fact the
22 simulation itself tends in some occasions to generate
23 decisions which are correct that nobody has ever thought of
24 before, and the question becomes is this a, is this creative
25 behavior or what would we, you know--

1 DR. LEWIS: That's because of the ability to think
2 fast, or to coordinate information fast, which is not
3 creativity, but that's another subject. I'm sorry.

4 MR. MICHELSON: Is it conservative or not to assume
5 that people will always improve the situation? People can
6 also intervene to make the situation worse.

7 DR. LEWIS: Indeed they can. When they intervene to
8 make it worse, we accommodate that in the PRA. It is the
9 opposite that we don't accommodate.

10 MR. MICHELSON: No, we don't necessarily accommodate
11 that in the PRA because we haven't thought they would even do
12 that yet, so it never got--

13 DR. LEWIS: I'm sorry. We do. We include an error
14 rate in human intervention, but we never include an
15 improvement rate. There have been tentative efforts to try
16 but it is extremely dry. I won't do this on Forrest's time.

17 CHAIRMAN REMICK: Thank you. Tom?

18 MR. RYAN: Very quickly here, the research that has
19 been done in this area has followed basically four steps in
20 the applied program.

21 First step is to do a what we call feasibility
22 analysis. That is, look out there in other environments and
23 to see what has been done and what we can capitalize on to
24 resolve the issue that we have in hand. If it is there, we
25 develop a prototype that will stand alone. That means it is

1 documented well enough that somebody other than the developer
2 can implement it, and we feel that it is ready for some kind
3 of testing.

4 Third step is a fairly practical step, technology
5 evaluation. We look at practicality of acceptability and
6 usefulness issues. Practicality--what does it cost? How many
7 people does it take. How long does it take to use it?

8 Acceptability has to do with will the community
9 accept the technology? Even today some people shy away from
10 anything that uses a computer. I can tell you that with
11 regard to something like MAPPS.

12 Usefulness has to do with the degree to which the
13 product itself responds to the original request. Technology
14 transfer has to do with going out and running controlled case
15 studies so that we can get feedback on the prototype to decide
16 what we need to do to better train people to make these things
17 more user friendly so they can be used by the larger
18 community.

19 (Slide)

20 MR. RYAN: Within that context of elements and
21 process, these are the projects that are ongoing for FY 1988,
22 and as you can see on this matrix from the location of them, a
23 lot of work has been done. In this first column under data
24 acquisition, I have a grant with the George Mason University,
25 more specifically with Dr. Ed Glickman, who is Director of the

1 Center for Cognitive and Behavioral Studies, to develop a
2 methodology and a data base which will allow us to take data
3 for the most part selected from operational experience in
4 other environments, aviation and so forth, and most of which
5 is in a probabalistic form, and be able to equate on a
6 psychological level equivalence between tasks we are
7 interested in in the nuclear power plant and the tasks on
8 which the data we are collecting, because we would like to use
9 this kind of data either as the point estimates or as anchor
10 points or bounding values to calculate the estimate.

11 The second column here, it has been mentioned before
12 we are working on, going on with Brookhaven, developing a
13 methodology for incorporating the influences of supervisor and
14 manager into the PRA. This is Brookhaven along with UCLA, and
15 McGill University in Montreal. This project is the CES
16 simulation, cognitive environment simulation that is being
17 done by Westinghouse Research and Development Center.

18 I have two projects ongoing in cooperation with
19 Commission of European Community, one to do with technology
20 transfer of the maintenance model, and secondly, we are
21 participating in a benchmarking exercise over there where we
22 are taking, doing an evaluation of a series of these HRA type
23 methods.

24 This next column data base is the work that is going
25 on at Idaho National Engineering Laboratory to further develop

1 and manage what we call the NUCLARR data base, and finally out
2 at Lawrence Livermore we are working on to develop some
3 procedures for integrating better the behavioral science
4 expertise in the process. I would mention here between 60 and
5 65 percent of these resources are going to non-labs. The
6 majority of the work is not being done at the laboratories.

7 MR. MICHELSON: What is total research we are
8 talking about for '88?

9 MR. RYAN: Approximately a million dollars, so you
10 can look at those percentages of resources and sort of
11 extrapolate.

12 MR. WARD: I don't understand what the asterisk
13 means.

14 MR. RYAN: Basically what is happening over here in
15 these other projects, we are also taking a look at these tools
16 and so on for their application to larger human factors
17 activities. For example, I am sure you are familiar with Dave
18 Woods work out at Westinghouse with the CES. Not only are we
19 trying to just evaluate it for its applicability to the HRA
20 activities, but ways in which we can use it also as an
21 analyzer of plant events and so on, so it can be used to
22 support some of these other activities.

23 For example, someone was mentioning during Neville
24 Moray's presentation a couple of weeks ago about the interest
25 not just being probabilities, but the conditions under which

1 an error, in this case a cognitive error, will occur. We
2 feel CES will permit you to do that kind of thing. It not
3 only will give you decision, but give you an audit trail to be
4 able to go back and by manipulating the simulation, create the
5 circumstances in which the operator given certain
6 characteristics can no longer deal with the scenario, so--

7 MR. WARD: You know, that sounds good except I
8 can't, I can relate some dollars being spent with the
9 percentage numbers, but not with the asterisk.

10 MR. RYAN: All I am trying to indicate here is not
11 to just have the blank column under these methods for
12 extending the technology. I just got them in here even though
13 there is no money specifically in projects that I would put
14 over in this column simply to indicate to you that in these
15 other projects, we are considering the extension issue as part
16 of those projects. That's all.

17 MR. WARD: I see.

18 MR. RYAN: We are not limiting the transfer for the
19 purpose of doing HRA type work.

20 MR. WARD: Okay.

21 MR. RYAN: I would like to turn my attention now to
22 the NUCLARR.

23 CHAIRMAN REMICK: It is Chairman's prerogative to
24 worry about time. We have two other subjects to take up this
25 afternoon. Anybody on the committee has particular questions

1 on the NUCLARR?

2 MR. WARD: I've just got one.

3 CHAIRMAN REMICK: Go head, please.

4 MR. WARD: Now does this relate to--there was an
5 industry program I thought, something like this, that Virginia
6 Power was doing something along these lines, in-house program?

7 MR. RYAN: Are you talking about a data bank or
8 talking about human performance evaluation system?

9 MR. WARD: Something like this NUCLARR, a data bank
10 on operator human performance that wasn't related to kind of
11 major events but just--

12 MR. RYAN: I think you are talking about HPES, which
13 is a system which allows people to report incidents to a
14 coordinator who keeps that information and then in turn
15 without identifying the person, coordinates with management to
16 make a decision what is to be done about it. This is a
17 probabalistic data base. If you are a PRA person or HRA, you
18 are getting ready to do your analysis, you say where do I get
19 the data? This is designed to do that.

20 MR. WARD: Excuse me.

21 MR. RYAN: Which is a little bit different.

22 CHAIRMAN REMICK: Any other questions? Otherwise I
23 suggest that we not hear the presentation on this today. Did
24 you have another one, Tom?

25 MR. RYAN: The other activity that I was--

1 CHAIRMAN REMICK: CES, cognitive environment
2 simulation--are there questions on that subject? Hearing
3 none, I would suggest that we go to the staffing budgets and
4 so forth. Is that something you are going to handle? Tom, I
5 apologize for cutting your presentation short. I hope you
6 understand.

7 MR. MICHELSON: Could we put these on a future
8 agenda?

9 CHAIRMAN REMICK: Sure.

10 MR. WARD: I would sure like to hear more about
11 those. Did you say yes to what Carl said?

12 CHAIRMAN REMICK: Yes. We will schedule it for a
13 future meeting. If possible, maybe we could fit them in on
14 the 27th of April.

15 MR. MICHELSON: Could they send us a little
16 documentation ahead of time just so we don't have so many
17 questions?

18 MR. RYAN: I have, in that regard, there are two
19 NUREG CRs, very short. I have copies of them right here. You
20 can see how short they are. NUREG CR 4639, Volume 1, which is
21 a very short document, to tell you all about NUCLARR. There
22 is a NUREG CR 4862, Volume 1, which will tell you all about
23 CES, and CES is the deterministic simulation.

24 We have another activity call cognitive reliability
25 analysis technique, which takes CES output and generates error

1 probability estimates. So there is Volume 1 of 4639 on the
2 data NUCLARR, Volume 1 of 4862, which is CES and CRAT, very
3 short.

4 MR. MICHELSON: You will leave those with Herman?

5 MR. RYAN: Sure.

6 MR. MICHELSON: That would be very helpful. We
7 could put them on the next meeting.

8 MR. COFFMAN: I think that's very important to hear
9 this work that has some meat to it that has been going on, but
10 I can appreciate in the interest of just looking at planning,
11 we will kind of skip over it today.

12 Just some quick points about resources and
13 coordination--the main point that I need to make here is that
14 we are, we are working circumspectly. We are not working in
15 isolation. We have discussed briefly--I won't try and amplify
16 on what we have discussed about accident management research.
17 We can discuss that at your interest--with the industry
18 groups. In fact we just met last Wednesday with NUMARC, EPRI
19 and INPO to discuss some joint and complementary research, but
20 the concept there is the joint research appears to be
21 particularly applicable to those questions requiring time from
22 plant personnel so that we jointly occupy those people's time,
23 and thus reduce the burden for those people, and I think the
24 good example is the MAPPS work where we are looking at
25 technology transfer jointly, but then also there is the need

1 to coordinate with industry and others for the purpose of
2 making sure we have a balance of both perspectives and
3 possibly eliminate some duplication, but we are working
4 closely with these, trying to work closely with these industry
5 groups. We hope to work even closer.

6 In addition to those industry groups, there is DOD,
7 FAA, and through some of the professional societies.

8 (Slide)

9 MR. COFFMAN: By way of staffing, within the branch,
10 Reliability and Human Factors Branch, there are eight
11 professionals that are directly working upon the human factors
12 research that is underway in the plant.

13 All of these are senior professionals. All have
14 graduate degrees. Half of them have Ph.D.s. They are
15 multi-discipline. You will see by, only by coincidence you
16 will see eight disciplines listed. It is not that they match
17 up individually. There is, there is some overlap, but each
18 individual himself has more than one discipline where he has
19 significant experience and formal training because as you can
20 see and you may already know, human factors is a rather broad,
21 broad topic.

22 The research contractors, we have discussed it a
23 little bit. Let me, let me just break it down for you that
24 among the national labs, the universities and the consultants
25 and in fact some international work, that right now, we are

1 about 50 percent at national labs. Funding, 50 percent of our
2 funding in human factors research is at national laboratories.
3 Overall, in the branch, it is a little less than 10 percent at
4 universities, although as Tom told you, most of his work, over
5 half of his work is with universities and consultants outside
6 the national laboratories.

7 MR. WARD: I didn't get the difference in those two
8 numbers. You are saying--

9 MR. COFFMAN: Tom's, if you look on that last
10 handout which I will get to you, see that the work that Tom
11 Ryan described to you in this entire area of human performance
12 and human reliability assessment, that that runs at about a
13 million dollars per year, and of that, about more than half is
14 not funding that is given to national laboratories. That is
15 primarily with the universities and consultants.

16 MR. WARD: Okay.

17 MR. COFFMAN: International agreements; however, if
18 you look at it across the entire branch, right now, we are
19 only, we are a little less than 10 percent with the
20 universities.

21 MR. WARD: That means 90 percent with national labs?

22 MR. COFFMAN: No; 50 percent--these numbers are
23 rounded off, but it is like 53 percent at national
24 laboratories, less than--I just wanted to let you know I
25 changed the base between Tom and me.

1 MR. MICHELSON: Forty percent with consultants then?
2 You only listed three categories. Laboratories were 50
3 percent, and universities were 10 percent,

4 MR. COFFMAN: Consultants run about 15 percent, and
5 then our international agreements run about 20 percent, but
6 even at the national laboratories, we are specifically focused
7 in on identifying experienced human factors personnel, people
8 who have multi-disciplinary capabilities.

9 Just the last vignette by way of summarizing
10 resources, I tried to show you how our current budget for
11 fiscal '88 and for fiscal '89 is allocated among these
12 different categories, and you can see that man/machine
13 interface runs about a quarter of the budget, procedures about
14 10 percent, qualifications and training because of the
15 discussion that NRR explained, you know, that is not a big
16 piece of our work, 5 percent. Organization and management,
17 about a quarter, and the human factors area, about a third;
18 human performance and reliability assessment, about a third.

19 Our total budget is, it will increase to a level
20 somewhere between four and five million annually. The past
21 level of funding has had a mean funding somewhere around 2.3
22 million, so that the fiscal '88 funding is about 45 percent
23 higher than what the past average has been, and the '89 budget
24 will go even higher. It will be 85 percent higher than the
25 past mean.

1 I might mention that the mean funding during the NAS
2 human factors regulatory research study was less than a
3 million or about 60 percent below the average of the past,
4 past funding, but to revitalize the human factors regulatory
5 research requires more than just intensifying the resources
6 and the schedules.

7 (Slide)

8 MR. COFFMAN: To revitalize the research, it
9 requires structuring it, and coordinating, coordinating it,
10 and directing it, and packaging the research products for use.
11 So that was our intent today was to give you in the
12 presentations and hopefully from the discussions a good feel
13 for not only the level of effort that we have selected, but
14 also some of the structure and some of the coordination and
15 some of the direction that we are using to revitalize the
16 human factors regulatory research.

17 We have been making notes on the comments that are
18 made, that have been made. We continue to be anxious to hear
19 comments. We would be interested if the committee would like
20 to make formal comments as we are preparing to go to the
21 Commission in the form of a letter.

22 CHAIRMAN REMICK: Do you, when you have these
23 research projects, do you issue an RFP in the Federal
24 Register? How do you handle solicitation of bidders?

25 MR. COFFMAN: We have--let's see if I can get them

1 straight. We have three different funding channels with our
2 DOE contracts that we can use, and we have individual
3 competitive bids where we go out and announce for solicitation
4 and we have the--

5 CHAIRMAN REMICK: Where do you announce? Where do
6 you announce and how do you announce?

7 MR. COFFMAN: We have the broad agency announcement.
8 Tom, do you want to explain this funding channels?

9 MR. RYAN: With regard to open competitive
10 procurement, we go through the Commerce Business Daily just
11 like other agencies do.

12 MR. COFFMAN: Broad agency announcements use the
13 Commerce Business Daily also. We have additional--those are
14 our main funding channels. We have grants which we can make
15 also, but the small business source of funding is, you know,
16 is up for reconsideration right now.

17 CHAIRMAN REMICK: Can anybody tell me when you use
18 the Commerce Business Daily versus the Federal Register? You
19 also advertise contracts in the Federal Register. Anybody
20 know on that, what the distinction is there?

21 MR. RYAN: Excuse me. What was the question?

22 CHAIRMAN REMICK: How does one decide whether to
23 advertise in the Commerce Business Daily or the Federal
24 Register?

25 MR. RYAN: If you go out on open competitive

1 procurement, you are required to publish it in the Commerce
2 Business Daily. I think we just put solicitations for small
3 business grants and things like that in the Federal Register,
4 and we also have a broad agency announcement soliciting, well,
5 indicating topical areas where universities might want to
6 provide us with grant applications. That also is in the
7 Federal Register. Any kind of open competitive procurement is
8 required to be in the Commerce Business Daily.

9 CHAIRMAN REMICK: I was thinking, and I could be
10 wrong, the Center for Nuclear Waste Regulatory Analysis, NMSS,
11 advertised about a year ago if I recall in the Federal
12 Register. Maybe I am wrong and it was the Commerce Business
13 Daily.

14 MR. RYAN: We also have standing bidders. People
15 come in who are interested in doing the work in certain areas,
16 put themselves on the bidders list, and one of the things we
17 do when we go to contracts with a, in addition to people maybe
18 requesting the particular RFP, they have a computer over it
19 and search certain key words. They will give you a bidders
20 list. What we normally do is send out solicitation to
21 everybody that is on those, the bidders list.

22 CHAIRMAN REMICK: Okay. Thank you. Questions or
23 comments?

24 MR. WARD: I guess going back to the staffing, eight
25 professionals, I didn't quite, wasn't quite able to figure out

1 how many of those professionals would you say have, you know,
2 are primarily human factors specialists in broad definition?

3 MR. COFFMAN: I guess I left my list. Depending
4 upon your definition of a human factors specialist, if you
5 look, if you take as a key, would you use as a key those who
6 form the NAS panel review?

7 MR. WARD: Let's just say how many--you have
8 psychology and human factors engineering listed up there. How
9 many of the eight have professional background in those two
10 areas?

11 MR. COFFMAN: Three.

12 MR. MICHELSON: They have a degree in psychology or
13 human factors engineering?

14 MR. COFFMAN: The one has a BS in psychology. The
15 other has a Ph.D. in industrial organization and psychology,
16 and the third has a Ph.D. in experimental psychology and human
17 factors engineering.

18 MR. MICHELSON: Okay.

19 MR. WARD: Well, I guess that strikes me as a little
20 thin for the mission that this group has.

21 MR. COFFMAN: If you are using as an indicator just
22 their formal education, it may sound a little thin, but one
23 has to look at their experience, too. Even Rasmussen, if you
24 look at his formal training, is rather limited in fact, but if
25 you look at his experience, and he is a world renowned expert.

1 I think we have got people with, with significant experience
2 in this area. I'm not going to refuse more people, and
3 qualified people. In fact, we do have a vacancy which we hope
4 to fill, a senior position, and there are well-qualified
5 people to fill that vacancy, but given the level of funding
6 that we have got, I think we have a good match because it
7 would mean that on an average, there would be somewhere around
8 600,000 a year that would be managed by an individual. Maybe
9 I am not addressing your--

10 MR. WARD: No. That's fine. I understand.

11 CHAIRMAN REMICK: Any other questions or comments?

12 MR. WARD: I have got another comment, comment on
13 the--I am still bothered by the high fraction of the total
14 budget going to the human performance and reliability
15 assessment, 32 percent, '88; actually goes up to 38 percent in
16 '89. I heard Tom Ryan's talk and I guess if I have a lot of
17 faith that something is going to come out of those asterisks,
18 maybe it is not so bad, but I don't know that, you know, I
19 have any particular reason to have a lot of faith in the,
20 faith in the asterisk, and I am just afraid that the whole
21 issue of human factors over the last research has tended to be
22 dominated by the PRA orientation, and I really think that
23 needs to be turned around. Maybe it has been, but I'm
24 bothered that there are indications that we are still too
25 heavy in that part of the business.

1 MR. COFFMAN: We are certainly heavy at the time in
2 1985, '86 timeframe when that was all there was, but before
3 that--

4 MR. WARD: I guess what irritates me is that if you
5 had gone up the high policy levels in the Commission, some of
6 the commissioners thought you still had a human factors
7 research program during that time because you had this PRA
8 program going on.

9 MR. COFFMAN: I would hate to put PRA in an
10 adversarial position with human factors. I don't think
11 that's, I think there has got to be a balance as you look at
12 the different roles of these different methodologies.

13 MR. WARD: I think, too--and the agency has spent
14 several hundred million dollars on PRA research in the last 15
15 years, and it has spent maybe \$20 million on human factors
16 research in the last 15 years, and one of the things that
17 experience and PRA both keep telling us is that human
18 performance is a major contributor to, to risk, and you know,
19 how well do we have to learn that lesson before deciding that
20 research into the causal factors of human plants and
21 everything is more important than continuing to try to
22 quantify?

23 MR. COFFMAN: I think I appreciate what you are
24 saying, and I am having trouble finding how the direction we
25 are heading is different from that.

1 The human performance and human reliability
2 assessment work is not what I would call, put it in the same
3 category as the PRA work that is being funded for 1150.
4 Within that category is the cognitive error where the MAPPS
5 work, and these are areas which are directly tied into human
6 performance.

7 One has to measure them, or if I can paraphrase Lord
8 Kelvin, we may be on the threshold of science but we are not
9 really at science until we can in fact measure and quantify
10 things, and having quantified that in one step would be to
11 then translate it into risk numbers, but I don't think our
12 human factors research plan is directed totally toward PRAs,
13 and the 30 percent or the one-third of effort that is, that is
14 in that research area, if we are really looking to distinguish
15 that from reliability methods, it may be a little heavy. That
16 number may be heavy, but I don't, I don't think it is out of
17 proportion for what is needed.

18 The question that might be addressed is what is the
19 total appropriate, total level of funding, and is in fact
20 somewhere between 4 and 5 million a year an appropriate level?
21 And certainly if the committee had more guidance on that work,
22 we are anxious to hear it.

23 MR. GIMMY: At this mature stage of plant plumbing
24 and so forth, you would think that something like half NRC's
25 budget would be on human factors because humans cause half of

1 the problems just in every--I don't care whether you
2 accumulate the data at Savannah River or commercial stuff, but
3 half the problems are humans, and indeed we could argue it is
4 more than half on the real serious accidents. And granted we
5 have gotten pretty good at building the plumbing and the
6 welding and so forth, QA plans, if you just follow them. You
7 would think there would be a whole lot more in this area.

8 MR. COFFMAN: I think that human factors research
9 needs to be compatible and has no trouble being compatible
10 with the risk environment and the probabalistic risk
11 environment that we are working in, and I think we can proceed
12 compatible with that without being driven by that.

13 DR. LEWIS: I don't see those as antithesis. I
14 don't know what a probabalistic risk environment is, but PRA
15 is a risk assessment tool. That's all it is, whereas what we
16 are talking about in these other contexts is risk management,
17 and there are simply different objectives. They don't match
18 with each other.

19 MR. COFFMAN: I guess I mention risk in this
20 terminology. Risk management is, is the activity that we are
21 involved in, and that's what I was referring to.

22 CHAIRMAN REMICK: Other questions? If not, the
23 presentation of the Full Committee is scheduled for Thursday
24 afternoon, currently 2:30 to four o'clock. I would urge the
25 staff in their presentation to stick to telling us just what

1 is proposed in the research, the human factors research plan,
2 and I would suggest that you try to keep your presentation to
3 no more than about 30 minutes allowing time for questioning
4 and so forth. Otherwise I think we will not have sufficient
5 time so you will need to hone down your presentation to
6 factual matters. Don't give us the historical perspective. I
7 think we will just have to assume that people know that, and
8 address what it is that you are planning to do.

9 I think you will need to mention the ongoing
10 research and then what you plan to do and the various
11 categories, the five different categories, the budget, that
12 type of thing. You will need to include in that, but you will
13 need to hone down the presentation quite a bit. I would
14 suggest plan no more than 30 minutes of actual presentation
15 time I think would be about right.

16 Anybody else wish to make a suggestion to the staff
17 on that? I assume that you are looking for a letter from the
18 ACRS if possible?

19 MR. COFFMAN: Yes, sir.

20 CHAIRMAN REMICK: So I urge the subcommittee to
21 think about suggestions that you might have to suggest to the
22 Full Committee in such a letter.

23 All right. We are roughly 25 minutes behind time.

24 MR. ALDERMAN: Yes.

25 CHAIRMAN REMICK: Let's adjourn for lunch and return

1 at 1:30.

2 (Whereupon, at 12:25 p.m., the meeting was
3 adjourned, to reconvene at 1:30 p.m. the
4 same day.)

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A F T E R N O O N S E S S I O N 1:30 p.m.

CHAIRMAN REMICK: We need to reconvene the human factors subcommittee meeting. The next topic is a policy statement on training and qualification, and as I think you know, I am a member of the National Nuclear Accrediting Board, and although this is not a review of those technologies, it is a review of review of those technologies, so I think it is best that I not chair this portion of the session, nor will I participate in voting on the Full Committee in any action we would take, and I am turn the gavel over to my colleague Dave Ward who has agreed to chair this portion of the meeting.

MR. WARD: (Presiding) Thank you. If I had been chairing in the morning, I would have given you another five minutes for lunch!

CHAIRMAN REMICK: I wanted to tell you you are half an hour late. I hope you are going to make it up!

DR. LEWIS: Is there an aptitude test for this job?

MR. WARD: Our first speaker is Jay Persensky.

MR. PERSENSKY: Well, as both of our chairmen, chairman and chairman pro tem, here indicated, I am Jay Persensky, and I am here to talk about the policy statement on training and qualifications which is a revision to an existing policy statement which was issued in March of 1985.

In that policy statement, we indicated that we would revise the issue after a two-year period of evaluation which

1 ended about a year ago, and based on that, the staff suggested
2 that a new policy statement be drafted, and this is the, one
3 of the steps in that process of getting a new policy statement
4 up to the Commission and published.

5 (Slide)

6 MR. PERSENSKY: By way of background, this program
7 was initiated back in 1983 I guess, when Public Law 97425,
8 Section 306, was passed--Nuclear Waste Policy Act, but as
9 Section 306 was added to that Act as sort of a rider that
10 didn't have much to do with nuclear waste, but did have to do
11 with telling the staff that we should develop rules or
12 regulatory guidance in the area of training for nuclear power
13 plant staff.

14 In the 1984 timeframe, we prepared three different
15 SECY papers that proposed rules in the area of training. Also
16 included in one of those packages was something you are going
17 to be discussing after the presentation, which is fitness for
18 duty since it dealt with both training and qualifications.
19 Since that time, things have been sort of pulled apart.

20 At the same time we were preparing the rules, INPO
21 and NUMARC were very active in developing their accreditation
22 program. Actually been trying to get it really rolling; it
23 had been developed, and they made some very strong commitments
24 to the Commission that they would do certain things like get
25 all ten programs ready for accreditation within a two-year

1 period if we would refrain from rulemaking during that period.
2 Therefore, the Commission decided to refrain from rulemaking,
3 and in March 1985, we published the policy statement on
4 training and qualification of nuclear power plant personnel.
5 In that we endorsed the accreditation program. We reiterated
6 the agreement by NUMARC that there would be 610 programs ready
7 for accreditation within a two-year period at 61 sites.

8 It's each of the ten programs. As I indicated, we
9 refrained from rulemaking and doing evaluation for a two-year
10 period. The three SECY papers that are listed, 85201 was
11 description of how we would go about doing that evaluation.
12 The 86119 was an interim report of the evaluation after a
13 one-year period, and 87121 is the SECY paper that describes
14 the final evaluation after the two-year period.

15 Some related actions that took place during this
16 time was again when we first proposed rules in the area of
17 training, we also proposed to include with that whole
18 rulemaking package revisions to Part 55 on operator licensing.
19 That was pulled out of the package and said okay, go ahead and
20 do rulemaking in that area because that is a necessary effort
21 and should be covered by rules as opposed to policy
22 statements, and then we just did the training policy
23 statement.

24 It is important, though, in that the final published
25 version of that rule essentially allows the industry to

1 indicate that they are an accredited program, that they have
2 an accredited training program such that we then, we, the NRC,
3 would not get involved with the evaluation as we had in the
4 past of their training programs, so that if they are an
5 accredited program, there is no real need for them to get
6 approval of their training programs from the NRC.

7 What it really does is it gives them blanket
8 approval. All programs have to be approved by the NRC, but in
9 the statement of consideration, it indicates that if you have
10 an accredited program and if you say that you are, have a
11 systems approach to training or performance-based training
12 program, the NRC would write it off as an approved program.

13 Regulatory Guide 1.8, which also deals with training
14 and qualifications and endorses ANS 3.11981, was published at
15 the same time as the new rule, and that document again says
16 here is the qualifications and training program you need if
17 you are not accredited. If you are accredited, that reg guide
18 really doesn't count.

19 CHAIRMAN REMICK: Before you leave that slide, a
20 somewhat unrelated question, but it is a convenient time to
21 ask--in the new Part 55, does it say that this does not affect
22 non-power reactors or there is only limited effect?

23 MR. PERSENSKY: Certain parts of it.

24 CHAIRMAN REMICK: What is it that you anticipate
25 that non-power reactors must do to comply with Part 55? Is

1 that a fair question of you?

2 MR. PERSENSKY: Well, I can answer it in
3 generalities. Most of them must take a look at their program
4 to make sure that it is in compliance. There are a few things
5 with regard to manipulations I believe, control manipulations,
6 time between recall--it essentially still goes back to 15.4 as
7 the basis, but there are some specific items in
8 there--actually the, Dolores Morisseau from my staff who has
9 just been doing some recall reviews on non-power plants, did I
10 miss anything?

11 MS. MORISSEAU: Mostly what we have had to do is
12 send them back and most what I have done is send them back and
13 say you have not told us which of these control manipulations
14 are applicable to your reactor, please do that. And then they
15 are usually fine otherwise, but that's the one thing that--

16 CHAIRMAN REMICK: If they wanted to change from a
17 one-year or one-year cycle, is someone looking at that they
18 could propose that? Is it possible for that?

19 MS. MORISSEAU: Yes. Anything under 55 is okay as
20 long as if there are deviations, they have got to have a
21 reason for them.

22 CHAIRMAN REMICK: Probably even accept the
23 performance-based training if they wanted to do it.

24 MR. PERSENSKY: Yes, definitely, and I understand
25 the TRTR Committee has made some approaches to INPO about

1 that. I don't know that INPO has the staff or the resources
2 to do it, but there is some push also with DOE I believe to
3 move more toward performance-based training concept.

4 MR. WARD: Why doesn't the reg guide apply to them?

5 MR. PERSENSKY: They have their own reg guide 15.4,
6 and I believe the reg guide, yes, it is an ANSI standard.

7 MR. WARD: It is a different ANSI standard?

8 MR. PERSENSKY: It is a different ANSI standard,
9 right.

10 With that as background, how did we go about doing
11 our evaluation? There are a number of things that were listed
12 in the draft Commission paper that you received I believe in
13 your packages. The original policy statement is one of the
14 enclosures which lists a number of things, but I think the
15 most important of these is that we have spent some time
16 observing the team visits that INPO does, approximately 20
17 percent during that two-year period. We had a member of our
18 staff or the regional staff observing what they were doing
19 during that period.

20 We have also had senior managers observing
21 accreditation board activities, actually sitting at the board.
22 I don't have it included here, but since Forrest is here, I
23 must say it--we also had an NRC recommended member on the
24 board, on each of the boards. Forrest Remick was one of those
25 NRC recommended people.

1 The inspection program, the routine inspection
2 program for training was revised by changing the inspection
3 module to include a look at how well the people operate or do
4 their job after they have finished training as opposed to just
5 going down and counting how many hours of training there were,
6 so there were some changes in the inspection program. We used
7 the inspection reports from those as part of our evaluation.

8 We also conducted nine post-accreditation visits
9 where my staff and I would go out to the plant after about six
10 months or more after they had been accredited to do a more
11 in-depth review to assure that they did have systems approach
12 to training in place. We always talked about those audits not
13 as, not something that we were auditing the utility but
14 actually evaluating the INFO program as our concept was to
15 make sure that that was included after it had been accredited.

16 And of course, we continued to conduct operator
17 licensing exams, review the results of those exams, and the
18 reports that come out of those exams as part of our evaluation
19 method.

20 However, because of the timing of exams versus when
21 people finish training, it is not a very good statistical base
22 at this point because not that many people had been through an
23 approved program, accredited program, when they were doing
24 their actual operator licensing exams.

25 So after two years of doing all that, we came up

1 with a set of recommendations in 87121. The first and most
2 important is that we continue to endorse the accreditation
3 program, and to defer rulemaking. We are not proposing, staff
4 is not proposing at this time that it be a fixed period like
5 two years from, but an indefinite period for deferral and
6 endorsement, but during this period, we would continue to
7 monitor and review the programs to make sure things are still
8 in place. We can always change back any time.

9 The other recommendations relate to the
10 accreditation program itself, and I would like to go through
11 these, and the process that we have been going through, and it
12 is not really quite finished, is that we presented these to
13 INPO, to the INPO staff, and have asked, had some meetings
14 with them with regard to how they would respond to this.

15 The first was that the technical staff and manager
16 function was one of the original ten functions in the program.
17 INPO did not require that a job task analysis be done for
18 that. Their concern was that it was a very broad program, and
19 very different selections as far as what people were involved
20 throughout the industry. They used the guidelines, their
21 technical training or technical manager guidelines as part of
22 the basis, and allowed the industry to do what might be
23 considered more of a very broad job analysis. We feel that it
24 is time to tighten that up. In our discussions with INPO,
25 they feel that again it is not necessary, that it is not, it

1 is really not possible for their people to do a detailed job
2 task analysis on every one of these positions. They have
3 agreed that any changes in jobs or changes in functions would,
4 they should look at a training needs evaluation, each utility
5 should look at the training needs for those people.

6 They have also agreed, and this relates really down
7 to the expand accreditation program, management function, that
8 they would begin to look at those people that serve in the
9 Technical Support Center, and the emergency opening facility,
10 TSC and EOF. They would look at those people in terms of
11 their jobs and their training needs as part of the tech staff
12 and manager's program.

13 MR. WARD: When you said that they, they agreed to
14 look at whether it was, if someone changes the job, they might
15 need different training? I should think that would have been
16 a given from--

17 MR. PERSENSKY: Well, in terms of if the job
18 function, not necessarily an individual, but if the job
19 function changes in some way, that they would look at the
20 need, the training needs to fulfill that function. They never
21 look at the individual. They look at, at the job or the
22 function.

23 I guess part of their concern and part of our
24 concern also is that this would be a very resource intensive
25 effort to do a job task analysis on all these positions.

1 Right now the industry is moving forward very actively in
2 trying to get the other positions filled. Well, there have
3 been some utilities, though, that have done the full job task
4 analysis and done a very good job of it. I think it is
5 something we are going to have to continue to track as far as
6 possible changes in the future.

7 The next issue was the applied accreditation
8 standards to contractor provided training. A couple of
9 different things that come in here--there are many utilities
10 that have contractors come in and deliver training, their own
11 developed training programs, the utility developed training
12 programs. They have contract instructors who helped develop
13 the program. They also have contract training when it goes
14 out to some vender for some specific function or specific
15 piece of equipment.

16 INPO did agree that they would look to the utility
17 to develop procedures to assure that this contract training
18 comes as close as possible to performance basis as they feel
19 they can. There are limits that INPO has on it in this issue.
20 It is really up to the utility to use their bargain unit,
21 economic forces, to get the contractors to provide adequate
22 training for their staffs, so we are pretty much in agreement
23 on that issue.

24 The next one was emphasize the development of
25 knowledge, skills and abilities.

1 MR. WARD: Has there been any thought of, I mean how
2 many contractors, how many contractors are there that do this
3 sort of thing?

4 MR. PERSENSKY: Many; I can't tell you. There are
5 the basic ones--GE, the CE, and Westinghouse, but there are
6 also a lot of small independent contractors that would get
7 involved.

8 CHAIRMAN REMICK: I think what Jay is referring to
9 is suppose GE runs a maintenance for control rod drives or
10 something. MOVATS has a training contractor or somebody has
11 on the very specific equipment and so forth.

12 Am I correct, that's the type of thing?

13 MR. PERSENSKY: Yes, that kind of thing.

14 CHAIRMAN REMICK: They are kind of vender-specific
15 equipment type things.

16 MR. PERSENSKY: Emphasize the development of KSA,
17 analysis, skills and abilities, and we have talked in the past
18 about systems approach to training, usually do a job task
19 analysis to identify the knowledge, skills and abilities that
20 are then used to develop the learning objectives.

21 Our concern really here is with regard to the
22 objectives. A lot of utilities we looked at can't really give
23 you numbers because we only looked at a small subset and we
24 know of other--they would do a job analysis, and if the job
25 task analysis--second part of the job task analysis is the

1 task where you break those tasks into knowledge, skills and
2 abilities. They do the first part of it and then they compare
3 that to an existing training program, what they already have
4 in-house, say okay, is this covered? Have we got something
5 that covers that, that job function? If so, they would stop
6 at that point. If it is not, then they might go on and do a
7 task analysis of, of that job.

8 What we have found is that in many cases they have
9 very broad learning objectives such that it is difficult, we
10 feel it would be difficult to develop specific testing
11 objectives, both from their own standpoint for the evaluation
12 phase of the program, and also from our standpoint in that we
13 go back to, relationship to Part 55. We use that same
14 information in developing our examinations or their
15 examinations really, and we have been getting some independent
16 verification of this through the new requalification program
17 pilot that is going on in that our examiners are having a
18 great deal of difficulty using the information provided by the
19 utilities to develop those examinations.

20 INPO again has, in this case has disagreed, that
21 they feel that the job analysis is sufficient in that
22 everything should be covered based on that job analysis.

23 They have agreed that there would be some emphasis
24 on this for, again for the new functions; as jobs change, that
25 there would be some additional need to analyze in more depth

1 those tasks, so I guess we have come to a point of agreeing to
2 disagree on this issue and have almost since the beginning of
3 this program.

4 The next two items have, we have come to agreement
5 on as far as the feedback of operating experience which we
6 feel is important and everyone feels is important to get back
7 into the jobs as quickly as possible. We found, I think INPO
8 found that the processes have been in place for sometime.
9 They haven't--the utilities have the process to do that. The
10 problem has been the implementation and the speed with which
11 that information is getting into the programs, so they have
12 agreed that they would look into and working with the
13 utilities to enhance the implementation of those programs.

14 MR. MICHELSON: Which feedback are they referring to
15 now?

16 MR. PERSENSKY: Operational feedback.

17 MR. MICHELSON: Yes, but of the particular plant or
18 of experience outside the plant?

19 MR. PERSENSKY: Both.

20 MR. MICHELSON: The experience outside the plant has
21 two aspects. One is within that given utility, and the other
22 is for other utilities.

23 MR. PERSENSKY: Right.

24 MR. MICHELSON: Are you including both?

25 MR. PERSENSKY: We are including all operational

1 experience that relate to their job.

2 MR. MICHELSON: Yes, but keep in mind that a, much
3 of this operational experience is fed back to INPO, not to the
4 given utility, and INPO in turn feeds it back only in the form
5 SERs and SOERs. Now the utility, a given utility, must keep
6 track of its own experience.

7 MR. PERSENSKY: That's right.

8 MR. MICHELSON: And there is some argument as to
9 whether there was thought they were supposed to keep track of
10 other sister plants as well; in other words, plants very
11 similar to their own that they--and they haven't been doing
12 that it is my understanding. They are depending upon INPO to
13 do everything but look at their own particular plant
14 experience.

15 MR. PERSENSKY: Okay. That I think is another
16 issue. Our concern right now is that once they have it, that
17 they get it into the training program as quickly as possible.

18 MR. MICHELSON: They don't get it from INPO in that
19 form. They get it i SERs and SOERs, take particular events
20 that are highlighted and looked into by INPO and that's fed
21 back. All this other experience is not.

22 MR. PERSENSKY: Our LER system--

23 MR. MICHELSON: I guess you could say they have
24 access to it.

25 Did you ever ask them if they even get them?

1 MR. PERSENSKY: Yes, we do ask them. That is part
2 of our--we look at their feedback.

3 MR. MICHELSON: You find the utilities are getting
4 all of the LERs?

5 MR. PERSENSKY: We find that there is a system in
6 place to do that and to review them and to incorporate them
7 into training. Now that's the problem. It takes a while for
8 it to filter down into the training program.

9 MR. MICHELSON: Well, are you saying that each
10 utility gets all of the LERs?

11 MR. PERSENSKY: I cannot say that. I can't, I don't
12 have that information. They have access to them.

13 MR. MICHELSON: It is news to me if they are getting
14 them. I guess you could always argue they have got access to
15 them. If they really want them, they can buy them from the
16 government or be put on the mailing list. It was my
17 impression they do not get them.

18 MR. PERSENSKY: Well, in those instances where we
19 looked at the feedback aspect of their SAT, they did indicate
20 the availability and showed some example of how they had used
21 that in improving their training program.

22 MR. MICHELSON: I am surprised they thought that as
23 they claim they are getting the LERS themselves because the
24 argument I usually get is whatever, when INPO looks at all
25 LERs and they find problems, they send them back to us as SERS

1 or SOER. Those they do feed back, but in the, the ones that
2 didn't come back as SERs SOERs--

3 MR. PERSENSKY: The training departments generally
4 do not do the total review. What they do is the things that
5 are filtered through the system to them, and I would guess
6 there is probably some, has shown us a slowness in the system
7 itself. We were focusing mostly on the speed with which or
8 the efficiency with which once they have it in their hands,
9 what they do with it, and INPO has agreed that that part of
10 it, they would work in the--

11 MR. MICHELSON: Somebody ought to ask sometime do
12 you get them or don't you? Ask the utility now, not INPO. I
13 know INPO gets them all. There is no doubt. They do all the
14 microfiche and so forth, but the utilities simply don't get
15 them it was my very strong impression.

16 MR. WARD: Or even if they would get them, I'm not
17 sure to what extent they evaluate them.

18 MR. MICHELSON: That is yet another question, so
19 okay, so you do get them. What do you do with them? I was
20 curious as to what they did with them, found out they didn't
21 get them. They didn't even ask for them, but they, if they
22 were important, their argument was that if they are important,
23 INPO will send them as an SER or SOER.

24 MR. WARD: Well--

25 MR. MICHELSON: If they are not important, we don't

1 have time to look at them anyway.

2 MR. WARD: I guess that was kind of the position the
3 industry took.

4 MR. MICHELSON: I don't know. It was only a
5 utility, not the industry. That's why I asked. I thought
6 they were canvassing the whole industry, could give me a
7 better answer.

8 MR. PERSENSKY: Not from that standard; only from
9 the standpoint of how they might use it in training, and we
10 did have some examples of it actually working into a training
11 program.

12 MR. MICHELSON: The problem is there is a lot of
13 operating instances that INPO doesn't highlight because they
14 may be quite unique or unique to a plant. INPO doesn't
15 highlight them and the utility doesn't find out about them
16 until they look at that particular LER and realize that it is
17 explaining something that they have at their plant, and that
18 was why I was really pursuing it, because I think it is
19 important they do see them and I wondered how they got them.
20 It turns out in that case they didn't get them. And
21 furthermore, they weren't interested in getting them because
22 they didn't know what to do with them, and INPO was really not
23 taking care of that particular aspect of the problem.

24 CHAIRMAN REMICK: I think the greatest inefficiency
25 in not incorporating industry's experience is in the initial

1 training program. They seem to do a better job of getting
2 into the training program, getting it immediately for the
3 people continuing training, but they fail then to put it in
4 initial training so that new trainees can get that
5 information.

6 MR. PERSENSKY: I think a lot of it we consider
7 training is really just required reading, comes across the
8 desk, something that they have to do as part of their job.

9 The final effort or final bullet in this one has to
10 do with cooperative effort to develop training effectiveness
11 measures, and this is, really comes down to how do you really
12 decide what is a good, what is good training?

13 We have been talking about programmatic ways of
14 looking at it, but the basic measure is how they do on the
15 job. Has training improved their effectiveness? We have, we,
16 NRR, have asked Research to initiate a program in this area.
17 INPO agreed that they would work with us, however we can,
18 within our limited resources, work in this area.

19 DR. LEWIS: On that point, the performance on the
20 job is a measure of one element of training, and I always like
21 to distinguish between education and training because training
22 enables you to deal with the routine job. Education gives you
23 the breadth to deal with jobs, that things that happen off
24 routine.

25 Presumably for many of these people--not all of

1 them, of course--there is an issue of what the depth of their
2 ability is to deal with an event which doesn't come up in the
3 normal course of a day's work, and therefore which cannot be
4 measured by their performance on the job in that way.

5 Is this a consideration that anybody worries about?

6 MR. PERSENSKY: Well, those are the, yes, I think it
7 is, the degree rule keeps coming up around those thoughts.

8 DR. LEWIS: Not from me.

9 MR. PERSENSKY: The rule that would require all SROs
10 to have a Bachelors degree. You will be hearing that before
11 too long, too.

12 DR. LEWIS: I always say I am against that because I
13 give degrees and I know what they are worth, but please go
14 ahead.

15 MR. PERSENSKY: I think that's the kind of thing we
16 would like to get out of a study of this area, is just what is
17 a good measure of human performance? At the job, whatever,
18 whatever it is, what does it take to do that job properly,
19 which includes both training and education, and experience,
20 but first you have to know what makes good job performance.

21 DR. LEWIS: I guess the question I am raising is
22 that you cannot learn what makes a good job performance under
23 abnormal conditions by studying people's performance under
24 normal conditions.

25 MR. PERSENSKY: Some of that data might come out of

1 some simulative work.

2 DR. LEWIS: Yes, for example.

3 MR. PERSENSKY: As one way, and I think again we
4 have just put this user needs forward a couple of weeks or
5 couple of months ago, and we are still working with Research
6 on that, is find out what is a good way to develop that
7 program? So hopefully we will have something in a year or so
8 that will give us some better answers to those questions.

9 DR. LEWIS: I can wait.

10 MR. PERSENSKY: The final or major area here was to
11 expand the accreditation program. These first five bullets
12 were enhancements to the existing program. We propose that
13 the program be expanded to include the QA and QC function, the
14 severe accident management function.

15 Then we have a third one here that relates to
16 contractors that come in to do the job. These aren't people
17 that do training, but people that have been trained elsewhere
18 and come in to do a site specific job. And last--we will go
19 to that one first--the last one, they have agreed that again
20 they would have to look more thoroughly at the procedures that
21 have been developed by the utility to evaluate the
22 qualifications of contractors coming in to do the job. We
23 have had some problems with it. They have some problems with
24 it. They have agreed on that issue.

25 The other two functions, the discussion revolved

1 around the fact that both of those are, QA/QC is a changing
2 function. We are beginning to develop different views of that
3 here at the NRC. The industry in general is looking at QA and
4 QC in a different way at this point, so they feel that it is
5 not time. Let's see if we can get that settled down before we
6 start going out and doing job task analyses and developing
7 programs for something that is changing fairly rapidly.

8 The other one is the severe accident management
9 function. Again, this is something where we are growing into
10 it. It is a relatively new concept, and we haven't developed,
11 we, the industry in general, and the NRC, haven't really
12 decided what we are talking about, and it is too early in that
13 case.

14 They have agreed, as I indicated before, under the
15 tech staff and manager function, though, that since most of
16 this is going to happen at the TSC and the EOF, that they are
17 going to start looking at those job requirements.

18 Now INPO has elected instead to expand accreditation
19 program by including licensed operator requalification
20 training as the 11th program. It is their program, and we
21 generally believe that it is important that that aspect become
22 more focused as far as requalification. In fact, we have
23 found problems in requalification over the last two years,
24 previous two years, probably the biggest area that needed
25 improvement in the accreditation program.

1 MR. WARD: It is strange--why wasn't that under the
2 original program?

3 MR. PERSENSKY: Well--

4 MR. WARD: I had asked that question four years ago.

5 MR. PERSENSKY: Actually it was under the original
6 program. The program that INPO started back in '82, '81 or
7 '82, had requalification as one of the elements, one of the
8 ten elements, and they had RO and SRO lumped together.

9 Now what they have done, well, they changed it to
10 put requalification as part of RO and SRO as two separate
11 programs. Now they are pulling it back out. Staff,
12 particularly me, has a problem with that in that if you look
13 at their own documents, the training systems development
14 program which is their description of the systems approach to
15 training, requalification is part of your development. As you
16 are doing your analysis phase, you are supposed to say okay,
17 which one of these job tasks should be part of retraining,
18 both initial and retraining; which ones are going to have
19 decay, have low frequency, high importance? There are
20 measures that you are supposed to take in developing your
21 analysis, and it is in their own documentation they describe
22 that. And that's how you identify those things that should be
23 in requalification or continuing training for all ten
24 programs, not only for licensed operators.

25 So I feel strongly that this is sort of a, not a

1 real increase in the program at all because it is something
2 they should have been looking at in the past. There was
3 a--they didn't look at it for the reason that requalification
4 has been very lightly regulated. Appendix A to Part 55 said
5 this is what you have got to do, so most utilities didn't
6 change their program, and INPO said that's a regulatory
7 program, we are not going to touch it, and left it at that.

8 I feel that it is important that it be emphasized,
9 but I don't think it is needs to be culled out as a separate
10 program because I am afraid that always de-emphasizes the
11 importance of requalification or continuing training in the
12 other eight programs, so I guess you know that we have a
13 difference on this as far as staff is concerned. I guess I
14 looked at it as a way--

15 CHAIRMAN REMICK: It isn't a question of whether
16 requalification is covered or not. It is a question of
17 whether you pull it out, address it as a separate item.

18 MR. PERSENSKY: Yes.

19 CHAIRMAN REMICK: It is already in there in one form
20 or another. Continuing it is now the question of pulling it
21 out and asking utilities specifically what are you doing in
22 reconsideration of licensed personnel? So it is not--and
23 there is the danger of giving too much importance to that and
24 not continuing training on, requalification training in the
25 operator positions. I think that is the staff's position.

1 MR. PERSENSKY: I am afraid that the next time they
2 revise it, it is going to be requalification for INC people
3 and requalification for maintenance, and that should be part
4 of the initial system as they go through it, but it is INPO's
5 program. There is a need from our own standpoint to improve
6 the requalification program at the utilities because it has
7 been, it hasn't been emphasized appropriately with regard to
8 the systems approach because of the regulatory history on it.
9 With the new Part 55, they can do a performance-based training
10 program without crossing guns with us as far as their required
11 program. It makes an SAT an acceptable way of doing it.

12 CHAIRMAN REMICK: Jay, one of the programs that some
13 people have thrown around for possible inclusion is physical
14 or plant security personnel training.

15 Did the staff give any consideration to that?

16 MR. PERSENSKY: That had been talked about earlier,
17 and there is some training that is, or some requirements
18 already in place for that. It is not nearly as detailed as
19 some of the others.

20 I guess from a safety standpoint, we felt more
21 strongly about moving into the QA/QC. We also know that a lot
22 of utilities are beginning to do that on their own, that they
23 have in fact seen the value of the performance-based training
24 and are beginning to move into areas, including QA, and that
25 was part of our hope when we first started preaching this.

1 CHAIRMAN REMICK: Spreading to the fossil side of
2 the utilities, too?

3 MR. PERSENSKY: Yes. Well, in any event, it comes
4 down to the proposed policy statement as you have it in your
5 package continues to endorse accreditation program, including
6 the requalification for licensed operators, will continue to
7 defer rulemaking. It does assume that they don't slack off,
8 that their programs that were ready for accreditation, that
9 have yet to be accredited, that they have to catch up with
10 that. They have to continue to maintain accreditation.
11 Accreditation is only good for four years, so after that, we
12 expect them to continue the whole process.

13 We will continue to review and monitor the program
14 as we have in the past, perhaps not to the same level of
15 resources since we don't have as many resources as we used to
16 have. In fact, since the 87121 went out, I think we have only
17 done one post-accreditation review, which is almost a year
18 now.

19 There is also a line in there that anticipates the
20 degree rule, because we didn't want them to think that we are
21 going to stop on that, because the commissioners don't seem to
22 want us to stop on that yet.

23 And finally, there is one change with regard to the
24 enforcement requirements. There was a large paragraph in the
25 old version that indicated that we would--what was the term?

1 Well, it comes down to we wouldn't necessarily take escalated
2 enforcement actions without approval of the Commission in the
3 area of training, so we really held back on enforcements in
4 the training area. If there was a finding in an inspection,
5 the utility would be made aware of that finding, would have a
6 certain period of, period to try to straighten it out. If
7 they straightened it out, we would back down, and the only way
8 we would go forward is if there was a major problem that the
9 utility was unwilling to correct.

10 We have also tried to feed some of this kind of
11 information through to INPO to see that they would have a
12 continuing feedback from us on how to improve their program
13 and work with the utilities to improve the utilities program.

14 This new policy statement doesn't have the caveat
15 about going to the Commission for enforcement actions. If
16 they break the requirements, if they break the rules, we are
17 giving, feel that the region should have the authority to take
18 enforcement action just as they would in any other regulatory
19 arena.

20 With that, any questions, comments?

21 MR. WARD: You say if they break?

22 MR. PERSENSKY: If there are any requirements,
23 actual requirements that they do not fulfill, then they are
24 subject to enforcement action.

25 MR. WARD: Requirements?

1 MR. PERSENSKY: That gets kind of--sticking with
2 training since there are very few requirements in the area of
3 training, and they have really under the new Part 55, even--

4 MR. WARD: You don't mean accreditation
5 requirements?

6 MR. PERSENSKY: Not accreditation requirements; NRC
7 requirements.

8 MR. WARD: All right.

9 CHAIRMAN REMICK: In fact I still find surprising
10 the agency doesn't have a rule which requires that you have
11 training programs. It requires that you have requalification
12 programs, but not training programs.

13 MR. PERSENSKY: Almost every one finds that is
14 surprising. But we tried that three years ago, and it, even a
15 very simple you must have a training program did not sell
16 well.

17 CHAIRMAN REMICK: Of course that was during the
18 moratorium, wasn't it, the two-year moratorium?

19 MR. PERSENSKY: It was part of establishment of that
20 moratorium. I think it personally--this is Jay Persensky's
21 view--I think it would be advantageous to have that kind of
22 very general non-specific rule that just they have one.

23 CHAIRMAN REMICK: Why not?

24 MR. PERSENSKY: Questions?

25 MR. WARD: I guess there are no more, so we can go

1 on to the next--I'm sorry. We do have something planned for
2 the Committee to come in?

3 CHAIRMAN REMICK: Dave, this is something we might
4 want to discuss, whether we think it is necessary to have the
5 staff come in versus the subcommittee report or whatever.

6 MR. WARD: We have got 45 minutes. That is all he
7 took was 45 minutes. Do you think the Committee needs to hear
8 this or could we just have the subcommittee chairman?

9 MR. MICHELSON: The committee report is all--

10 CHAIRMAN REMICK: I'm sorry?

11 MR. MICHELSON: The committee report is all I think
12 the Full Committee needs to hear.

13 MR. WARD: Okay. Jay, it won't break your heart?

14 MR. PERSENSKY: No--not that, I don't mind coming
15 down, but if you can do without me, that would be fine, too.

16 MR. MICHELSON: It's a pretty non-confidential
17 subject.

18 MR. WARD: It seems to me it is.

19 MR. PERSENSKY: This year.

20 MR. MICHELSON: Yes. Later, it may not. At this
21 stage--

22 MR. WARD: Okay. Thanks a lot.

23 CHAIRMAN REMICK: (Presiding) Thank you very
24 much, Dave.

25 The next topic is fitness for duty rule. This is an

1 item that the Committee has taken a position on in the past,
2 and Herman passed out to the subcommittee members a copy of
3 our previous epistle on this subject. Up until now it has
4 been a--

5 DR. LEWIS: Those are letters!

6 CHAIRMAN REMICK: For those in California, those are
7 letters! Up until this point, it has been a policy statement.
8 It is now proposed as a rule, and Jim Partlow is here to tell
9 us about it. Jim?

10 MR. PARTLOW: Thank you. I am Jim Partlow, Director
11 of the Division of Reactor Inspection and Safeguards, Office
12 of Research.

13 For the past several years, we have been responsible
14 for development of agency policy on fitness for duty programs
15 for the regulated industry.

16 Mr. Chairman, with your permission, I have a number
17 of staff here. I am hoping and sure there will be a number of
18 questions about how we developed this rule. I might, if we
19 get into that, I have Lauren Bush, the principal staffer; Mr.
20 John Olson, who has helped us from the Battelle Human Affairs
21 Resource Committee. If it gets heavy, with your permission, I
22 might ask them to come right up here and sit where they can be
23 on the firing line because I don't have a set of slides. We
24 are just going to talk through this program.

25 CHAIRMAN REMICK: They are certainly welcome if they

1 would like to join us at the table.

2 MR. PARTLOW: It might be a good idea if you and
3 John come up.

4 First, a bit of background about the package that
5 you have in front of you. As you may recall, that the staff
6 started on rulemaking on fitness for duty back in the early
7 80s, 1982, 1983. By 1984, we had delivered a, after public
8 comment, a proposed final rule to the Commission. It was a
9 short, one-paragraph rule. It said operating nuclear power
10 plants would develop fitness for duty programs to provide
11 reasonable assurance that their people were not under the
12 effect of drugs and alcohol.

13 The Commission then asked the staff to work with
14 industry to see if the industry might be willing to develop
15 the considerable guidance that would be necessary to go with
16 that rule. The industry--by this time NUMARC had been formed
17 and so INPO was operating. The industry signaled that they
18 would be willing to put together that kind of guidance.
19 However, in doing that, they didn't see the need to have this,
20 this kind of rule by the NRC.

21 The Commission accepted that as an industry
22 initiative to develop fitness for duty program, it is to
23 develop the guidance to go with it, and in the, about the 1st
24 of August of 1986 then a policy statement was issued, and that
25 has been in effect since that time.

1 Edison Electric Institute developed the guidelines
2 for fitness for duty programs for operating nuclear power
3 plants, and it has been made a part of industry's commitment.

4 DR. LEWIS: Just for clarification, when we say
5 fitness for duty, we mean only the influence of drugs and
6 alcohol, not extreme fatigue or psychological upset?

7 MR. PARTLOW: In the general sense, we consider that
8 as well.

9 DR. LEWIS: We do?

10 MR. PARTLOW: Yes. Clearly the emphasis of the
11 subject has been drugs in the past several years, but as the
12 policy statement is written, it is clearly meant to be
13 anything from the operator with two broken arms to the
14 operator who in the eyes of his supervisor, is not fit to
15 conduct his duties by virtue of fatigue, drugs, alcohol,
16 psychological stress.

17 DR. LEWIS: Limit on overtime then?

18 MR. PARTLOW: Pardon me?

19 DR. LEWIS: There is a limit on overtime then?

20 MR. PARTLOW: There is a separate policy statement
21 which limits overtime for selected positions, yes.

22 MR. WARD: Jim, you said that EEI report or document
23 has been made part of the industry's commitment. And how,
24 how?

25 MR. PARTLOW: Basically by letter from the president

1 of NUMARC to the Chairman saying that every Chief Executive
2 Officer of a company that operates a nuclear power plant has
3 committed to develop fitness for duty program that would meet
4 these guidelines and meet the expectations of the Commission's
5 policy statement since August.

6 CHAIRMAN REMICK: The EEI guidelines have certain
7 elements that compose a good program?

8 MR. PARTLOW: Certain basic elements of what fitness
9 for duty program is from having policy statements and
10 procedure, training for personnel, testing for personnel,
11 employee assistance programs and so forth.

12 CHAIRMAN REMICK: But not random chemical testing,
13 is that right?

14 MR. PARTLOW: No. Now what is this, what is this
15 agreement, basic fitness for duty program that industry had
16 committed to?

17 It was to develop programs of supervisory training,
18 employee assistance programs, meeting with the unions,
19 incorporating it into contractor programs, and so forth.

20 On the subject of testing, of drug testing, the
21 agreement accepted by the Commission was the testing would be
22 conducted on a pre-employment basis. In other words, before
23 people were initially granted unescorted access to nuclear
24 power plants, then it would be conducted for cause, in other
25 words, in those cases where supervisors had reasonable

1 suspicion that someone might not be fit for duty, and that was
2 it. The commitment did not speak to any kind of periodic or
3 annual testing or any kind of random testing.

4 CHAIRMAN REMICK: In the ACRS letter of August '86,
5 our concluding paragraph was further, the Committee endorses
6 the random chemical testing of body fluids as an element in
7 effect in the fitness for duty program, encourages its
8 incorporation by nuclear utilities in the nuclear power plant
9 fitness for duty program. I am just reminding the
10 subcommittee of that of one item.

11 MR. PARTLOW: Now since the time the policy
12 statement was put into effect in August of 1986, the staff has
13 done its own evaluation of the industry's program. We have
14 done that through some nine or ten in-depth inspections, led
15 by Lauren Bush here. We have observed the INPO process, how
16 INPO evaluates fitness for duty programs at utilities. We
17 have received reports of drug involvement, and they are there.
18 We have received reports of drug involvement and we have,
19 through our regional offices, have followed up to see if
20 utilities are taking appropriate action.

21 DR. LEWIS: I just wonder, I looked at the first
22 sentence of the policy, or I'm sorry--it says carry out in an
23 environment which is free of the effects of alcohol and drug
24 abuse, period. No reference to any other impairments. I am
25 just trying to reconcile that with your answer to the earlier

1 question.

2 MR. PARTLOW: Again, drugs and alcohol are the major
3 point of emphasis.

4 DR. LEWIS: You said they weren't the only point.
5 As I read that, they are the only points.

6 MR. MICHELSON: I have been looking for any others
7 in the document, flipping through it again real quick, and I
8 fail to find any others, but maybe you can tell me where to
9 look.

10 DR. LEWIS: Are you going to stick by the answer to
11 your earlier question?

12 MR. PARTLOW: I will stick by whatever, whatever way
13 the intelligent reader reads the rule is.

14 DR. LEWIS: There is no question of intelligence or
15 even degree here. It just says free of the effect of alcohol
16 and drug abuse, period.

17 MR. PARTLOW: That is the objective of this
18 rulemaking.

19 DR. LEWIS: That's the rule.

20 MR. MICHELSON: That is really I think as far as it
21 goes.

22 DR. LEWIS: So I really have to strike the answer to
23 the earlier question? I just want to be sure. I am not
24 trying to badger you.

25 MR. MICHELSON: Behavior I thought was getting

1 close, but then it started reading into it. It puts it right
2 back.

3 MR. BUSH: You might want to look at the general
4 performance objectives.

5 MR. MICHELSON: What page?

6 MR. BUSH: Page 81 of the ones that-- 10.

7 DR. LEWIS: I confess I wasn't up to page 83 yet.

8 MR. PARTLOW: I am still giving you the background
9 before you get to page 1.

10 DR. LEWIS: Okay.

11 MR. PARTLOW: Since August 1986, the staff has been
12 evaluating industry's program on this initiative and fitness
13 for duty program. First of December this last year, we met
14 with the Commission. The staff was there to present their
15 evaluation. Industry in the form of NUMARC was there to
16 present their evaluation.

17 The staff gave a very good report card to industry
18 on their commitments to meet fitness for duty programs. We
19 said major progress had been made. There still were things
20 that needed to be done better. It wasn't clear that always
21 the word was getting through to contractors. Some training
22 had not been conducted and so forth. Industry also presented,
23 presented their views.

24 A week and a half before Christmas, the Commission
25 tasked the staff to develop a rulemaking on fitness for duty

1 and to have that rulemaking to the Commission by the 4th of
2 March on a priority, no slip basis. And since that time, we
3 have been working with offices, ACRS and CRGR and EDOs and so
4 forth.

5 Why did the Commission, why did the Commission
6 direct a rule? I think there were two points that came out in
7 that briefing. The first was that although there was no
8 commitment by the industry for every utility to develop random
9 testing programs, about one-third of the utilities had
10 implemented some sort of random testing programs. A few
11 others, I don't know the number, had attempted such programs,
12 but have been thwarted so far by various legal challenges,
13 bargaining unit agreements, and so forth.

14 I believe there was, I believe there has been a
15 sense within the staff, perhaps within the Commission, and as
16 Dr. Remick pointed out, within the ACRS, that random testing
17 programs if you are really serious about deterrent and
18 detection capabilities at an operating power plant, that
19 random testing really needs to be seriously considered, so I
20 think that was one point on why the Commission chose to
21 initiate rulemaking proceedings.

22 A second thing that developed as a result of the
23 industry brief and of a survey done by INPO was that just as
24 you would well expect, these 54 different utilities had some
25 differences in how they developed their programs. The key

1 example has to do with cutoff levels that are used to declare
2 a drug test as either positive or negative for various
3 drugs--marijuana, cocaine and so forth.

4 DR. LEWIS: I want to carry on two conversations at
5 one because I do have to put on record I look at page 83 and I
6 find no reference to anything by alcohol and drugs, again very
7 explicit. It is confined entirely to alcohol and drugs, so I
8 don't know why I was referred to page 83.

9 MR. MICHELSON: It is on 84?

10 MR. BUSH: Yes.

11 MR. WARD: Let's get this over with right now. Look
12 at page 84.

13 DR. LEWIS: He said under general program
14 performance. That's why I looked at that before.

15 MR. PARTLOW: We will look at that.

16 MR. MICHELSON: What part of 84 do you think
17 addresses the question? Do you have a sentence in mind
18 already? We will get it even quicker.

19 MR. BUSH: It is the paragraph B.

20 MR. MICHELSON: B.

21 DR. LEWIS: That is inconsistent with the rest of
22 the document. We will negotiate this.

23 MR. BUSH: You have to realize that everybody who
24 has looked at this has wanted to edit it, so your concern was
25 initially included in the general performance objectives.

1 Unfortunately, it has been edited out.

2 DR. LEWIS: I see. Okay. You were working on that
3 ancestral memory and I have no complaint about that.

4 MR. MICHELSON: But the preamble to this leads me
5 right back to drugs again anyway even though you did throw it
6 in down here under other health problems.

7 CHAIRMAN REMICK: Is your observation it is not in
8 there or you feel those type of things should be in the
9 fitness for duty?

10 DR. LEWIS: That's right. I was trying it raise an
11 important issue which is that under fitness I hope there is no
12 such work lack of--fitness for duty can involve things besides
13 drug and alcohol. And in fact, I don't know whether it says
14 illegal drugs. I assume it is both cases of drugs. There are
15 prescription drugs, antihistamines which render people unfit
16 for duty. Nobody was thinking of testing for those I think.

17 MR. PARTLOW: We thought of it for a while.

18 DR. LEWIS: Forgive me, but there are just many,
19 many things that make people unfit for duty and it gets very,
20 very hard when you really try to lay down a set of rules other
21 than the--I know the ones that apply to pilots. They say that
22 you should disqualify yourself if you are not fit to do your
23 job, but then it is your responsibility.

24 CHAIRMAN REMICK: I am trying to get the point. Are
25 you suggesting that those other things should be included in

1 the rule, or if they are included, they are very difficult to
2 test for? I am not sure what your point is.

3 DR. LEWIS: They are difficult to test for, and I
4 think two alternatives--including them in the rule would make
5 it such a nightmare you would never get the rule out. The
6 other is change the title of the rule to be drug and alcohol
7 testing and not call it fitness review.

8 CHAIRMAN REMICK: I see.

9 DR. LEWIS: It is a legitimate objective.

10 MR. PARTLOW: I might note that the NRC's own
11 program that I am going to give you a status report on here in
12 a minute is in the fitness for duty program, it is a drug
13 testing program. The proposed rules recently just last week
14 issued by FAA for a variety of different kind of aviation
15 personnel is a drug testing rule. It is not a fitness for
16 duty rule.

17 DR. LEWIS: Yes. But--

18 MR. WARD: Both cases, you said drug. Did you mean
19 drug and alcohol?

20 MR. PARTLOW: My recollection, Lauren, is that
21 the--both of those are drug rules?

22 MR. BUSH: Yes.

23 MR. WARD: But I don't know that it is meant to be.
24 Is alcohol included as a drug in those cases?

25 MR. BUSH: What they specify in another rule is that

1 you cannot be a crew of an aircraft or some such thing with
2 blood alcohol content in excess of .04 percent.

3 DR. LEWIS: Point 04; .04 you are impaired.

4 MR. BUSH: Yes.

5 MR. PARTLOW: I guess that the FAA--

6 MR. WARD: That's an old rule.

7 MR. BUSH: Yes.

8 MR. PARTLOW: In reading the FAA rule over the
9 weekend, it does speak to alcohol. I am wrong in what I said
10 before. The FAA rule speaks to both drugs and alcohol.

11 DR. LEWIS: You said this is a brand new rule?

12 MR. PARTLOW: Yes, sir.

13 DR. LEWIS: Because I have not seen it.

14 MR. PARTLOW: Just published for comment within the
15 past week.

16 DR. LEWIS: It is not a rule yet?

17 MR. PARTLOW: It is proposed out for comment. It is
18 where we want to be shortly with our own regulation.

19 With that as background then, I would like to use
20 the draft Commission paper that you have on top of the package
21 to go through with you and receive your thoughts on how the
22 staff has outlined just the proposed rule so far, and the
23 first is the scope of the rule.

24 Of all the people involved in NRC regulated
25 activities, to whom, to what kind of activities would this

1 rule apply? And the proposed rule as is stands today would
2 apply to operating nuclear power plant. The rule would not
3 apply to nuclear power plants under construction, to research
4 or test reactors, or to the variety of materials and fuel
5 facilities, activities that are also carried on by the NRC.

6 The Federal Register notice would request comments
7 from the public upon the extent to which these kinds of
8 programs should be applied to other than operating nuclear
9 power plants, but the rule today does not stop there.

10 CHAIRMAN REMICK: It does not include NRC employees
11 who have access to vital areas. You are going to talk about
12 that as a separate item.

13 MR. PARTLOW: First the scope of facilities and
14 activities covered in the answer is operating nuclear power
15 plants at this point.

16 The next section is what people would be covered at
17 these operating nuclear power plants. First, it would be all
18 of those who have unescorted access to the protected area, all
19 of those with unescorted access to the protected area.
20 Persons who were under escort would not have to be covered by
21 the rule.

22 CHAIRMAN REMICK: Protected areas are the fences?

23 MR. PARTLOW: That's at first--not the site boundary
24 fence, but that general area which is where the security
25 starts, yes.

1 CHAIRMAN REMICK: Okay.

2 MR. PARTLOW: So that clearly would also cover
3 people who are inside vital areas inside the protected area.

4 The second class of people that the rule would apply
5 to would be those who are required to respond to the, to the
6 resulting emergency facilities, which are in many cases off
7 site, so it would be those people who might not normally work
8 at the nuclear power plant, but who are, in accordance with
9 the emergency plans and procedures, would be required to
10 respond to the EOF or to the Technical Support Center.

11 The rule would not apply to certain people.
12 Emergency medical and fire personnel who are needed to respond
13 to the plant would not be covered by the rule, and NRC
14 employees would not be covered by the rule.

15 The thinking here, of course, is that NRC people are
16 already covered by a fitness for duty or a drug testing
17 policy.

18 Now let me give you a brief status on where we stand
19 with the NRC's own, own testing program. The NRC's program
20 for testing was approved by the Commission. It has to go to
21 three different government agencies. It goes to OMB to review
22 the cost information, and that has been done.

23 It goes to the Department of Justice. Department of
24 Justice has approved the NRC's plan.

25 And it goes to the HHS, Health and Human Services.

1 It is there awaiting approval. That has not been done yet.
2 And it is necessary to have that approval before proceeding
3 with our own testing program.

4 CHAIRMAN REMICK: Does that include random testing?

5 MR. PARTLOW: The program includes random testing,
6 yes. The proposal for the NRC is a random testing program for
7 three classes of people--those with unescorted access to
8 nuclear power plants, those who are required to respond to the
9 NRC's emergency center and so forth, and a third small class
10 of people who have access to sensitive classified material.

11 CHAIRMAN REMICK: Now what if, for some reason, HHS
12 takes a long time in eventually approving. This would move
13 ahead as a rule and be in effect. We would be in a position
14 where NRC personnel could have access to and not be covered by
15 a fitness for duty rule, is that correct?

16 MR. PARTLOW: That is correct, but I wouldn't want
17 to guess on which, which prong might be holding the other one
18 up at this time. The whole subject of random testing is, most
19 of the conventional wisdom is that that will be, the Supreme
20 Court will decide that next year, so there is, I think there
21 is a long way to go in terms of the NRC having its required
22 program in place for the regulated industry before we need to
23 worry that our own people are not, not covered.

24 DR. LEWIS: Even within the boundaries of random
25 testing, when it occurs, there is random testing and random

1 testing. There are few subjects that have been subjected to
2 more popular research than how to beat random testing
3 programs.

4 MR. PARTLOW: How to beat them?

5 DR. LEWIS: It is really well known in the community
6 how to get around most of them, unless there are real
7 safeguards, and the reason for mentioning this is that you can
8 have random testing which is perfunctory. Perhaps I shouldn't
9 use the word perfunctory, but is meant to satisfy a rule, and
10 random testing that is really done with the assumption that
11 the other guy is trying to cheat you, and only the latter is
12 really effective in this miserable world, and there are
13 technical aids to doing the latter, but it is personally
14 extremely intrusive and offensive to the person being tested,
15 so in the end even if random testing makes it through the
16 courts, it is going to be a real issue about how seriously the
17 NRC is willing to offend its employees by doing suspicious
18 random testing.

19 MR. PARTLOW: The procedures for doing the random
20 testing are laid out for the entire government by HHS again in
21 the HHS guidelines. That's one reason why the program has not
22 been approved yet is because those guidelines have not been
23 finalized yet by HHS. They are in near final draft form we
24 understand, but those have to be finalized, and they contain
25 the procedures for, for taking the samples from the employees.

1 and so forth. So we have to wait for that. As soon as our
2 plan is approved, then we go into the notification process of
3 notifying employees 60 days before the start of testing, then
4 30 days prior to the start of testing, and so forth.

5 Chairman Zech I understand within the past two weeks
6 made a call upon HHS Secretary Bowen, and urged that our
7 program be approved and that we can start our own testing
8 program.

9 CHAIRMAN REMICK: In the event that the NRC is
10 delayed for one reason or another, and the industry, this rule
11 went out let's say--I realize it is not good to have the
12 regulator subject to the licensee's fitness for duty programs
13 on a long-term basis, but on a short-term, has any
14 consideration been given it was better than having those
15 people exempt from any kind of fitness for duty?

16 MR. PARTLOW: We have had one little, little test at
17 Nebraska Public Power Company, Schooler site, who instituted a
18 testing program, by reason of fairness in order to make sure
19 that they were well argued in court, said that this program
20 applies to everybody, including the NRC, and so NRC, if you
21 want the resident inspectors to have unescorted access on site
22 or other people, have them participate in our program.
23 Otherwise we will escort them.

24 We had them escort them for a while. Then we
25 developed a scheme by which NRC people would participate in

1 the utility's drug testing program. I guess if we did end up
2 in that situation, that's probably what we would do
3 again--encourage our people to participate in the program, and
4 lacking that volunteer, they would be, they would do their
5 appointed rounds under escort.

6 CHAIRMAN REMICK: That sounds like a rational
7 approach. It does affect others. It affect contractors,

8 MR. PARTLOW: This program affects contractors, yes.

9 CHAIRMAN REMICK: And speaking not personally, but
10 in my own institution, we face that with faculty members doing
11 research at utilities in which utilities wanted the university
12 to have a fitness for duty program which was almost an
13 impossibility. We came to the conclusion those faculty
14 members who want to be at that utility, and do that research,
15 then they have to be subject to that. If they don't, that is
16 their choice. I think there is rational side effects that
17 hav. to be, you know, decided upon on a case-by-case basis,
18 and I would sure encourage the NRC to take an approach like
19 that if they find that the rule is in effect and they don't
20 have their own program.

21 MR. PARTLOW: Yes.

22 DR. LEWIS: In a sense, the nuclear power plant is
23 an easier problem than a university campus because it is a
24 closed community, and there are methods which I probably would
25 rather not discuss here for not determining whether an

1 individual is using drugs, but whether a site is using drugs.
2 There are such techniques which are not quite so personally
3 offensive, and I wonder whether NRC has looked into that class
4 of questions?

5 MR. PARTLOW: At places like research reactors or
6 methods of determining at site?

7 DR. LEWIS: Places that are a closed community; if
8 you wanted to know whether drugs are being used within a
9 prison, comparing a nuclear power plant to a prison if you
10 like, a whole new set of technical opportunities presents
11 itself that would provide interesting information.

12 MR. WARD: You have to make certain assumptions for
13 those?

14 MR. PARTLOW: In this rule, we did not choose to
15 prescribe such things as searches, dogs, undercover
16 investigations, hot lines or confidential telephones and so
17 forth, but we have put those--

18 DR. LEWIS: Nor am I talking about such things.

19 MR. PARTLOW: We have put those in the request for
20 comments. You will find them in Appendix B which is a couple
21 of areas where we asked the public, we said we haven't put
22 these in the rule, what do you think? So those kinds of--

23 DR. LEWIS: I am not talking about any of those
24 things. I am saying there are things which are not in the
25 public domain with a technological opportunity which would be

1 useful in this context, and I only wonder if NRC is aware of
2 them.

3 MR. PARTLOW: I don't know whether--

4 CHAIRMAN REMICK: Sampling the sewer lines?

5 DR. LEWIS: For example.

6 MR. PARTLOW: Okay. I don't know.

7 CHAIRMAN REMICK: That's high tech or low tech?

8 MR. BUSH: What tech?

9 MR. PARTLOW: What requirements for drug testing
10 are in the rule? What kind of drug testing is required by the
11 rule? First, there is what has traditinally been called
12 pre-employment testing. We are not calling it that because it
13 is not really pre-employment as far as we are concerned. We
14 want people to be tested prior to, new people, tested prior to
15 the granting of unescorted access or prior to the assignment
16 to some kind of key safety, safety job under an emergency, so
17 it takes several words to describe that, but it is basically
18 pre-employment testing or pre-access testing would be
19 required.

20 The rule calls for for-cause testing based upon
21 supervisory evaluation, and the rule also calls for a form of
22 post-accident testing, although we do not use post-accident,
23 but the rule says that under certain conditions where human
24 performance has failed, and it has resulted in overexposures
25 or release, that there would be a, there would be testing

1 conducted in those cases.

2 CHAIRMAN REMICK: Does it identify how you decide
3 what group of people would be tested in that case? Immediate
4 people affected or--

5 MR. PARTLOW: To the extent that a supervisor could
6 determine that this one or two or three classes of people made
7 a mistake.

8 CHAIRMAN REMICK: How would the supervisor, does it
9 go that far? Where do you draw the line?

10 MR. PARTLOW: It does not get into that kind of
11 detail.

12 MR. MICHELSON: One of the questions I had was if
13 you are going to have drug testing of new employees, what do
14 you do about the problem that the new employee may not
15 actually be requiring access for two or three years or
16 something? And you are not doing the normal kinds of
17 observation and so forth that is prescribed in here for people
18 that are on site? How do you know that when he does finally
19 show up for access, that he is still clean?

20 MR. PARTLOW: That's when we would ask he be tested.
21 We don't care that--

22 MR. MICHELSON: The rule didn't seem to come--to me,
23 if you did it just prior to the process, you did it rather on
24 new employees sometime prior to granting access but no fact as
25 to whether you did it on the day he shows up for the the job

1 or the day he finally does need access, which might be years
2 later.

3 MR. BUSH: Then he also would have been tested
4 randomly during that period.

5 MR. MICHELSON: No, because that person wasn't under
6 this program, was he, for random testing?

7 CHAIRMAN REMICK: I think what Carl is talking
8 about, you have a new employee. Let's say you have
9 pre-employment screening. He has been screened three years
10 later. He takes on a new position, which now he fully falls
11 under the fitness for duty program. He has not been random
12 sampled because he has not been a part of it. Perhaps--

13 MR. PARTLOW: That would clearly be violating the
14 spirit of this thing, to hire somebody and test him and then
15 put him off on some other job for a couple of years and then
16 say he can go on the project. We can look at that.

17 MR. MICHELSON: Once you decide he has to have
18 access, then you ought to get a test and then random
19 thereafter.

20 MR. PARTLOW: Yes.

21 MR. MICHELSON: I thought that was the spirit of it.
22 But it doesn't come through.

23 MR. PARTLOW: The final area of testing, of course,
24 is random testing on an unannounced basis. We have picked in
25 this proposed rule a, what I would say would be a very

1 aggressive level of testing. It is a level of testing that
2 would require that on statistical basis, that you test at the
3 rate of 125 percent of the population during the year. The
4 statistics are such that you have high probability then that
5 about 75 percent of all the people in the population will have
6 had at least one test during the year.

7 This is the same rate of testing that has been, is
8 being used by the FAA and I believe the Coast Guard in their
9 pending rules.

10 The body of the package that you have--

11 CHAIRMAN REMICK: That still hasn't settled with me.
12 By 125 percent, you mean that you would sample, approximately
13 25 percent of the people would be tested twice in a year? You
14 want an average of no less than 75 percent of the people
15 tested in any one-month period? On average, that 125 percent
16 isn't not making sense to me.

17 MR. PARTLOW: If you have a population of a thousand
18 people, then you would say okay, 125 percent of that is 1250
19 people, or 1250 tests that I have to do this year. Let's do
20 them unannounced on an even basis every month. So one 12th of
21 the, of those, and each time the person gets thrown back into
22 the pot for the next test. When you get all finished, the
23 statistics say that you have, 75 percent of the people would
24 have had one test. I can't tell you how many would have had
25 two or three tests.

1 DR. LEWIS: Sure, you can't, but it is 71 percent,
2 not 75 percent. I just worked it out.

3 MR. PARTLOW: Okay. A major portion of the package
4 that you have goes through why random testing? Why is it
5 important or why are there alternatives to random testing for
6 deterrence and detection of drug use at an operating nuclear
7 power plant? The Commission wanted to have a sound basis for
8 that as we went forward with rulemaking.

9 Another good portion of that package there has to,
10 again to do with random testing. Are there any alternatives
11 to routine testing and obtrusiveness and so forth of urine
12 testing, so with the help of the Battelle Human affairs
13 Research Center and a lot of our own reading, we have put this
14 together, this justification, that it is, sort of says the
15 short answer is that there are no real true alternatives to
16 random testing for detection and deterrence.

17 Training is essential, and awareness is essential,
18 and management support is essential, and assistance programs
19 are essential, and so forth and so forth, but absent the
20 random testing program, you just may not have any picture at
21 all of where you stand or where you are trending. I believe
22 there is pretty good discussion in there of the results
23 achieved by the Coast Guard over a five-year period from, with
24 random testing programs.

25 We also looked at considerable length at

1 alternatives to urine testing. There are methods to examine
2 the hair, to examine the eyes, to examine the blood, to
3 examine the fingernails. They all, I guess we would say they
4 appear rather promising. They are to varying degrees of
5 reliability, but they are just not in that, that method is not
6 yet ready to be deliverable for use in a large-scale operation
7 like a nuclear power plant.

8 MR. MICHELSON: How reliable is the urine test?

9 MR. PARTLOW: Reliability of the urine test? Again,
10 it depends I guess on the equipment you use, and what, how
11 conservative you want to be in your cutoff level.

12 MR. MICHELSON: Let me ask the question differently
13 then.

14 What do you do when you get a positive test? What
15 is required to do, to happen?

16 MR. PARTLOW: We will get into this in the next
17 section here.

18 With that on testing, we now go to the management
19 actions or management sanctions.

20 MR. GIMMY: Why is the random selection and random
21 timing technique used as opposed to just random timing in
22 everybody? This way you miss one out of four people every
23 year. You only get 57 percent of them. Why not test a
24 hundred percent of them but have a totally random timing?
25 That's what really counts is if you don't know when it is

1 coming.

2 MR. BUSH: There are some licensees that have tried
3 this approach, and apparently it is pretty difficult to do it
4 so that people, you know, they have their underground
5 intelligence network and the grapevine works overtime, and so
6 there is a lot of allegations if you would of leaks in the
7 system, so we just felt based upon the information that we had
8 gathered looking at those kind of periodic tests I guess is
9 what you would call them, randomly scheduled periodic tests.

10 MR. PARTLOW: Another practical consideration would
11 be that a plant would have maybe several thousand people on
12 board and if you choose to test all of those people this
13 morning, you would really be bringing the building to a stop
14 and--

15 DR. LEWIS: No. He didn't say that.

16 MR. GIMMY: I am saying instead of testing 125
17 percent of the people, only test a hundred percent of the
18 people, but do it randomly scheduled.

19 CHAIRMAN REMICK: After I have had my test, I pretty
20 well know it is going to be about a year before they get
21 around to me again. This way you don't.

22 DR. LEWIS: Not if it is random timing; he has a
23 good point.

24 MR. MICHELSON: What do you do if I get hit the
25 first day do I know I am going to get hit again?

1 DR. LEWIS: You don't know anything if it is random
2 timing.

3 CHAIRMAN REMICK: He is limiting it to a hundred
4 percent.

5 MR. WARD: If it is random timing? Everybody gets
6 it once a year I think is what he says is right.

7 DR. LEWIS: You are not doing it once a year.

8 MR. GIMMY: The way I said it, he is right. Do 125
9 percent with random timing, then you wouldn't know just
10 because you had one that you weren't going to get another one
11 next week.

12 MR. WARD: That's what, I don't see how that is any
13 different from what they are doing.

14 MR. GIMMY: What they are doing is missing one out
15 of four people.

16 MR. MICHELSON: When do you pick up the one you
17 missed then if you want a hundred percent coverage? You pick
18 him up on the last day or something? He hasn't been hit yet
19 for the year?

20 DR. LEWIS: You would miss your one out of five
21 anyway.

22 CHAIRMAN REMICK: The way he stated, it should be
23 guaranteed of getting a hundred percent of the people. That
24 is not random. You might randomly pick the day, but it is not
25 random sample.

1 DR. LEWIS: It really does work out the same. The
2 way, if you do random timing, there is a certain probability
3 that my number won't come up for three years. There is a
4 certain probability.

5 CHAIRMAN REMICK: Sure.

6 DR. LEWIS: In that case, there is also a certain
7 probability that--in fact, they are functionally exactly the
8 same.

9 CHAIRMAN REMICK: All right. That isn't what Chris
10 was proposing. He was proposing that you do, absolutely cover
11 all hundred percent of the people.

12 DR. LEWIS: That is what he first said. Then he
13 didn't mean to have said that.

14 MR. MICHELSON: Then how do you do that? You are
15 going to wait until the last day and those who haven't been
16 covered, give them a test?

17 MR. GIMMY: Put all the names in a fish bowl, and
18 let's say, let's say you--make it easy--365 employees; every
19 day pull one out and test him. whoever's name comes out gets
20 tested on that day. The guy, when they are down to one ball,
21 he knows. Okay.

22 MR. MICHELSON: If I get the first one out of the
23 pot, I know I am clear for nearly a year.

24 MR. WARD: That's the problem.

25 CHAIRMAN REMICK: That's right.

1 MP. GIMMY: That's his point.

2 DR. LEWIS: I--that isn't the way I was going to do
3 it.

4 MR. BUSH: There are all kinds of variations on the
5 themes that you have discussed, and basically we have
6 concluded that, that the scheme that has the most deterrent
7 value is where there is frequent random testing on a daily or
8 weekly basis, and as soon as the person has been tested, his
9 name goes back into the hat so he could. he knows that there
10 is a chance he is going to get tested the next day.

11 DR. LEWIS: They are mathematically identical. They
12 really are.

13 MR. GIMMY: What is the guess on the number of false
14 positives?

15 MR. PARTLOW: We will get into this as we get
16 through the paper here. Again, it would depend upon where you
17 set your cutoff level to determine the administrative where
18 you set your level on how many false positives you get.

19 What action are taken when people are found to be
20 involved in drugs? Now first keep in mind that there are two
21 different kinds of test results here. One we call screening
22 tests, and the second test called a confirmation test.
23 Screening test perhaps carried on on site, using locally
24 available equipment--pretty good test but not, not high, high
25 precision; normally followed up then by a confirmation test to

1 confirm the results of the screening test either positive or
2 negative.

3 MR. MICHELSON: How many confirmation do you have to
4 have since--are you sure that the confirmation is also, is it
5 a hundred percent accurate? The confirmation? Higher
6 precision?

7 MR. PARTLOW: If it is anything a hundred percent.

8 MR. MICHELSON: You don't have to do three of these?
9 Just do one for confirmation?

10 MR. PARTLOW: Yes.

11 MR. BUSH: The employee I might interject always,
12 the way the rule is structured, can render an appeal and then
13 we have structured it so that the sample or the portion of the
14 sample that is retained can be retested.

15 MR. PARTLOW: The scheme that we are going, going to
16 go through here now is basically that for off-site. Off-site
17 drug use, a person is going to be given one chance at
18 rehabilitation and returned to duties and given a chance to
19 continue with his career.

20 If that person is found to be involved in drugs the
21 second time, by virtue of any kind of test, random test or
22 cause test or whatever, that person is going to be denied
23 access at that, he is going to be taken off of that job. The
24 government is not dictating that person be fired, but that
25 that person be denied unescorted access to the plant or any

1 activities within the scope of the rule for a period of three
2 years.

3 CHAIRMAN REMICK: In the draft we received, you were
4 giving the Commission an option of accepting that, which I
5 believe is the staff recommendation, versus a more stringent
6 requirement--once caught, you are out.

7 Is that still, are you giving the Commission an
8 option?

9 MR. PARTLOW: Yes. Those kind of words, we are
10 making our proposal in the draft, but in the Commission paper,
11 we are pointing out that there is a number of places where the
12 Commission could weigh in. Let me mention the third class,
13 on-site involvement. That person who was so bold as to bring
14 drugs on board, inside the protected area, and there to have
15 him, or to try to sell them or to use them, the Commission,
16 the Commission's policy statement speaks to discharge of that
17 person. Expectation would be that they would be discharged.
18 We are still right in the middle of this on the staff, but
19 what should be the management sanction there for that person
20 so bold after having been warned, trained, and so forth, that
21 would bring drugs to a nuclear power plant?

22 We have one version of this written up that, that
23 that says that that person's access is denied forever. I have
24 another version that says that for five years. And if there
25 are any good feelings for that, we would be happy, happy to

1 hear them.

2 Again, the Commission's policy statement seemed to
3 speak to forever. We first wrote it up that way, but that's a
4 long, long time.

5 CHAIRMAN REMICK: This is sale or use on site?

6 MR. PARTLOW: On site.

7 MR. MICHELSON: How about unsuccessful attempt to
8 bring it on site? How do you categorize it?

9 MR. PARTLOW: They are not yet inside. If they get
10 caught at the protected area boundary, they are lucky.

11 MR. MICHELSON: Okay. Wait a minute. They are
12 lucky? You mean, you mean if you are caught trying to bring
13 them in, that doesn't count the same as having gotten them in
14 and whatever you did with them thereafter? Is there a
15 difference?

16 MR. BUSH: As the rule is written--

17 MR. MICHELSON: If I attempt to bring them on site
18 and don't succeed?

19 MR. PARTLOW: That's a good point.

20 MR. MICHELSON: If I don't succeed, presently I am
21 off. I guess unescorted access is the only thing that you
22 can't get. That doesn't seem quite--

23 MR. PARTLOW: We should perhaps say or attempting to
24 introduce drugs on site.

25 MR. MICHELSON: One and the same.

1 MR. PARTLOW: So the scheme now then is a person who
2 comes up with a positive test and it is determined to be as a
3 result of off-site use, they would upon confirmation of that
4 positive test, they would be removed from access to the plant.
5 They would be referred to an employee assistance program, and
6 they would then be returned to duties once it has been both a
7 medical and a management determination that that person is fit
8 and ready to assume his safety responsibilities.

9 We have not gotten into the details of how long or
10 how much EAP or what criteria from the medical officer or the
11 management official. We have left it just as that. He will
12 be removed, and management will have to make that decision
13 before that person is allowed to return to the plant.

14 If he--and he would then be subject to special
15 follow-on testing, not operat. the random testing program that
16 the rest of the plant is subject to, but a special random
17 testing program for that person to determine, to have
18 confidence that he is continuing to abstain from drugs.

19 The second time and he would then invoke what is the
20 three-year provision. He would be removed for a period of at
21 least three years, at which time management and the medical
22 officials could go through a redetermination without us
23 specifying the details, of his suitability for return to that
24 kind of job.

25 MR. MICHELSON: Another small point along the same

1 line--do you differentiate as to which drug he is on and
2 whether or not the drug changes and so forth? In other words,
3 he was discharged, are you put on this program because he was
4 using cocaine?

5 MR. PARTLOW: Marijuana, now he shifts to coke?

6 MR. MICHELSON: Yes, or whatever; does that make a
7 difference or just any of the--you list all the substances
8 that you are including in the program, but there are
9 inferences in here that you mean more.

10 How do you decide what the prohibited list is and
11 does it change with time?

12 MR. PARTLOW: We will get to that. That is coming
13 up. So that's it on the management sanctions.

14 Tracking of personnel, in this tasking to the staff,
15 the Commission asked us to be sure that the rule addressed the
16 tracking of personnel who have been discharged for drug
17 related reasons. Again as I mentioned, the staff in this
18 ruling is not using the words discharge, but we know, I think
19 we know what the Commission meant, so now this is raising the
20 question of okay, at one particular plant it is easy to handle
21 this matter of them being denied access for a short period of
22 time for rehabilitation or three years for a second offense,
23 or perhaps five years or for life for on-site involvement.
24 What about the other nuclear power plants? And what kind of
25 program does the government put in place to provide some kind

1 of assurance that that person does not move to the next
2 nuclear power plant to continue that kind of activity?

3 We have written that up by saying that the utility,
4 again for a new person prior to the initial granting of
5 unescorted access, would get a statement from that perspective
6 employee as to whether or not they had ever been removed from
7 access at a nuclear power plant, and we would ask the utility
8 to conduct a suitable inquiry into the perform's past, past
9 work at any other nuclear power plants to determine whether or
10 not there was a record there that they had been removed, been
11 removed from duty, so there would be a system in place,
12 certainly not perfect probably, but there would be some sort
13 of system that as new people report to nuclear power plants,
14 that there will be a method of checking into their background
15 in drug use.

16 MR. MICHELSON: In the case of the sabotage
17 business, there is always the question of knowing the fellow's
18 history, particularly if he came from a foreign country into
19 this country.

20 How are you handling this history outside the
21 country prior to coming to work at this particular plant?
22 Because there are, there is a lot of nuclear plants now
23 outside the U.S.

24 MR. PARTLOW: I am not sure I can answer it. There
25 is the new industry-developed guidelines for access

1 authorization, safeguard program, requires a background
2 investigation. Lauren?

3 MR. BUSH: It says basically do the best you can.
4 It recognizes that going to Russia or China is difficult or
5 impossible.

6 MR. MICHELSON: Even going to Canada or Brazil or
7 other places where there are large nuclear plants a person
8 might work at is very, very difficult to do. The statement he
9 signs I assume ought to be written at least so that any
10 nuclear facility, anywhere in the world, is attesting to it
11 and not just what he did in the U.S. because that's no--
12 expands the statement. His attestment at least is that I have
13 never been involved in this. Better to ask him if he was ever
14 involved at all, but I don't know how far you want to go.
15 Clearly you don't want to limit it to U.S..

16 MR. PARTLOW: By now we have talked about a couple
17 of the rather active part of this proposed rule--people
18 tested, random testing, urine testing and so forth. Number 2,
19 rather significant management sanctions carried out when a
20 person is found to be involved; the next couple of sections of
21 the rule that I talk about here now are somewhat more on the
22 other side of balancing those heavy government regulations
23 with certain protections for the employee, and the first one
24 has to do with to what level should we ensure that these
25 testing programs are run with high quality to try to minimize

1 this opportunity for false positives, to try to minimize the
2 obtrusive effects of this kind of program upon people who are
3 overwhelmingly out there not drug users, and decent
4 human-beings? So the first thing has to do with the quality
5 control or the quality of the taking of samples, the keeping
6 track of samples, keeping track of people's names, the quality
7 of the laboratories where these samples are measured, and so
8 forth.

9 Here so far the way our rule stands, we are
10 piggybacking off of the government's rules for the government
11 people, namely, the guidelines prepared by Health and Human
12 Services, the HHS guidelines, which are the standards which we
13 will hold our own program to here in the NRC as we test our
14 people.

15 We are proposing that with a couple of limited
16 exceptions that I will mention, that we asked the industry to
17 meet those same kind of quality standards as are called for in
18 the HHS guidelines, and as I mentioned earlier in talking
19 about the NRC's program, those are in near final draft, but
20 they are not final yet.

21 CHAIRMAN REMICK: Those are specified in the
22 proposed rule so people will know where they are?

23 MR. PARTLOW: Yes. They are laid out by Federal
24 Register notice and so forth.

25 Employee assistance programs, as I mentioned, if a

1 person is involved in drugs, we want him away from those
2 duties, and we want to, we want to have management committed
3 that they won't return that person to safety duties until they
4 feel that he is, that has been, that he is ready to resume
5 that kind of job and won't be using drugs.

6 Should we, the government, require that utilities
7 have these things called employee assistance programs? And so
8 far in the rule, we do have it in there that there would be
9 EAPs again because such things are an important part of a
10 total fitness for duty program, having those kinds of services
11 available to do that kind of thing.

12 CHAIRMAN REMICK: I assume all utilities, nuclear
13 utilities, currently have some kind of assistance program?

14 MR. PARTLOW: I believe they do, yes. There is an
15 important matter here that is hard to get down on paper, and
16 that is again an important concept in this matter is that
17 there be a way for utilities to self-refer themselves for a
18 problem like drugs or alcohol to an employee assistance
19 program and not to, not to receive any kind of retribution
20 from management, not to be pulled off their job, but to be
21 able to just go ahead and realize that they have a problem, go
22 and get help for it, but not have them subject to the kinds of
23 things that we have just talked about here, removal from
24 access to the plant and so forth.

25 MR. MICHELSON: How do you prevent the fellow from

1 thinking he is about to be caught and therefore turns himself
2 in and avoid all the retribution?

3 MR. PARTLOW: I don't know.

4 DR. LEWIS: The FAA had that problem five or six
5 years ago. They removed the penalty for reporting a near miss
6 if you were at fault. They said if you report it, we won't
7 hit you. The number of reports tripled I think because people
8 were looking for the immunity, so Carl's point is a good one.

9 MR. PARTLOW: I don't know, Dr. Michelson. I would
10 think the answer would be do that once to the utility, and
11 shame on the individual; try to pull it twice, and shame on
12 the utility for letting them get away with it.

13 DR. LEWIS: Carrying the attribution point a bit
14 further, in there I saw in terms of the NRC employee, although
15 they could be exempt, if the plant suspects is the word used
16 in here, that they are under the influence, the plant should
17 give them escorted access and report immediately to their
18 regional administrator. If I were a plant operator, I would
19 think in terms of the retribution if I were wrong on that. I
20 would be very reluctant to take that step. So they are in
21 fact exempt.

22 MR. BUSH: I might point out that the current
23 practice of the programs that we looked at are very
24 fundamentally black and white situation, that if an employee
25 is contacted and told that he must report to provide a

1 specimen for testing, that he cannot then go down to the
2 employee assistance program and turn himself in and be granted
3 immunity--very simple.

4 MR. MICHELSON: Is that provided in your document as
5 well?

6 MR. BUSH: I think it is, I think it has been taken
7 out.

8 MR. PARTLOW: Lauren's point on taken out, he had
9 that in the rule at one time and somebody took it out, feeling
10 that there are so many different levels of detail like that to
11 get into, that we thought we should keep it general.

12 MR. MICHELSON: If you have called up for a
13 specimen, isn't that the time to turn yourself in then and you
14 won't, nothing will happen other than you go through a
15 rehabilitation program? You still have access. You still
16 have your job doing what you have been doing, is that right?

17 MR. BUSH: No. The intention really, and the things
18 are not written in the rule because things of this nature
19 probably would be put in an implementing guidance, but as the
20 current programs are, as I said before, if the employee is
21 confronted and asked to submit a sample, then he cannot seek
22 the protection of the employee assistance program.

23 On the other hand, if he turns himself in to the
24 employee assistance program, and he is so impaired that he
25 constitutes a hazard to himself or to other workers and the

1 public, then certainly we expect the employee assistance
2 counselors to report that to management, and for management to
3 take the appropriate action to take him out of the workplace.

4 MR. MICHELSON: There could be retribution? It is a
5 matter of judgment as to whether there is?

6 MR. BUSH: Yes.

7 MR. MICHELSON: That's another twist on it. I
8 imagine there could, that could be misused.

9 CHAIRMAN REMICK: Of the existing programs, how do
10 they handle that? Are those the ones you are saying they seem
11 to have, you can't--if you are going to receive testing, then
12 go apply to the assistance program? Is that the tendency.

13 MR. BUSH: Anybody can seek help through the
14 employee assistance program, but the difference is the
15 fundamental philosophy of the employee assistance program is
16 to seek people to self-refer because theoretically, if, well,
17 two things--No. 1, if the person who is having trouble
18 recognizes that he is having trouble, then it is much easier
19 to correct the problem.

20 MR. PARTLOW: Do we know of any examples of how
21 utilities are practically handling this problem?

22 MR. BUSH: Well--

23 MR. PARTLOW: I don't recall any.

24 CHAIRMAN REMICK: Because it is a current problem,
25 right?

1 MR. PARTLOW: Well--

2 CHAIRMAN REMICK: Not by the rule.

3 MR. PARTLOW: There are utilities out there with
4 random testing, and with EAPs, and I just don't know how they
5 are handled.

6 MR. BUSH: I have had a number of counselors tell
7 me, in fact in one utility they said they were required by
8 state law, for example, in cases of child abuse, for example,
9 somebody is drinking and abuses his child, then they are
10 required by state law to report that to the law enforcement
11 authorities.

12 CHAIRMAN REMICK: Utility has the obligation if they
13 discover it, is that it?

14 MR. BUSH: Yes. Our contention basically is that
15 public health and safety has to be given priority over the
16 confidentiality provided for normally in the employee
17 assistance program.

18 MR. MICHELSON: If a person turns himself in, then
19 it is up to the judgment of the utility whether to or not to
20 remove him from that particular activity?

21 MR. BUSH: There is a step missing, that the initial
22 step is the evaluation by the professional medical staff as to
23 whether or not this person--

24 MR. MICHELSON: That is part of what I was referring
25 to.

1 MR. PARTLOW: Plant manager kind of person probably
2 isn't going to be in on that judgment.

3 MR. MICHELSON: I would hope not. I am just trying
4 to clarify, so he still could be removed even if he turned
5 himself in?

6 MR. BUSH: In some of the utilities that I talked
7 to, they talked about seeing hundreds and hundreds and maybe
8 even thousands of employees, and they are talking maybe one or
9 two cases that, that the person was so impaired that they
10 contacted management, so we are not talking about a
11 significant frequently occurring problem.

12 DR. LEWIS: I can give you a number. It has nothing
13 to do with nuclear power plant, but my son is now interning at
14 a large hospital whose location I won't tell you, but he
15 reports that of the young women who come in to deliver, in
16 that particular socio-economic extract, 30 percent have
17 cocaine in their system when they come in to deliver. That's
18 the other end of the coin, so somewhere in between there is
19 the real problem.

20 MR. WARD: That is in Gettysburg?!

21 DR. LEWIS: What did you say?

22 MR. WARD: That was a joke.

23 MR. PARTLOW: The proposed rule has other provisions
24 in it, provisions that the utility has established written
25 policies and procedures on how they are going to carry out the

1 requirements in this rule, provisions for training programs
2 not only for supervisors, but for all personnel, and here
3 again both in the policies and procedures and in the training
4 programs one of the main thrusts there is that the employee
5 themselves, employees themselves, understand, understand the
6 health effects of drugs and alcoholism and that they
7 understand how the utility's program is going to work and that
8 they understand what is going to happen to them if they come
9 up with a positive test result. We tried to be very careful
10 to build that into the requirements for procedures, for
11 policies, and for training programs.

12 MR. BUSH: I might point out in response to an
13 earlier question, that the rule does very clearly state we
14 expect the training to include the effect of prescription
15 drugs and over-the-counter drugs and the fact that the rule
16 requires medical review of the testing findings before
17 somebody is removed.

18 MR. PARTLOW: There is a provision in the rule that
19 these programs apply not only to employees of the utilities
20 but to contractors, and that utilities keep on top of the
21 contractor programs. They can either have the contractors
22 abide fully by their own program, or they can arrange for
23 their contractors to develop their own contractor programs
24 subject to approval by the, by the utility themselves, but for
25 all people, contractors or employees, the utility is

1 responsible to the NRC for implementing the rule.

2 There are provisions for employee appeals in the
3 case of the results that come back. There is a, requirements
4 that samples be split and kept and so forth so that there can
5 be a second measuring of the same urine sample to help bring,
6 bring new information to, as to whether or not a first test
7 was a false positive and so forth.

8 There are certain things--

9 MR. MICHELSON: I have a slightly different question
10 on another subject, but related.

11 How often is it compulsory to have a physical exam
12 if you are a licensed operator, for instance?

13 MR. PARTLOW: Licensed operator is annual.

14 MR. MICHELSON: Okay. Thank you. None of this
15 necessarily would be picked up by a physical exam, would it?
16 The doctor can't tell in the process of his doing a work-up on
17 an individual?

18 CHAIRMAN REMICK: I think that is once every two
19 years.

20 MR. PARTLOW: Okay. Sorry. It is two years.

21 MR. MICHELSON: But a medical exam per se is not a
22 good way to pick up on this possible problem?

23 MR. OLSON: You can tell some things from an exam.
24 It is not comprehensive.

25 MR. PARTLOW: As I mentioned earlier, there are some

1 areas that are not in the rules, and we are asking the public
2 to comment upon that. I mentioned what kinds of facilities
3 should the rules apply to. Should we expand the scope, the
4 people portion of the thing, to cover important areas of work
5 that might go on just outside the protected area? Those kinds
6 of people; should we include requirements that licensees
7 conduct program audits of themselves to determine the ongoing
8 effectiveness of their fitness for duty program?

9 Should we require them to collect performance data
10 on what, how many tests are conducted, what kinds of tests,
11 what are the results, what are the trends? You could gain
12 perhaps useful information by studying the kinds of drugs that
13 are involved around your plant or the kinds of people who have
14 been involved and so forth.

15 We have asked for public comments on that, and on
16 the level to which we and the NRC should receive reports on
17 drug abuse.

18 Dr. Michelson, I really didn't answer one of your
19 questions.

20 MR. MICHELSON: Just one?

21 MR. PARTLOW: The five drugs, the HHS guidelines
22 which we adopt calls for the testing of five drugs, and we
23 would say that that would be done on a nationwide basis. We
24 also have something in here that acknowledges that there are I
25 guess by localities or part of the country some drugs become

1 popular. We have not said what those are nor what the cutoff
2 levels are. We have just said that the utility should stay in
3 touch with local drug enforcement offices and with the local
4 law enforcement agencies, determine what those are, and should
5 test for them without naming them.

6 MR. MICHELSON: I just wondered in terms of fitness
7 for duty, what we did about certain kinds of prescription
8 drugs that could become a problem for an individual? I wonder
9 in a broader sense what do we do about people that develop
10 physical disabilities between the two-year medical exam and
11 what obligation or, you know, they might even want to keep it
12 a secret, don't want to lose their job. They might be
13 developing serious dizzy spells or diabetes or some darned
14 thing that could impair the safety of operation. You know,
15 how do we handle those situations?

16 MR. PARTLOW: Prescription drugs, the Commission's
17 original policy statement said that people shall not be under
18 the influence of any substance, comma, legal or illegal.

19 This rule does not speak to those prescriptive
20 drugs. The only way I know to address that kind of thing at
21 this time is through the training, through the counseling,
22 through the, through those kinds of programs. I believe--do
23 we require that in our training, Lauren, as it written now?

24 MR. BUSH: Yes.

25 CHAIRMAN REMICK: Supervisors, you are talking

1 about--

2 MR. PARTLOW: People and supervisors.

3 CHAIRMAN REMICK: Supervisory observation program,
4 training of those people.

5 MR. PARTLOW: They should be trained on the effect
6 of too much poppy seeds on your breakfast roll.

7 CHAIRMAN REMICK: Do you have a supervisor
8 observation program as part of this package?

9 MR. PARTLOW: Yes.

10 CHAIRMAN REMICK: Going back to Carl's question
11 about operators that you looked at, in that two-year period a
12 person doesn't turn himself in, you are looking to training
13 supervisors to detect--

14 MR. MICHELSON: Physical observation; that's about
15 the only way you pick up on changes in physical character
16 because of illness or because of some prescription drug that
17 might be related to the illness that is impairing his ability.

18 MR. PARTLOW: That covers it from our point. Again,
19 the FAA has put their rules out for aviation kind of
20 people--pilots, stewardesses, maintenance technicians, and so
21 forth.

22 It also adopts the HHS guidelines. It requires the
23 same level of random testing. That, that rule as it stands
24 now for public comment, does not propose the management
25 sanctions or the tracking kinds of things that we have in our

1 proposed rule. It basically throws out various options and
2 asks questions about what, what kind of approach should be
3 taken. We have gone ahead on the staff here and planned on
4 proposing a set of sanctions.

5 MR. MICHELSON: I was under the impression that the
6 aviation people are covered by the rule that includes any kind
7 of prescription drug that could have adverse effect on their
8 flying capability.

9 MR. PARTLOW: They are covered by rules that say,
10 for example, I believe don't drink or use, that kind of thing.

11 MR. MICHELSON: Antihistamines.

12 MR. PARTLOW: This FAA rule is a testing rule.

13 DR. LEWIS: I know what the FAA rule is that I fly
14 by, and I don't know this new thing you mentioned, but it is
15 really a very vague rule. It says you shall not pilot an
16 airplane while your condition is impaired, you know, by
17 illness, for God's sake, or drugs or alcohol or anything. And
18 that's it.

19 Now individual pilots are left to make that judgment
20 by themselves, and in the accident reports there are quite a
21 few that are alcohol related, of course.

22 There are--the airlines differ, but most airlines
23 have tried to make it more quantitative, and many of them have
24 so-called eight hour rule. You shall not have drunk within
25 eight hours of the time you fly. And that's, you know, again,

1 is not, it is not good to be too quantitative because clearly
2 you can have a beer with dinner six hours before you are
3 scheduled to fly and there will be no effect.

4 On the other hand, it is possible, all of us when we
5 were young could attest to it, to drink so much that eight
6 hours later you shouldn't be flying an airplane, so trying to
7 make something too precise can be a terrible mistake, so the
8 FAA rule that I fly by is very nonspecific. It simply says
9 you must not be impaired.

10 MR. MICHELSON: It is broad in the sense of any
11 physical impairment?

12 DR. LEWIS: That is correct. If you have a bad
13 cold, you really shouldn't be doing it.

14 MR. PARTLOW: The comments on the FAA proposed rule
15 on testing were overwhelmingly against this kind of random
16 testing program, and the comments apparently said that the
17 current FAA standards or regulations are sufficient if they
18 are just exercised.

19 DR. LEWIS: As a matter of fact, the airplane
20 accidents that involve drugs or alcohol tend to be not
21 commercial airline pilots. All the professional pilots that I
22 know, people who really earn their living that way, really are
23 pretty good about taking care of themselves. They even try to
24 get enough sleep before they fly. You don't get to be an old
25 pilot unless you are careful.

1 MR. MICHELSON: These were on commuter airlines?

2 DR. LEWIS: They are professional; that applies to
3 the people in the commuter airlines.

4 MR. MICHELSON: In the case, the one in Colorado--

5 DR. LEWIS: There are cases. There are cases.

6 CHAIRMAN REMICK: Is this a convenient place to take
7 a break?

8 MR. PARTLOW: Yes, sir.

9 CHAIRMAN REMICK: Is that the end of the formal
10 staff presentation?

11 MR. PARTLOW: I went through the main things. I
12 would like to hear more questions. I am really interested in
13 this on-site use. Should the government really ban forever,
14 or should we put a timeframe on it?

15 CHAIRMAN REMICK: What is the time schedule on
16 departures?

17 MR. MICHELSON: I have no problem.

18 MR. WYLIE: I have no problem.

19 MR. MICHELSON: Six forty-five.

20 MR. WARD: I am going to leave in 15 minutes.

21 CHAIRMAN REMICK: Any question or comment you want
22 to make?

23 MR. WARD: No.

24 CHAIRMAN REMICK: Let's take a 15-minute break,
25 coming back 20 minutes before the hour.

1 (A brief recess was taken.)

2 CHAIRMAN FEMICK: Let's reconvene. Jim, you had
3 some specific points you want us to test. Were those
4 sanctions on site? Was that your question, what we think of
5 those?

6 MR. PARTLOW: Again, we have adopted the strategy
7 that one time and we are willing, the utility, we are willing
8 to work with the person. The person can be rehabilitated, and
9 returned to a job within the nuclear power plant.

10 The second time, we are not ruling it out, but we
11 are prescribing that that person would not go back into those
12 kind of activities for a period of at least three years. This
13 is again for off-site use in which you become detected during
14 a random or other testing program.

15 The next one is then the matter of that person who
16 is so bold as to actually introduce it inside a nuclear power
17 plant. They will be caught using it or distributing it or
18 possessing it.

19 MR. WYLIE: I was curious why you limited that to
20 within the protected area?

21 MR. PARTLOW: We have to define it. We have to
22 define our boundaries someplace.

23 MR. WYLIE: I mean for the sale, though; looked like
24 to me anywhere on site--

25 MR. MICHELSON: Okay to peddle it in the parking

1 lot.

2 MR. WYLIE: Or the cafeteria or wherever; it seems
3 like, well, you have got some inconsistencies with what you
4 wrote here because under the tracking in personnel, on the
5 next to the last paragraph, you say assignment to activities
6 covered by the scope of the rule cannot be made for three
7 years following removal for two positive test results and for
8 five years from any past on-site involvement with the drug.

9 Now that, you didn't say protected area there.

10 MR. BUSH: Lack of precision in the words we chose.

11 MR. WYLIE: I would agree with you that any selling
12 it on site anywhere--

13 MR. BUSH: I myself would say I don't care if he is
14 selling it down in the local community, but I guess the policy
15 decision was to limit that concern to on site.

16 MR. PARTLOW: We are going to have to--

17 MR. WYLIE: That are on site but not within
18 protected area.

19 MR. PARTLOW: We are going to have to defend this on
20 the basis of NRC regulation of safety.

21 MR. WYLIE: It is a wrong statement then?

22 CHAIRMAN REMICK: The on site?

23 MR. MICHELSON: You didn't mean on site in that
24 statement.

25 MR. PARTLOW: So far we have meant within protected

1 areas.

2 MR. WYLIE: So this is wrong?

3 MR. PARTLOW: Okay.

4 MR. WYLIE: Page 4.

5 MR. PARTLOW: But the question is how severe should
6 that sanction be? Let's say it is off site, on site, I don't
7 care. How severe should that sanction be? Can we set it one
8 time for all cases, the young 18 year old versus that same
9 individual when he is 35 or 40 and so forth, and settled down?

10 DR. LEWIS: There are some drugs from which you can
11 settle down and some drugs from which you cannot settle down.
12 For people started down the heroin track, they get cured
13 occasionally, but the incidence of recidivism is in the 90
14 percent bracket. You just don't get away from that, and for
15 those people the prudent thing is one time and you have had
16 it, but for marijuana, it is quite the opposite.

17 You have got to be drug selective.

18 CHAIRMAN REMICK: I felt that where the staff came
19 out with the recommendations is where I personally would come
20 out I think.

21 MR. PARTLOW: At about the three year and five year
22 type of--

23 CHAIRMAN REMICK: I wasn't thinking so much of that,
24 but I don't think I would be the first time. I would allow
25 people to get help and prove themselves personally. The way I

1 would prefer to be treated I guess, and so I thought that what
2 you indicate as a staff recommendation, although laying it out
3 in alternatives for the Commission, I agreed with it when I
4 read it, assuming they are the same in the draft version and
5 the version we got today, which I have not had a chance to
6 read.

7 MR. PARTLOW: Okay.

8 CHAIRMAN REMICK: Anybody differ with that?

9 MR. GIMMY: I was going to ask a question. I
10 couldn't pick up--does this also apply to alcohol as well as
11 drugs? Suppose a guy brings a, got a cooler, he brings his
12 lunch in every day and one day he comes in with a couple of
13 beers and he is trying to sell me a beer, and he gets nailed?
14 Is is subject to drug sanction?

15 MR. PARTLOW: No.

16 MR. GIMMY: He isn't?

17 MR. PARTLOW: No. I believe as it is written now,
18 it is being aimed at drugs. Alcohol is specifically mentioned
19 in here only in for-cause testing, that if someone is believed
20 to be unfit by virtue of being drunk, that on duty, that they
21 would be tested for alcohol.

22 MR. MICHELSON: I don't think it said drunk on duty.
23 He said he was trying to sell a beer on site.

24 CHAIRMAN REMICK: Only place it comes in is for
25 cause, if you suspect a guy is drunk. It is only for cause

1 that alcohol testing is allowed.

2 MR. MICHELSON: I see.

3 CHAIRMAN REMICK: That's a good question. It was
4 not intended to cover the sale of alcohol then? Sanction was
5 not?

6 MR. PARTLOW: I believe that's right.

7 MR. BUSH: Yes. Very broadly now, in 2620 there is
8 an expectation that the written policy would include or would
9 address alcohol.

10 MR. MICHELSON: What page is that on?

11 MR. BUSH: Eighty-four.

12 MR. GRIMES: Perhaps I could also comment. There is
13 a number of these areas--Brian Grimes--a number of these areas
14 which are not, do not preclude the utility from having a
15 policy which requires discharge or exclusion for things such
16 as selling alcohol in the parking lot.

17 MR. BUSH: We opted not to be prescriptive as far as
18 what the written policy would look like.

19 MR. GRIMES: Very common for utilities to have these
20 kinds of policies.

21 MR. MICHELSON: How does this policy not treat the
22 case where somebody is found in possession outside the site,
23 but found possessing say cocaine?

24 MR. BUSH: Possessing drugs?

25 MR. MICHELSON: Yes. What do you do as a utility?

1 MR. PARTLOW: Right now the words say that do not
2 provide for specific sanctions in that case. They say that if
3 the utility becomes aware of this situation, in real life is
4 that they often don't even become aware of this situation,
5 that we are assuming they will address it in part of access
6 authorization policy; in other words, the trustworthiness of
7 the individual.

8 MR. BUSH: The current policies that are in place
9 now, basically that's a violation of the policy. Any on-site
10 or off-site involvement with drugs is clearly addressed in
11 this, the current policies that the utilities have in place.

12 MR. MICHELSON: What do they normally do? What is
13 the normal recourse if somebody was arrested for possession of
14 drugs?

15 MR. BUSH: Okay. The licensee normally conducts an
16 inquiry. They will probably take the individual in for a
17 for-cause test, and they will make the decision then as to
18 whether that employee would be put under some kind of a
19 follow-up testing program; in other words, kind of a probation
20 if you would, or whether they are going to take the action and
21 terminate the employee. That's what is currently happening.

22 MR. MICHELSON: Not something prescribed as far as
23 this--

24 MR. PARTLOW: Because that person--

25 MR. MICHELSON: Considered fit for duty, yet from

1 the viewpoint of this document--

2 MR. PARTLOW: The whole structure here on the blood
3 testing, and if a person has drugs or residuals of drugs in
4 their body, and that raises the serious question of their
5 reliability to do their safety-related job, we are unable to
6 tie that to the off-site possessor or the off-site seller and
7 might have difficulty defending that safety connection.

8 MR. MICHELSON: Now the next case is the case where
9 I, a utility has a trainee in the training program and he was
10 found, in the process of that training program he was
11 discovered smoking marijuana or whatever. How is he treated?
12 It is off-site now. It wasn't inside the protected area.
13 Generally it wouldn't be, but it was in a building on the
14 other side of the fence, maybe a quarter of a mile away, maybe
15 many miles away. I don't know, but it was on the utility
16 property. Again, it doesn't relate to this rule?

17 MR. BUSH: No.

18 MR. MICHELSON: Other than they could as a result of
19 discovering this ask to get a drug test?

20 MR. BUSH: The only way it is related to the rule is
21 dependence on the licensee to develop a written policy.

22 MR. MICHELSON: Under the rule, though, if you are
23 discovered using drugs on site, it is clear it is up to five
24 years perhaps, but what happens if you are discovered using
25 drugs off site? Then the rule also requires the immediate

1 test then to determine your fitness for duty and so forth?

2 MR. BUSH: No.

3 MR. MICHELSON: Shouldn't it?

4 MR. PARTLOW: How might you be discovered off site?

5 MR. MICHELSON: Training program, a student who came
6 in, he is under observation for a year or two before he ever
7 gets on, you know, on plant perhaps.

8 MR. PARTLOW: We are leaving that to the utility and
9 the judgment. We are saying before that person receives
10 unescorted access, he will receive a drug test. Whether that
11 utility wants to continue that person in the training
12 pipeline, give him access to the plant and put him to work, we
13 are leaving that to their judgment.

14 CHAIRMAN REMICK: I would be surprised if a utility
15 was lenient with the rule. You know, there are existing ones.
16 I think in their eyes it would be no different, but I'm not
17 positive.

18 MR. MICHELSON: Another thing you run into is
19 students in the training program actually have access to a
20 plant because they go in certain days of the week and work a
21 shift or something as a part of the training program, but the
22 discovery was not on site. The discovery was off site when
23 they were working on the simulator or whatever. And if they
24 are off site and discovered, I guess it doesn't come under
25 this rule. I would think it would. I would think anywhere in

1 the utility, that if the utility discovers it, I think it
2 should be, and he has access, it should be under the rule
3 whether he was on site or off site.

4 MR. PARTLOW: Now wait. You say he does have
5 access, it was discovered off site?

6 MR. MICHELSON: But it was discovered off site.

7 MR. PARTLOW: That's okay. That person's access
8 would be pulled.

9 MR. MICHELSON: It is under this rule then?

10 MR. BUSH: I think his point is, Jim, that it is not
11 clear because the only thing we have said clearly is that two
12 confirmed positive tests which we assume indicate off-site
13 use, okay, but that's the only method of detecting off-site
14 use that we have addressed here in the rule.

15 CHAIRMAN REMICK: How about the access rule? What
16 does it say about that? Anything?

17 MR. BUSH: No. Just very broadly the access
18 authorization policy statement in the industry guidelines that
19 implement, that simply talk to a person having a history of
20 alcohol or drug abuse without evidence of rehabilitation.

21 CHAIRMAN REMICK: All right.

22 DR. LEWIS: I wonder if I could ask a question just
23 for my clarification? We called your attention earlier twice
24 to 2620 on page 84, and under the D section I am a little
25 confused because of the semicolons on the last couple of

1 lines. I wonder if they are supposed to be commas, because it
2 gives it a different meaning if they are commas than if they
3 are--it is meaningless with the semicolons. I just assumed
4 that that's a misprint, but I want to be sure.

5 MR. BUSH: 2624 D?

6 DR. LEWIS: D, the bottom lines after.

7 MR. PARTLOW: I think those, our intent would be to
8 read better with commas.

9 MR. BUSH: I want to make sure.

10 DR. LEWIS: Second question related to that is that
11 there is a reference to illegal drugs, and I just want to be
12 sure I know what you mean. There are very few drugs that are
13 illegal.

14 Do you mean controlled substances or in the legal
15 sense of the term, what do you mean by illegal drugs for the
16 purposes of this section? Very few drugs are illegal.

17 MR. BUSH: Yes.

18 MR. GIMMY: If you really mean six specific drugs,
19 why not just say the six specific drugs?

20 DR. LEWIS: They are almost all legal.

21 MR. GIMMY: That's what I am saying. Back under the
22 other section they name about six or seven drugs, if you
23 really mean six or seven drugs--

24 MR. PARTLOW: To be tested for?

25 DR. LEWIS: I think the term is simply, illegal

1 drugs is simply a bad term. Whatever you say, I think you
2 should say what you mean here, whatever that is.

3 MR. PARTLOW: I think we mean those drugs that are
4 illegal, and are not obtainable through, through the medical
5 community.

6 DR. LEWIS: That means morphine is okay? You have
7 to face this because you are writing a rule.

8 MR. GIMMY: Some lawyer will tear you to pieces on
9 that. There are some that are legal, and that's why they are
10 called controlled substance.

11 DR. LEWIS: It doesn't require a lawyer. they.

12 MR. MICHELSON: Lewis will do it!

13 DR. LEWIS: Always speak of controlled substances as
14 those are things you need a DEA number to write a prescription
15 and that you certainly would, but then even among those, there
16 are some that--people who have asthma often carry around, you
17 know, supply of some form of epinephrine or something like
18 that, which is an abusable substance, and you don't want to
19 get people for carrying around their medical supplies, so I am
20 not recommending how you write it, but the term illegal drugs
21 is surely not what you mean, and you ought to write what you
22 mean.

23 MR. BUSH: I think we had it in the rule at one
24 time, and we defined it as those drugs listed in the
25 Controlled Substance Act and we had all the legal cites and

1 the lawyer said in essence that rule has been or law has been
2 changed ten times in the last six years, and so they advised
3 taking it out and just say illegal substances.

4 DR. LEWIS: Well, they advised illegal substances?

5 MR. BUSH: As I recall.

6 DR. LEWIS: I can't believe that because there are
7 very few such things, and certainly most of the things you
8 have listed in the front, many of them are not illegal. Some
9 are.

10 MR. MICHELSON: They are quite legal in
11 circumstances.

12 DR. LEWIS: You have to write it precisely, and I
13 think this is a problem, writing it precisely, because many of
14 these drugs are both subject to abuse and they have legitimate
15 applications, and so then you are into the business of testing
16 intent for a specific drug, and that's a very hairy business,
17 so I think you can't cover it up by using sloppy language.

18 CHAIRMAN REMICK: Does anybody on the subcommittee
19 feel opposed to the concept of a rule, Commission proposing a
20 rule?

21 DR. LEWIS: I am not on the subcommittee.

22 CHAIRMAN REMICK: Excuse me.

23 MR. WYLIE: No.

24 DR. LEWIS: I have mixed feeling, and it isn't that
25 I want people to be drinking on the job at nuclear power

1 plants or shooting up obviously, but there is a disease
2 involved in always writing a rule when you have a problem.
3 Sometimes in the effort to make things precise enough to write
4 a rule, you lose the essence of what you are trying
5 accomplish and that very often goes the route of the, of the
6 FAA before, and I haven't read this Federal Register notice
7 you were kind enough to give me. Writing the intent and
8 letting the intent be judged on the local basis is better than
9 trying to make things too precise.

10 On the other hand, this is a problem in American
11 society. There is no question whatever about that, and I, I'm
12 not prepared to say I oppose it, but I have mixed feelings
13 about trying to make it so precise that you can write a rule,
14 and I am just picking that one case of illegal drugs. I think
15 you haven't quite done it yet here, and whether you could in
16 the end I just don't know.

17 CHAIRMAN REMICK: I have mixed feelings for
18 different reasons. I certainly favored the policy statement
19 in giving industry a chance to handle this themselves, and I
20 think they have done a good job, but I must admit there are
21 people who would like to have random testing and haven't been
22 able to do it, and some of them I believe would welcome a rule
23 requiring them to do it. That is certainly one consideration,
24 and currently there are inconsistencies in the thresholds
25 that different utilities are using, and this is one way to get

1 some kind of a system threshold, but I guess I still have a
2 little bit of an aversion to the idea of a rule myself.

3 Chris, do you have any comments on that?

4 MR. GIMMY: I lean toward this broader statement of
5 getting back to fitness for duty sort of thing. As he pointed
6 out when he first started, we may be arguing over nothing here
7 with the Supreme Court ruling a year from now, but one thing
8 that you will still want to have in there whether the NRC
9 wants to have a rule or not, is you want to have something
10 about the fellow shall be fit to run ... plant safely, and
11 this applies to a lot of things it has been brought out, many
12 times, disabilities, drugs, so for sure you want that flavor
13 to carry through it if you are going to have anything survive
14 from all this work. The Supreme Court could strike down--you
15 could write it super precisely and lose it all a year from
16 now. If you want to have anything survive, I think it is a
17 fitness for duty concept. The NRC, and I don't know how you
18 write it, but the NRC wants people fit for duty when they run
19 these plants.

20 MR. WYLIE: As I--you tell me if I am wrong--as I
21 read this, what this says is that the utilities should have
22 procedures and make their own rules regarding the fitness for
23 duty in regard to alcohol, in all other things except these
24 hard drugs that you have talked about and the management
25 sanction would only pertain to these hard drugs you have laid

1 out, I mean the requirements. Is that correct?

2 MR. BUSH: The current programs address the quote,
3 illegal drugs, if I could use that term, the prescription and
4 over-the-counter drugs and alcohol, both, all of the drugs if
5 you would on an off-site, and the alcohol on site.

6 MR. WYLIE: What I am saying is that as I read this
7 management sanction section of this thing, it pertains only to
8 the illegal drugs. It doesn't say anything about alcohol.

9 MR. BUSH: Right.

10 MR. PARTLOW: That's right.

11 DR. LEWIS: What page are you referring to?

12 MR. WYLIE: Back here at page 84.

13 CHAIRMAN REMICK: Seems like the meat is on page 84.

14 MR. BUSH: Page 88.

15 MR. WYLIE: I haven't got far enough--88.

16 DR. LEWIS: Eighty-four puts them all together.

17 Thank you, sir. I can count that high.

18 MR. WYLIE: What it says, you're requiring that the
19 utilities come up with a program to control these things, but
20 for these hard drugs, you have got to do these things back
21 here as far as sanctions are concerned, isn't that it?

22 MR. PARTLOW: Yes.

23 MR. WYLIE: Doesn't talk about alcohol and drug. It
24 says the utility just has to address them.

25 MR. MICHELSON: The hard drugs, that set of six that

1 are in the first part?

2 MR. WYLIE: The objectives is to have a drug,
3 alcohol, other problem area free operation of the plant.

4 MR. PARTLOW: I think you will find that utilities
5 do have those kinds of policies on alcohol now. What they
6 don't have is the consistent drug, want drugs to be tested for
7 what the positive level shall be, what the sanctions will be.

8 CHAIRMAN REMICK: So basically the rule is intended
9 to require basically the elements of the EEI guidelines plus
10 mandate random testing for a certain set of drugs, and alcohol
11 testing for cause? Is that basically what the rule is doing?

12 MR. PARTLOW: It prescribes standard cutoff levels
13 for the industry.

14 CHAIRMAN REMICK: Sets threshold and tracking.

15 MR. PARTLOW: And prescribes standard sanctions.

16 MR. WYLIE: The sanctions don't address alcohol as I
17 read them?

18 MR. BUSH: Right.

19 DR. LEWIS: Eighty-eight does not address--

20 MR. WYLIE: It defines impairment as 1.05 percent.

21 MR. BUSH: We left those sanctions to licensee
22 management, which is on page 84.

23 CHAIRMAN REMICK: Now is there any danger that
24 industry if this rule were passed would read the rule and
25 comply with the rule and drop some of the other things they

1 already have in the area of alcohol? So they understand
2 that--

3 MR. PARTLOW: I wouldn't think so. Again, I don't
4 know for sure, but I suspect that programs put in place
5 concerning alcohol were probably not radically changed as a
6 result of the Commission's fitness for duty bent.

7 MR. WYLIE: I would be surprised if the utility who
8 found that someone was selling these illegal drugs on site, I
9 would be surprised if their rules weren't to fire them and
10 this says that you have got to catch them in the protected
11 area to even suspend them.

12 DR. LEWIS: So there is a problem so as far as it
13 describes--

14 CHAIRMAN REMICK: Only if they are relaxed.

15 MR. MICHELSON: I have read a number of LERs on
16 marijuana use. They read like the guy was fired right on the
17 spot, shoved out the gate.

18 MR. PARTLOW: Many utilities are taking sanctions
19 more strict than these now.

20 DR. LEWIS: If there is a rule, people have a
21 tendency to go by the letter of the rule even if it means a
22 relaxation, although in this case they might not.

23 MR. GIMMY: Certainly have the danger of the fired
24 employee's lawyer bringing this up and saying good night, you
25 fired him for selling a little bit in the parking lot, and it

1 says right here that you know that s only this and NRC
2 wouldn't have done that.

3 MR. WYLIE: Well, I myself have come down hard on
4 firing a man. If he were caught selling the stuff on the
5 site, even in the engineering office. I would have fired him.

6 DR. LEWIS: That's right.

7 MR. BUSH: I guess what you are really getting to is
8 one of the debates we had is to where, and I think Jim touched
9 on this earlier when he was talking about categories of
10 actions, and we regarded this as a management prerogative on
11 decisions as to whether or not to hire or fire somebody, and
12 that we felt that it should not be in the rule, something
13 mandated.

14 DR. LEWIS: This is one of a class of things in
15 which by making things precise in a rule you muddy the
16 situation that is already reasonably clear.

17 MR. MICHELSON: Couldn't you just put a sentence or
18 two in that, you know, addresses the fact that we recognize
19 that such programs exist, we are not interested in wanting to
20 see those disrupted? This is in addition to whatever the
21 licensee judges to be required by his own needs. That doesn't
22 help it any, but at least--

23 CHAIRMAN REMICK: It might.

24 MR. MICHELSON: Gives recognition to the fact we
25 believe it exists and it ought to exist and ought to be

1 encouraged.

2 DR. LEWIS: But the purpose of a rule is to be
3 precis., and once you start making it imprecise, you wonder
4 why you need a rule.

5 MR. MICHELSON: I hope we aren't saying this is to
6 be used in lieu of whatever the utilities are now doing.

7 DR. LEWIS: I have heard people say--

8 MR. MICHELSON: Rather in addition to, whatever they
9 are doing.

10 DR. LEWIS: I have heard people say that the reason
11 for going to a rule is that it makes whatever is in the rule
12 legally enforceable. And general rule applies that something
13 that is fuzzy can't be enforced. A person has got to know
14 whether he is breaking the law, and this is a problem of
15 making this precise, but at a lower level retribution than is
16 common out in the industry.

17 MR. BUSH: I think enforceability was a secondary
18 consideration. The primary consideration was achieving what
19 we regarded as the desired level of uniformity and consistency
20 in key areas of the program, as Jim pointed out, as to whether
21 or not we are doing random testing and the cutoff levels and
22 the actions that we would expect management to take, minimum
23 actions.

24 DR. LEWIS: But you are really not seeking
25 uniformity. You are seeking to pick the low outliers up to

1 the top. You are certainly not trying to take the best people
2 and bring them down to the average level, so by uniformity you
3 mean leveling at the bottom, and that's what is hard to write.

4 MR. BUSH: Yes.

5 MR. GIMMY: Without getting into enforcement, you
6 could use simply a clarifying thing, again starting from the
7 pillar of man must be fit for duty and not impaired, and we
8 have studied--this is the way it would read--studied this, and
9 for nuclear plants, this is our definition of
10 impaired--alcohol, .04, marijuana, two tests, test and a
11 confirmed.

12 MR. PARTLOW: You can't do that.

13 MR. GIMMY: Why can't you do that?

14 MR. PARTLOW: There are no established levels of
15 marijuana that represent impairment.

16 DR. LEWIS: I wouldn't like to be flying in an
17 airplane in which the pilot has .03.

18 (A discussion was held off the record.)

19 DR. LEWIS: For example, we run into this problem
20 setting a threshold speed limit on the road. It is because
21 the real intent of the rule is to keep people from driving
22 dangerously, but you can't prove that somebody who was driving
23 80 miles an hour is driving dangerously and maybe Al Unser
24 never drives that slow in normal life, and so the speed limits
25 are defined as prima facie limits, that is, there is no limit

1 on speed, but above a certain speed, you are presumed to be
2 driving unsafely, and yet you know, you know, everybody knows
3 that you drive five or ten miles over the speed limit because
4 they would have trouble proving that you were over unless you
5 were well over it, so it becomes a kind of minimum rather than
6 a maximum, certainly on California highways.

7 MR. PARTLOW: We met with a number of unions about
8 our plans for fitness for duty. They are listed in the
9 Commission paper. They are very, very strong against any form
10 of random testing. Random testing just is not the way to go
11 in their view.

12 One of their arguments is that the fact that a test
13 is positive for drugs has absolutely nothing to do with
14 whether that person is really impaired or not. It is a, it
15 represents a level of residual chemicals in a person's body,
16 and someone has somewhat arbitrarily or administratively
17 chosen a detection level of those chemicals to draw the line
18 at whether it is positive or not, and it has nothing to do
19 with whether or not that person is impaired.

20 DR. LEWIS: That's also not true. It doesn't have
21 nothing to do, but it isn't definitive, and the point is that
22 anything like this you have to distinguish between the
23 consequent enforcement action and the measurement itself.

24 I am strongly in favor of random testing. I think
25 we should do random testing for AIDS, you know. I'll get shot

1 for saying that in California, but when you come to the next
2 step, what do you do when you find out? That's where the
3 trouble really begins because it is true that there is no
4 specific threshold and it is true that people, some people can
5 function with a higher alcohol level in their blood than
6 others. All these things are true, but that's the enforcement
7 level, and you might find the unions less opposed if they
8 aren't an automatic sanction that goes with an arbitrarily
9 defined threshold. I don't know. You might.

10 MR. PARTLOW: We did not discuss these kind of
11 sanctions with them at the time I don't believe.

12 DR. LEWIS: If you check the information, you find
13 that somebody tests positive four times in five years, that
14 tells you something. You needn't have automatic sanction.
15 Certainly call them in for sanction counseling.

16 CHAIRMAN REMICK: Any other words of wisdom for the
17 staff that we have to give them? Other words, other comments
18 or questions?

19 MR. WYLIE: A question--what is your definition of
20 protected area as used in this document?

21 MR. PARTLOW: It is where safeguard security starts.

22 MR. WYLIE: Inside?

23 MR. PARTLOW: It is that administrative control
24 point for people.

25 MR. WYLIE: Within the secondary boundary, not

1 within the perimeter fence?

2 MR. MICHELSON: Could be in the cafeteria.

3 MR. WYLIE: That's the control area.

4 MR. MICHELSON: The cafeteria is inside the
5 perimeter fence outside the protected area. If I am caught
6 selling marijuana in the cafeteria, that is not treated as
7 being the same thing as selling inside the protected area.

8 MR. PARTLOW: You have not been so bold as to after
9 knowing our policy, try to bring it inside that plant, so we
10 are not--

11 MR. MICHELSON: Try bring it in--the plant is not
12 the protected area. You try to bring it into, you try to
13 bring it in through the perimeter fence, which is still
14 outside the protected area, are you going to say if you try to
15 bring it in there, you are going to cover it?

16 MR. PARTLOW: We will take a new look at that. We
17 can fix that. The question is for how long should that
18 person, Dr. Michelson, be banned? Make it the site.

19 MR. MICHELSON: However big that happens to be
20 around that plant.

21 MR. PARTLOW: That is easy. How long? That's the
22 question.

23 MR. MICHELSON: Plant site; plant site generally
24 means everything in that site area.

25 MR. PARTLOW: That's easy. We will fix that. The

1 question is for how long?

2 CHAIRMAN REMICK: You are starting to get problems,
3 there is fossil unit on there. Are we--

4 MR. MICHELSON: That could present a problem,
5 couldn't it? Plant sites do have fossil areas.

6 MR. BUSH: Picnic ground.

7 MR. MICHELSON: What do we call that outside fence?

8 MR. WYLIE: Controlled area.

9 MR. MICHELSON: Controlled area, that could be at
10 least where I was going--that's getting pretty serious to sell
11 marijuana in the cafeteria inside the control area.

12 MR. WYLIE: Wasn't there a notice that came out
13 recently where somebody found some in the cafeteria?

14 MR. BUSH: Licensees have found alcohol and drugs in
15 vehicles in the parking lots under their current programs.

16 MR. MICHELSON: What do you do about the guy that
17 claims he didn't know it was in his lunch box, and you caught
18 it because you examined the lunch box?

19 MR. BUSH: For the last couple of years, licensees
20 have encountered several cases like that, and they have
21 considered each case on its merits, and I would say what I
22 know, what I can recall, typically they found in favor of,
23 favor of terminating the individual.

24 MR. MICHELSON: Even though he claimed that
25 somebody, somebody put it?

1 MR. PARTLOW: Played a joke on him or whatever.

2 MR. BUSH: One licensee's policy was so stringent
3 they found a guy with one can of beer in the trunk of his car
4 left over from a picnic two weeks before. They terminated
5 him. He wasn't even trying to bring it inside the protected
6 area.

7 DR. LEWIS: That's stupid.

8 CHAIRMAN REMICK: Yes, that is.

9 MR. MICHELSON: There was a case that Pan Am's
10 stewardess walked off with the milk that was left over in
11 Paris because she didn't like the local milk and somebody
12 squealed on her and she got caught and fired after 20 some
13 years of service for carrying off the milk.

14 MR. PARTLOW: Because of all these different things,
15 we have chosen to name the boundaries, the protected areas,
16 name the people, and name the drugs to be involved, five or
17 six of them.

18 DR. LEWIS: They should do it consistently through
19 it.

20 CHAIRMAN REMICK: Looking ahead to the Full
21 Committee meeting on the 7th of April, which is Thursday, we
22 are scheduled to discuss fitness for duty currently 8:45 to
23 10:30. That's an hour and forty minutes. We are going to try
24 to get that increased at least to two hours.

25 Jim, I think the type of presentation you made is

1 right on target I think for the Full Committee, and we don't
2 get too much down into the nitty-gritty. It is a big document
3 and so forth. I think what you gave us was generally on
4 target. I would try to limit, and I think you did, roughly 45
5 minutes or something like that, so that there is ample time
6 for questions.

7 I think it is going to be more productive if we
8 allow time for the Full Committee to raise questions, consider
9 some of these things that were pointed out where there may be
10 inconsistency or are inconsistencies in the document. I think
11 that the early questions that came up from several members on
12 the question of what is this to cover? Is it fitness for duty
13 in the broad sense, or is it drugs, including alcohol type of
14 document, only I think that needs to be clarified because I
15 think you indicated it is broader but I think the wording also
16 except for the few exceptions, covers drugs and alcohol.

17 MR. PARTLOW: Maybe it is not incompatible to have a
18 broad entry that says you should have programs regarding the
19 fitness of your people, but now I am not going to get into all
20 of that except let me give you some specifics about drugs.

21 CHAIRMAN REMICK: We are just going to address this
22 aspect of it.

23 Any other words? We have invited NUMARC if they
24 wish to attend that meeting and address the subject of
25 rulemaking. It is not clear that they wish to, apparently do

1 not have any consensus as of the moment. They are invited and
2 whether they will attend that session we are not sure.

3 MR. WYLIE: Let me ask a question. This says you
4 know, that he is denied unescorted access if he is caught the
5 second time, so forth.

6 Now suppose he is. It is okay then to escort him
7 down into that?

8 MR. BUSH: Well--

9 MR. PARTLOW: That's a reading of the letter of the
10 rule, yes.

11 MR. WYLIE: Okay. You can escort him down there?

12 MR. PARTLOW: Yes.

13 CHAIRMAN REMICK: My own personal observation in
14 reading the draft, it is a difficult, complex subject in many
15 ways, but I found that a very interesting document to read.
16 There is a lot of information in there. I thought that you
17 sure tried to put it out in a logical way, and knew when you
18 were reading these pages that you were on this subject and so
19 forth, and obviously there are still some inconsistencies, but
20 at this stage of a draft rulemaking document of this
21 magnitude, I think it is one of the better myself in conveying
22 the message. I want to congratulate you for that.

23 MR. PARTLOW: Thank you.

24 CHAIRMAN REMICK: This is not a new subject, been
25 going on since '80 or '81, something like that. But any other

1 words from--Chris, do you have any final comments?

2 MR. GIMMY: No.

3 CHAIRMAN REMICK: Any members? If not, we thank you
4 very much and look forward to seeing you then on Thursday,
5 April the 7th.

6 MR. PARTLOW: Thank you.

7 CHAIRMAN REMICK: If the time changes, we will let
8 you know.

9 CHAIRMAN REMICK: The meeting is adjourned.

10 (Whereupon, at 4:20 p.m., the meeting was
11 adjourned.)

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CERTIFICATE

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

Name: ACRS--Human Factors Subcommittee

Docket Number:

Place: Washington, D.C.

Date: March 28, 1988

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

/s/ Catherine S. Boyd

(Signature typed): Catherine S. Boyd

Official Reporter

Heritage Reporting Corporation

NRR STAFF PRESENTATION TO THE ACRS

SUBJECT: POLICY STATEMENT ON TRAINING AND QUALIFICATION

DATE: MARCH 28, 1988

PRESENTER: J. J. PERSENSKY, Ph.D.

PRESENTER'S TITLE/BRANCH/DIV: SECTION CHIEF
HUMAN FACTORS ASSESSMENT BRANCH
DIVISION OF LICENSEE PERFORMANCE
AND QUALITY EVALUATION

PRESENTER'S NRC TEL. NO.: 492-1013

SUBCOMMITTEE: HUMAN FACTORS

BACKGROUND

- ° SECTION 306 PL 97-425 1983
- ° SECY 84-76, 84-76A, 84-76B 1984
- ° NUMARC/INPO - TRAINING INITIATIVE 1984
- ° POLICY STATEMENT ON TRAINING AND QUALIFICATION MARCH 1985

- ENDORSE ACCREDITATION
- 610 PROGRAMS, 61 SITES
- REFRAIN FROM RULEMAKING
- EVALUATE FOR 2 YEARS

- ° SECY 85-201, SECY 86-119, SECY 87-121
- ° REVISED 10 CFR 55 - OPERATORS' LICENSEES 1987
- ° REVISED REG. GUIDE 1.8 - 1987 (ANS 3.1-1981) 1987

EVALUATION ACTIVITIES

- ° OBSERVE INPO ACCREDITATION TEAM EVALUATIONS
- ° OBSERVE ACCREDITING BOARD ACTIVITIES
- ° CONDUCT ON-SITE PERFORMANCE-BASED INSPECTIONS
- ° CONDUCT POST-ACCREDITATION REVIEWS OF UTILITY TRAINING PROGRAMS
USING NUREG-1220, "TRAINING REVIEW CRITERIA AND PROCEDURES"
- ° CONDUCT OPERATOR LICENSING EXAMS

SUMMARY OF RECOMMENDATIONS

OF SECY 87-121

- ° CONTINUE TO ENDORSE ACCREDITATION AND DEFER RULEMAKING
- ° ENHANCE EXISTING ACCREDITATION PROGRAM
 - JTA FOR TECH. STAFF AND MANAGER POSITIONS
 - APPLY ACCREDITATION STANDARDS TO CONTRACTOR-PROVIDED TRAINING
 - EMPHASIZE DEVELOPMENT OF KSAs
 - STRENGTHEN IMPLEMENTATION OF FEEDBACK OF OPERATING EXPERIENCE
 - COOPERATIVE EFFORT TO DEVELOP TRAINING EFFECTIVENESS MEASURES
- ° EXPAND ACCREDITATION PROGRAM
 - QA/QC FUNCTION
 - SEVERE ACCIDENT MANAGEMENT FUNCTION
 - CONTRACTORS

PROPOSED REVISED POLICY STATEMENT

- ° CONTINUE TO ENDORSE ACCREDITATION PROGRAM
 - ELEVENTH PROGRAM-LICENSED OPERATOR CONTINUING TRAINING
- ° CONTINUE TO DEFER RULEMAKING
- ° TIMELY ACCREDITATION OF REMAINING NON-ACCREDITED PROGRAMS
- ° MAINTENANCE OF ACCREDITATION
- ° CONTINUE REVIEW AND APPROVAL OF ALL APPLICANT TRAINING PROGRAMS
- ° CONTINUE MONITORING OF PROCESS AND RESULTS
- ° ANTICIPATES DEGREE RULE
- ° DOES NOT LIMIT NRC AUTHORITY TO ENFORCE REQUIREMENTS

RES STAFF PRESENTATION TO THE

ACRS

SUBJECT: HUMAN REACTORS RESEARCH PROGRAM PLAN

DATE: MARCH 28, 1988

PRESENTER: BRIAN SHERON, FRANK COFFMAN, ALAN RUBIN, TOM RYAN

PRESENTER'S TITLE/BRANCH/DIV.:

1. DIRECTOR, DRPS
2. BRANCH CHIEF, RHFB/DRPS
3. SECTION LEADER, RHFB/DRPS
4. SENIOR ENGINEERING PSYCHOLOGIST, RHFB/DRPS

PRESENTER'S NRC TEL. NO.:

1. 49-23500
2. 49-23520
3. 49-23546
4. 49-23550

SUBCOMMITTEE: ACRS SUBCOMMITTEE ON HUMAN FACTORS

PRESENTATION ON THE
HUMAN FACTORS RESEARCH PROGRAM PLAN
TO THE
ACRS SUBCOMMITTEE ON HUMAN FACTORS

BY

BRIAN SHEPCH
FRANK COFFMAN
ALAN PUBIN
TOM RYAN

DIVISION OF REACTOR AND PLANT SYSTEMS
OFFICE OF NUCLEAR REGULATORY RESEARCH

MARCH 28, 1980

PRESENTATION OVERVIEW

ION

LOGY OF NRC HUMAN FACTORS MILESTONES
R HF RESEARCH
OF USER NEEDS
TION WITH USER OFFICES

RESEARCH PROGRAM PLAN

PLANNED RESEARCH ACTIVITIES

GOI HUMAN RELIABILITY ASSESSMENT RESEARCH

CHRONOLCCY OF MAJOR NRC HUMAN FACTORS MILESTONES

- 1976 WASH-1400 IDENTIFIED HUMAN FACTORS PROBLEMS RELATED TO PLANT SAFETY
- 1979 NRC IDENTIFIED ACTION ITEMS TO ADDRESS HUMAN FACTORS ISSUES AFTER THE TMI-2 ACCIDENT
- 1980 NRC ESTABLISHED DIVISION OF HUMAN FACTORS SAFETY
- 1981 RES ESTABLISHED BRANCH TO CONDUCT HUMAN FACTORS RESEARCH
- 1983 NRC PUBLISHED NUREG-0985, "USNRC HUMAN FACTORS PROGRAM PLAN"
- 1985 BUDGET REDUCTION FORCED END OF FUNDING FOR HUMAN FACTORS RESEARCH (EXCEPT HUMAN RELIABILITY ASSESSMENT) AND DISBANDING OF THE HUMAN FACTORS BRANCH IN RES
- 1986 NRC TERMINATED ANNUAL REPORT ON HUMAN FACTORS PROGRAM PLAN AND RES RECEIVED NAS REPORT, "REVITALIZING NUCLEAR SAFETY RESEARCH," RECOMMENDING INTENSIFIED HUMAN FACTORS RESEARCH
- APR 1987 NRC REORGANIZATION - RELIABILITY AND HUMAN FACTORS BRANCH ESTABLISHED IN RES TO REVITALIZE HUMAN FACTORS RESEARCH PROGRAM
- FEB 1988 NAS PUBLISHED REPORT, "HUMAN FACTORS RESEARCH AND NUCLEAR SAFETY"
- MAR 1988 DRAFT HUMAN FACTORS RESEARCH PROGRAM PLAN TO ACPS
- MAY 1988 HUMAN FACTORS RESEARCH PROGRAM PLAN TO COMMISSION

NEED FOR HUMAN FACTORS RESEARCH

- FREQUENCY OF SIGNIFICANT EVENTS AND LERS CONTINUED TO IDENTIFY HUMAN FACTORS CONCERNS
- PRAs IDENTIFY HUMAN PERFORMANCE AS A SIGNIFICANT CONTRIBUTOR TO RISK AND A SOURCE OF UNCERTAINTY
- DECEMBER 1986 NAs REPORT, "REVITALIZING NUCLEAR SAFETY RESEARCH"
- FEBRUARY 1988 NAs REPORT, "HUMAN FACTORS RESEARCH AND NUCLEAR SAFETY"
- APRIL 1988 EPRI REPORT NP-5795, "CONTROL ROOM DEFICIENCIES, REMEDIAL OPTIONS, AND FUTURE HUMAN FACTORS RESEARCH NEEDS" (IN PRESS)

COORDINATION WITH USER OFFICES

0 PLANNING TO SATISFY THE HF RESEARCH NEEDS OF USER OFFICES

- REQUEST USER'S NEEDS (NRR, AEOD, RES, NMSS)
- REVIEW ONGOING AND COMPLETED RESEARCH
- IDENTIFY NEED FOR ADDITIONAL RESEARCH
- COMBINE SIMILAR USER NEEDS INTO ONE PROJECT, AS APPROPRIATE
- COORDINATE PLANNED PROJECTS WITH USERS

SUMMARY OF NRC HUMAN FACTORS RESEARCH NEEDS

C NRR

- ORGANIZATION AND MANAGEMENT INFLUENCES
- HUMAN RELIABILITY RESEARCH
- IMPACT OF ADVANCED TECHNOLOGIES
- OPERATOR/TEAM PERFORMANCE
- PROCEDURES AND TRAINING

C AEOD

- COGNITIVE ERROR
- MANAGEMENT
- PROGRAMMATIC PERFORMANCE INDICATORS

O RES

- MAN-MACHINE INTERFACE FOR ADVANCED CONTROL ROOMS
- HUMAN FACTORS ASPECTS OF ACCIDENT MANAGEMENT
- HUMAN ERROR DATA BANK

O NMSS

- TO BE DETERMINED

PROGRAM PLAN

- o OBJECTIVE OF PLAN
- o RESEARCH AREAS
 - OBJECTIVES
 - ONGOING PROJECTS
 - PLANNED RESEARCH
 - EXPECTED RESULTS
- o PRIORITIZATION OF PROJECTS
- o INTEGRATED PROCESS FOR RESOLVING HUMAN FACTORS CONCERNS

OBJECTIVES OF THE PLAN

- o TO OUTLINE THE STRUCTURE AND CONTENT OF A HUMAN FACTORS RESEARCH PROGRAM DESIGNED TO MEET THE COMMISSION'S 1987 POLICY AND PLANNING GUIDANCE COMMITMENT "...TO EXPLORE METHODS TO BETTER UNDERSTAND THE CAUSES OF HUMAN ERROR AND TO REDUCE ITS INCIDENCE."
- o TO IDENTIFY MAJOR AREAS OF HUMAN FACTORS RESEARCH TO BE SPONSORED BY THE NRC
- o TO ADDRESS NEAR AND LONG TERM HUMAN FACTORS RESEARCH NEEDS IN A WAY CONSISTENT WITH THE NRC'S RESEARCH PHILOSOPHY
 - SHORT TERM TASKS TO SUPPORT TIMELY REGULATORY DECISIONS AND USER NEEDS
 - LONG TERM RESEARCH TO ALLOW THE NRC TO ANTICIPATE HUMAN FACTOR PROBLEMS OF POTENTIAL SAFETY SIGNIFICANCE

FIVE RESEARCH AREAS

- MAN-MACHINE INTERFACE
- PROCEDURES
- QUALIFICATIONS AND TRAINING
- ORGANIZATION AND MANAGEMENT
- HUMAN PERFORMANCE AND HUMAN RELIABILITY ASSESSMENT

MAN-MACHINE INTERFACE

o ONGOING PROJECTS

- LOCAL CONTROL STATIONS (HF 5.1)
- CONTROL ROOM DESIGN STANDARD (I.D.4)
- IMPROVED CONTROL ROOM INSTRUMENTATION
ANNUNCIATORS (HF 5.2)
SURVEY OF ADVANCED CONTROLS/EXPERT SYSTEMS/AI

o PLANNED RESEARCH

- IMPACT OF HIGH TECHNOLOGY ON CONTROL ROOM OPERATIONS
- COMPUTER CLASSIFICATION
- EXPERT SYSTEM VERIFICATION AND VALIDATION
- RELIANCE ON SFDS
- ADVANCED CONTROL ROOM DESIGN STANDARD

o HALDEN PROGRAM SUPPORTS ABOVE RESEARCH

HALDEN PROGRAM

- o EXPERIMENTS AND SIMULATOR TESTS OF ADVANCED COMPUTER-BASED OPERATOR AIDS
- o COMPUTER-BASED OPERATOR AIDS CONTAIN
 - EXPERT SYSTEMS
 - PROCESS MODELLING
- o APPLICATION AREAS
 - EARLY FAULT DETECTION
 - DIAGNOSIS OF PLANT DISTURBANCES
 - COMPUTER BASED PROCEDURES
 - INTEGRATED SURVEILLANCE TO MONITOR PLANT OPERATIONS
- o EXPECTED BENEFITS
 - HUMAN FACTORS KNOWLEDGE ON THE USE OF EXPERT SYSTEMS AS OPERATOR AIDS
 - REVIEW CRITERIA/GUIDANCE FOR ADVANCED INSTRUMENTATION
 - COMPUTER-BASED PROCEDURES
 - SIMULATOR DATA ON OPERATOR PERFORMANCE FOR HRA

PROCEDURES

o ONGOING PROJECTS

- GUIDELINES FOR UPGRADING OTHER PROCEDURES (HF 4.4)

c PLANNED RESEARCH

- PROCEDURE VIOLATIONS (CHERNOBYL FOLLOW-UP)
- ACCIDENT MANAGEMENT PROCEDURES (E.G., LEVEL OF DETAIL)
- PRESENTATION OF ECPs

QUALIFICATIONS AND TRAINING

c NO ONGOING PROGRAMS

o PLANNED PROJECTS

- TRAINING EFFECTIVENESS

- TRAINING FOR SEVERE ACCIDENTS

ORGANIZATION AND MANAGEMENT

c ONGOING PROJECTS

- SHIFT STAFFING (HF 1.1)
- MANAGEMENT/ORGANIZATION INFLUENCE ON HUMAN PERFORMANCE
- PROGRAMMATIC PERFORMANCE INDICATORS

c PLANNED RESEARCH

- SHIFT SCHEDULING AND OVERTIME
- TEAM PERFORMANCE
- ORGANIZATION/MANAGEMENT CAPABILITIES TO COPE WITH SEVERE ACCIDENTS

HUMAN PERFORMANCE AND HUMAN RELIABILITY ASSESSMENT

o ONGOING PROJECTS

- ACQUISITION OF HUMAN PERFORMANCE DATA
- DATABASE ON HUMAN ERROR RATES
- COGNITIVE MODEL OF INTENDED HUMAN ACTIONS DURING EMERGENCIES
- INTEGRATE HUMAN RELIABILITY ASSESSMENTS INTO PROBABILISTIC RISK ASSESSMENTS
- MAINTENANCE PERSONNEL PERFORMANCE SIMULATOR
- CRITERIA FOR SAFETY-RELATED OPERATOR ACTIONS (B-17)

o PLANNED RESEARCH

- EVENT REPORTING
- OPERATOR PERFORMANCE UNDER STRESS OF EMERGENCY OPERATIONS
- OPERATOR PERFORMANCE UNDER EXTREME ENVIRONMENTAL CONDITIONS (E.G., DURING SEVERE ACCIDENTS)

PRIORITIZATION HUMAN FACTORS RESEARCH

- POTENTIAL FOR REDUCING RISK
- TECHNICALLY FEASIBLE
- TIMELY SCHEDULE
- RELATION TO GENERIC ISSUES
- SPECIFIC USER NEED
- RELATION TO NRC REGULATORY RESPONSIBILITIES
- RELATED WORK INSIDE FOR OUTSIDE THE NRC
- BENEFITS VERSUS COSTS

INTEGRATED PROCESS FOR RESOLVING HUMAN FACTORS CONCERNS

- IDENTIFICATION OF THE TASK PERFORMANCE REQUIREMENTS PLACED UPON HUMANS BY THE SYSTEM OF WHICH THEY ARE PART
- IDENTIFICATION OF HUMAN PERFORMANCE CAPABILITIES
- EVALUATION OF THE INFLUENCE VARIOUS FACTORS (I.E., PERFORMANCE SHAPING FACTORS) HAVE ON THOSE CAPABILITIES
- EVALUATION OF A SYSTEM'S HUMAN PERFORMANCE REQUIREMENTS AGAINST KNOWN HUMAN PERFORMANCE CAPABILITIES TO IDENTIFY HUMAN FACTORS CONCERNS (I.E., SITUATIONS WHERE HUMAN PERFORMANCE REQUIREMENTS MAY EXCEED HUMAN PERFORMANCE CAPABILITIES)
- REVIEW OF THE SIGNIFICANCE OF THESE CONCERNS IN RELATION TO SYSTEM GOALS (E.G., SAFETY, AVAILABILITY, COST)
- DEVELOPMENT AND VERIFICATION OF ALTERNATIVE APPROACHES TO RESOLVE HUMAN FACTORS CONCERNS CONSIDERED TO BE SIGNIFICANT
- COMPARISON OF THE IMPACTS OF THE ALTERNATIVE APPROACHES ON THE FULL SET OF SYSTEM GOALS
- IMPLEMENTATION OF A PREFERRED ALTERNATIVE AND MONITORING TO SEE ITS IMPACT ON ACHIEVING SYSTEM GOALS

HUMAN RELIABILITY RESEARCH

PURPOSE OF PRESENTATION:

- o PROVIDE A GENERAL OVERVIEW OF THE RESEARCH ACTIVITY.
- o DISCUSS TWO SPECIFIC RESEARCH INITIATIVES.
 - COMPUTER-BASED DATA MANAGEMENT SYSTEM KNOWN AS NUCLARR (NUCLEAR COMPUTERIZED LIBRARY FOR ASSESSING REACTOR RELIABILITY)
 - ARTIFICIAL INTELLIGENCE-BASED DECISIONMAKING (INTENTION FORMATION) ANALYZER KNOWN AS CES (COGNITIVE ENVIRONMENT SIMULATION)

HUMAN RELIABILITY RESEARCH

GENERAL OBJECTIVES:

1. DEVELOP METHODS AND DATA TO CONDUCT HRA SEGMENTS OF PRAS AND RELIABILITY-BASED ANALYSES OF GENERIC ISSUES.
2. EXTEND METHODS AND DATA TO MORE GENERAL HUMAN FACTORS APPLICATIONS.

HUMAN RELIABILITY RESEARCH

SPECIFIC RESEARCH ELEMENTS:

1. HUMAN PERFORMANCE DATA TO SUPPORT ERROR PROBABILITY ESTIMATION
2. TOOLS TO CALCULATE HUMAN ERROR PROBABILITY ESTIMATES
3. MANAGEMENT SYSTEM (REPOSITORY) FOR HUMAN ERROR PROBABILITY AND HARDWARE COMPONENT FAILURE DATA
4. PROCEDURES FOR INTEGRATING THE ABOVE TOOLS AND DATA, AND BEHAVIORAL SCIENCE EXPERTISE INTO THE PRA PROCESS
5. METHODS FOR SYSTEMATICALLY EXTENDING THESE TOOLS, DATA AND PROCEDURES, AND RESULTS OF THEIR USE, TO GENERIC ISSUES AND MORE GENERAL HUMAN FACTORS CONCERNS

HUMAN RELIABILITY RESEARCH

CONDITIONAL RESEARCH STEPS:

1. FEASIBILITY ANALYSIS (BASIS FOR PROTOTYPE DEVELOPMENT)
2. TECHNOLOGY DEVELOPMENT (STAND-ALONE, TESTABLE PROTOTYPE)
3. TECHNOLOGY EVALUATION (PRACTICALITY, ACCEPTABILITY, USEFULNESS OF PROTOTYPE)
4. TECHNOLOGY TRANSFER (CASE STUDY FEEDBACK AND FINAL PACKAGING OF PROTOTYPE)

HUMAN RELIABILITY RESEARCH

FY 1988 FOCUS OF RESOURCES:

<u>RESEARCH STEPS</u>	<u>ELEMENTS</u>				
	DATA	TOOLS	DATA BANK	PROCEDURES	METHODS EXTENSION
FEASIBILITY ANALYSIS					
TECHNOLOGY DEVELOPMENT	GMU 13%	BNL 15%		LLNL 14%	*
TECHNOLOGY EVALUATION		WRDC 13%			*
TECHNOLOGY TRANSFER		CEC 9%	INEL 36%		*
TOTALS	13%	37%	36%	14%	

- * INVESTIGATED AS PART OF OTHER TECHNOLOGY DEVELOPMENT, EVALUATION AND TRANSFER STUDIES.

NUCLEAR COMPUTERIZED LIBRARY FOR ASSESSING
REACTOR RELIABILITY
(NUCLARR)

BACKGROUND: BASED ON EARLIER RESEARCH DOCUMENTED IN
NUREG/CR-4010.

PURPOSE: COMPUTER-BASED DATA MANAGEMENT SYSTEM FOR
COLLATING AGGREGATING, STORING AND RETRIEVING
HUMAN ERROR PROBABILITY AND HARDWARE COMPONENT
FAILURE RATE DATA

SOURCE OF INPUT DATA FOR DOING HUMAN AND
HARDWARE RELIABILITY ANALYSES

LOCATION: IDAHO NATIONAL ENGINEERING LABORATORY

STATUS: DATA LOADING AND DISSEMINATION
(TECHNOLOGY TRANSFER)

NUCLEAR COMPUTERIZED LIBRARY FOR ASSESSING
REACTOR RELIABILITY
(NUCLARR)

CONTINUED

DATA TAXONOMY: NESTED MATRIX ORGANIZATION WHOSE -

VERTICAL AXIS INCLUDES

PLANT TYPE)

VENDOR)

SYSTEM)

COMPONENT)

DISPLAY/CONTROL

HORIZONTAL AXIS INCLUDES FOR HUMAN

ACTOR)

ACTION VERB

HORIZONTAL AXIS INCLUDES FOR HARDWARE

COMPONENT CATEGORY)

TYPE)

DESIGN)

FAILURE MODE

AND NORMAL STATE

NUCLEAR COMPUTERIZED LIBRARY FOR ASSESSING
REACTOR RELIABILITY
(NUCLARR)

CONTINUED

DATA CELLS: MATRIX INTERSECTS WHICH PRESENT -

HUMAN INFORMATION BY DATA MEDIUM AND SOURCE

- O TASK CONDITIONS
- O POINT ESTIMATES
- O UNCERTAINTY OR CONFIDENCE INTERVALS
- O PERFORMANCE SHAPING FACTOR VALUES
- O RAW DATA TALLIES
- O SOURCE REFERENCE
- O WITHIN AND ACROSS CELL AGGREGATIONS

HARDWARE INFORMATION BY DATA MEDIUM AND SOURCE

- O FAILURE RATES OR PROBABILITIES
- O CONFIDENCE INTERVALS
- O UNITS OF ANALYSIS (PER TIME UNIT OR PER DEMAND)
- O RAW DATA TALLIES
- O SOURCE REFERENCE
- O WITHIN AND ACROSS CELL AGGREGATIONS

NUCLEAR COMPUTERIZED LIBRARY FOR ASSESSING
REACTOR RELIABILITY
(NUCLARR)

CONTINUED

SEARCHES: DESCRIPTIVE OR MENU DRIVEN, AD HOC

REQUESTS: TABULATIONS FOR STATISTICAL ANALYSIS

DIRECT INTERFACE WITH ANALYSIS CODE
(IN-PROCESS)

CLEARINGHOUSE FOR SOURCE REFERENCE MATERIALS

OUTPUTS: SCREEN OR HARDCOPY
O CELL PRESENTATION
O SUMMARY REPORT
O GRAPHIC
O ASCII FORMAT

MEDIUM: DISKETTE AND HARDCOPY

DOCUMENTATION: NUREG/CR-4639 (VOLUMES 1 THRU 5)

COGNITIVE ENVIRONMENT SIMULATION (CES)

BACKGROUND: RESPONDS TO NEEDS FOR IMPROVED ANALYSES OF
DECISIONMAKING TASKS, AS PART OF PRAs.

FEASIBILITY ANALYSIS PRESENTED IN
NUREG/CR-4532; CES AND CREATE PROTOTYPES
PRESENTED IN NUREG/CR-4862.

PURPOSE: ANALYZE DECISIONMAKING (INTENTION FORMATION)
ASPECTS OF NUCLEAR POWER PLANT PERSONNEL
BEHAVIOR.

IS DETERMINISTIC AND PROVIDES THE ANALYST
DECISIONMAKING RESPONSES AND DECISION
PROCESS AUDITS.

COUPLED WITH THE COGNITIVE RELIABILITY
ANALYSIS TECHNIQUE (CREATE) PROVIDES
DECISIONMAKING (INTENTION FORMATION)
ERROR PROBABILITIES.

COGNITIVE ENVIRONMENT SIMULATION
(CES)

CONTINUED

APPLICATIONS: ANALYZES INDEPENDENT AND DEPENDENT ERRORS OF OMISSION (NO DECISION) AND COMMISSION (WRONG DECISION), AND RECOVERY.

PINPOINTS CIRCUMSTANCES AND SITUATIONS IN WHICH ERRORS OF OMISSION AND COMMISSION CAN BE PREDICTED.

LOCATION: WESTINGHOUSE R&D CENTER, PITTSBURGH, PA

STATUS: UNDERGOING OPERABILITY AND VALIDITY TESTING (TECHNOLOGY EVALUATION).

COGNITIVE ENVIRONMENT SIMULATION (CES)

CONTINUED

CES TECHNOLOGY:

USES AN ARTIFICIAL INTELLIGENCE-BASED CONTROL PACKAGE CALLED EAGOL TO MIMIC THE DECISIONMAKING PROCESS.

RESOURCES OPERATED ON BY EAGOL ARE A KNOWLEDGE BASE (WHAT THE DECISIONMAKER KNOWS ABOUT THE PLANT), AND PROCESS MECHANISMS (MONITORING, EXPLANATION BUILDING AND RESPONSE MANAGEMENT RULES USED BY THE DECISIONMAKER TO RECONCILE SCENARIO INPUTS WITH HIS STATE OF KNOWLEDGE).

CES INTERFACES DIRECTLY WITH A TRAINING SIMULATOR SO THAT ITS DECISIONS CAN BE EXECUTED AND FEEDBACK ON EACH PROVIDED AT EACH STEP IN THE SCENARIO.

COGNITIVE ENVIRONMENT SIMULATION (CES)

CONTINUED

CONTROLS:

THE ANALYST MANIPULATES PERFORMANCE SHAPING FACTORS OF INTEREST BY EXPANDING/RESTRICTING THE KNOWLEDGE BASE AND PROCESS MECHANISMS.

OUTPL : (SCREEN OR HARDCOPY):

LIST OF DECISION OPTIONS FOR THE SCENARIO ANALYZED ALONG WITH PROCESSING AUDITS FOR EACH DECISION.

IN INSTANCES WHERE SCENARIOS DON'T RESULT IN A DECISION, CES PROVIDES AN AUDIT OF THE ANALYSIS UP TO THE POINT AT WHICH PROCESSING OPTIONS WERE EXHAUSTED.

COORDINATION/INTERACTIONS

- o ACCIDENT MANAGEMENT RESEARCH PLAN
- o INDUSTRY GROUPS
 - EPRI, NUMARC, INPO
- o FOREIGN
 - AGREEMENTS - HALDEN, CEC
 - INFORMATION EXCHANGES - SWEDEN, JAPAN, GERMANY

STAFFING

o RHFB

- 8 PROFESSIONALS WITH MULTIDISCIPLINED BACKGROUNDS
AND EXPERIENCE

PSYCHOLOGY

HUMAN FACTORS ENGINEERING

INDUSTRIAL ORGANIZATION

OPERATIONS RESEARCH

COMPUTER SYSTEMS

CONTROL SYSTEMS

NUCLEAR ENGINEERING

MECHANICAL ENGINEERING

o RESEARCH CONTRACTORS

- NATIONAL LABORATORIES/UNIVERSITIES/CONSULTANTS
- EXPERIENCED HUMAN FACTORS STAFFS
- MULTIDISCIPLINARY CAPABILITIES

HUMAN FACTORS RESEARCH BUDGET

	<u>FY 1988</u>	<u>FY 1989</u>
MAN-MACHINE INTERFACE	26%	23%
PROCEDURES	10%	7%
QUALIFICATION AND TRAINING	5%	5%
ORGANIZATION AND MANAGEMENT	27%	27%
HUMAN PERFORMANCE AND HUMAN RELIABILITY ASSESSMENT	32%	38%
TOTAL BUDGET (MILLION)	<u>\$3.4</u>	<u>\$4.3</u>

FIVE-YEAR PLAN MAINTAINS LEVEL OF SUPPORT FOR HF RESEARCH BETWEEN
\$4 AND \$5 MILLION