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NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF:

PUBLIC MEETING

BRIEFING ON TMI LESSONS LEARNED TASK FORCE REPORT

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

PUBLIC MEETING

BRIEFING ON TMI LESSONS LEARNED TASK FORCE REPORT

Room 1130
1717 H Street, N. W.
Washington, D. C.

Tuesday, 16 October 1979

The Commission met, pursuant to notice, at 9:35 a.m.

BEFORE:

DR. JOSEPH A. HENDRIE, Chairman

VICTOR GILINSKY, Commissioner

RICHARD T. KENNEDY, Commissioner

PETER A. BRADFORD, Commissioner

JOHN F. AHEARNE, Commissioner

ALSO PRESENT:

Messrs. Mattson, Case, Gossick, Sege, and Bickwit.

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P R O C E E D I N G S

1
2 CHAIRMAN HENDRIE: If we could come to order. I
3 assume our colleagues will join us directly. The Commission
4 meets this morning for another in a series of the briefings
5 on the Three Mile Island lessons from our Lessons Learned
6 Task Force. I take it this is an introductory briefing
7 indicating the direction that Roger and his forces are
8 going in the forthcoming long-term recommendations paper,
9 which I would remark is not yet with us, in case anybody's
10 looking around to see what they missed.

11 We welcome you, Lee, Roger, Ed, please go ahead.

12 MR. GOSSICK: Thank you, Mr. Chairman. As you
13 indicated the report is not out yet. Roger tells me that he
14 expects to have it available by the end of this week.

15 (At 9:36 Commissioner Kennedy entered the room.)

16 MR. GOSSICK: This is indeed a preview of the
17 paper on final recommendations of the task force. Ed, did
18 you have anything?

19 MR. CASE: No.

20 COMMISSIONER GILINSKY: These are the long-term as
21 opposed to the short-term items?

22 MR. MATTSON: I will describe the difference. Let
23 me do that. And I think that will answer your question.

24 COMMISSIONER GILINSKY: But it's complementary to
25 what we heard before, rather than going over that ground

kapDAV 1 again?

2 MR. MATTSON: That's right.

3 COMMISSIONER KENNEDY: A supplement.

4 MR. MATTSON: A supplement. Well, the purpose
5 today is to tell you the content of the final report by the
6 Lessons Learned Task Force. We hope to issue the report by
7 Friday night of this week. We have a problem in
8 guaranteeing that, which is somewhat of a systems
9 interaction problem. I felt that it's really a quality
10 assurance problem. But it seems that the dehumidifier in
11 the reproduction room causes the reproduction -- seem to
12 kind of stick pieces of paper together. And you can't
13 guarantee, when you want 100 copies of something, that they
14 won't be missing several pages. I think that's a systems
15 interaction problem. We're trying to solve several in
16 getting this report out.

17 I thought it would be good to review the history
18 of the task force to give you an idea --

19 CHAIRMAN HENDRIE: It's dryer downtown. If we
20 could consolidate down here we won't have a problem.

21 (Laughter.)

22 COMMISSIONER AHEARNE: Joe, can you say that the
23 way the roof's been leaking?

24 CHAIRMAN HENDRIE: A different problem.

25 MR. MATTSON: The task force was an

kapDAV 1 interdisciplinary team of about 20 people. It was formed by
2 the Office of Nuclear Reactor Regulation in late May so
3 we've had roughly five months to work on the lessons learned
4 from Three Mile Island. Our purpose was to identify and
5 evaluate safety concerns from Three Mile Island that were
6 within NRR cognizance.

7 And as I told you in the last briefing, there were
8 some things we specifically excluded, like emergency
9 preparedness, from the state's siting and the overall NRC
10 role in accidents, those topics being addressed by other
11 people within the staff.

12 We issued a short-term report in July known as
13 NUREG-0578, which had a number of recommendations for
14 changes in operating plants and licensing requirements for
15 near-term OL applications.

16 As a result of those recommendations, reviewed by
17 the ACRS, Mr. Denton and you gentlemen, some 24 short-term
18 licensing requirements are now being implemented on
19 operating plants.

20 (At 9:40 Commissioner Bradford entered the room.)

21 MR. MATTSON: All but a large number of those are
22 to be in place by January 1, 1980. The rest, for all
23 practical purposes, a year later. In the course of working
24 on those short-term recommendations and developing long-term
25 recommendations that I won't be describing today, we've had

kapDAV 1 an opportunity for many meetings with the ACRS and its TMI-2
2 subcommittee. Something on the order of 10 meetings
3 altogether, of half a day to day duration, Just to give you
4 a flavor of the size of the interaction we've had with the
5 ACRS.

6 (At 9:41, Commissioner Bradford left the room.)

7 MR. MATTSON: In addition, there is one short-term
8 recommendation coming to the Commission from the office of
9 Standards Development, that involves rulemaking. This was
10 one of our short-term recommendations in the NUREG-0518. It
11 has to do with the new limiting condition for operation for
12 human errors. I think you'll recall we discussed that
13 before.

14 At this stage, all but five members of the Lessons
15 Learned Task Force have been reassigned to other jobs. We
16 reassigned them to the implementation of short-term actions
17 on operating plants, where they are part of the four review
18 teams meeting with the four owners groups and speeding the
19 implementation of the short-term lessons.

20 We have assigned people to the review for the
21 restart of TMI-1 and we have assigned people to the review
22 of the near-term operating license applications. Several of
23 the task force members have returned to their parent
24 offices. You'll recall we had four of the 22 that were from
25 other offices. Two have now returned. And we have set

kapDAV 1 aside one person from the Lessons Learned Task Force to be
2 the nucleus of the human factor control room efforts within
3 the office of Nuclear Reactor Regulation over the coming
4 months.

5 With publication of the final report later this
6 week or the first of next week, the rest of the task force
7 will return to its other duties.

8 COMMISSIONER GILINSKY: Could I just interrupt you
9 for a moment? Mr. Chairman, did you intend to schedule a
10 meeting after we've had a chance to look at that report?

11 MR. MATTSON: I think I can anticipate your
12 concern. What we have said to the people that are being
13 reassigned and to their managers is that they have to be
14 available to call together again over the course of the next
15 few months, for two basic reasons. One is to advise on the
16 implementation of that recommendations. Sometimes it's hard
17 for people to read your words and simply walk away with
18 that.

19 The other is to participate in presentations of
20 their recommendations to whomever, the ACRS, the Commission,
21 other interested people.

22 COMMISSIONER AHEARNE: That's half the answer.
23 Your answer is that it'll be available. The other part of
24 the question is, are we going to have a meeting?

25 CHAIRMAN HENDRIE: Clearly, when we get the report

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1 and the commissioners have had a chance to reflect both on
2 the material at this briefing and the discussions here and
3 the written report. I think the Commission will want to
4 meet again with you and have further discussion of those
5 items when we've had a chance to think about them a little.

6 MR. MATTSON: That was the next subject I was
7 going to turn to, which is what do we envision being done
8 with the report, now that it's practically written?

9 CHAIRMAN HENDRIE: If the machinery worked right,
10 why, you'd be able to print it Friday night.

11 MR. MATTSON: Yes. What we would do is formally
12 transmit it to Mr. Denton, the director of NRR, with copies
13 to you, to the ACRS, to the public, to the President's
14 commission, to your special inquiry, and others that we know
15 to be interested in this subject matter.

16 I would anticipate that Mr. Denton, much like in
17 the case of the short-term report, would refer the final
18 report to the ACRS for its review and comment. We've
19 already talked to the ACRS about having some time in the
20 November meeting, both with the full committee and the
21 subcommittee, to talk about the final report.

22 In parallel with that, we would anticipate that
23 there is a need for an action plan. As I'll describe later,
24 there's a lot of work portended in our recommendations and
25 there's a lot of work already going on with short-term

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1 recommendations and other changes that have been made since
2 Three Mile Island. We know that there is a Lessons Learned
3 Task Force in the Office of Inspection & Enforcement also
4 about to issue a report and there is a real need to sit
5 down, develop an action plan, consider the relative priority
6 of these various recommendations and assign resources to
7 them and get on with the ones that are most important.

8 We think that this review by the ACRS --

9 COMMISSIONER AHEARNE: One minute. There is also
10 the possibility that some of them may be modified.

11 MR. MATTSON: Of course, yes, and that's going to
12 say so right in the report, in fact, as I'll explain later.
13 The thrust of the report is more of a policy nature than of
14 a detailed nature. And our recommendations are more in the
15 form of, This is the way we would start in a given area in
16 order to achieve policy objectives that we have tried to
17 articulate. It's quite possible that others will come up
18 with better ways or permutations and combinations of our
19 recommendations that would be more to the point.

20 I should also mention that in the month or so that
21 it should reasonably take to develop an action plan we
22 should have the Kemeny Commission proposals on the table.
23 And I think that's good, that we can have all of the
24 recommendations that have been placed at one time and
25 consider them together.

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1 I'm sure there are ideas that we had that they
2 might not have had and vice versa. It's quite possible
3 there are more ways than one to skin some of these cats.

4 I'd like to turn to an overview of the final
5 report. As I said, in contrast to the short-term report, it
6 deals with more fundamental and longer term issues. You'll
7 recall when I was here to describe the short-term report we
8 called them our "hot coals," our "burning issues," the
9 specific things and desires in operations that we thought
10 needed to be gotten on with in a relatively short time
11 frame.

12 The final report addresses three areas: nuclear
13 power plant operations, design and regulation. The
14 structure of the report is to give prominence to the policy
15 issues in these areas that we judge to be important and in
16 need of change or improvement. Having reported our thoughts
17 and conclusions in these policy issues, then we turn to
18 specific recommendations to begin motion in the direction of
19 achieving those objectives.

20 The costs of our recommendations are large, at
21 least in terms of the people required to execute them.

22 COMMISSIONER KENNEDY: What does that mean?

23 MR. MATTSON: I made an estimate myself last
24 night. I must caution you that it's not rigorous, but I
25 took 70 plants and the number of people I thought it would

kapDAV 1 take per plant to do various of these recommendations. I
2 didn't go through them all in excruciating detail. I would
3 say on the order of 2000 people and two years could do the
4 recommendations that we have in the final report.

5 COMMISSIONER KENNEDY: That is 2000 people in
6 addition to existing staff?

7 MR. MATTSON: No, I don't think that's necessarily
8 true. 2000 people in the industry, some of whom will be
9 people already engaged in other activities in the industry,
10 which, if phased properly, will be complete before the
11 longer term things are initiated.

12 COMMISSIONER AHEARNE: Are you really saying that
13 you estimate roughly 4000 man-years?

14 MR. MATTSON: I roughly estimate 2000 man-years,
15 2000 year over a two-year period.

16 COMMISSIONER KENNEDY: Okay.

17 MR. MATTSON: Again, that's a rough number in
18 terms of NRC resources --

19 COMMISSIONER GILINSKY: To do what?

20 MR. MATTSON: Implement the recommendations
21 contained in the report. Better to let me describe them one
22 at a time.

23 COMMISSIONER GILINSKY: Oh, you're going to? All
24 right.

25 CHAIRMAN HENDRIE: And the NRC resource?

kapDAV 1 MR. MATTON: About 110 man-years in a two-year
2 period.

3 COMMISSIONER KENNEDY: That's in addition to
4 existing staff?

5 MR. MATTON: Some of it could be accomplished by
6 existing staff, priority adjustments. Again, there's a need
7 for an action plan to consider what we're putting on
8 unresolved safety issues. The hundred people that we were
9 given by the Congress to address licensing cases that are
10 pending, those things need to be sorted out. Some of the
11 110 would be new. But not all of them. I'd say the
12 majority of them would be new.

13 Some of it involves expertise that's not presently
14 on the staff. If I could have the first slide.

15 (Slide.)

16 We've been saying what this slide says, and others
17 have been saying it for some months now. The fundamental
18 lesson from Three Mile Island for nuclear safety regulation
19 lies in the area of operations safety. I want to define
20 what I mean by "operations safety," but first let me put a
21 qualifier on the statement on this slide. First, we have
22 concluded in our short-term report the continued belief that
23 the accidents stem from many sources, human error, design
24 error, equipment malfunction and regulatory error. By
25 giving paramount attention to operations safety and the

kapDA/ 1 human element that it contains, we are not intending, by any
2 means, to place sole blame on the operator at Three Mile
3 Island. It's important to recognize that qualifier as we
4 talk about operations safety for the future.

5 The essence of our conclusion is that there are
6 no such separate things as operations safety on the one hand
7 and design safety on the other hand. There has been a
8 mistake in the past in nuclear reactor regulation. It's
9 been the overwhelming emphasis placed on design safety and
10 the lack of emphasis on operations safety. And then the
11 natural consequence of ignorance of the juxtaposition of the
12 two, the joining of operations safety and design safety in
13 assuring overall plant safety.

14 So when we say place paramount attention on
15 operations safety we mean for the coming months and few
16 years in order to bring it up in pace with design safety
17 efforts that have been ongoing for 20 years. That's not to
18 say that there isn't a need for design safety improvements
19 also. Could I have the next slide, slide two?

20 (Slide.)

21 COMMISSIONER GILINSKY: When you talk of
22 operations safety, you mean basically the running of the
23 plant, the safe running of the plant?

24 MR. MATTSON: The safe running of the plant, and
25 the consideration in design for the eventual safe running of

kapJAV 1 the plant.

2 Maybe it helps if we look at the definition on
3 this second slide, of what we mean by operations safety.
4 It's a broad area, including human factors, personnel
5 qualifications and training and the other things listed
6 there. And we mean operations safety to include both normal
7 and emergency operations.

8 In the report we describe or depict a matrix of
9 the elements in operations safety. These four bullets at
10 the top of the slide are the principal elements. Of course,
11 many subdivisions in these elements -- and they're
12 discussed --

13 COMMISSIONER GILINSKY: Does the last one include
14 gathering and analyzing safety information?

15 MR. MATTSON: Yes, it does. But of course, the
16 second one does also. Training must have the lessons from
17 day-to-day evaluation from operating experience factored
18 back into the training. And then we try to articulate two
19 goals of operational safety.

20 I said at the outset the body of this report is
21 policy or goal-oriented, and so in each of the three areas
22 we try to say what ought we to be striving for. We don't
23 claim that these are the final articulations of these
24 goals. But we think goal orientation over the next few
25 months is very important for all of us.

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2 The two goals we would suggest at this stage are
3 reducing the challenges to safety and mitigating the
4 challenges to safety; that is, the goals for operations
5 safety. And we mean predominantly those challenges caused
6 by human error. And in mitigation we mean maximizing the
7 capability of the human being to intercede productively in
8 transient upset or accident event, depending upon --

9 COMMISSIONER KENNEDY: At the same time, lessening
10 the likelihood of improper intervention?

11 MR. MATTSON: Yes. We think that reducing
12 challenges entails a number of things. First and probably
13 most important, recognition of personal responsibility and
14 accountability at all levels of an operations organization.
15 You'll see in our specific recommendations we feel there is
16 a need, not to just concentrate on the operator and senior
17 reactor operator in training and qualifications, but to
18 concentrate lower in the operations staff, instrument
19 technicians, auxiliary operators, higher in the operations
20 staff, plant superintendents, vice presidents for operation.

21 And as we quote Admiral Rickover in the report,
22 one of the keys to his successful naval nuclear proposal
23 program has been a continual reinforcement of the need to
24 recognize this responsibility at all levels. Of course,
25 part of recognizing the responsibility is also understanding
attitudes and mind-sets that may hve crept into the

kapDAV 1 commercial nuclear power program over the years. We speak
2 a little bit in the report about that mind-set and the need
3 for commitment throughout nuclear technology to see that
4 people believe accidents can happen, that people understand
5 the level they need to understand, the fundamentals of
6 nuclear technology and the hazards of nuclear technology.

7
8 COMMISSIONER GILINSKY: How far do you carry —
9 would you elaborate on these goals, because these are the
10 sorts of things that one could have written out a week after
11 the accident. And I presume you've gone far beyond that and
12 indicated how a new approach would differ from the current
13 or previous approach.

14 Can you give me some sense for that?

15 MR. MATTSON: We go beyond it in two ways. One is
16 a way that I hope to describe by quickly going through the
17 policy matters. I'm just getting started.

18 Second, by our specific recommendations, to give
19 more concrete examples of what it is we're talking about
20 that should be changed. And we hope through those two ways
21 and through some preliminary articulation of the goals of
22 these areas to move the agency into a position of better
23 articulating for itself and for the industry it regulates
24 and for the people who depend upon us, what it is we're
25 trying to achieve.

So part of the answer to your question isn't up

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1 there, Commissioner Gilinsky, and part of the reason is that
2 we're looking for opportunities with you and with Congress
3 and others to consider what these goals ought to be.

4 I'm going to come back to the question of an
5 overall risk goal for reactor safety near the end of this
6 presentation, and I think it will give more the flavor of
7 what I'm talking about when I do that.

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Now, quickly, reducing challenges entails recognition of responsibility, better training of personnel, better control of normal operations, better control of information, better training about the significance of precursors, and better evaluation of operating experience to identify precursors, cognizance of industry-wide operating experience, and better founding in the technology and the hazards that we discussed.

These are all things we think belong not only in Washington in the lines of activities in the Nuclear Regulatory Commission, but also in the individual plants being improved by the individual licensees.

Mitigating challenges requires better training and qualification of operators, better operational aids in the control room, better technical and management support for upset or emergency conditions, better emergency procedures, better preparation and communications on the part of NRC for its role in accident situations and, as I'll discuss later, some additional engineered safety features.

One last slide, number 3 --

(Slide.)

-- on operations safety policy, the question of the NRC versus the licensee's role.

We believe that operations safety is uniquely nuclear utility's responsibility. This isn't to say that

DH gsh 1 NRC shouldn't set minimum criteria and shouldn't see that
2 incentives are there for people to do the right thing.

3 But if the hands-on operators, and operations is
4 a hands-on concept, do not practice the spirit of the
5 regulations, then no matter how they meet them in detail,
6 the regulations cannot have anticipated all of the operations
7 as facts that could cause difficulty or safety problems.

8 COMMISSIONER GILINSKY: But your last bullet on
9 operations safety is technical and management support of
10 operations. And under that you would include the gathering
11 and analyzing and dissemination of safety data.

12 That's an activity in which NRC has a pretty
13 prominent role.

14 DR. MATTSON: It's clearly an activity in which NRC
15 has a responsibility. And you have directed the formation of
16 a new office reporting to the executive director and supporting
17 offices or supporting organizations within the program
18 offices.

19 That's true.

20 But there are other people who can and should and
21 are beginning to evaluate operating experience in detail and
22 industry-wide.

23 Those people include the Institute for Nuclear
24 Power Operations and pursuant to one of our short-term
25 recommendations, each and every nuclear power plant licensee

DH gsh 1 is required to have a dedicated, multi-disciplinary team
2 with a site presence evaluating operating experience,
3 engineers evaluating operating experience from their plant
4 and plants of like design, factoring that back into their
5 training program and their engineering program.

6 So as you'll see in one of our recommendations,
7 there's a need to couple all of these things. We recommend
8 some sort of nation-wide network of operating experience
9 evaluation with NRC in the lead role pulling together these
10 various elements, so that they're learning with and from
11 one another.

12 So we don't -- this slide is a dangerous slide.
13 I realize that. It triggers various responses. Let me say
14 again what we mean by this slide.

15 We mean that operations safety is a hands-on
16 concept and no matter who's standing over your shoulder and
17 what details have been reviewed before, if the hands-on
18 person at each piece of equipment, at each level of the
19 utility is not dedicated to operations safety, then there
20 won't be good operations safety.

21 It's a fundamental point in safe operations; in
22 our judgment.

23 COMMISSIONER AHEARNE: I certainly don't disagree
24 with that, Roger. But I think the word "uniquely" is what
25 certainly is bothering me. As you pointed out, the Admiral

DH gsh 1 has several times stressed that you must have this pervasive
2 attitude on safety.

3 But as I recall, part of that stress goes throughout
4 the whole system. And I don't disagree at all with your
5 focus that the operators, the operational staff, the plant
6 management, must have that.

7 But I'm a little worried that if we stress that so
8 highly, as some places have stressed the great reliance upon
9 nuclear safety, that there may become a backing-off on the
10 part of our people and the gradual feeling that, well,
11 that's the utility's responsibility or the industry's
12 responsibility.

13 It isn't. It's across the board. We have to feel
14 that we have a fundamental responsibility there.

15 So the word "uniquely" --

16 COMMISSIONER GILINSKY: We would be auditing their
17 performance.

18 DR. MATTSON: Yes, and also setting criteria and
19 conducting reviews of programs to meet those criteria before
20 they go into effect.

21 We're not in disagreement. It is the word "unique,"
22 I guess, that upsets the situation here.

23 I think you'll see in the specific recommendations
24 that we do not recommend standing back and letting INPO do
25 its thing and the NRC endorsing it.

DH gsh 1 That's not the tac that we have chosen. Furthermore,
2 we do not recommend standing pat with the LCO recommendations
3 in the short-term report.

4 As we said, we need to increase the incentive for
5 them to improve operations safety. We're also saying in the
6 final report we need to go further and into more of the
7 details of how operational safety is guaranteed and all of
8 the elements that I've described. And we've got some ways
9 that we think are good ways to start to do that.

10 COMMISSIONER GILINSKY: What's LCO?

11 DR. MATTSON: Limiting Condition of Operation. I'm
12 sorry. When you have a condition that leads to a complete
13 loss of safety function.

14 Dwelling on that point just a moment, there is a
15 need to decide how NRC and INPO, the Institution for Nuclear
16 Power Operation, should relate one to another in the
17 coming years.

18 I don't think that I'd wait too long to have those
19 discussions. The institute has formed a board of directors
20 and is seeking to place the director of the institute and
21 hire staff with a goal toward starting activity January 1
22 of the coming year.

23 I think early in the coming year would be the time
24 to sit down as a policy matter between the commission and
25 the board of directors, perhaps, of the institute and think

DH gsh 1 through some of these role questions.

2 Well, the fourth slide --

3 (Slide.)

4 And if your slides are numbered, you'll have to

5 skip around here a little bit. This is the one that's no. 4.

6 The slide that isn't numbered, it's the fifth one in the

7 package --

8 (Slide.)

9 -- if I didn't say so already. It deals with

10 improvements in reactor regulation. We come down to this

11 question of the need for an improved safety policy basis, a

12 reactor safety goal.

13 What we've done the last couple of months in our

14 final effort is stood back and asked ourselves the question

15 where we've been, how we're going, and how we're going to

16 get there.

17 We pretty much list the problems raised by Three

18 Mile Island.

19 (At 10:05, Commission Bradford enters the room.)

20 Our list is not dissimilar to other people's

21 lists. But the difficulty we see is one of reaching

22 decisions in the short-term report. We came to you -- not

23 just we came to you before Three Mile Island with individual

24 piecemeal changes in the existing buyer regulation.

25 In the report, we likened it to a clockwork where

DH gsh

1 we had a piece at a time.

2 What we see is that reactor safety policy has
3 evolved over the 20 years of regulations, intense years of
4 regulation, evolved generally in the context of the no-undue
5 risk to public health and safety, the statutory language,
6 but without either a detailed subjective statement of what
7 our reactor safety goals are, and certainly without a
8 numerical statement, a risk number, in our safety goal.

9 The ACRS has written a letter, or a short letter,
10 saying, in their judgment, it's time now to write and
11 promulgate a numerical risk goal.

12 COMMISSIONER AHEARNE: Yes. As I'm sure you know,
13 they said that it would take at least a year to get there.

14 DR. MATTSON: At least a year. We see some
15 shortcomings in articulating a numerical risk goal. There
16 are places where you can do it and there are places where
17 you can't.

18 We, for example, don't know how to write a numerical
19 risk goal for shift technical advisors; yet, we know
20 improving the technical capability for dynamic response
21 diagnosis in the control room is a very important thing.

22 So what we recommend is the need to articulate a
23 clear safety goal in subjective terms augmented by quantitative
24 criteria, where appropriate.

25 And there are some places where it is appropriate,

DH gsh

1 especially in equipment and systems analysis.

2 COMMISSIONER AHEARNE: Could you give me a feeling,
3 an example, or some examples of what you mean by "clear and
4 subjective terms"?

5 DR. MATTSON: Accept the premise that what we have
6 today is reasonable assurance of no one to risk the public
7 health and safety. We have more than that, depending upon
8 the individuals you talked to. But as a clearly and
9 comprehensively articulated commission policy, I don't believe
10 that we have much more than that.

11 Now you can go beyond that and I think the
12 commission has. And we say so in the report since Three
13 Mile Island.

14 As we read commission statements to the Congress
15 and commission action on short-term recommendations, there
16 apparently is evolving a policy of reasonable assurance of
17 no more Three Mile Islands.

18 That would be another form of subjective criterion.

19 COMMISSIONER AHEARNE: It's not obvious that that
20 would necessarily be clear.

21 DR. MATTSON: But it would be, in our judgment,
22 better than no undue risk to public health and safety. It's
23 a concrete example of what constitutes no undue risk, if
24 that's the right level.

25 COMMISSIONER GILINSKY: Where do you get this undue

DH gsh 1 risk. The law says adequate protection.

2 DR. MATTSON: Adequate protection. I'm sorry. The

3 words in the staff have evolved to "no undue risk."

4 MR. BICKWIT: It's in the regulations various places,

5 not in the statute.

6 DR. MATTSON: Thank you.

7 COMMISSIONER KENNEDY: Is there any reason to

8 doubt that they've been equated?

9 DR. MATTSON: No doubt.

10 MR. BICKWIT: No doubt.

11 CHAIRMAN HENDRIE: The statute talks about no

12 unreasonable risk.

13 DR. MATTSON: There are some suggestions in the

14 report about ways that you could better articulate it. You

15 could come to concepts like "safe and reasonably achievable."

16 You could come to a concept of "as safe as best practical

17 technology," or "best available technology," the kind of

18 language, the concept chosen in the Clean Air Act and the

19 Clean Water Act.

20 You could come to a numerical statement -- you

21 could say less than some numerical quantity of risk per

22 reactor year per core meltdown.

23 We don't try to tell you the preferred way of

24 setting that goal.

25 COMMISSIONER AHEARNE: You're saying that we ought to.

DH gsh 1 DR. MATTSON: We see too many places where our
2 ability to make decisions on new safety issues has been
3 eroded by interpretation and change in the safety goal
4 through a patchwork of regulatory criteria evolved through
5 the years, and it's difficult for us to make decisions and
6 conclude on solutions to safety problems in a timely way,
7 especially backfitting.

8 COMMISSIONER AHEARNE: Let me see if I understand
9 that.

10 Is what you're saying that because of the lack of
11 clarity or lack of these kinds of goals that when you find
12 instances where you believe, the staff believes that it is
13 advisable to make these improvements, you don't have the
14 regulatory framework to use as a justification.

15 DR. MATTSON: Yes, that's true. Backfit policy is
16 one of the areas in which we need this common guidance to
17 bind together the regulatory requirements.

18 There are other reasons. In evaluation of operating
19 experience you're going to find many new safety concerns.
20 The degree to which you fix them and the timeliness of your
21 ability to decide upon the degree to which to fix those
22 operating problems require a well articulated goal. Your
23 unresolved safety issues, there are 19 of them being worked
24 very hard by a dedicated group of people in the Office of
25 Nuclear Reactor Regulation, again, the difficulty in deciding

DH gsh 1 to what degree to resolve them using what kinds of decision
2 methods, ATWS being a good example.

3 We've tried numerically. We've tried engineering
4 judgment. We've tried combinations of the two. Yet, the
5 ATWS decision comes slowly.

6 COMMISSIONER GILINSKY: Extraordinarily slowly.

7 DR. MATTSON: Yes. We point out the value impact
8 shows you how to weigh the gains and the losses and various
9 alternatives, but it still doesn't help you choose from
10 among alternatives.

11 The most cost effective solution is not necessarily
12 the one required to meet your basic safety goals.

13 Now leaving that and turning to the third bullet
14 here, we list a number of things in the final report as
15 considerations and what I've called here the reform of the
16 licensing process to improve its quality.

17 We've looked at how we've reviewed Three Mile
18 Island. We've looked at how we've reviewed other cases. We've
19 seen things that we think need to be improved. We need a
20 better integrated system review, including human factors, in
21 that integrated system review.

22 And we need to stress the system level of review,
23 not the component level of review, as we've sometimes gotten
24 embroiled in the past.

25 COMMISSIONER AHEARNE: Is that a shift or an addition?

DH gsh 1 DR. MATTSON: I think it's a shift. I think we have
2 to come to an era where we audit, to some small extent, how
3 the details of the design have been executed. And if we
4 find that they haven't been done well, we have to come to
5 the discipline to be able to turn a licensing process off.

6 We cannot continue to get into the verification and
7 validation of the details of the design ourselves. We
8 cannot act as the software or design verifier and validator
9 for a utility at the OL stage. And we've seen that happen in
10 the past. I can give you examples of where it's happened.
11 And in order to get back away from that nitty-gritty detail
12 that is someone else's responsibility and get back up to the
13 system level of review is going to take some discipline on
14 the part of the staff and some intentional organizational
15 creations, in our judgment.

16 We've --

17 COMMISSIONER GILINSKY: Could you give us some
18 specific example that would take this discretion beyond the
19 level of generalities.

20 After all, we've always believed we have to look at
21 the system.

22 DR. MATTSON: I don't believe, Commissioner Gilinsky,
23 that we've always believed that in the correct way.

24 COMMISSIONER GILINSKY: Well, then, what I'm asking
25 is what is the difference between the correct way and the

DH gsh 1 incorrect way? I'm trying to get some feel for what you're
2 proposing.

3 DR. MATTSON: Okay. We have a standard review plan.
4 It's written so that each individual branch in the division
5 of systems safety, for example, can assign various sections of
6 the standard review plan to individual reviewers and tell them
7 to go review a narrow portion of the design.

8 We've got, in addition in the standard review plan,
9 the specification of secondary review responsibilities.
10 These are the things which are intended to see that what one
11 person from one branch needs of another person in another
12 branch is provided.

13 Down through the years there's been difficulty in
14 accomplishing these secondary review responsibilities; that
15 is, the coordination among the branches in accomplishing
16 integrating of the review has not been good.

17 The manifestations of that are overspecification of
18 margin in some areas, underspecification in others,
19 combinations of margin specifications that, when the whole
20 system comes together, are either inordinately large or
21 unsatisfactory, in some cases.

22 A way to do that differently is to use
23 interdisciplinary project review teams with strong project
24 leadership drawn from some central technical review
25 organization, for example, but with the capability in the

DH gsh 1 project team itself to synthesize and integrate the
2 contributions of the individual technical experts to the
3 overall work product.

4 In the past, that's been done by a relatively few
5 isolated individuals within the division of project
6 management and always at the tail end of the licensing
7 process when the pressure is on to get to the ACRS to get to
8 the hearing boards. The staff is taking too much time to do
9 its technical review and the discipline and thoroughness
10 with which this system integration occurs is not good enough.

11 COMMISSIONER GILINSKY: Are you suggesting that we
12 move to a team approach the way Saab builds cars rather than
13 have an assembly line where each worker or reviewer does his
14 bit -- assemble a team that will handle an application when
15 that was completed, would move on to another application.

16 COMMISSIONER AHEARNE: But it sounds like there's more
17 of an emphasis on looking at the pieces as to how they are
18 put together in the system as a whole as opposed to each
19 individual part.

20 The impression that I'm getting is that you might
21 be taking for granted that a number of parts weren't going to
22 work as designed and that, instead, you're going to look at
23 how they worked together.

24

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1 DR. MATTSON: Yes, given that you continue to have
2 assurance tha the parts are done correctly because our
3 experience teaches us that it hasn't been done correctly.
4 So there need to be devices created, and they exist. The
5 Defense Department has used verification and validation
6 concepts with its contractors, third party checking of the
7 details according to established criteria and procedures,
8 and it evidently worked. And there's some history of their
9 development. There's potentially there an expertise that is
10 tapable.

11 COMMISSIONER GILINSKY: Well, are you saying that
12 we would delve less deeply into the various portions of the
13 design that we look at now, but somehow emphasize the
14 fitting together of the pieces?

15 DR. MATTSON: Yes, that's a fair statement of what
16 we're trying to say. And as long as we understand that
17 "less deeply" doesn't necessarily mean that we're going to
18 do less work. It's probably more work to do the system
19 level integration review of safety. It just means that
20 we're not going to get down into the wire by wire, nut by
21 nut, component by component level of review.

22 COMMISSIONER GILINSKY: But you are saying less
23 detail work.

24 DR. MATTSON: That's true.

25 COMMISSIONER AHEARNE: It's a different type of

mgcDAV 1 detail.

2 DR. MATTSON: Yes.

3 COMMISSIONER GILINSKY: You're talking about less
4 wire by wire review.

5 DR. MATTSON: Instead of looking just wire by wire
6 in safety systems, for example -- forget the wire by wire.
7 Tell somebody else how to do that so you have assurance that
8 it's been done. Then you expand your scope from safety
9 systems to non-safety systems as we have traditionally
10 defined them and look at the interaction of the two, and you
11 look at the reach and scope of equipment important to
12 safety. And you look at the ways that you can get into
13 difficulty through combinations and permutations of failures
14 and operator errors to get into difficulty in safety.

15 And you come at a broader and we think better
16 overall picture of the safety of the plant and especially
17 its integration with the human being.

18 COMMISSIONER GILINSKY: I'm mentioning wire by
19 wire obviously. That's what our electrical branches do.
20 They in fact do look at the actual wiring diagrams, as I
21 understand.

22 DR. MATTSON: That's true.

23 COMMISSIONER GILINSKY: Are you saying they've
24 been looking in too much detail at those diagrams? In fact,
25 they're the only ones who look at the actual working

mgcDAV 1 drawings, as far as I know.

2 DR. MATTISON: Too much in two respects and not
3 enough in another respect. Too much in the respect of
4 having to go through a regulatory failure modes and defects
5 analysis to show that the single failure criterion has been
6 met in the design. Now some of that is necessary to audit,
7 but when you find one, instead of taking the design, turning
8 it back to the utility and saying, "I found a single failure
9 in this design; the criteria say there aren't to be any. Go
10 review the whole design and tell me its right again."

11 Instead, the staff has the tendency, having found
12 one, to go find the rest of them, do a single failure
13 analysis of the complete safety system itself, then hand the
14 whole package back to the utility and say, "Fix all of these
15 things, and I'll approve the design", at the expense of
16 looking at the safety systems where, if instead of doing the
17 detailed failure modes and defects analyses for single
18 failures to the safety system alone, they had integrated
19 more of the plant, the non-safety systems, the systems that
20 lie between totally non-safety and totally safety, and
21 seeing the interaction, seeing the overall contribution to
22 the safe operations of the plant of other systems in the
23 plant not normally looked at.

24 It's a much better expenditure of their time.

25 COMMISSIONER GILINSKY: Are you saying that the

mgcDAV 1 present staff effort could be allocated in such a way as to
2 produce a greater benefit, in terms of safety?

3 DR. MATTSON: Yes.

4 COMMISSIONER GILINSKY: Are you also saying that
5 that's a reasonable level of effort? I mean did you in your
6 analysis feel bound by that level of effort and feel that
7 you were committed to moving it around and shifting it from
8 details to systems?

9 DR. MATTSON: First of all, we don't recommend a
10 revolutionary overnight change in the staff organization and
11 process to accomplish this. We say with the couple examples
12 in the last few months where approaches like this have been
13 taken, this task force being one, with benefits arising from
14 this type of approach, we suggest some pilot projects with
15 perhaps operating plants in the SEP program or operating
16 license reviews that are either new reviews or midstream
17 reviews with the intentional formation of dedicated review
18 teams to several of those reviews, to try it and see how it
19 works.

20 COMMISSIONER AHEARNE: That sounds more like your
21 review of it is being a marginal improvement as opposed to a
22 necessary --

23 COMMISSIONER GILINSKY: To what?

24 COMMISSIONER AHEARNE: As opposed to a
25 necessary --

mgcDAV 1 COMMISSIONER GILINSKY: What was the first one?

2 COMMISSIONER AHEARNE: Marginal.

3 DR. MATTSON: I think it's more than marginal. I
4 think it is a necessary change, and perhaps as people think
5 about this specific recommendation with some time more than
6 we have had, they will do it in addition to the trial in the
7 way that you suggested.

8 There's another recommendation, another
9 consideration in here. Another way to achieve this
10 integration is to have an accident analysis function within
11 the staff different from the one we have today. You start
12 with the initiating event, carry through the dynamic
13 response of the machine and the operators to the mitigation
14 of consequences and eventually to the emergency procedure
15 and what have you, trying to integrate margin and
16 contributions from the individual review disciplines that
17 have been made along the way.

18 In the development of the Safety Evaluation
19 Report, for example -- that would be a way to cut across a
20 number of cases rather than trying the interdisciplinary
21 system level review on individual specific cases. So you
22 might want to try both simultaneously.

23 Part of the difficulty here is understanding when
24 and how to restructure NRR to achieve some of these goals,
25 and we have not written a roadmap for Mr. Denton to follow

mgcDAV 1 in how to restructure NRR. He has a number of other
2 interests, a number of other policy interests, and this one
3 we've dwelt on here is one of the things we think he ought
4 to bear in mind as he goes about choosing that new
5 structure.

6 COMMISSIONER AHEARNE: But to get back to the
7 point that Commissioner Gilinsky had made there, one of the
8 questions certainly that I will end up being interested in
9 is whether you see this provision as being a better way to
10 use the resources that you think are adequate, or whether
11 you think that given the limitation on resources, this is
12 the best way to use them, or whether you feel that this
13 approach ought to be added on top of the current approach.

14 DR. MATTSON: I haven't a good answer to the
15 question. I will say that in looking at how the job ought
16 to be done, we didn't say to ourselves "with the six or
17 seven hundred people that NRR has today"; however, we did
18 recognize the ability to lend, train, and use resources.
19 Our larger number is limited or has been limited in the
20 past.

21 Well, forging ahead with this slide, attention to
22 unresolved safety issues is something that we just have to
23 mention. It's not really a lesson from Three Mile Island,
24 but Mr. Denton and you shared in that decision earlier this
25 summer and decided to dedicate the people to unresolved

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1 safety issues in the way that they were before Three Mile
2 Island. That's an excellent decision. It has to continue.
3 Progress is being made, as I understand it, on unresolved
4 safety issues.

5 And then turning to the next bulletin, we think
6 you're going to have to come to some analogous situation
7 with the lessons yet to be learned from operating
8 experience. It isn't good enough to stop with a really good
9 system and people for reviewing operating experience.
10 You've also got to have criteria and objectives for deciding
11 what to fix and be sure that you put the resources on it to
12 get it fixed. And I think we'll probably come to the same
13 concept that we've used on unresolved safety issues.

14 Finally, in improvements in reactor regulation,
15 there are many things going on, whether the staff -- as you
16 are aware on the response capability and role of NRC, the
17 executive management team, a number of things going on.

18 We added a narrow thought here that needs to be
19 factored into the planning. There are NRR specialists,
20 analysts, experts of one sort or another that were called
21 upon at Three Mile Island and would be called upon in any
22 future emergency that need to do some preparing, some
23 thinking about who they are relative to one another, what's
24 the list of experts they ought to have in their desk and
25 their phone numbers. How do they get mobile in a hurry?

mgcDAV 1 Should they conduct some drills so that they know how to
2 interface with the incident response center people, and what
3 kind of arrangements are there in the Philips Building or
4 elsewhere to do their work?

5 We're recommending that Mr. Denton identify the
6 technical specialists' group within NRR and give a couple
7 members of that group a few weeks of relief from other
8 duties to sit down, think through the things they need to
9 have including things in coordination with the Office of
10 Inspection and Enforcement, so that in the relatively short
11 future, within the next month or so, this group of technical
12 specialists is ready to go and be depended upon.

13 COMMISSIONER AHEARNE: Could I ask one perhaps
14 peripherally related question in the way of technical
15 support for emergency response? Did you give any thought
16 anywhere in your deliberations on calculational support that
17 might be needed as far as the NRC is concerned or NRR, its
18 ability to have runs made or analyses done rapidly?

19 DR. MATTSON: Yes. The research program -- as I
20 recall, the briefing of a few weeks ago is already examining
21 the ways to put computer decks on existing machines in the
22 national laboratories, decks describing generically various
23 classes of reactors -- for example, a B&W deck that would be
24 available for running on command by the staff in the event
25 of a future emergency.

mgcDAV 1 There's another area here that some of us feel
2 fairly strongly about that the Lessons Learned Task Force
3 does not speak to that needs attention. It's the question
4 of simulators. Should NRC have one?

5 I think we need a simulator. I think we could use
6 a generic -- and I'm told a hybrid analog digital simulator
7 to help us in several respects. One is the evaluation of
8 operating experience, the ability to ask "what if"
9 questions. Permutations and combinations of events are much
10 enhanced by a hands-on real life kind of simulation, but
11 with advanced software, you need the ability to couple in
12 the fast running versions of TRAC or RELAP or the more
13 advanced sophisticated codes. So if you're generating
14 phenomenological consequences by your "what if" questions
15 that are ordinarily handled in the course of the licensing
16 process, you've got codes that have some capability to be
17 modified to handle those consequences.

18 Another way it could help -- and one of the things
19 we suggest for improving the licensing staff -- is practical
20 experience, in-house training in the use of simulators.
21 Even as part of the licensing process, the integration of
22 procedures, for example, we say we ought to review emergency
23 procedures as part of OL licensing. ACRS has insisted upon
24 it. We have agreed to that.

25 The use of those emergency procedures, the review

mgcDAV 1 of the emergency procedures in conjunction with the design
2 review probably doesn't add much in terms of resources to
3 the staff. We have to do the two simultaneously. And a way
4 to integrate how it all works would be to use those
5 emergency procedures on an NRC simulator.

6 There's also a third area of the use of simulators
7 during an accident to diagnose or analyze alternative ways
8 of getting out of undesirable situations -- the way that
9 NASA has used simulators to understand alternative courses
10 of reaction to failures for spacecraft in flight.

11 I note the Kemeny Commission has looked into this
12 area. To some degree, I believe the experts in the Office
13 of Research have looked. As I understand it, if that will
14 ever happen in the future, that is accelerated time analysis
15 of real events, say ten times normal speed, there have got
16 to be some pretty fundamental changes in the way we do the
17 computations with the big enormous loss of coolant accident
18 codes like RELAP and TRAC, and there's considerable
19 development required before that kind of use could be
20 realized.

21 It's something we're continuing to think about.
22 These other uses of the simulator for more normal times I
23 think would be good.

24 You asked about analysis --

25 COMMISSIONER AHEARNE: Well, I gather what you're

mgcDAV 1 saying is that in the more normal operations of NRR, you
2 think it might be very valuable, but as far as specifically
3 in the emergency response mode, it sounds like you haven't
4 yet reached a conclusion as to whether or not that might be
5 something.

6 DR. MATTSON: I understand up to this point
7 there's much development that has to be done there. I know
8 the Kemeny people have looked at it. Perhaps they have
9 found experts that see ways to do it that we haven't seen
10 yet.

11 The next slide, number five --

12 COMMISSIONER GILINSKY: Before you go on, since
13 you mentioned Admiral Rickover, you cited him in your
14 report -- what is your reaction to his view that simulators
15 ought not to be used in the training operators?

16 DR. MATTSON: Well, as I understand, his basic
17 reason for discouraging the use of simulators is because he
18 encourages the use of prototypes. That is, he says you need
19 people that believe a drill or exercise they're being
20 exposed to, rather than to sit back and say, "Well, if I
21 make a mistake on the simulator, it's just a mistake on a
22 simulator."

23 COMMISSIONER GILINSKY: He's gone beyond that. He
24 said, "We won't have them."

25 DR. MATTSON: But he has another alternative. His

mgcDAV 1 prototypes are small. They're easier to cite. They were
2 there at the beginning of the program, when they were very
3 useful in design decisions and things like that. They're
4 still used today for training. We speak in the final report
5 to the use of in-plant drills to supplement simulator
o training.

7 We're a little timid compared to some schools of
8 thought. There are people who suggest that in-plant drills
9 with some kinds of upset conditions might be reasonable to
10 conduct. At this point, I think that we would just
11 encourage that that continue to be looked at. We're not
12 satisfied that that's safe, in the time that we've spent
13 looking at the use of drills. We think walkd-through drills
14 are important because you can involve many levels of the
15 operations staff in interactions among people and
16 communications and things that you really don't do on a
17 simulator with detailed training of operators.

18 CHAIRMAN HENDRIE: You get to go out and look at
19 the geography and remind yourself where it all is and which
20 way the valve goes, one thing and another.

21 I think if naval reactors did not have prototypes,
22 then they would have used simulators. And also, without
23 going into any detail, I think it's fair to say that the
24 Navy reactors, in view of their design characteristics --
25 you're able to run on the prototypes a set of exercises

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1 that, as Roger says, you would want to think about very
2 carefully before you deliberately made that a matter of
3 normal training practice on large power reactors which are
4 not set up to carry out some of the same evolutions that
5 military machines are.

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mgcDAV 1 DR. MATTSON: There's another possibility. If the
2 reason for not wanting to depend on simulators is because of
3 the fact that they're not real consequences that you're
4 risking when you're on a simulator, then you might choose to
5 supplement simulator training.

6 Simulator training is important because it's the
7 mock-up of the exact control room. At least some of them
8 are. That aspect is very important.

9 CHAIRMAN HENDRIE: You could have the fire sprays
10 come on if they blow the plant.

11 (Laughter.)

12 DR. MATTSON: What I was going to suggest is that
13 if reality of potential consequences is of concern, you
14 might consider supplementing simulator training and in-plant
15 drills with training on smaller reactors which are not
16 prototypical reactors.

17 COMMISSIONER GILINSKY: That's what I'm really
18 asking about.

19 COMMISSIONER AHEARNE: You say supplement, but not
20 replace?

21 DR. MATTSON: Yes.

22 COMMISSIONER GILINSKY: My question is, how do you
23 feel about operators taking over the controls of a complex
24 reactor without ever having operated any reactor before?

25 DR. MATTSON: Well, we speak to some of those

mgcDAV 1 things in some recommendations for future reactor operation,
2 at least for the senior reactor operators. It's a good
3 question. We haven't thought that deeply about the specific
4 suggestion, and we don't treat it in the report.

5 But clearly, there are going to be qualification
6 requirements and training requirements changed beyond what
7 we've suggested over the next year or so.

8 COMMISSIONER AHEARNE: I hope so.

9 DR. MATTSON: I'm led to understand that the FAA
10 is reaching a point in the near future where pilots will
11 step into a 747 with people in the passenger area, having
12 never flown a 747 anywhere except in a simulator prior to
13 that time, but having flown an airplane somewhere before.

14 COMMISSIONER AHEARNE: I'm assuming that they will
15 allow a person to be captain without having a co-captain?

16 DR. MATTSON: No, I didn't say that, and, in fact,
17 we don't say that in our final report. One of the things we
18 say ought to be instituted for senior operators, the
19 commander or the captain if you will, is that there be
20 requirements for service as a reactor operator before being
21 a senior.

22 COMMISSIONER GILINSKY: But I think your
23 qualification is important. This man presumably has had many
24 hours in the air.

25 COMMISSIONER AHEARNE: Right.

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1 DR. MATTSON: Let me forge ahead through plant
2 design, and then I'll try to get you some specifics.

3 (Slide.)

4 We think there are three areas in plant design
5 that require change: first, better implementation of
6 present requirements in one particular area that has to do
7 with the classification and qualification of equipment.

8 Now, we're not suggesting IEEE 3/23/1973 versus
9 IEEE 1971. It's a different topic than that -- relatable
10 but different. What we're saying is that the distinction
11 between safety grade equipment and non-safety grade
12 equipment has been too clear a line. In reality, it's not
13 that clear a line. It's a fuzzier line. And in between is
14 a class of equipment important to safety in ways that you
15 might not even have thought about at this point -- that is,
16 systems interaction ways.

17 Now, how non-safety grade equipment can help you
18 in the event of an accident and ought to be improved to
19 safety grade qualifications or some better qualifications
20 than none is the subject, at least in part, of Regulatory
21 Guide 1.97. It's "Instrumentation to Follow the Course of
22 an Accident." That's a guide that starts with
23 instrumentation in normal operations, carries it through
24 transients and precursors up through accidents and all the
25 way through core melt.

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1 COMMISSIONER AHEARNE: A Regulatory Guide not
2 widely implemented.

3 DR. MATTSON: A guide, though, that we told you
4 when we issued the short term report, we had some specific
5 things in there that were part of it. We need to get on and
6 do those. We're doing it, and we needed a very rapid,
7 thorough revision of 1.97 and then backfit it for
8 implementation across the board of the necessary elements
9 of 1.97 operating plants.

10 That revision is well along. It goes to the ACRS
11 the first of next month for its review. And soon after that
12 or in parallel, I expect it to come to the Ratchet Committee
13 for consideration.

14 COMMISSIONER AHEARNE: Safety improvement.

15 DR. MATTSON: Okay. But it leaves a hole, this
16 addressing of the interaction and contribution of non-safety
17 grade equipment. The hole is the deleterious effects that
18 non-safety grade equipment can have on safety. It's really
19 systems interaction as defined in the unresolved safety
20 issues to the Congress. The staff has been working on this
21 for now for several years, and frankly I think in my view
22 and in the view of the ACRS and others, it's slow coming to
23 grips with the question.

24 Steve Hanauer's here. He'll be probably shooting
25 arrows in my back, because he thinks that he's got it well

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1 in hand. But the difficulty, in my judgment, is the
2 complexity of solving that problem, given its dependence
3 upon the unique characteristics of individual plant
4 designs. For those reasons -- and I won't go into them much
5 more at this point -- the task force is suggesting that we
6 require an industry wide, plant by plant systems interaction
7 review of all equipment.

8 COMMISSIONER AHEARNE: On what kind of time scale?

9 DR. MATTSON: On a time scale of a year or more.

10 I don't think it can be done meaningfully in less than a
11 year.

12 COMMISSIONER AHEARNE: Would this review be that
13 you would lay down criteria for the review?

14 DR. MATTSON: Yes, and that's difficult. The ACRS
15 just wrote a letter two days ago saying, "We saw the one on
16 Zion. We want to know about the one on Indian Point. We're
17 interested in suggestions." We looked at that yesterday to
18 see, could we take that letter, send it to 70 licensees and
19 say, "Do this failure modes and defects analysis sort of
20 systems interaction problem," and expect to get back
21 reviewable results that could be interpreted for all plants.

22 It's not good enough yet. And how we specify what
23 we want them to do and how we want them to report it and how
24 we expect it to be accomplished in that review needs some
25 work. But it's not bleak.

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1 Westinghouse just reported through Salem that it
2 had reviewed non-safety grade equipment within its scope of
3 supply for deleterious effects from accidents that could
4 lead to unreviewed safety questions -- that is, design basis
5 events that exceeded what they told us about before. They
6 found three. I don't remember the specifics of it today.
7 I've talked briefly to the Westinghouse people, and what
8 they did was set up a matrix, and they systematically went
9 through the plant. It's interesting that they did this by
10 virtue of a requirement that we placed on them in the DSS
11 some months ago to look at environmental qualifications for
12 this aspect.

13 So what we're really doing here in this
14 recommendation is extending it beyond electrical to include
15 mechanical, and say it's all systems, not just the
16 Westinghouse or the NSSS scope of supply. And failure modes
17 and defects is part of it, and you've got to look not just
18 for -- assuming the component doesn't function in the event
19 of an upset commission, and therefore you won't rely upon it
20 in the analysis.

21 Assume it does function and functions wrong, and
22 it takes an accident to change the course of the event in a
23 way you hadn't thought of. It could be that it changes the
24 way that other equipment performs, or it could be that it
25 gives the operator misinformation that he's not trained to

mgcDAV 1 accomodate. If that's what it does, then the answer to that
2 particular problem may lie in training and man-machine
3 changes in the control room.

4 There are a variety of ways to solve the problems,
5 once you identify them.

6 COMMISSIONER AHEARNE: That sounds like a fairly
7 complex set of reviews.

8 DR. MATTSON: It is.

9 COMMISSIONER AHEARNE: Are the utilities really
10 capable of doing that?

11 DR. MATTSON: Only in groups. Utilities in groups
12 and with technical support of their architect engineers. I
13 think some utilities are capable thoroughly of doing it
14 themselves or vendors. I had an opportunity sitting with
15 the AIF policy committee on Three Mile Island, roughly at
16 the vice-president level from utilities, AEs, and vendors a
17 few weeks ago to talk about some of the thoughts that were
18 on our minds.

19 This is what I laid on the table. I asked them
20 the same question that you just asked. They said yes. They
21 thought it was a good idea. They ought to get on with it
22 and do it. Westinghouse at that time sketched for me the
23 process they had used in the work they had done. I think
24 it's useful. It's an enormous resource question. It's hard
25 to envision using less than half a dozen people per plant to

mgcDAV 1 do this review. Even if you say you are going to do it over
2 a year or more -- and right there is 400 and some man-years
3 of really good engineers. These aren't fresh college
4 graduates that understand systems interactions and defects
5 of a variety of equipment. They're good people.

6 COMMISSIONER AHEARNE: I was wondering where they
7 were all coming from.

8 DR. MATTSON: The question that has to be answered
9 is whether there's a significant enough improvement in
10 safety to expect from this kind of thing to expend those
11 resources at this time when those resources are being spent
12 on something else.

13 COMMISSIONER GILINSKY: And you would perform the
14 equivalent review here for those plants that are not yet
15 licensed?

16 DR. MATTSON: No. For those plants that aren't
17 licensed, if this became a requirement, I think you'd
18 require the license applicant to demonstrate that he had
19 performed this kind of review.

20 CHAIRMAN HENDRIE: Will a fast survey, fault tree
21 analysis be in advance of such things if they're done. That
22 is, would those results be available before people got
23 started on failure mode and defect analyses?

24 DR. MATTSON: That's a good question. I'm going
25 to talk in this next bullet about failure modes and defects

mgcDAV 1 analysis. Maybe I ought to say what I know, and then we can
2 bring the two points together.

3 Lessons Learned is saying that we've had good
4 experience this last summer in using risk assessment,
5 probablistic assessment techniques as an overlay to the
6 deterministic criteria and deciding whether the auxiliary
7 feedwater systems in the Westinghouse and combustion
8 engineering designs were reliable systems. In that
9 exercise, we used competent people which helped to shorten
10 the time -- very highly skilled people. But the review was
11 accomplished very shortly, apparently with good uniformity,
12 and significant improvements in reliability were
13 accomplished with relatively insignificant changes in the
14 design of aux feedwater systems.

15 Now we say that we ought to use some form of
16 probablistic assessment of system reliability beginning now
17 in the licensing process. And there are choices as to how
18 to proceed. The Office of Research is working on a thing
19 called the Integrated Reliability Evaluation Program, which
20 is a thing agreed to in principle with the Director of NRR
21 for simplifying from event trees and fault trees and
22 training cadres of people to apply these simplified
23 techniques and to look at operating plants or plants near
24 the end of the OL licensing process where design details are
25 available, to extend the reach and application of the

mgcDAV 1 reactor safety study methodology. The Task Force completely
2 supports that effort, and we encourage its use as an overlay
3 to the existing deterministic criteria.

4 The vibrations we received from the ACRS are
5 really more than vibrations. They are in their letter on
6 the response to the short term lessons, with strong support
7 for using these integrated reliability assessment techniques
8 from the reactor safety study.

9 (Commissioner Gilinsky left the room at 10:50
10 a.m.)

11 There are several ways to come at it. You can
12 take individual plants and do all systems, and you can do
13 particular systems and do them on all plants. The latter
14 approach was the one that was used last summer by the
15 Bulletins and Orders Task Force, using people from the
16 research laboratories to look at aux feedwater. I think the
17 Office of Research prefers to use individual plants,
18 probably plants different than the plants that were used in
19 the reactor safety study. We don't have any special quarrel
20 with that, except that to be alert, as you go through these
21 individual plants, as you identify systems that may have
22 generic problems that you can stop, look at that system
23 broadly in all plants like aux feedwater that was done last
24 summer and make decisions on those individual systems.

25 I'm sorry, Mr. Chairman. The two approaches are

mgcDAV 1 complementary to one another on these two bullets. And the
2 way that they are married and moved forward should be
3 carefully coordinated.

4 I think in the action plan that we recommend that
5 there's time in the next month or so for the Office of
6 Research and the Office of NRR to get their heads together
7 on what's necessary here and what the two things will
8 accomplish, what approaches are going to be taken plant by
9 plant or system by system, and then make decisions on which
10 to do first, or whether to do it in parallel.

11 CHAIRMAN HENDRIE: Well, it seems to me that the
12 IREP results are likely to be incoming through the first,
13 probably by a fair margin in time. And I wouldn't like to
14 see that held up. I think it's an important effort because
15 the aim there is to see that if there are high probability
16 vulnerabilities out there that we haven't come to in the
17 classic review process --

18 DR. MATTSON: I was not suggesting that IREP would
19 be the one to wait. I was suggesting that if there was
20 something useful that IREP would produce, the first
21 recommendation -- then perhaps we've got to consider that.
22 I suspect the answer is that you need to do them both in
23 parallel. The IREP is being done pretty much by the staff
24 and has a crosscut of system reliability and the failure
25 modes and defects analysis of non-safety grade equipment

mgcDAV 1 being done as a sort of fundamental re-look at the
2 conformance with the regulations that speak to the goodness
3 of equipment importance to safety.

4 COMMISSIONER AHEARNE: As far as the how-to-lay-on
5 to the utilities, do you expect though that the actual plan
6 will address how you would develop and flesh out the
7 instructions you are giving?

8 DR. MATTSON: Yes.

9 MR. LEVINE: I haven't seen the matrix that
10 Roger's talking about that Westinghouse used to do this
11 system interaction stuff. It sounds to me like there could
12 be considerable overlap between IREP and that program, and
13 both these programs are going to tax resources enormously
14 across the country. I would suggest that Research and IREP
15 get together and see if we can make an accomodation.

16 COMMISSIONER AHEARNE: It seems to be a reasonable
17 request.

18 DR. MATTSON: Well, the last bullet on this page
19 has to do with the question of whether design features need
20 to be added to existing plants and future plants for
21 mitigation of degraded core and core melt accidents.

22 The way we started with this problem was the
23 question of hydrogen, the amount of hydrogen generated at
24 Three Mile Island, and the fact that it exceeded the design
25 basis for hydrogen in all plants. It was a large dry PWR

mgcDAV 1 containment at Three Mile Island. The same amount of
2 hydrogen in other containment would have generated different
3 kinds of problems. Not all of them were difficult as the
4 ones at Three Mile Island, but some of them were difficult.

5 Smaller containments with smaller design pressure
6 or with different kinds of equipment inside could have
7 experienced different consequences as a result of the
8 hydrogen burning inside of Three Mile Island, and what we
9 decided for reasons explained in some detail in the report
10 is that we should come at this question of hydrogen
11 narrowly. So we backed off, and we started with the
12 question of defense in depth and its embodiment as a concept
13 in our regulations.

14 We say that we think there are three levels of
15 difference in depth, the first level being for normal
16 operations and expected events and the design objective
17 being as low as reasonably achievable, off-site release; the
18 second level being the design bases for accidents, there the
19 objective being off-site consequences less than the Part 100
20 guidelines. And the design basis, of course, sets the
21 design of certain engineered safety features like emergency
22 core cooling and containment.

23 The third level of defense in depth is less
24 completely articulated, but it's there, in our judgment,
25 nevertheless. That is consequence mitigation or limiting,

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1 including accidents beyond the design basis for engineered
2 safety features. We would put in that level of defense
3 emergency preparedness, containment leakage, some of the
4 environmental qualifications that we require like radiation
5 for things inside of containment, and our siting policies
6 certainly give us consideration of this third level of
7 defense in depth.

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DH gsh 1 What we see is a piecemeal mitigation strategy. It
2 hasn't been thought through in terms of the relation of
3 the design to the emergency preparedness and deciding in any
4 definitive way since the early 1960s.

5 And what we see in Three Mile Island that
6 significantly exceeded the design basis. And by looking at
7 that event, we see other events in our operating experience
8 that have involved sequences of failure beyond the design
9 basis in several respects.

10 One other example is sufficient to illustrate the
11 point -- the Davis-Besse transient.

12 COMMISSIONER AHEARNE: You mean the earlier one.

13 DR. MATTSON: No, the Davis-Besse transient of
14 December, 1977. That one stands out more in my mind than
15 others, perhaps.

16 We further, for reasons explained in the report,
17 come to the judgment that TMI 2 is a significant precursor
18 of core melt and we come to the judgment for much the same
19 reasons that we did in the context of ATWS that it is very
20 difficult to prove or to assure to a sufficiently high
21 level that prevention measures satisfy the National Safety
22 Goal for nuclear power plants. Recognize that I've already
23 said this morning that that goal needs better articulation.
24 It comes out different than what we're presuming it would
25 come out. And some of our recommendations might be

DH gsh 1 unnecessary. But judging what we think that national safety
2 policy is, we recommend that mitigation of degraded core
3 events and core melt events should be required. And we
4 stopped short of recommending that they become design basis
5 accidents.

6 We, instead, come with a recommendation that the
7 design basis accidents and the designs supplied in present
8 systems, as evidenced by Three Mile Island, have some
9 considerable capability beyond the design. Except in the
10 case of hydrogen and perhaps in the ability of emergency
11 core cooling system to handle debris, which is the smaller
12 point.

13 Now by mitigation, I don't mean limit the
14 consequences of degraded core cooling events or core melt
15 events to part 100. I don't think that that's a reasonable
16 expectation.

17 By mitigation, we mean cutting the consequences
18 once they have gotten beyond the design basis of the
19 facility. And we think we see potential for feasible
20 engineering changes to accomplish a further capability to
21 mitigate catastrophic consequences.

22 And those two feasible considerations, two feasible
23 design features that we recommend for high and prompt
24 attention are hydrogen control inside of containment for
25 the degraded core event and controlled, filtered venting of

DH gsh 1 containments for the core melt event.
2 Now the controlled filtered venting, in our minds,
3 is a way to achieve significant off-site consequence
4 mitigation by assuring that the pathway to man is through
5 failure of the containment by melt through the base rather
6 than by a prompt overpressure above-ground failure and prompt
7 release of the gaseous fission products to man.

8 That does several things. It buys you time, which
9 gives you the decay capability. It gives you better off-site
10 people management capabilities. It also give you the
11 capability to interdict the source of release. If you can
12 control it, you can filter it. If you can filter it, you
13 can writer criteria for how much you want to knock the
14 dose or concentration of radioactivity down before you want
15 to release it.

16 Now I said that it looks feasible for us to move
17 in this direction. I have to qualify that feasibility.

18 We are unable, given the current state of technology,
19 to come to you and say, here are specific recommendations for
20 specific design features that you ought to consider for
21 backfit to all plants. There's more information that needs
22 to be gathered, more people that need to be involved in the
23 discussion.

24 It needs to be coupled with this -- what is our
25 national safety goal question?

DH gsh 1 So we recommend that you move soon, and I don't
2 mean tomorrow, but within the coming months, with a notice
3 of intent to conduct rule-making.

4 That would give the agency the opportunity to put in
5 one place what its policy on catastrophic consequence
6 mitigation is, how to do siting, how to do design features,
7 how to do emergency plans, emergency training.

8 They all fit together in a consequence mitigation
9 strategy.

10 In that notice of intent period, nine months or
11 a year, there would be an opportunity to accelerate and
12 collect information from the reactor safety research program
13 now ongoing for improved safety, which contains a large
14 element on controlled, filtered venting containments and an
15 opportunity to explore alternative ways of hydrogen control
16 in addition to inerting.

17 For example, burning of hydrogen upon its generation.
18 And provide the commission with a better body of information
19 to make a decision on a proposed rule requiring such
20 mitigation features, say a year from now or a year and a half
21 from now.

22 Well, I spent an hour and a half doing the policy
23 things. If I could switch quickly to Slide No. 6, I'd like to
24 run down some of the details.

25 (Slide.)

DH gsh 1 If you look through 6 to 10 of the slide pages,
2 you will find that there are 14 areas of recommendations.
3 Some are heavier than others and some of them have many
4 subparts.

5 I'll just try to run down them quickly and I'll
6 tell you that having thought broadly, the way we described,
7 we came to each of these individual things and said we need
8 to change.

9 Under utility management involvement, it's more
10 policy recommendation of the need for utility management to
11 recognize the role it's playing in assuring that people at
12 all levels attend to safety.

13 One specific change there would be to require
14 certification by the vice president of operations of a
15 utility of the competence and fitness of his operator
16 license applicants.

17 COMMISSIONER AHEARNE: Would we also set up some kind
18 of criterion that could be against which he would be making
19 the certification?

20 DR. MATTSON: Well, we have qualification criteria
21 and we have recommendations to improve those qualification
22 criteria.

23 So one of the things that he would be doing was that
24 the person was qualified according to those criteria.

25 COMMISSIONER BRADFORD: What are you really saying

DH gsh 1 there, Roger? That he expects the person to pass the exam?

2 DR. MATTSON: No. He certifies that this is the
3 person that he personally has met, talked to, reviewed his
4 credentials, reviewed his capabilities and, in his judgment,
5 as the senior person responsible for safe operations, this is
6 the person to be at the controls in the control room.

7 It's a little bit like Admiral Rickover saying that
8 he's personally interviewed the engineering officers of the
9 watch in his naval vessels.

10 COMMISSIONER AHEARNE: In a lot of cases in the
11 Navy, they do the interviewing even before they let them into
12 the program.

13 DR. MATTSON: I would suspect that the vice president
14 for operations is not going to invest a whole bunch of
15 resources and time on a person that he's later going to find
16 he can't certify to the commission.

17 COMMISSIONER KENNEDY: But he can't be interviewing
18 if it precedes the man's qualifications, can't be itself the
19 basis for his certification, which I think is the point.

20 DR. MATTSON: No. If I were the vice president,
21 I'd want to do something at the front end. I'd probably
22 want to do some checking in the middle and then at the end,
23 all I'd have to do is make a certification.

24 COMMISSIONER AHEARNE: Speaking for myself, I'm
25 hoping that NRC does something for that front end.

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DR. MATTSON: Okay, good point.

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CHAIRMAN HENDRIE: Why don't we recognize that there will be a paper to read and further reading, and the hand tooling of each of these points at this time will result in our not getting through them because I'm going to break the meeting at about 10 minutes of 12:00.

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DR. MATTSON: Even worse, there are a number of task force members in the audience. And when you gentlemen state your personal preference, they'll want to change everything that they've written and will never get the report out.

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(Laughter.)

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COMMISSIONER AHEARNE: You're trying to get me to believe that when we make a comment, the staff runs off and changes it?

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DR. MATTSON: I've seen it happen, sir.

(Laughter.)

CHAIRMAN HENDRIE: I'd just be pleased to know that they had been listening.

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DR. MATTSON: In training programs, this particular one is narrow to personnel other than operators and senior reactor operators.

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And what we recommend is that each licensee be required to review over the course of, say, a year, using position task analysis, every operations organization position

DH gsh 1 and then thoroughly compare that position task analysis with
2 the training received and make decisions on how the training
3 needs to be improved and report back on what has been done.

4 And that year is a good time, I think, because it
5 would be in parallel with the evolution of requirements and
6 certifications and training programs from the Institute
7 for Nuclear Power Operations. The two can build upon one
8 another, the institute offering advice and assistance to
9 individual utilities on how to go about meeting what the NRC
10 will expect in terms of criteria for these training programs
11 for other operators and senior reactor operators.

12 In plant drills -- I've already mentioned that
13 briefly -- each licensee establishes a program of in-plant
14 walk-through drills for the entire operational staff and the
15 technical management support staff.

16 Again, we, I think, suggest the possibility of
17 going further with drills and prototypes along the lines that
18 Commissioner Gilinsky has offered.

19 In operator licensing, 8 specific recommendations --
20 I'll run through them quickly.

21 We think there's a need to identify by name the
22 sources of operator errors in operating plants. We think we
23 have the information to do that. We think it could be
24 handled under the privacy act in an acceptable manner for use
25 by operator licensing reviewers and NRC.

DH gsh 1 That is, when they have a person in front of them
2 who has exhibited a tendency to make mistakes in the past,
3 they can try to discover the heart of the problem and make
4 a decision as to whether he continues to be qualified to
5 hold the license.

6 In that regard, we think we would also improve
7 the interface or the collaboration between NRR and I&E in
8 making these license renewal decisions. There are experiences
9 and knowledge held by I&E inspectors by virtue of their
10 closer presence to the site about operating staff capabilities,
11 probably need to be fed back into qualification examinations.

12 A unique recommendation is to require one week of
13 NRC staff training of all new reactor operators;

14 that is, establish a program where the regulatory
15 interest criteria, fundamentals, underlying policies,
16 expectations, what have you, are described and explained to
17 all reactor operators.

18 It's a large resource problem. And we would
19 anticipate that you don't assign somebody to that task forever,
20 that it's a rotating assignment for people within review
21 organizations.

22 It gives them some feedback and it makes sure that
23 you have a continuing refreshing of that regulatory perspective

24 We would also require a multi-disciplinary NRC
25 staff oral examination of all new senior reactor operators and

DH gsh 1 shift technical advisors, and biennially thereafter. That is,
2 as part of the oral examination for senior reactor operators
3 and shift technical advisors, we would subject them to more
4 than an operator licensing examiner review.

5 We'd put them in front of a board, if you will, of
6 diverse skills and knowledge about the dynamic response of
7 nuclear power plants.

8 COMMISSIONER AHEARNE: And that would be conducted
9 by the NRC?

10 DR. MATTSON: Yes. The passing of that examination
11 would be a prerequisite to renewal of the license.

12 Now I should pause. We haven't got a license for
13 shift technical advisors yet. Down on 1.8 at the bottom of
14 the page, we say that some people ought to sit down and
15 think through a disciplined way of what other people ought to
16 be licensed.

17 We see a couple of prime candidates. A shift
18 technical advisor might be one. I tried not to prejudge what
19 others might need to be. There's some expertise that needs
20 to be taken into account.

21 Okay. We also want to try to build another element
22 of this bridge between the staff and the operations crew. We
23 recommend an annual workshop of reactor operations to give
24 reactor operators an opportunity to come back to the fount
25 of regulatory requirements, tell us what's wrong with them,

DH gsh 1 help us solve problems that they know about and help us help
2 them to understand what we're all about.

3 COMMISSIONER AHEARNE: you don't mean all operators.

4 DR. MATTSON: No. What we would think would be
5 one reactor operator and perhaps one senior operator for, say,
6 a three- or five-day period once a year -- maybe you do it
7 regionally, but perhaps you do it nationally. Probably you
8 do it nationally.

9 That would mean you'd break it into workshops. You
10 would take on specific problem areas and current operating
11 experience with current licensing requirement developments
12 or what have you and try to build that bridge a little better.

13 There's a tremendous gap there. We've seen it
14 before Three Mile Island. I think you'll recall the work
15 done at the Yankee organization on understanding the needs
16 and interests of reactor operators.

17 We've seen the gap and we think that a combination
18 of these things might accomplish it.

19 Another recommendation is that we know that the
20 Institute for Nuclear Power Operations is going to go into
21 the business of certifying instructors for operations
22 training.

23 We specifically culled that area out as one that
24 ought to be looked at soon because there are in the paper
25 before you now, on the operator licensing branch, there's a

DH gsh 1 specific recommendation on how operator instructors ought to
2 be qualified.

3 That's a small point.

4 We recommend placement of operator licensing
5 examiners at regional training centers. We'd like to see some
6 of these examinations at the simulators rather than in the
7 office in Bethesda. And our presence in the operating
8 license in this area, where there are a number of training
9 institutions is probably a good idea.

10 We also eliminate part-time operator licensing
11 examinations. You see, we're moving in a direction of
12 building a stronger, broader operator licensing function that
13 has resource implications.

14 Under NRC staff coordination on qualifications and
15 training —

16 COMMISSIONER AHEARNE: I just have a comment on your
17 proposal. It's an insightful, intelligent -- it's very good.

18 DR. MATTSON: NRC staff coordination thing here
19 means that we see a variety of activities in industry and
20 professional societies with their standards-writing activities
21 in the staff on personnel qualifications and training.

22 We really need to have a better coordination and
23 a game plan. And writing this action plan is a chance to draw
24 all this together.

25 We'll also have a chance to see Mr. Kemeny's

DH gsh 1 recommendation in this area. And I suspect that they will
2 dwell to some extent on personnel qualifications.

3 Licensed reactor operators is a more significant
4 area. I'm going to make recourse to the specific words. We
5 recommend that the shift supervisor -- that is, the person
6 in charge of operations on shift at the station -- should
7 have at least a bachelor of science degree in engineering or
8 the physical sciences and that he should also hold a senior
9 reactor operator's license issued under the new requirements
10 and have served as a senior reactor operator for one year
11 before he is in this command position.

12 I should say at the outset that these specific
13 things cannot be accomplished tomorrow. We recommend in the
14 current draft over the next period of the next years to
15 work for this. And that four years might even change
16 between now and Friday.

17 We're tussling with whether four years is
18 necessary and sufficient time.

19 COMMISSIONER AHEARNE: You're probably not going to
20 be able to pin it down much harder than that.

21 DR. MATTSON: We're probably going to put in there
22 bachelor of science degree or equivalent training, but that
23 will put the onus on us and others to develop in some
24 detail what we mean by "or equivalent."

25 I think that we've had some success with doing that

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with certified health physicists in the radiation protection area. And I think that we can probably have the same kind of success with shift supervisors.

1 COMMISSIONER AHEARNE: You might do something like
2 requiring a degree, but with then a comment that it might be
3 modified or waived on a showing of equivalence; a little greater
4 requirement on them.

5 DR. MATTSON: Yes. The senior reactor operator, in
6 this same time period we recommend that senior reactor
7 operators should have at least the same general technical
8 education and training in transient and accident responses as
9 now required for the shift technical advisor. What that means
10 is roughly 60 hours of college-level training for all senior
11 level reactor operators, plus special training to the unique
12 characteristics of the individual design as to its dynamic
13 response to upset conditions.

14 In addition, senior reactor operators should have
15 two years of additional nuclear power plant experience beyond
16 that required of a reactor operator, with a minimum of six
17 months of the two additional years being served as a licensed
18 reactor operator.

19 There is another recommendation in this area having
20 to do with whether or not 12 months to accomplish the funda-
21 mentals course in operator training -- I'm sorry, 12 weeks --
22 is sufficient. We don't think it is. We have our idea of
23 what we think ought to be accomplished in that 12 weeks and
24 we say somebody ought to spend some time and really think
25 through that basic fundamentals course. We haven't had time

1 to think through it and we think it needs to be.

2 The licensee technical and management support --

3 COMMISSIONER AHEARNE: Could I switch to the
4 gentleman on your left and ask him a question?

5 Ed, how does NRR view the recommendations coming out
6 of Lessons Learned with respect to the recommendations proposed
7 in the operator training paper? Do you intend to do any
8 revisiting of the operator training proposal?

9 MR. CASE: I think we'd revisit that based on input
10 from the Commissioners we've received from you, but not from
11 the others, as far as I know, and the Lessons Learned input.
12 So we'd take both of those into account in coming up with
13 recommendations.

14 DR. MATTSON: Licensee technical and management
15 support is really just the task force recognizing and supporting
16 the work going on with the Quality Assurance Branch. You
17 recall Mr. Denton sent out a letter asking all licensees to
18 describe what they had in these areas. They are retaining a
19 contractor to review what the licensees have described and to
20 extract from work like ours and from other sources what the
21 criteria ought to be and get back to each of those licensees
22 with suggested required changes in their programs.

23 It's a little bit of a backwards way of coming at the
24 problem, although I think it was useful to start early to
25 heighten the sensitivity of individual licensees, if for no

1 other reason than to make them think through what kind of
2 expertise might they need and where would they get it if they
3 needed it tomorrow.

4 This is something that the AIF Ad Hoc Policy
5 Committee on Three Mile Island has worked on fairly hard, the
6 capability of the industry to respond to accidents and, by
7 implication, then, building upon what individual licensees
8 ought to have in the future. So there is, I think, progress
9 being made by the Atomic Industrial Forum in this area. It's
10 an important area.

11 Licensing of additional operating personnel we've
12 described already. Let's go to the seventh slide.

13 (Slide.)

14 The staffing of the control room. We recommend two
15 things be done.

16 First, we need to get the regulations consistent with
17 more stringent staff requirements. We've been exceeding the
18 regulations for some years, for what we require for presence
19 in the control room. We need to keep bookkeeping straight
20 there.

21 But in addition, we need to consider whether what
22 we may require is enough. The Task Force recommends we
23 consider a requirement for an SRO and two reactor operators in
24 the control room at all times. The senior reactor operator
25 seems to be helped by the shift technical advisor in at least

1 some plants. A number of operating plants will use persons
2 holding SRO licenses to meet the shift technical advisor
3 requirement beginning in January 1980.

4 Under working hours--this is not a problem that
5 flows directly from Three Mile Island; it's a problem that
6 flows from heightened sensitivity to operations, which flows
7 from Three Mile Island. And a number of people have said to
8 us, we need to do something about working hours for operations
9 crews in nuclear plants. We want them fit, we want them
10 capable and able to do what might be expected of them on a
11 moment's notice.

12 We see evidence of places that use operating crews
13 and other places that abuse operating crews. We think there
14 ought to be regulatory requirements setting minimum criteria.
15 We suggest no more than two shifts of 12 hours on consecutive
16 days. That is, in any 24-hour period, you work 12 hours and
17 in the next 24-hour period you can only be expected to work
18 12 hours, and then you're expected to return to a normal
19 8-hour shift duty.

20 Whether that's the right one or not, we're not
21 married to these numbers. We think the Operator Licensing
22 Branch and the staff people can come up with the criteria.
23 The point is there ought to be one.

24 Emergency procedures. I've alluded to that already.
25 First the staff review of all emergency procedures is the

1 basic recommendation. The Bulletins & Orders Task Force
2 already has a significant start on that by virtue of their
3 review of small break LOCA procedures and guidelines and
4 analyses over the course of the summer. It's still ongoing.

5 The short-term Lessons Learned spoke to three phases
6 of reanalysis of transients and accidents, and in each phase
7 of the three phases there was a new guideline to review the
8 new procedures. So we're well on our way for operating plants.

9 We also have promised the ACRS that we will review
10 the emergency procedures on all new OLS. We said we'll
11 probably do the ones next year better than the ones we do
12 this year because this is a learning experience.

13 There are many suggestions, including an articulate
14 one from the ACRS, that maybe we write emergency procedures
15 the wrong way, that there's ways to use the written word in a
16 crisis situation that are preferable to other ways, and some,
17 in their fresh, renewed interest in emergency procedures,
18 reviewed the ones that are there today and say, we've got to
19 be able to improve these things, they don't have enough
20 symptom instruction, they don't do this kind of instruction,
21 they give too much do-this kind of instruction.

22 People in the industry have suggested that maybe,
23 in addition to the instinctive response, rapid utilization
24 event-oriented procedures, it might be useful to have event
25 mitigation procedures which are more oriented to, I don't

1 care how you got to the situation; if you're in the following
2 situation, here are alternative ways for getting out of the
3 situation. All of that with some discipline, with some
4 additional technical disciplines to the staff, I would think,
5 in education theory and crisis management theory, and consultants
6 or staff members if it's necessary to have them.

7 We need to go with improving emergency procedures
8 plant by plant the way we're doing it. But we also need to
9 come generically at, are we doing it the right way, to optimize
10 the way in which emergency procedures are handled.

11 CHAIRMAN HENDRIE: You're going to have to find some
12 way in the typical plant to get them catalogued and simplified
13 a little better.

14 DR. MATTSON: Access is another question.

15 CHAIRMAN HENDRIE: When the board goes bang and after
16 you turn the enunciator horn off and contemplate what's going
17 on, it doesn't help much to face 12 looseleaf notebooks and
18 scratch your head over where in there is the procedure that
19 tells you what to do now.

20 Now, obviously, operators who have gone through
21 training and worked on a plant are in enormously better
22 situations to deal with the 12 notebooks than some character
23 who is trying to upgrade his own feeling for the thing and
24 has just been around a week in a simulator course. But there
25 is a guideline sort of problem there: How do you get speedily

1 into the ones that you need, and so on?

2 DR. MATTSON: One thing that helps that is the
3 addition of the extra person in the control room to stand
4 back and integrate and advise the shift technical advisor,
5 especially in the area of symptoms.

6 CHAIRMAN HENDRIE: But whoever is to delve into that
7 collection of material, now, and find the right place, and
8 then once you've got one that seems to fit, time will often
9 press a bit. You're then faced with the proposition, really,
10 have I got the right procedure? Shouldn't I get on and follow
11 it, or should I spend some more time making sure that there
12 isn't a better one, or that there aren't two that I ought to
13 have before me to keep in mind as we go down this heretofore
14 unencountered peculiarity in the system?

15 DR. MATTSON: That's part of what I said we needed
16 to look more broadly at, this review, to make sure the right
17 technical information is in there plant by plant. We also
18 need to come back to some of the theories of why and how
19 they're useful.

20 Verification of correct performance of operating
21 activities. Mr. Kennedy, I know this is an area in which
22 you've expressed to staff recently about double-checking
23 components to see that they're aligned properly or performing
24 properly after maintenance.

25 We've looked at this independent verification of

1 correct performance of operating activities and think that
2 there's a need for two levels of verification. We would have
3 not only independent human verification by the licensee, but
4 also automatic verification by machine. Therefore, we're
5 recommending a backfit of Regulatory Guide 1.47 on status
6 monitoring of safety systems in the control room; and we're
7 recommending that each licensee establish a program for main-
8 tenance, surveillance and other normal operating activities
9 verification.

10 We've already heard that some licensees plan to use
11 their shift technical advisor cadre in this capacity, that is,
12 this dedication to safety of the shift technical advisor
13 cadre, the things they do in addition to their prompt response
14 capabilities in the control room have to do with safety. In
15 some plants they'll do it the way we initially recommended it,
16 evaluating operating experience with that same group of people.
17 In some plants they'll also perform third party verification
18 of operating experience. I've alluded to this. Two points:

19 We completely support the establishment of NRC's
20 lead role and responsibility in evaluating operating experience.
21 We've already required licensees to have similar engineering
22 groups in place by the first of the year. The Institute for
23 Nuclear Power Operations will be along after the first of the
24 year. All of these people need to be tied together somehow
25 so that their lessons are shared, so that their insights are

1 shared, and we think that we should take the lead or the
2 agency should take the lead in establishing some sort of
3 network.

4 We also should pay attention not only to how these
5 lessons get resolved in the licensing process, but also to
6 how the lessons get down to the operator. I keep meeting
7 operations crews and I ask about this or that regulatory
8 pronouncement; they aren't familiar with what I'm talking
9 about. There's the need to keep communicating up and down
10 these lines of command.

11 COMMISSIONER AHEARNE: While you're getting those
12 educational psychologists to address how we'd better approach
13 defining emergency procedures, you might also address that
14 last question.

15 CHAIRMAN HENDRIE: If it turns out to be necessary,
16 we can keep in mind that each of the people that you want to
17 get to in fact holds a license from the agency, and we have
18 a direct string between this place and where that guy domiciles
19 and, if necessary, direct communication is an option.

20 DR.. MATTSON: That flavor is clearly on there.

21 CHAIRMAN HENDRIE: In addition to the periodic
22 workshop sorts of things, which provide a more generalized --

23 COMMISSIONER KENNEDY: If you're going to do that,
24 you've got to be sure that you simply don't overwhelm the guy
25 with paper, which finally goes straight from his mailbox to

1 his out box.

2 DR. MATTSON: The thing we're trying to achieve,
3 you see, is some significant advance in professionalism and
4 excellence of reactor operations as a career, as a life work.

5 COMMISSIONER AHEARNE: Have you anywhere carried
6 with it any of your recommendations to go along with that,
7 some sense that the utilities might pay them more?

8 DR. MATTSON: I've carried it everywhere I've gone,
9 and I've been so abused for carrying it. Yes, sir. I don't
10 see how people will meet these criteria without paying them
11 more. And I firmly believe they ought to be paid more.

12 (Slide.)

13 The next page has to do with the man-machine
14 interface. I think one of the most useful, potentially most
15 productive recommendations in the task force is the 7.1 control
16 room reviews. Basically what we're saying is each licensee
17 perform a one year long review of his control room. We have
18 a list of things that are to be studied and accomplished in
19 the course of that review.

20 We're working now with the resources we have, and
21 the resources are growing, to develop criteria to promulgate
22 this requirement within the next few months. We think we
23 can actually initiate the review without completely definitive
24 criteria, instead providing opportunities for exchange through
25 the course of the year as we have further learning experiences

1 on control room design and control room backfitting.

2 I want to make it absolutely clear that we do not
3 envision a control room review where the licensee studies it
4 for a year, comes back and rationalizes why he didn't make
5 changes. There are specific changes of a generic sort that
6 we know we will want to see.

7 One is the second point on this sheet, plant safety
8 status display.

9 (At 11:32 a.m., Commissioner Bradford leaves the room.)

10 DR. MATTSON: In the parlance of control room safety
11 engineers, we want them to describe to us a process variable
12 state vector, that is, a vector whose components characterize
13 the current status of the plant. That state vector we want
14 centrally displayed. We want it to be paramount in the
15 attention of training and accident response, training and
16 what have you.

17 It's also that state vector that the task force
18 feels is probably the set of information that gets communicated
19 to NRC. First, it ought to go to a central point in the
20 control room, and there ought to be good displays and diagnostic
21 devices applied to that information for the operator's use.
22 It also ought to go to the on-site technical support center,
23 which these people are all establishing pursuant to the
24 short-term lessons learned.

25 On the on-site technical support center, you do a

1 little bit different things to it. You want to be able to
2 record it so that when the people assemble in the on-site
3 training and control center, they can do some training without
4 having to go to the control room and bother the operators who
5 are still in the control room situation. And it also ought
6 to be transmitted off-site. There are people who suggested it
7 ought to go to the vendor. The industry, for example, suggested
8 that it ought to go to the vendor and the AE. The states will
9 probably suggest it ought to go to them. Staff will suggest
10 and I'm sure that some of you will, that it ought to go to the
11 NRC.

12 Well, we're working hard and Saul has a research
13 program with Sandia that's working on how to put things in the
14 right format and send them. We're requiring the licensees to
15 go out and think about this state vector, because we think
16 that's the thing that ought to be sent to us. We're going to
17 hear from other investigatory groups as to the relative roles
18 of the state and Federal Government and the operators and what
19 have you.

20 By the time some of this technical work has progressed,
21 we'll know better who to send it to. At this point, we think
22 we'd like that state vector.

23 Disturbance analysis systems, we do not recommend
24 anything specific in plants today, and we have recommended
25 that Saul do some research on disturbance analysis, and I

1 think that's planned. These are the more sophisticated noise
2 analyses and diagnostic systems developed in Europe and in
3 this country. They have potential for operational aid in the
4 future.

5 Manual versus automatic operations. We tried to
6 come at the fundamental question of, should there be no
7 reliance on the operator for the first 15 minutes, that is,
8 should you forbid operator intervention, or should there be
9 what we have now, which allows productive intervention but
10 still automates equipment that we think is so important that
11 we can't rely upon the operator to initiate it. Or I guess
12 the third possibility would go to non-automatic, all operator
13 command.

14 There's been a standard under development in the
15 ANSI program for several years, and I think if I could charac-
16 terize my view of the difficulty with that standard, it's the
17 reluctance on the part of the licensing staff to accept it.
18 It's a bunch of engineers trying to judge what's really a
19 human factors question.

20 Now, there are engineering elements to it, clearly,
21 and there are basic safety elements to it. But we recommend
22 that we do some serious study of manual versus automatic and
23 try to bring some clarity into this area of confusion down
24 through the years. We are not recommending that we prohibit
25 operator intervention in the United States nuclear power

1 plants, not at this time. I would say it's not even a strong
2 interest of the task force.

3 We talked about it. We looked at what others have
4 said about it. And we want the operator there for productive
5 intervention. We need to get to the question of how much
6 credit to give to the operator, not how much debit to take
7 away from him, because we're not that confident of his training
8 any more. When we get over that, then we can start talking
9 again about how much credit we give some of these training
10 things.

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1 Standard control room design, our outlook on the
2 task force has been a retrospective outlook. We're looking
3 at what to do to operating plants. We're doing the same
4 thing in plants already designed and under construction, to
5 improve their safety in ways we think are necessary,
6 expecting that if we do that job correctly, and we
7 articulate our goals and objectives correctly, building on
8 that experience, then criteria for future plants will be a
9 natural consequence of our work.

10 Standard control room designs we know are
11 ongoing. They seem to be learning from the experience of
12 Three Mile Island and there seem to be significant changes
13 made in people's approach to control rooms for the future.
14 Therefore we noted in passing in the report, and encouraged
15 that work to go forward.

16 (Slide.)

17 The next to the last slide, I have already treated
18 reliability assessments of final designs, the so-called IREP
19 program that Saul is working on in concurrence with NRR.
20 I'm sure we'll have lots of discussions about the best way
21 to do it, and I am sure we will eventually be up here with
22 you to tell you what we considered as alternatives and what
23 ways we've chosen.

24 Suffice it to say a recommendation on reliability
25 assessment techniques be overlaid on deterministic criteria

kapDAV 1 to identify outliers and to identify outliers in the sense
2 of specific designs that aren't reliable enough compared to
3 the best available technology and other designs, for
4 example, and to identify weaknesses in deterministic
5 criteria.

6 For example, the single failure criterion does not
7 consider passive failures of components. In aux feedwater
8 reviews this summer, we found some single passive failures
9 which were the key weak points in aux feedwater system
10 reliability.

11 Does that mean we ought to change the
12 deterministic criteria for application to future plants?
13 Review of safety classifications and qualifications -- I've
14 talked about that. Design features for core melt and
15 degraded core accidents, I've talked about that.

16 (Slide.)

17 The safety goal for reactor regulation on the last
18 slide -- again, we recommend a lot of attention at the
19 policy level to this. We need better subjective criteria
20 and we think you can set quantitative criteria in some
21 areas. And we think we ought to get on with doing that. We
22 caution that there are places where probabilistic assessment
23 works, in the licensing process. There are places where it
24 doesn't work. We need to be careful to recognize that fact
25 and try to distinguish the two places. And we need to be

kapDAV 1 careful that probabilistic assessment doesn't lengthen the
2 decision process. It has the capacity to do that when you
3 are reviewing somebody else's probabilistic assessment with
4 your own. There are differences in methods; there are
5 differences in judgment that have to be exercised in
6 turning out those kinds of analyses. The goal ought to be
7 to set more definitive policy for making better and more
8 timely decisions and not to set a policy that makes the
9 decisions harder and longer.

10 Staff review objectives -- we started out a month
11 ago trying to draw an organization chart for Harold and we
12 gave that up, decided we couldn't do it. He had other
13 things besides Three Mile Island to be concerned with.
14 We've met with him. We've described some of the
15 considerations that ought to go into his organizational
16 thoughts as we come off of these task forces and look to the
17 future.

18 We've listed eight objectives to meet in
19 restructuring the Office of Nuclear Reactor Regulation as
20 things we've learned about the way we do business as a
21 result of looking at Three Mile Island.

22 Finally, the NRR emergency response team, I've
23 explained the need for that and the preparation of the
24 technical backup and the management folks in an accident
25 situation. And that's all.

kapDAV 1 COMMISSIONER KENNEDY: Thank you very much. That
2 was splendid.

3 COMMISSIONER AHEARNE: I look forward with great
4 interest to seeing the report.

5 CHAIRMAN HENDRIE: I think in view of the time,
6 I'd be glad to defer any substantive further discussion
7 until the meeting which I expect John, we ought to look
8 forward to in three weeks.

9 COMMISSIONER AHEARNE: That's fine with me.

10 MR. MATTSON: If I could offer a suggestion. It's
11 the same one I offered to ACRS in my last meeting with
12 them. Policy-makers and policy advisors have been used to
13 dealing with the same set of people in relation to Three
14 Mile Island matters. ACRS hasn't seen much of anybody
15 except Mattson and Denny Ross. On lessons learned, you can
16 talk to me. It's necessary at this point, in my judgment,
17 that we begin to broadly disseminate the capability to speak
18 to these lessons learned within elements of NRR and
19 elsewhere in the staff.

20 So, I will be pushing from my end, when next you
21 hear about lessons learned, and the action plan progressing,
22 you'll be hearing from some of the line officials
23 responsible for the eventual execution of these
24 recommendations, rather than only from the people making the
25 recommendations.

kapDAV 1

COMMISSIONER KENNEDY: Agreed.

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COMMISSIONER AHEARNE: I wouldn't want to let you go away, though, without at least thanking not only you but all the people on your effort, because clearly you have put in a lot of work and I think it's been a very useful one. And I'm sure it will end up being quite significant for us.

7

MR. MATTSON: I'd like to say that it's been an extraordinary group of people. As a manager, if you can get 15 percent self-starters that work all night and give you everything they've got, in an ordinary organization, you're doing well. This organization it was well into the 90s. It was very committee, hard-working -- excellent group of people, to sit back and take off the blinders and look broadly and, I think, deeply.

15

COMMISSIONER KENNEDY: The briefing gives every evidence of that.

17

CHAIRMAN HENDRIE: We thank you for the briefing today, and when you succeed in getting it through the print shop, we'll be even more delighted to have the report of the task force. Thank you.

21

(Whereupon, at 11:45, the meeting was adjourned.)

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