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NUCLEAR REGULATORY COMMISSION

COMMISSIONERS JOINT MEETING WITH ACRS

**DKT/CASE NO.**

**TITLE** DISCUSSION WITH ACRS ON SEVERE ACCIDENT POLICY

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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DISCUSSION WITH ACRS ON SEVERE ACCIDENT POLICY

- - -

PUBLIC MEETING

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Room 1130  
1717 H Street, N.W.  
Washington, D.C.  
Thursday, February 10, 1983

The Commission met jointly with the Advisory  
Committee on Nuclear Safeguards at 2:35 p.m.

BEFORE:

- NUNZIO PALLADINO, Chairman of the Commission
- VICTOR GILINSKY, Commissioner
- JOHN AHEARNE, Commissioner
- THOMAS ROBERTS, Commissioner
- JOHN ASSELSTINE, Commissioner

1           ACRS MEMBERS PRESENT:  
2           JEREMIAH J. RAY, Chairman  
3           JESSE C. EBERSOLE, Vice Chairman  
4           PAUL G. SHEWMON  
5           CARSON MARK  
6           CHESTER P. SIESS  
7           ROBERT C. AXTMANN  
8           DADE W. MOELLER  
9           MYER BENDER  
10          WILLIAM KERR  
11          MAX W. CARBON  
12          HAROLD ETHERINGTON  
13          FORREST J. REMICK  
14          DAVID A. WARD  
15          DAVID OKRENT  
16          HAROLD LEWIS  
17          AUDIENCE SPEAKERS:  
18          WILLIAM DIRCKS, EDO  
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P R O C E E D I N G S

1  
2 CHAIRMAN PALLADINO: Good afternoon, ladies  
3 and gentlemen.

4 We are meeting today with members of the ACRS  
5 to discuss the subject of severe accidents. Pending  
6 before the Commission is a paper, SECY-82-1B, in which  
7 the staff has proposed that a policy statement be issued  
8 regarding the Commission position on the need to address  
9 severe accident issues for existing plants and for new  
10 applications. This policy statement would be issued in  
11 lieu of any generic severe accident rulemaking at this  
12 time.

13 The ACRS has met with the staff on a number of  
14 occasions in the evolution of the proposed policy  
15 statement, and the committee is present today to present  
16 its positions regarding the staff's proposal.

17 I might add also that we received several ACRS  
18 letters on the subject, and there have been enough  
19 eye-catching points in those letters so that we really  
20 ought to sit down and discuss these matters with the  
21 committee.

22 I believe it would be helpful if we could get  
23 from the committee, or the individual members of the  
24 committee, particular suggestions on what we ought to be  
25 doing, rather than what is proposed in the policy

1 statement. Then we might also get the staff to comment  
2 on any suggestions you make.

3 I do not propose that we try to take a vote  
4 today. As a matter of fact, I would propose that the  
5 Commission, after having the benefit of this meeting,  
6 will hold another meeting to explore the issues before  
7 taking any action.

8 I would also note at this time that subsequent  
9 to the latest ACRS letter to the Commission, the EDO has  
10 forwarded a memorandum dated February 7th that  
11 incorporates some modifications as a result of various  
12 people's comments and some of the ACRS concerns. The  
13 EDO is also with us today and is prepared to discuss  
14 these changes, if there are questions on them.

15 Let me ask at this point if any of my fellow  
16 Commissioners have additional remarks before we get  
17 started.

18 COMMISSIONER AHEARNE: No.

19 CHAIRMAN PALLADINO: If not, I propose to turn  
20 the meeting over to Mr. Ray to lead us into discussion  
21 on this topic.

22 MR. RAY: Thank you, Dr. Palladino.

23 The members of the committee are pleased to  
24 have the opportunity to have this discussion with you on  
25 this subject, and I think the motive underlying it is

1 certainly very, very desirable.

2 I think it would perhaps be unfitting of me as  
3 a member of ACRS and recognizing the characteristics of  
4 most of the ACRS members if I didn't comment that it  
5 would be very nice if we could possibly have more  
6 meetings of this nature, for this purpose, before major  
7 projects are too far progressed. This might guide us in  
8 scheduling meetings for the future.

9 We have had discussions, many discussions on  
10 this subject, and as you said we have issued many  
11 reports. We have decided that we would ask Dr. Kerr, a  
12 member of the committee, to lead the discussion on this  
13 subject from that viewpoint, and then move off into give  
14 and take, and exchange of ideas and thoughts.

15 I will give Dr. Kerr the opportunity now of  
16 initiating the effort.

17 MR. KERR: I will speak briefly because a  
18 number of my colleagues are present, and I am sure that  
19 you will want to discuss more than you will want to  
20 listen to a lecture.

21 CHAIRMAN PALLADINO: Incidentally, I would  
22 encourage free exchange of questions and answers as we  
23 go along.

24 MR. KERR: By the way if I am not speaking  
25 loudly enough --

1           CHAIRMAN PALLADINO: We will let you know.

2           MR. KERB: I will mention that in our January  
3 10th letter, we did say that a great deal of attention  
4 and a great deal of dependence was being placed upon  
5 probabilistic risk assessment methodology in the  
6 decision-making process, and in the proposed method for  
7 dealing with severe accidents.

8           We expressed some skepticism about the  
9 accuracy with which one could predict the probability of  
10 very low probability accidents, and that we did not see  
11 a good methodology in place to do that, nor to compare  
12 it with any particular goal. We recognize that  
13 preliminary work is going ahead in all of these areas,  
14 but we don't see an end result that is readily in view  
15 which one could interpret as capable of dealing with the  
16 severe accident problem.

17           We also recognized or commented that in  
18 dealing with existing plants, as contrasted with the  
19 proposal for standard plant application, that apparently  
20 one was going to use some set of PRAs, some of which  
21 were specific and some of which were generic, in order  
22 to attempt to evaluate the level of safety that now  
23 existed. Then, again in a way that was not well-defined  
24 insofar as we could see, try to apply that to determine  
25 what needed to be done, if anything, about existing



1 plants.

2           We are also concerned about what we saw as a  
3 lack of attention being given to an appropriate balance  
4 between prevention and mitigation. There is a long  
5 tradition of defense in-depth in the approach that has  
6 been taken in licensing. We believe I think, that that  
7 was a wise approach and we, therefore, would like or  
8 would feel it appropriate that some quantitative  
9 attention be given to this, specifying at least some  
10 boundaries -- this much is going to be devoted to  
11 prevention, and perhaps this much to mitigation.

12           As we saw, for example, the approach to PRA,  
13 to be a bit ridiculous perhaps, but what we saw might  
14 even permit one in principle to eliminate containment if  
15 the PRA indicated that the risk was sufficiently low.  
16 One would perhaps appeal to engineering judgment and  
17 prudence in order to eliminate that possibility. This  
18 is an extreme example, perhaps, of what we saw as a  
19 possible missing link.

20           COMMISSIONER AHEARNE: In that, Bill, your  
21 concern was that there was too much focus upon  
22 prevention; is that correct?

23           MR. KERR: Not necessarily that there was too  
24 much focus on prevention, but we didn't see specific  
25 attention given to what I would call a defense in-depth

1 in the qualitative sense which might say, "Here is what  
2 we expect the prevention to accomplish, but we still  
3 think that it would be prudent to accomplish a certain  
4 fraction with mitigation, and here is sort of the  
5 boundary that we see would be appropriate for  
6 mitigation."

7           Finally, we gave some examples of specific  
8 mitigation systems or prevention systems that one might  
9 want to specify in the light of the uncertainties that  
10 exist. We didn't mean this to be exhaustive, but really  
11 to represent possible examples of systems that we felt  
12 were important and that one might therefore want to  
13 specify, in a sense almost independently of the final  
14 results of the PRA.

15           CHAIRMAN PALLADINO: Bill, with regard to the  
16 PRA comments, one question that occurred to me last  
17 night as I was re-reading some of this material. I am  
18 not an expert on PRA, so what I have to say comes from  
19 only a limited knowledge.

20           One of the pluses that I thought the staff was  
21 trying to achieve from PRA was not necessarily the  
22 numerical probabilities, but rather the discipline  
23 technique of evaluating event-trees and fault-trees, and  
24 that this was not a bad way to identify scenarios that  
25 could get us into trouble that we haven't previously

1 foreseen.

2 I remember Roger Mattson, in a meeting here,  
3 and I don't know if Roger is here, pointed out several  
4 scenarios which had not been identified previously that  
5 came about by the PRA analysis. In trying to understand  
6 the ACRS position, my question was, how else do you do  
7 it except by intuition. I did not necessarily see the  
8 fault that you saw if we used PRA that way.

9 COMMISSIONER GILINSKY: But you are talking  
10 about a different application of it, Joe, than we are  
11 talking about here in connection with the severe  
12 accident policy.

13 CHAIRMAN PALLADINO: It is a little hard to  
14 know because I have always had that at the back of my  
15 mind that that is one of the real pluses of the PRA.  
16 The attempts to quantify them, I agree, have far more  
17 uncertainty than the event-trees.

18 COMMISSIONER GILINSKY: I don't think there is  
19 any controversy over the use that you have been talking  
20 about.

21 CHAIRMAN PALLADINO: Let me finish.

22 If you throw all the PRA away, we may be  
23 throwing that aspect of it away, and I wanted to get  
24 your comments to see whether I was misunderstanding you,  
25 or misunderstanding what is involved in PRA.

1           MR. KERR: Let me emphasize that in no sense  
2 do we want to throw PRA away. Indeed, I think it is  
3 very useful and we ought to try to improve it in order  
4 to try to use it in a situation in which it can be used  
5 with some confidence.

6           I certainly agree with what I understand of  
7 your comment. I believe that it is not only useful  
8 quantitatively in some situations, but it is very useful  
9 qualitatively in turning up perhaps unsuspected weak  
10 points in systems which one is forced to look at when  
11 one takes a disciplined, detailed approach as necessary  
12 in order, for example, to describe sequences with  
13 event-trees. It is extremely useful for that purpose.

14           What we see, however, is not that usage, but a  
15 decision by someone which says, okay, we have done this  
16 and now the plant is acceptable on some quantitative  
17 basis, or it isn't acceptable on some quantitative  
18 basis. At some point one says, we throw away that  
19 particular sequence, although we know it is there,  
20 because we don't need to worry about it quantitatively,  
21 the plant is safe enough.

22           It is at the point at which one decides that  
23 it is safe enough, if one attempts to do it by  
24 quantitative PRA, that we have questions.

25           We looked, for example, at the experience that

1 was gained in an effort to settle the ATWS issue. The  
2 initial -- not the initial, but at least when the  
3 question was well along, an effort was made to look at  
4 that carefully using risk assessment, and finally the  
5 people involved, I think, decided that it was a low  
6 enough probability event, and the uncertainties were  
7 great enough that one simply could not make a clear cut  
8 decision using probabilistic risk assessment alone, one  
9 almost had to go to a prescriptive approach.

10 I don't know what the final decision will be,  
11 I don't think it yet exists, but this is one example, I  
12 think, of the difficulty one encounters when one  
13 attempts to make decisions about very low probability  
14 events on which the data on which one can rely to  
15 validate the approach is very sparse.

16 CHAIRMAN PALLADINO: I appreciate the  
17 clarification because I can understand, if you are going  
18 to throw the event out on probabilistic risk assessment,  
19 that there is danger because of the large  
20 uncertainties. But I wanted to make sure that we were  
21 not throwing out all of the PRA approach because I do  
22 think that the discipline of the approach can help us  
23 identify important scenarios that we haven't covered.

24 Particularly because I wanted to understand  
25 better the statement that said that we ought to use

1 specific guidelines rather than PRA, it led me to wonder  
2 how could we get the specific guidelines in a more  
3 disciplined way because this helps you.

4 MR. KERR: Let me try to emphasize at least  
5 how I interpret the language in that statement.

6 CHAIRMAN PALLADINO: All right.

7 MR. KERR: It says, "We have reservations  
8 about a strong dependence on PRA alone," and I think the  
9 "alone" maybe should have been underlined.

10 CHAIRMAN PALLADINO: Do you feel that we are  
11 doing it alone?

12 MR. KERR: As I interpret the approach to  
13 licensing new plants, for example, on which perhaps we  
14 have a most detailed description, it is PRA plus  
15 engineering judgment. As Mr. Etherington has so aptly  
16 said, the difficulty with engineering judgment is that  
17 one has to have engineers with judgment.

18 CHAIRMAN PALLADINO: One has what?

19 MR. KERR: One has to have engineers with  
20 judgment. Aside from Mr. Etherington, those people are  
21 rather rare.

22 (General laughter.)

23 MR. KERR: So when I look at an approach, I am  
24 not sure what the engineering judgment part means. I am  
25 in favor of it, and I think one should always use it

1 when it is available, but it is difficult to be  
2 completely objective. Maybe one can.

3 COMMISSIONER GILINSKY: It is really ad hoc  
4 engineering judgment.

5 MR. KERR: That is a good point, yes, and it  
6 may vary from one individual or group to another.

7 CHAIRMAN PALLADINO: The PRA I view as a tool  
8 to help make engineering judgment. I just want to  
9 understand your position, I was not trying to debate  
10 it.

11 MR. KERR: I believe, not everyone on ACRS,  
12 but at least there are certain people within ACRS who  
13 have long felt that PRA is a useful tool and it should  
14 be improved.

15 COMMISSIONER GILINSKY: Doesn't it all come  
16 down to whether you are going to look at various parts  
17 of the problem or a reactor system and impose individual  
18 requirements which add up to a system of defense  
19 in-depth, or whether you are going to throw everything  
20 into the hopper and just say, as long as the overall  
21 answer comes out okay, it is okay.

22 Maybe that is all right if you have tremendous  
23 confidence in your understanding of the system,  
24 techniques and methods of calculation, and so on, but I  
25 don't think that applies to where we are right now in

1 reactor safety.

2 CHAIRMAN PALLADINO: I think that we have sort  
3 of expressed that in our safety goal approach. We are  
4 saying, look, here is an interesting approach, but we  
5 are not ready to use it for a couple of years.

6 COMMISSIONER GILINSKY: I think that it is  
7 going to be used.

8 CHAIRMAN PALLADINO: We are going to have to  
9 step in to make sure that the guidance goes in the  
10 direction that we want it to go.

11 MR. WARD: Further than that I think, in your  
12 safety goal approach, the fact that the final, bottom  
13 line safety goal is expressed in terms of off-site risk,  
14 then there is an intermediate goal of ten to the minus  
15 four for core melt. That, in effect, is specifying a  
16 split between prevention and mitigation.

17 CHAIRMAN PALLADINO: I appreciate that.

18 MR. SHEWMON: My only point was that to get  
19 from offsite consequences to how many feedwater pumps do  
20 you need is tenuous, and that brought back the ATWS  
21 situation when you people tried to set up general goals,  
22 the implement of which to specific things involved a lot  
23 of tenuous links, and that is at least frustrating at  
24 the engineering judgment level.

25 CHAIRMAN PALLADINO: I might also make one



1 other comment. I think the rewrite of February 7 is a  
2 little stronger on the balance between accident  
3 prevention and the mitigation. I am not sure that it  
4 satisfies all the points that you brought up.

5           COMMISSIONER AHEARNE: Bill, I wasn't sure  
6 whether your letter, in the seriously flawed conclusion  
7 that you made, was focused upon this philosophy, or in  
8 addition was focused on what you perceived to be some  
9 lack in elements in whatever we had in the way of a  
10 research program.

11           MR. KERR: I was going to mention that I  
12 thought that the research program was an important part  
13 of this. The letter, I think, dealt primarily with what  
14 we had seen as a proposed policy, which we felt was not  
15 interpretable and it was not interpretable in two senses  
16 which we felt were important.

17           One, we didn't know how to implement it, if  
18 one was trying to do licensing or decide whether to  
19 operate existing plants. Second, presumably the  
20 research program is designed to answer questions that  
21 one needs to answer after one at least has taken a first  
22 cut at saying, "Here is how we propose to deal with  
23 severe accident. But in this area or that area there  
24 are unknowns, the answers to which we need, first, to  
25 decide whether we can do it this way and, second, to

1 decide what the quantitative nature or the qualitative  
2 nature of the requirement finally is to be."

3 I think the letter dealt primarily with the  
4 first of these. But, in looking at the research  
5 program, the second is of overriding importance, what  
6 are the proposed approaches, how does one go about it,  
7 where are the uncertainties, and knowing whether you can  
8 do this or not. At that point, you say, the research  
9 program ought to be able to answer whatever questions  
10 one needs to answer before one knows whether one can  
11 implement this policy.

12 CHAIRMAN PALLADINO: I think the staff  
13 believes that it is doing it that way.

14 MR. KERF: Let me now depart from committee  
15 opinion and just give you some observations that I have  
16 as a result of listening to the staff. Let me  
17 emphasize, and I can't emphasize it too strongly, I know  
18 this is an extremely difficult task, and I certainly  
19 believe the staff has worked hard on it. To try to be  
20 constructively critical is difficult, because if you are  
21 critical, you are critical. So we are trying to be  
22 helpful.

23 At a recent subcommittee meeting, for example,  
24 when I asked questions about why do you want  
25 information, detailed information on severely damaged

1 fuel. The answer was, "We want to reduce the  
2 uncertainties in PRA and our ability to do quantitative  
3 PRAs." This was a worthwhile objective, but unless one  
4 goes beyond that -- this was at a subcommittee meeting  
5 -- I am not sure exactly how it contributes except in a  
6 general way.

7 I further asked a question which was meant to  
8 find out how far one would go, which was: What  
9 uncertainty would be acceptable. There is no answer to  
10 that. There is a general approach that says that things  
11 are pretty uncertain, and we would like to reduce the  
12 uncertainty. I can't quarrel with that completely, but  
13 it would be nice to know, is this a ten-year effort or a  
14 two-year effort, and that depends a bit on the  
15 uncertainty that is acceptable.

16 Furthermore, we talked about the effect that  
17 the severe fuel damage research would have on one's  
18 information about source term, the uncertainty, and that  
19 is a very important area. We were shown some estimates  
20 which differed in this particular presentation by a  
21 factor of about 100.

22 I asked the question, "What do you think would  
23 be acceptable or what is likely to be the final  
24 result?" There was not a good answer.

25 CHAIRMAN PALLADINO: I didn't understand your

1 question. What would be acceptable in terms of what?

2 MR. KERR: In terms of licensing, for  
3 example.

4 COMMISSIONER AHEARNE: What uncertainty would  
5 be acceptable.

6 CHAIRMAN PALLADINO: What uncertainty.

7 MR. KERR: Not only that, but what value of  
8 source term.

9 You may answer, I don't know the answer to  
10 that until I do the research. I would say that I don't  
11 think that this is entirely the case. If you take the  
12 source term that we have been using in Part 100, for  
13 example, nobody thought that that was based on any  
14 physical analysis.

15 It was an arbitrary source term that came from  
16 some suggestions in TID-1484-N4, and aside from perhaps  
17 being bounding, it didn't have much physical basis. We  
18 have not been using that because people were unaware of  
19 the fact that iodine will plate out on the cold metal  
20 surface, or that iodine can be dissolved in water. This  
21 has not been used out of ignorance.

22 I think no matter how much research we do on  
23 source term, there is probably some lower limit or some  
24 bounding value that is going to be independent of the  
25 research. In the first place, suppose you take an

1 approach which says, we are going to pick out scenarios  
2 that contribute most to risk. So we pick out three,  
3 four, five, six scenarios. Then you get the source term  
4 based on those scenarios. Is that where you are going  
5 to stop?

6 I am not sure, but if the staff said that, if  
7 they said, "We will decide it after looking at this  
8 carefully, and the source term that we are going to  
9 decide on is the source term contributed by scenario A,  
10 B, C, D. Then at least we would have something common  
11 to talk about.

12 CHAIRMAN PALLADINO: Isn't that premature,  
13 Bill?

14 You go back and you said the first source term  
15 was based on complete lack of knowledge, it was a  
16 bounding type of situation. The purpose of the research  
17 is to find out whether there is some other bound that  
18 ought to be considered. I don't sense why, and do you  
19 think that you can answer that.

20 MR. KERR: It seems to me that there has to be  
21 an iterative process involved. One makes some effort to  
22 say: What set of scenarios, and what lower limits am  
23 going to be satisfied with?

24 It may turn out that when one does the  
25 research to answer these questions, it will be clear

1 that you asked the wrong question to begin with, or you  
2 chose the wrong bounds to begin with. But unless you do  
3 something like this, it seems to me that you are faced  
4 with a problem of trying to get all the information  
5 about the behavior of radioactive material in and around  
6 cores. I just don't think that our resources or the  
7 time available permit us to do that.

8 CHAIRMAN PALLADINO: What would you suggest be  
9 done in place of that?

10 MR. KERR: That some planning be done which  
11 says: "We have been using this source term. Let's look  
12 at a combination of practical, political, whatever other  
13 circumstances enter into the licensing process. Let's  
14 decide on the basis of scenarios that contribute a  
15 certain amount of risk. Let's cut off at some level.  
16 Some sort of previous planning."

17 Then one says: "Having made this decision,  
18 here are the uncertainties that we need to resolve by  
19 the research program."

20 I would guess that the initial decision will  
21 probably be wrong, at least it will have to be revised,  
22 but at least it permits one to focus on specific  
23 research programs, rather than in a sense saying, "We  
24 need to find out as much as we can about how severely  
25 damaged fuel behaves."

1           CHAIRMAN PALLADINO: That is an interesting  
2 approach.

3           COMMISSIONER GILINSKY: Could I ask a  
4 question?

5           CHAIRMAN PALLADINO: Sure.

6           COMMISSIONER GILINSKY: You just alluded to  
7 the suggestions of the committee on the possible  
8 direction that the Commission might give in issuing such  
9 a statement. You have three, (a), (b), (c), in your  
10 letter, three areas where you have made some  
11 suggestions. I wonder if you could expand on those?

12           MR. KERR: Expand in the sense of adding to  
13 the list?

14           COMMISSIONER GILINSKY: No. Tell us more  
15 about them. I also have one other one, which I would  
16 like to have your thoughts on, and that is more  
17 extensive operator training on accidents which go beyond  
18 the categories of accidents that we emphasized up until  
19 now.

20           MR. KERR: I hope that my colleagues here  
21 won't hesitate to break in. I don't want to do all the  
22 talking, but let me comment briefly on the two questions  
23 you raised.

24           Let's take containment as an example,  
25 specifying containment performance. The present

1 containment performance is specified, I think, in 10 CFR  
2 100 and 10 CFR 50 on the basis of source term leakage  
3 and the consequent dose off-site, and in terms of the  
4 pressures and temperatures which one finds by applying  
5 50.46 and Appendix K. One is required to demonstrate  
6 that the containment will perform in order to satisfy  
7 this set of criteria.

8           If one is going to put a quantitative measure  
9 on mitigation, it seems to me that some effort might be  
10 given toward saying, "We think containments ought to  
11 behave thusly," only some percent of whatever one picks  
12 as the total amount of radioactive material available,  
13 or that most likely to be in containment, will be  
14 released over a given amount of time.

15           I haven't thought in detail to know what sort  
16 of performance specifications one might make. One might  
17 talk in terms of the amount of core material that could  
18 be contained by a containment. I am not sure what the  
19 requirement should be.

20           In other discussions of safety goals, for  
21 example, at least in our discussions, the statement was  
22 made that we don't know enough yet to specify  
23 containment performance. There at least was some  
24 indication given that it might be desirable to do this.

25           At that point, if one made a first cut at



1 specifying containment performance on the basis of  
2 defense in-depth, and said, "We are going to give this  
3 much importance to containment performance," one then, I  
4 think, would identify what is now capable of being  
5 specified about containment performance and what  
6 additional research might be necessary or additional  
7 design might be necessary before one could, with  
8 confidence, say: "This is the way the containment will  
9 perform."

10           COMMISSIONER GILINSKY: I am not clear on how  
11 your suggestion goes beyond what we have already. We  
12 have certain requirements, and so on.

13           MR. KERR: The present method of specification  
14 deals only with design basis accidents, which do not say  
15 anything about core melt, for example.

16           COMMISSIONER GILINSKY: So you are talking  
17 about performance in dealing with more serious events.

18           MR. KERR: Yes. We have done it up until now  
19 with DBAs. If we are going to consider severe  
20 accidents, can we do the same sort of thing? I am not  
21 sure if we can, but it seems to me that it would be  
22 worth a try in order to focus the research.

23           MR. BENDER: Bill, if I could offer a slightly  
24 different slant on the points that have been made here.

25           We put a lot of emphasis on the bottom line in

1 the way in which we do containment assessment nowadays.  
2 It is the way that we have been doing it for a long  
3 time. In fact, there are important time elements that  
4 go into the effectiveness of containment. Everything  
5 doesn't come out at one time, and everything isn't  
6 trapped in the same way under the same circumstances.

7 All the postulants that we have been dealing  
8 with up to now have represented a big volume of  
9 contained gas in which all the radionuclides are fully  
10 mixed up. But in fact we know that they are not that  
11 way. Every bit of scientific evidence points to the  
12 fact that a large fraction of it is tied up in some  
13 other way.

14 If you want to consider the fact that  
15 containments have some unreliability associated with  
16 them, and that you have to deal with that matter in some  
17 way, then there is a need to recognize what are the  
18 mechanism substitutes.

19 Knowing more about the physical behavior of  
20 the materials that hold the radionuclides is an  
21 important matter in educating and assuring the public  
22 that there are other things that might constitute  
23 protection in the event that the containments don't do  
24 what we expect them to do.

25 If you want to worry about the containments

1 blowing up, at the same time you ought to be thinking  
2 about, if they do blow up, what other things might be  
3 there that would help out.

4           A lot of the argument for and against PRA have  
5 to do with the probability of certain circumstances  
6 being put together. Even though I am looked upon as the  
7 most severe critic, I think that it is a useful tool. I  
8 think I have never been guilty of saying that it is not  
9 a useful tool. I say that it is being misapplied,  
10 because most of the emphasis is being put on the bottom  
11 line.

12           There is a need to decide what kind of  
13 mitigation should be applied, when to apply it, or to  
14 take credit for, and at what state of the accident you  
15 can afford to do other kinds of things.

16           It seems to me that the staff, in trying to  
17 develop an approach for dealing with severe accidents  
18 and the mitigation actions that are associated with  
19 them, need to think about the sequence of events and the  
20 physical phenomena that go with them.

21           I think we have not yet heard that they are  
22 doing that kind of thinking. They are doing experiments  
23 to find out where fission products go, and perhaps doing  
24 experiments to find out at what rate, but there is no  
25 context for it.

1           Suppose they do get released at some rate.  
2 What kind of response might you use under those  
3 circumstances? Right now we are doing it on the basis  
4 that everything is instantaneous.

5           COMMISSIONER GILINSKY: When you say  
6 "response," you are talking on whose part, operators?

7           MR. BENDER: I am talking about possibly the  
8 operator's response, possibly design related response.  
9 Some of it you can give to operators, and some you can  
10 put into the design, and some of it is inherent in the  
11 design that already exists. We really haven't tried to  
12 separate those things out yet.

13          CHAIRMAN PALLADINO: Mike, are you saying that  
14 you don't think -- I will admit to your need to look at  
15 these other things.

16          I want to make sure that I understand what you  
17 are saying. Are you saying that the research that will  
18 tell us at what rate they came out, where they might  
19 deposit, you are not saying that that is useless  
20 research and that we shouldn't be doing it?

21          MR. BENDER: No. As a matter of fact, I am  
22 saying just the opposite, and I think that is what our  
23 letter says. Lay out the questions in such a way that  
24 you know the research relates to the questions, and we  
25 are a long way from having that on the table.

1           COMMISSIONER GILINSKY: Are you just talking  
2 about research, or are you talking about specifying  
3 performance criteria for containments?

4           MR. BENDER: I think that the two things go  
5 together.

6           COMMISSIONER GILINSKY: To some extent.

7           MR. BENDER: I am not right now trying to  
8 change the requirements for containments, that is your  
9 job. I can give you some advice.

10          COMMISSIONER GILINSKY: No, no. There is a  
11 suggestion here, which I must I am in sympathy with if I  
12 understand it correctly, that some effort ought to be  
13 made to specify containment performance criteria now.  
14 Obviously, we are going to have to be continuing to do  
15 research to understand a whole bunch of phenomena that  
16 we don't have pinned down at the present time.

17          MR. BENDER: I think what I am saying is that  
18 we have been very arbitrary about the current  
19 containment criteria. It was convenient for accident  
20 analysis purposes, but it is certainly true that there  
21 are other kinds of criteria that would be just as  
22 meaningful and wouldn't put so much emphasis on certain  
23 aspects of the safety protection.

24                   It is not all that important to have the  
25 containments very leak-tight if there are other

1 mechanisms that hold up the radionuclides.

2           COMMISSIONER GILINSKY: That gets down to the  
3 details as to how the containment is to perform.

4           MR. BENDER: I am just using it as an  
5 illustration.

6           COMMISSIONER GILINSKY: In terms of setting  
7 some sort of overall -- at least that is the way I  
8 understood the last part of the letter, it was that the  
9 Commission ought to be thinking about setting  
10 performance criteria.

11           CHAIRMAN PALLADINO: That is the way I  
12 understood it, too.

13           COMMISSIONER GILINSKY: I am not sure I  
14 understand how you come out on that.

15           CHAIRMAN PALLADINO: If you are trying to  
16 balance the leak rate versus the other mechanisms, don't  
17 you have to have some background on the other  
18 mechanisms?

19           MR. BENDER: Let me try to respond to Vic  
20 first.

21           CHAIRMAN PALLADINO: Yes, I should be  
22 patient.

23           MR. BENDER: Various kinds of accidents need  
24 different kinds of criteria. The only criteria we have  
25 got right now in terms of containment is the one that

1 goes with the source term that is arbitrarily defined,  
2 and it is based on a certain leak rate with certain  
3 associated pressures that go with them. It is a very  
4 prescriptive kind of consideration.

5           But there are a lot more kinds of accidents  
6 that can occur, and they progress at different rates,  
7 and there is no reason why one shouldn't be thinking  
8 about those other kinds of accidents, and trying to  
9 develop some logic for them that can be used and  
10 compared against what presently exists in the design.

11           COMMISSIONER GILINSKY: As I understand it,  
12 you are saying that whatever these criteria are, they  
13 ought to be sensible and take into account a variety of  
14 circumstances, and it is pretty hard to argue with  
15 that.

16           MR. BENDER: Right now the ones that we have  
17 bound only certain kinds of accidents, and they don't  
18 deal with the spectrum of accidents which nowadays you  
19 like to ask about, an John likes to ask about, and Tom  
20 likes to ask about, because each one has a different  
21 accident in mind. Consequently, you have to deal with  
22 all of them.

23           MR. KERR: Let me speak to the other question  
24 you had, then I am going to be quiet and listen. I  
25 think you said we might also find out something that

1 would be useful in operator training to deal with severe  
2 accidents or emergencies.

3           COMMISSIONER GILINSKY: I wonder, since in the  
4 last analysis one depends on the people who are in the  
5 control room, whether one wants to train them, or at  
6 least give them experience in having gone through rather  
7 more severe events and do that more often than it is  
8 done at the present time in simulators.

9           MR. KERR: Not in direct answer to your  
10 question, but I think associated with it, in the same  
11 meeting where we were talking about severe fuel damage,  
12 near the end of the meeting -- By the way, the research  
13 sounded to me like it was well-organized, the people who  
14 were doing it were competent. It was interesting  
15 research, exciting, I would say.

16           I said: "Okay, what would you tell the  
17 operators at TMI-2, the responsible during that  
18 accident, that is different now that you have done this  
19 research than what you would have told them before you  
20 did the research?" There was some caucusing and at the  
21 end of the caucusing, the consensus seemed to be that  
22 there really wasn't anything different that you would  
23 tell them now than there was before one did the  
24 research.

25           This is not necessarily an indication that the



1 research is lousy, or bad. But it seems to me that in a  
2 more general sense, one ought to give a little bit of  
3 thought to what operators need to know and is there  
4 something in this research program that can tell them  
5 that.

6 I also asked, "What would you tell the  
7 Governor of Pennsylvania that is different?" The  
8 initial response was, "Well, not anything." Then  
9 somebody who had been involved code development  
10 associated with this, I think it is the SCDAP code,  
11 said: "Well, I could tell him with a lot more  
12 confidence that he wouldn't have to worry about  
13 hydrogen."

14 As far as I can tell, this statement was based  
15 on the comparison of the code results with  
16 instrumentation in PBF which is a good bit more detailed  
17 and elaborate than one has in operating reactors. I am  
18 skeptical of that response, but it was the response.

19 The other response I got, and this one was  
20 perhaps from the staff, "We are really not interested in  
21 what you tell operators anyway. We are interested in  
22 decreasing the uncertainty in PRAs."

23 CHAIRMAN PALLADINO: I am not going to defend  
24 all those answers, but sometimes the right answer is  
25 that you wouldn't tell the operators anything, but you

1 might to something else differently.

2 MR. KERR: I didn't just say operators. I  
3 said operators, the people responsible for making  
4 decisions, and the Governor.

5 CHAIRMAN PALLADINO: At first I thought you  
6 said operators.

7 MR. KERR: I may have, but if I did let me  
8 correct it, because the question was for all.

9 COMMISSIONER GILINSKY: The reason I brought  
10 up the business of operators is that it seems to me that  
11 while it may be difficult to do this in a systematic way  
12 in writing procedures, it may well be and I think it  
13 would be true that to go through a number of scenarios  
14 on a simulator, which involved rather more severe events  
15 than one deals with routinely, is just like any other  
16 kind of training. If you are faced with circumstances  
17 like that, or even not precisely like that but at that  
18 level of seriousness, it reduces the terror of it, and  
19 one responds more reasonably.

20 MR. KERR: I can't find any reason to disagree  
21 with you.

22 MR. WARD: I think I might, to a certain  
23 extent. I think you have to be careful there. First of  
24 all, existing simulators don't have the programs to  
25 simulate what you would want to simulate in those

1 cases.

2           Secondly, even to develop those programs, you  
3 might have to pretend that you know more about the  
4 course of severe accidents than you know about them, and  
5 that is part of the big question here. You want to do  
6 research so that you understand the course of the  
7 accidents. If everybody agrees that even with big  
8 computers or with big research programs we can't  
9 understand them, you might be training the operators or  
10 giving them practice in wrong scenarios. There has to  
11 be some care exercised in that. Too much faith could be  
12 kind of dangerous.

13           CHAIRMAN PALLADINO: Jerry, can I ask you what  
14 your plan was. Did you have certain people who were  
15 going to lead certain aspects of this.

16           MR. RAY: We are going to respond as we felt  
17 we should to specifics as they came up.

18           CHAIRMAN PALLADINO: Do you want to continue  
19 this give and take, or do you have somebody else who is  
20 prepared to lead on this.

21           COMMISSIONER GILINSKY: I wonder if we could  
22 go on to (b) and (c) which are specific suggestions of  
23 the committee?

24           MR. OKRENT: Can I make a comment on a couple  
25 of points you raised.

1           In several operating license reviews, I tried  
2 to find out whether there were any or many people in the  
3 technical management who were familiar with WASH-1400,  
4 or something like that.

5           COMMISSIONER AHEARNE: Of the NRC or the  
6 licensee?

7           MR. OKRENT: The proposed licensee.

8           Usually my answer was, nobody or perhaps one  
9 person of the group, maybe the man who did licensing or  
10 somebody. That in itself is the kind of answer to your  
11 question as to their current state of readiness, I  
12 think. To me that represents a kind of deficiency. I  
13 posed the question to the staff, and they said that that  
14 kind of knowledge is beyond what they currently expect  
15 of, let say, the plant managers, and so forth.

16          COMMISSIONER AHEARNE: That gets to the  
17 question of the quality of the people.

18          MR. OKRENT: I think to me that is a not  
19 unimportant sign.

20          COMMISSIONER AHEARNE: It is very important.

21          MR. OKRENT: I wouldn't have them train on a  
22 simulator. I would like to have them know what kind of  
23 phenomena can be involved in different scenarios, and so  
24 forth, at least a few people within management, not  
25 necessarily every SRO.

1           With regard to containment, if I can make one  
2 or two points. If I can raise a question concerning the  
3 Commissioners now, rather than what the staff are  
4 proposing to the Commissioners.

5           One could look at your safety goal proposal,  
6 as I now understand it, and perhaps argue that it  
7 doesn't include enough features whereby to raise some of  
8 the questions that maybe should be raised concerning  
9 containment.

10           For example, there is nothing at the moment  
11 that suggests that there ought to be some kind of a  
12 limit on frequency of large areas of highly contaminated  
13 land. In principle that allows one to say, for a  
14 delayed event, if you can evacuate people, you can keep  
15 the risk down, and you are not concerned about the  
16 other.

17           If that is really your position, then in fact  
18 you don't have to protect against that. But the French  
19 and the people in Europe really, I think, are concerned  
20 about this question of important regions of land being  
21 unavailable for periods of time, and that motivates some  
22 of the things that they are putting on their large dry  
23 containments, through backfitting, for example.

24           They are doing a couple of things that I  
25 suspect have been discussed with you, I guess it is what

1 we would refer to as relatively inexpensive vented  
2 filter system, and also they are trying to better assure  
3 that the containment integrity is not lost by the valves  
4 having not closed when they should, and so on.

5           They are sort of saying, the accidents that  
6 won't be helped by this, we are just going to have keep  
7 sufficiently infrequent by other means. In other words,  
8 they are not saying, we are going to handle all  
9 accidents. You have to identify those that this doesn't  
10 help, and study them hard and see whether in fact what  
11 you are doing keeps them at a sufficient low frequency.  
12 If not, you go back and try to do better there  
13 presumably.

14           The point I am trying to make is, to some  
15 extent the staff response can be guided by how the  
16 Commission itself shapes qualitative or quantitative  
17 safety goals, and I use this as one example.

18           COMMISSIONER AHEARNE: Since you asked  
19 specifically, Dave, let me just give one person's  
20 response. I would say that the difference there, having  
21 spent a reasonable amount of time talking to a number of  
22 the Europeans on this issue, I think it is less that I  
23 am not concerned about land damage as it is that the  
24 cultural background that I have, as opposed to the  
25 cultural background that the people in France have, is

1 that they have a lot more feeling for the value of  
2 land.

3 In most of these discussions, the question of  
4 land arises first in their issue. It is almost, in  
5 their context, you will take care of the land and then,  
6 of course, you will be taking care of the people. In my  
7 cultural background, if you take care of the people, of  
8 course, you will be taking care of the land. It doesn't  
9 mean that in either of our cases we are dismissing the  
10 other aspect, but at least in this first step it is the  
11 approach that we are taking.

12 I would not be at all surprised if at the end  
13 of two years, in the refinement of any approach, if the  
14 property damage, property loss, and so forth, also gets  
15 folded in. But at least as an initial step, at least I  
16 focus primarily on people.

17 MR. OKRENT: Maybe if there were farmers on  
18 the Commission.

19 COMMISSIONER ASSELSTINE: You have heard one  
20 view, and since you have heard one, perhaps you ought to  
21 hear the other as well.

22 COMMISSIONER AHEARNE: I was giving the view  
23 of someone who supported it.

24 COMMISSIONER ASSELSTINE: That is right.

25 I was one of those who did advocate including

1 off-site property losses. I guess my own view was that  
2 that is something that ought to be considered as well as  
3 the personal injury or harm to individuals. I suspect  
4 that John may be right. One thing the Commission did  
5 agree to do was, over the evaluation period, look at  
6 both alternatives.

7 I am hopeful that not only in that case, but  
8 in many of the other suggestions that the ACRS made, as  
9 we look at both alternatives, over the evaluation  
10 period, that at the end of that time we will have the  
11 information we need to know what kinds of differences  
12 the different standards and alternatives would make, and  
13 fold that into a safety goal that we have a fair basis  
14 for believing is a fair estimate of risk, and is one  
15 that provides a complete set of indicators.

16 COMMISSIONER AHEARNE: Jim, that is a more  
17 optimistic statement that we will have an OPB at the end  
18 of two years than I would ever make.

19 COMMISSIONER ASSELSTINE: It is intended to  
20 reflect my lack of that confidence now.

21 MR. LEWIS: I just want to make one bottom  
22 line comment about PRA, because I have been very pleased  
23 to hear that many people have supported it.

24 (General laughter.)

25 MR. LEWIS: I was especially pleased to hear



1 Mike Bender make such a passionate statement about PRA.  
2 It means that even old engineers are trainable.

3 (General laughter.)

4 MR. BENDER: If only physicists could be, we  
5 would be in good shape.

6 MR. LEWIS: I want to come back to the issue  
7 of the letter.

8 CHAIRMAN PALLADINO: The side commentary is  
9 obscuring what you are saying.

10 MR. LEWIS: I was not present during the  
11 meeting at which this letter was written to you, and I  
12 have just read it and I agree with most of it.  
13 Particularly there is a comment in there which I believe  
14 is correct, which is that particularly for the severe  
15 accidents, it is just inextricably wound up with PRA,  
16 that I think is almost self-evident. It is also wound  
17 up with the Commission's safety goal, and I think that  
18 is also almost self-evident.

19 The safety themselves are not things on which,  
20 as you know, I am an ardent supporter of the  
21 Commission. I might suggest that the safety goals that  
22 you promulgate are precisely the misuse of PRA that was  
23 suggested by the splendid report of the Risk Assessment  
24 Review Group, which I happen to remember very well,  
25 which said that indeed you should make more widespread

1 use throughout the Commission. Indeed you should use it  
2 as a tool for decision-making. Indeed you should train  
3 everybody to know what it is. But above all, don't use  
4 it to give yourselves bottom lines on, for example, the  
5 probability of core melt.

6 I have had, and I am sure you have had, many  
7 people coming to you saying, "What are you going to do  
8 about the plants that falls below these criteria by a  
9 factor of 1.7 or something like that." That is precisely  
10 the misuse and the trap that you are falling into by  
11 trying to overlay the PRA hand.

12 So while I am an enthusiastic advocate, it too  
13 has limits and a bottom line.

14 CHAIRMAN PALLADINO: I agree with you that we  
15 don't want to overlay it. I think in a sense we are  
16 overlaying it because even in the safety goal document  
17 itself it has statements very similar to the ones you  
18 have just made. I am not sure how the safety goals are  
19 going to come out. I did not anticipate, at least at  
20 this time, that we were going to have a "go" or "no go"  
21 on the basis of the safety goals, but rather to look at  
22 the requirements and have the safety goals help us  
23 identify how far we have to go on the various  
24 requirements.

25 MR. LEWIS: You know that I support that

1 position.

2 CHAIRMAN PALLADINO: Sure, I know you do.

3 MR. LEWIS: I do believe you want  
4 deterministic regulation based on reasonable safety  
5 goals, but inevitably people will read these as "go" and  
6 "no goes." To the extent that you are influenced by  
7 them, which I think you will be, because I think these  
8 things take on a life of their own, I think that will be  
9 bad.

10 COMMISSIONER ASSELSTINE: To what extent will  
11 those kinds of bottom line numbers drive the PRA  
12 analyses, do you think?

13 MR. LEWIS: The numbers are derived from the  
14 analyses, so I don't understand the question.

15 COMMISSIONER ASSELSTINE: In terms of once one  
16 has, if one ever developed a set of objectives that you  
17 were going to use as some sort of a regulatory tool in  
18 making decisions, presumably then you will do PRAs for  
19 many more plants than has already been done. To what  
20 extent will the existence of bottom line numbers that  
21 are viewed as the acceptable levels alter or affect the  
22 validity of the PRA process itself?

23 MR. LEWIS: I guess I am still not entirely  
24 understanding. Let me answer what I think your question  
25 is.

1           When you say, do a PRA on a plant, I think  
2 that is already a bad idea, because it suggests that you  
3 are going to do a PRA which will combine all the effects  
4 and equipment in a plant, and you are going to come out  
5 with a bottom line number. You can do that, there is no  
6 question. It could be a precise number to set a  
7 significant figure good to a factor of 10 or 100, but  
8 that is bad.

9           The thing that you can do PRAs for now are  
10 some sections of the plant, elements of the plants, and  
11 much more importantly determine whether incremental NRC  
12 rules, actions, or requirements are good or bad, cost  
13 effective or not cost effective, and do that in a  
14 limited environment.

15           I think if you do a PRA that tells you that  
16 the probability of a core melt is three times four ten  
17 to the minus four, perhaps not this distinguished  
18 Commission, but many people will believe that it is  
19 true, because it is written down, and that is what I am  
20 concerned about.

21           MR. BENDER: I think Hal and I have more of  
22 common agreement than might be imagined about this  
23 business.

24           MR. LEWIS: I said that you were trainable.  
25           (General laughter.)

1           MR. BENDER: The problem with PRA as it is  
2 being dealt with is that it is already stylized. If we  
3 were willing to accept Hal's definition, he might get a  
4 few engineers to agree with him. But he fails to  
5 understand, and I think that is true of the staff, that  
6 there is no PRA device that represents the description  
7 of everything.

8           There is a kind of PRA for some hardware.  
9 There is a kind of PRA for some structure. Then there  
10 is a kind of PRA for some accidents. But there is no  
11 standardized way of doing them. If you are going to use  
12 them, you had better think about the context in which  
13 the results will be used as a basis for making your  
14 judgments, and that is where we are right now..

15           CHAIRMAN PALLADINO: That is one of the first  
16 steps in the implementation plan.

17           MR. BENDER: You selected a bunch of good  
18 examples that I thought would enable you to see where it  
19 would be useful and where it would not. That part of it  
20 I was pretty enthusiastic about.

21           CHAIRMAN PALLADINO: But the methodology in  
22 making sure that there is a common and consistent basis  
23 for developing any approach is a part of the safety goal  
24 evaluation.

25           MR. BENDER: Joe, I don't know whether or not

1 my message got across to you properly. The staff still  
2 uses PRA in one way only. It always gets to a bottom  
3 line of so many radionuclides being released. It  
4 doesn't represent this approach which says, let's look  
5 at a discrete problem and try to see what it is if you  
6 go from stage A to stage B, never mind about going to  
7 stage C, stage D, and so on. You may want to do all of  
8 them.

9 COMMISSIONER AHEARNE: I guess I have to take  
10 exception there with you. I don't think the staff does  
11 always use it that way. Many times, I believe the staff  
12 does it more in this discrete subset analysis.

13 I will agree that the staff is always pressed,  
14 and is pressed quite frequently by people on this side  
15 of the table and people in the Congress, if you have  
16 done a subset, then what is the final, what is that  
17 bottom line. Many people on the staff who do the PRA  
18 don't want to get there, but more or less are requested  
19 to do so.

20 MR. BENDER: I am going to make one more  
21 comment, and then quit.

22 CHAIRMAN PALLADINO: You don't want to do  
23 that, Mike.

24 MR. BENDER: I am going to.

25 I look at the PRAs that are submitted by the

1 licensees and the staff is using as its basis for  
2 discussing regulatory requirements. They are stylized,  
3 and they are bottom line kinds of analyses, and they are  
4 the ones that are in the front of the regulatory  
5 process.

6 COMMISSIONER AHEARNE: Yes.

7 MR. BENDER: I would agree that the analysts  
8 know how to do other things and sometimes do it.

9 COMMISSIONER AHEARNE: All right, that was the  
10 only thing that I was taking exception to.

11 COMMISSIONER GILINSKY: I wonder if we could  
12 get back to (b) and (c).

13 CHAIRMAN PALLADINO: Do you want to give it a  
14 try?

15 MR. KERR: Let me comment briefly on (b) and  
16 (c), and then ask my colleagues.

17 In (b), I think we tried to pick out something  
18 that almost everybody would agree is important, because  
19 if one can remove the decay heat, there are no  
20 problems. Hence, it seems to be a rather key system or  
21 subsystem, and for that reason we said that you might  
22 want to give attention to a specific requirement for  
23 that.

24 COMMISSIONER GILINSKY: You are talking about  
25 performance under degraded conditions or what?

1           MR. KERR: No, not necessarily. Performance  
2 to prevent degraded conditions.

3           COMMISSIONER GILINSKY: In what way does that  
4 differ from the present situation?

5           MR. KERR: I do not know of a specific  
6 requirement that exists for the performanc of decay heat  
7 removal systems other than the single failure  
8 criterion.

9           MR. OKRENT: Plus what is in the auxilliary  
10 feedwater systems, but that is a subset of the overall  
11 behavior of decay heat removal.

12          COMMISSIONER GILINSKY: Could you give me just  
13 an example of what form such a performance standard  
14 might take, not necessarily one that you think is the  
15 right one.

16          MR. KERR: It might say, one needs four  
17 separate and distinct heat removal systems. I would not  
18 want to try to give you a final best answer at this  
19 point, because we have not looked at it in detail. It  
20 could be that specific. On the other hand, it might  
21 say, the reliability must be and you must get this  
22 reliability, in order to avoid common mode failures, by  
23 having two diverse systems, or three, or whatever. But  
24 it would not be subsumed by the total performance of the  
25 plant. It would rather be selected for specific



1 attention.

2 COMMISSIONER GILINSKY: These are in a sense  
3 kind of super-general design criteria?

4 MR. KERR: I would be reluctant to  
5 characterize them without giving some additional  
6 thought, but they are specific and specific to a  
7 particular function.

8 CHAIRMAN PALLADINO: Bill, it is my  
9 understanding that the staff is looking at core heat  
10 removal systems. In a sense, you might even consider  
11 them as an alternative to filtered vents.

12 MR. KERR: In fact, indeed, I presume that  
13 this is one of the unresolved safety issues.

14 CHAIRMAN PALLADINO: I am not sure -- I want  
15 to make sure I understand the comment. Is it saying  
16 that we ought to be doing what it appears the staff is  
17 doing, or are you saying that we ought to be doing  
18 something different?

19 MR. KERR: Joe, let me tell you the difference  
20 between university professors and human beings.  
21 University professors study things, and they keep on  
22 studying, and they study them some more. Ordinary  
23 people do things. You need a little bit of both. What  
24 we are suggesting here, I think, is that one might think  
25 of some specifications that would be appropriate before

1 one started this study.

2 COMMISSIONER AHEARNE: Let me ask a question.

3 CHAIRMAN PALLADINO: Let me finish this  
4 because there is a problem I have here.

5 You can arbitrarily say that you want one,  
6 two, three, four systems. With two, you can do certain  
7 things that can substitute for other approaches. You  
8 make it sound like study is always the wrong thing. As  
9 a matter of fact, part of doing is part of studying, and  
10 I think what the staff is proposing here is to treat the  
11 subject. I am not sure whether you are saying that the  
12 way they are treating it is wrong.

13 COMMISSIONER GILINSKY: I gather he is saying  
14 that we know enough to say something about performance  
15 criteria right now.

16 CHAIRMAN PALLADINO: Are you substituting for  
17 a filter vented containment.

18 COMMISSIONER GILINSKY: The subject was not  
19 born yesterday.

20 COMMISSIONER AHEARNE: Part of what we say in  
21 our paper, the proposed staff paper that we were going  
22 to approve until we got your letter, was that the  
23 current designs, or current advanced designs were  
24 essentially okay, as long as they met the existing  
25 criteria and existing proposed rule.

1 I read this as the ACRS saying, if we are  
2 going to make such a statement, giving basic approval to  
3 the current approaches, that you thought that we ought  
4 to have in that kind of basic approval some  
5 specification and a few other items.

6 If we didn't know enough about them, such as  
7 the containment performance, we ought to at least  
8 indicate that here is an open area in which we may well  
9 later come down and put criteria. Decay heat, you were  
10 suggesting that if we don't know enough right now, we  
11 ought to at least take a stab at indicating that there  
12 is another area.

13 Is that correct, or is that not correct?

14 MR. KERR: I think, if I had thought of it in  
15 that way, that might have been what I was thinking,  
16 because I think you have expressed a reasonable  
17 approach. Let me try to say what I had in mind.

18 Again, I believe we were reluctant to put  
19 complete dependence on the PRA, and I say this in quote,  
20 "complete," because that was not the only thing. With  
21 that uncertainty, we suggest that one might pick out a  
22 few key subsystems, containment, decay heat removal, and  
23 write specifications for those -- we identified those  
24 two because they would have key importance, but one  
25 might pick out others -- specify their performance as a

1 sort of a defense in-depth approach, so that one is not  
2 just relying on that overall PRA, one is also putting  
3 some special emphasis on these.

4 I don't know what to say beyond that, but I  
5 appeal to anyone else.

6 MR. OKRENT: I would like to make a few  
7 comments, and I would like to start off by saying that I  
8 think you can make a mistake if you approve this  
9 version. I can give you several different reasons, and  
10 all of them are not in the ACRS letter.

11 Among other things, it implies a very strong  
12 use of the safety goals which you already, I think,  
13 indicated should only be evaluated and applied gingerly  
14 and tested gingerly.

15 With regard to the unresolved safety issue on  
16 decay heat removal, my understanding is that it is  
17 currently limited to existing plants, and this document  
18 is basically aimed at future plants. So these are two  
19 different things.

20 It proposes, as I understand it, to use PRA  
21 primarily as a way of judging whether the existing  
22 design meets the safety goals. Also to look at any  
23 possible improvements using your \$1,000 per man rem  
24 conditions to test alternatives, and if they don't meet  
25 the test, then presumably they wouldn't be needed.

1           This is the kind of thing one reads directly  
2 into this.

3           COMMISSIONER AHEARNE: Dave, I gather, then,  
4 that you see this reflecting how you apply the safety  
5 goals to future plants.

6           MR. OKRENT: With regard to existing plants,  
7 what it says, again I think it is flawed and the  
8 committee letter said so, but let me be more specific by  
9 some examples. It says that we have enough PRAs, and we  
10 can look at this question generically and make decisions  
11 for the existing plants as to whether or not we need  
12 additional features.

13           I think that is just an absolutely incorrect  
14 technical assessment of our knowledge. In fact, we have  
15 already had one recent example where an existing PRA on  
16 Oconee, done as part of the staff research program,  
17 missed a very important contributor that the utility  
18 found when they were redoing the PRA, which they will  
19 fix up. This was some kind of flooding incident.

20           COMMISSIONER AHEARNE: Right.

21           MR. OKRENT: But you have to assume, and I  
22 certainly do, that there are things like this around,  
23 okay.

24           COMMISSIONER AHEARNE: Yes.

25           MR. OKRENT: What one learns is that the

1 existing body of knowledge is inadequate, and certainly  
2 you can't make a generic decision based on it. But that  
3 is what it says in here. I must say, if I were you, I  
4 would dissent from agreeing to such a position. It just  
5 is technically flawed.

6 COMMISSIONER AHEARNE: Let me see if I can  
7 pursue that one a little bit more.

8 I think you did point out that Duke picked it  
9 up when they did their own PRA.

10 MR. OKRENT: It picked it up on what is  
11 equivalent to about a third go-round, but that was  
12 supposedly fixed after the flooding incident.

13 COMMISSIONER AHEARNE: I recognize that. I  
14 just was trying to make the point that with an  
15 approving tool, which PRA is a tool, the better you get  
16 at it, you would hopefully be able to do better at  
17 finding out problems and being able to at least identify  
18 where you need to work on solutions.

19 What I am concerned with is, it almost sounds  
20 like you just finished saying that you should not even  
21 use PRA on current plants. I don't agree with that so  
22 far.

23 MR. OKRENT: I have been a strong advocate  
24 within the committee to have them say, or they have  
25 said, we think that essentially every existing plant

1 should have a PRA with its scope properly defined.

2           COMMISSIONER AHEARNE: You are afraid that  
3 this would read as, all you have to do to look at  
4 existing plants is take existing PRAs and that is all.

5           MR. OKRENT: It says that you can make the  
6 long-term severe accident decision-making based on the  
7 existing PRAs's free-base line, and I just think that  
8 that is technically unsound.

9           CHAIRMAN PALLADINO: That I remember reading  
10 and having qualms about.

11           I somehow got the wrong impression, based on  
12 your later comment, because in the third go-round they  
13 found that the PRA disclosed a new situation. How else  
14 would we have found it without PRA?

15           MR. OKRENT: I want to repeat, I am very much  
16 in favor of plant specific PRAs. I think the existing  
17 body of PRAs used in some generic sense is not  
18 sufficient as the basis for arriving at severe accident  
19 decision-making, and I think it should be made, in fact,  
20 by using a combination of prudence and cost/benefit  
21 analysis, studying what you can do for each plant with  
22 regard to improving mitigation. That is one of the  
23 things I would do.

24           I would also look at each plant to see, again,  
25 what can you do to get improved prevention, using a

1 combination of prudence and cost/benefit.

2 CHAIRMAN PALLADINO: Dave, in reading this, in  
3 re-reading it, I was looking especially for some of the  
4 comments you made about plant-specific PRAs, if I  
5 understand it correctly, the standard design that would  
6 be proposed would have to have the plant-specific PRA  
7 done. To that extent, at least, that would be  
8 consistent with your comment. It is trying to get the  
9 generic items through the PRA.

10 MR. OKRENT: I am absolutely in favor of  
11 having each future plant have a PRA available at the  
12 time you are doing the construction permit. I think  
13 that it is a very good idea, and it shouldn't be lost no  
14 matter what else.

15 But I am 100 percent with what the committee  
16 says, that that is not the way, in view of the current  
17 status of PRA, to make decisions on should there be a  
18 bonkered, dedicated shutdown heat removal system, or  
19 should we put in some additional containment feature,  
20 and so forth. I don't think that it is good enough.

21 I will give you a few numerical examples,  
22 which I happen to have. Let me just mention one.  
23 Design PRA evaluated the filter vented containment  
24 system for risk reduction. They got about a factor of  
25 1.8 or something.



1           A student at UCLA looked at the same system,  
2 all he did was change the seismic design capability from  
3 what they used there, which was roughly equivalent to  
4 the refueling water storage tank, and said, let me  
5 assume that it is as good as the containment. He got a  
6 factor of about 15 risk reduction instead of 1.8. Based  
7 on just a simple assumption concerning when this system  
8 would fail in an earthquake, you get this big order of  
9 magnitude difference.

10           COMMISSIONER AHEARNE: It depends on the  
11 assumptions.

12           MR. OKRENT: I can give you others, if you  
13 wish. I can get a factor of 10 or 50 on the possibility  
14 of core melt.

15           CHAIRMAN PALLADINO: I was glad that you came  
16 back to support the value of study.

17           MR. OKRENT: I am ambivalent, you see. I am  
18 pushing the safety goals and the PRA, but I am worried  
19 people will misuse them.

20           MR. KERR: It is a question of whether you try  
21 to study everything, or focus your studying on the  
22 problem.

23           CHAIRMAN PALLADINO: We were studying the  
24 problem, I thought, in this one. I didn't mean to  
25 debate it.

1 MR. RAY: Do you want to get back to (c).

2 COMMISSIONER GILINSKY: Yes, why don't we get  
3 back to (c).

4 MR. KERR: (c) is self-evident.

5 (General laughter.)

6 COMMISSIONER GILINSKY: Is it an exercise for  
7 the Commissioners?

8 COMMISSIONER AHEARNE: Not only is it  
9 self-evident, but it is a statement that is in the  
10 latest version.

11 MR. KERR: I really don't know what else to  
12 say about (c). I will pass.

13 COMMISSIONER AHEARNE: I guess it was so  
14 self-evident that I notice that Bill Dircks picked it  
15 up, and it has been put in.

16 MR. OKRENT: I think the current version does  
17 put these ideas in, but I think the basic methodology is  
18 wrong for using PRA.

19 COMMISSIONER AHEARNE: The current version  
20 puts this statement in.

21 MR. OKRENT: Yes.

22 COMMISSIONER AHEARNE: It is different.

23 CHAIRMAN PALLADINO: Any other comments by  
24 committee members?

25 COMMISSIONER GILINSKY: Do you have any

1 thoughts about what kind of features you would like to  
2 see in plants to reduce the probability of sabotage?

3 MR. OKRENT: I don't know that this is the  
4 best meeting in which to go into specifics myself. I  
5 think that if one wanted to have a discussion on that,  
6 we ought to have it done in a closed session with proper  
7 preparation.

8 COMMISSIONER AHEARNE: I agree.

9 MR. OKRENT: It would be useful, perhaps, to  
10 do such.

11 COMMISSIONER GILINSKY: You feel that it would  
12 be awkward to even give us some general indications?

13 MR. OKRENT: It is always hard to know before  
14 the fact what you will want to put in after the fact.

15 (General laughter.)

16 CHAIRMAN PALLADINO: It is a very tricky  
17 subject, even though the statement is self-evident, what  
18 to do about it is a little more difficult.

19 MR. MARK: I am sure that it is not out of any  
20 one's mind, but I think it is a point that has been in  
21 mine for a long time. It is not enough to, let's say,  
22 invent probability of sabotage, and then to say, well,  
23 to reduce that probability, we will put barbed-wire up  
24 and down the hall, or something like that, without going  
25 on to ask, what does that do to the behavior which you

1 rely on in normal operation.

2           COMMISSIONER AHEARNE: We ran into that  
3 problem when we started trying to put in double-locked  
4 doors.

5           CHAIRMAN PALLADINO: It is a very significant  
6 point.

7           COMMISSIONER ASSELSTINE: Yes.

8           CHAIRMAN PALLADINO: Are there other comments  
9 by either Commissioners or committee members?

10          COMMISSIONER AHEARNE: Yes, and it is getting  
11 back to one of the early questions.

12                 To what extent is your concern, as represented  
13 in the letter, a concern also linked to what you see as  
14 an absence in any of the research programs? The policy  
15 statement addressed primarily the approaches to be taken  
16 in licensing reviews, recognizing that that has to be  
17 linked to what is available in research.

18          MR. KERR: Let me comment again. Unless I  
19 understand an approach or see one that is coherent and  
20 workable, I don't know whether a research program is  
21 going to answer the questions that one needs to have  
22 answered to implement that approach or not.

23                 It was not a criticism of the research program  
24 per se, but rather an effort to see its relationship --

25          COMMISSIONER AHEARNE: -- to some integrated

1 program.

2 MR. KERR: Yes.

3 CHAIRMAN PALLADINO: If there are no questions  
4 right at the moment --

5 COMMISSIONER GILINSKY: I wonder if I could  
6 pursue again the point I raised earlier just to see what  
7 reaction there is to the notion of having operators  
8 trained in severe accident mitigation. I am not clear  
9 how we came out on that.

10 Is that something that you think would be  
11 useful to do in a more systematic way, making do with  
12 what there is, possibly using non-safety grade  
13 equipment, just to kind of increase the resourcefulness  
14 of the people in the control room?

15 MR. OKRENT: I will give an answer. I think  
16 we may have different points of view.

17 My guess is that at least some of the senior  
18 reactor operators have in mind most of the alternate  
19 paths that can be followed, I guess at Brown's Ferry  
20 that was demonstrated to be the case, that is for how to  
21 get cooling water to cover the core in case you have  
22 lost the normal routes.

23 It may be that nevertheless there is more that  
24 can be done, and one can be better prepared with regard  
25 to knowing that all the senior reactor operators have

1 this well in mind.

2 I am doubtful that many of the senior reactor  
3 operators are able to quickly correlate sort of by  
4 rule-of-thumb what a certain amount of hydrogen on a  
5 hydrogen meter might mean, or what a certain number of  
6 fission products in the water or in the containment  
7 might mean.

8 It is some of these things that could be  
9 helpful, for example, because that takes one into a  
10 state of core damage. In fact, if it got more serious  
11 and you had a lot of melting, whether they have at least  
12 a qualitative sense of what is going on and how to  
13 interpret this.

14 You have to think out what was an efficient  
15 way of providing what would be a qualitative,  
16 semi-quantitative kind of background.

17 COMMISSIONER GILINSKY: I raise this because  
18 it is not so easy to add equipment or change the  
19 features in a plant, but expanding training is something  
20 that could be done now.

21 MR. KERR: It seems to me that preparatory to  
22 that, I think I understand what you are saying, and I  
23 think I agree with you, one needs to ask, what  
24 information would an operator have with today's sensors,  
25 today's control rooms, today's instruments, if one had a

1 series of very severe accidents, on an accident sequence  
2 that would result in a severely damaged core.

3           What could one conclude from the  
4 instrumentation that exists or is going to be installed  
5 in response, for example, to Reg Guide 1.97, because the  
6 operator's interpretation depends to some extent on what  
7 the instrumentation tells him in an abnormal situation,  
8 not the normal, every-day situation. So I think some  
9 attention needs to be given to that.

10           Once one has some better idea of what is  
11 available and what it might indicate, and it may be  
12 ambiguous in some cases, at that point one might say,  
13 okay, here is the way we train an operator to take  
14 advantage of that information.

15           It may be that you do it on a simulator. It  
16 may be that other approaches are better. You may simply  
17 give him a range of possibilities. It may be that the  
18 response is very simple, get all the water you can on  
19 the core. Get all the water you can in the  
20 containment. I don't know.

21           I am not opposed to a simulator, but it may be  
22 that a simulator is not the answer.

23           COMMISSIONER GILINSKY: I was not necessarily  
24 speaking about a simulator.

25           MR. KERR: I agree.

1           It seems to me that that general problem  
2 exists, and that it is a very important one in an effort  
3 to reduce risk.

4           CHAIRMAN PALLADINO: Max had his hand up.

5           MR. CARBON: I wanted to support the view that  
6 you do not necessarily use a simulator, but to go  
7 through scenarios so that the operator is not caught  
8 with his pants down, so to speak, so that some new  
9 phenomenon, or some new measurement, or something  
10 doesn't suddenly show up and the person has never  
11 thought about this before.

12           Maybe something shows up that is unimportant,  
13 he could go on his way in an actual accident situation,  
14 or maybe it is something that he should know about and  
15 to have given some thought to.

16           I think I would put it a little bit in the  
17 category of what I think the military people do in  
18 playing their war games, to try to go through scenarios  
19 and anticipate what might come up, what you might do,  
20 and to learn new things so that they don't catch you by  
21 surprise.

22           CHAIRMAN PALLADINO: Dave.

23           MR. WARD: I think this general sort of thing  
24 would be an important effort, but I think the emphasis  
25 probably should be on making sure that the plant staff,



1 in the broader sense rather than just the shift crew,  
2 understands the possibilities involved in accidents, and  
3 what can be done to mitigate them, and in particular  
4 that their understanding gets translated into some good  
5 and available plant procedures, using available  
6 instrumentation, and so forth.

7 I think that effort ought to have a much  
8 higher priority than trying to develop better or more  
9 advanced models for simulators, so that the reactors can  
10 actually these things. If the plant staff, the  
11 technical staff have the understanding, and that  
12 understanding is turned into procedures, I think that is  
13 taking the biggest bite, the biggest practical bite in  
14 helping in this area.

15 COMMISSIONER AHEARNE: A related part of that,  
16 though, has to be a better appreciation of the demands  
17 that have to be placed on that staff, which eventually  
18 would translate into, I would hope, perhaps an  
19 improvement in the quality of that staff.

20 MR. WARD: That is true.

21 MR. KERR: That could well be.

22 MR. BENDER: There are a couple of kinds of  
23 training and activities that could go on. One is the  
24 sort which Bill has alluded to, namely, that you look to  
25 see what kind of instrumentation is available and what

1 it can tell you. You might be surprised at how little  
2 it can tell you, and it might be useful to see whether  
3 you need anything to go beyond the postulated accidents  
4 that we presently are dealing with.

5           The other aspect is to look at accidents that  
6 have occurred and just see what the tools were that went  
7 with those accidents. We have pressed some of the  
8 applicants to do just that, to find out what happened at  
9 Chalk River, and what happened at Windscale, just so you  
10 could get some more appreciation of just what are the  
11 things you need to do.

12           The SO-1 accident should be something that  
13 everybody knows about, because the whole accident  
14 response set up that we have right now is pretty much  
15 based on that experience. I think it wouldn't hurt to  
16 think about how much of that you convey to people who  
17 are going to have to respond if something happens.

18           MR. CARBON: I should think that it is  
19 important to look at accidents that have occurred, but I  
20 think that it is also very important to look at the ones  
21 that have not occurred. I think Three Mile Island is a  
22 good example of the hydrogen question having caught soe  
23 people by surprise. I think that many of those  
24 surprises could be eliminated by what I think you are  
25 proposing.

1           CHAIRMAN PALLADINO: We do have some of the  
2 members of the staff here. Do the EDO or the senior  
3 staff have any specific questions that they feel ought  
4 to be raised here, or comment that would help in guiding  
5 our further deliberations?

6           MR. DIRCKS: Let me just say a few words.

7           First of all, I would like to recommend that  
8 everybody go back and read 82-1B again, because I think  
9 there may be a problem in communication here.

10           We have heard quite a bit of discussion of the  
11 use of PRAs and how they should be applied. At least in  
12 my reading of it, I think that we covered many of the  
13 concerns expressed on both sides of the table on the use  
14 of PRAs.

15           We have looked at the points (a), (b) and (c)  
16 on page 3, and we have tried to incorporate those  
17 concerns in the paper.

18           I think I have to emphasize that it is a  
19 policy paper. It is an attempt, I think, by the agency  
20 to indicate where the agency wants to go in the future,  
21 and lay out some broad general directions. It does not  
22 attempt to set specific requirements, regulatory  
23 requirements. It tracks out a pathway that the agency  
24 would move in the future. It indicates some concerns.  
25 It indicates how some of the reviews will be conducted.

1 But it does not set out specific generic requirements.

2           If the Commission wants to do that, that is  
3 the route that the Commission can use, and that is  
4 called rulemaking. We will be happy to start that  
5 process going, if we felt the Commission would support  
6 that way.

7           I do want to emphasize that in the discussion,  
8 I found it very interesting, they have moved from the  
9 research plan to discussions that the staff members  
10 might have had before the ACRS, to reviews of licensing,  
11 to other items. But I would like to emphasize that  
12 82-1B is the paper that is up for discussion, and I do  
13 think that some of the points that have gone back and  
14 forth really didn't focus on the content of the paper  
15 itself.

16           After you read it, I would like to get back  
17 into discussion with the committee in a review page by  
18 page of this thing to see how it expresses some  
19 deviation from the theology. I will be happy to get  
20 that discussion underway, if that is the case.

21           CHAIRMAN PALLADINO: Jerry, did you have a  
22 comment to make?

23           MR. RAY: I presume Mr. Dircks, when he  
24 recommends that we re-read, he is referring to the  
25 version dated February 7.

1           CHAIRMAN PALLADINO: I presume so.

2           Is that right, Bill?

3           MR. DIRCKS: Yes, but I think that if  
4 attention has been paid to the earlier versions, too, we  
5 will have eliminated some of the confusion that exists.

6           CHAIRMAN PALLADINO: Their viewpoints  
7 differed.

8           MR. DIRCKS: We are trying to incorporate the  
9 comments that they have made.

10          MR. KERR: Let me say that I have read 82-1B  
11 in its various versions very carefully, and there are  
12 some parts of it that I don't understand mostly on how  
13 one would carry out that policy. To me a policy is not  
14 a policy unless one unless you have some way of  
15 implementing it.

16          It is this on which we have been commenting.  
17 I don't think we have asked for a prescriptive,  
18 step-by-step implementation, but rather a general  
19 approach. We have said that we don't think the reliance  
20 on PRA, that at least we interpret to be the heart of  
21 the approach to new plants, will work.

22          CHAIRMAN PALLADINO: I think our further  
23 deliberations may cause us to make some suggestions on  
24 our process of interaction.

25          Are there any other Commissioner questions or

1 committee questions?

2 COMMISSIONER AHEARNE: Let me go back to Bill  
3 Kerr on that last point.

4 You are saying that, at least as you read it,  
5 you see the heart of the approach to new plants to be a  
6 reliance on PRA.

7 MR. KERB: Yes, sir.

8 COMMISSIONER AHEARNE: Do I conclude correctly  
9 that that is your fundamental objection?

10 MR. KERR: Yes.

11 CHAIRMAN PALLADINO: I think that it is the  
12 emphasis on the word "alone."

13 MR. KERR: The principal reliance. As I  
14 interpret 82-1B, the principal reliance is on PRA.

15 COMMISSIONER AHEARNE: One of the difficulties  
16 I will have in going back through this is that it is  
17 difficult to read a document sort of as a pure document  
18 in the sense that it is really -- I think all of us,  
19 when we approach a document like this, have a  
20 perspective which we bring to it based on both  
21 experience and a lot of discussion with various members  
22 of the staff.

23 I will try to re-read it from the standpoint  
24 of looking at it if I didn't have that background, what  
25 does it just say. I think, for example, as you have

1 just heard Mr. Dircks say, he believes that a lot of the  
2 complaints that have been raised are really handled in  
3 the document now. I don't know whether they are or  
4 not.

5 I was not that dissatisfied with the document  
6 prior to hearing some of your concerns. I will now have  
7 to go back through it and see, did I miss what was  
8 there, or perhaps you read into it how it might be  
9 interpreted, and that is just as damaging in the sense  
10 that any document like this is not only what we meant to  
11 say, but how is it going to be interpreted.

12 MR. KERR: I recognize that the English  
13 language is a very poor medium of communication,  
14 especially when it is written.

15 (General laughter.)

16 CHAIRMAN PALLADINO: Dave.

17 MR. OKRENT: To me, at least, part of the  
18 problem may arise because in a sense there seems to be  
19 one set of safety goals for existing plants and for  
20 future plants, when I really think that there should be  
21 two.

22 MR. KERR: Yes.

23 MR. OKRENT: It seems to me one can and should  
24 aspire to improve safety for future plants, and one  
25 should be able to accept less and be willing to take the

1 gap, whatever it is, for existing ones. They don't have  
2 to be as good as future ones. That does not come  
3 through in the safety goal policy statement, and it  
4 doesn't really come through in this except in the  
5 cost/benefit part.

6           If you aspire to improve safety in the future  
7 ones, you can do better on containment, you can do  
8 better on sabotage, you can do better on shutdown heat  
9 removal systems than you now have.

10           Maybe 50 years from now we will find out, with  
11 a lot of experience, that the ones that we have been  
12 running were really better than you needed, but I don't  
13 think that PRA can tell you that now, and that is part  
14 of it.

15           You earlier said that implicit in this is the  
16 assumption that the existing ones or the ones being  
17 built tomorrow are okay.

18           COMMISSIONER AHEARNE: I think that it almost  
19 does say it implicitly.

20           COMMISSIONER ASSELSTINE: It does say it  
21 implicitly.

22           COMMISSIONER AHEARNE: Yes.

23           MR. OKRENT: That is, in effect, a part of the  
24 issue I think. If you all are really convinced that the  
25 existing ones are okay, that the British are wrong in



1 what they are adding on auxilliary feedwater systems and  
2 HBI systems, and so forth, and other groups are. Then  
3 maybe this is it.

4 MR. KERR: I wish you would say that  
5 explicitly, because I agree that it says that  
6 implicitly.

7 COMMISSIONER AHEARNE: I think that it is  
8 actually explicit.

9 CHAIRMAN PALLADINO: It is pretty close.

10 COMMISSIONER AHEARNE: Let me just get to  
11 something he just said please.

12 Dave, I think what you just said was that you  
13 were challenging us because we are saying that current  
14 plants are okay.

15 MR. OKRENT: For the future --

16 COMMISSIONER AHEARNE: No, no, I am just  
17 talking about current plants.

18 Isn't it true that as regulators, and you as  
19 advisors of regulators, if we don't believe the current  
20 plant is okay, then we have to do something with it.

21 MR. OKRENT: Yes.

22 COMMISSIONER AHEARNE: I am saying the current  
23 plants.

24 MR. OKRENT: In fact, I earlier said what I  
25 would do with current plants. I would go back and look

1 at them individually, using PRA techniques.

2 COMMISSIONER AHEARNE: I have no problem with  
3 that.

4 MR. OKRENT: But I would not ask them to meet  
5 the higher standards of safety. I would seek it in  
6 future ones, because I don't have enough knowledge about  
7 the existing ones to know that really it is de minimis  
8 already.

9 COMMISSIONER AHEARNE: Let me look as far as  
10 future. When you talk about future, there are several  
11 slices to the future. One slice is, a future plant is  
12 one that is not already operating, and that incorporates  
13 all those that are under construction as future plants.

14 There is another slice which is those plants  
15 which are under design, or have been designed and the  
16 manufacturers are trying to sell, but have not yet  
17 sold. That is another piece of the future. Then there  
18 is another piece of the future which is the plants which  
19 have not yet been designed.

20 When you say that we ought to be setting a  
21 higher standard for future plants, do you mean all three  
22 of those?

23 MR. OKRENT: I would say all of those after  
24 NTCP.

25 COMMISSIONER GILINSKY: What is NTCP?

1           COMMISSIONER AHEARNE: Near term construction  
2 permit.

3           MR. OKRENT: If they have not yet been sold, I  
4 will call them future, that is my cut-off. You could  
5 make two cut-offs by your definition.

6           COMMISSIONER AHEARNE: My definition is, I  
7 think, a more practical one in the real world where  
8 people have finished designing plants.

9           MR. OKRENT: If they were selling them like  
10 mad this year, I would agree with you. I don't really  
11 read that that is the case.

12           COMMISSIONER AHEARNE: I am not saying that  
13 you want to put them down differently, but I think there  
14 really are three categories.

15           MR. LEWIS: I can't pass up the opportunity.  
16 Since I am opposed to bottom line safety goals, clearly  
17 I am more opposed to two bottom lines.

18           (General laughter.)

19           MR. LEWIS: May I suggest that in the current  
20 state-of-the-art, I actually disagree with Dave on this,  
21 and we will talk about it later, I suspect. If you set  
22 two sets of safety goals, unless they differ by at least  
23 a factor of ten, they are the same within the current  
24 state-of-the-art. I wonder whether you are prepared to  
25 accept factors of ten difference in aspirations for

1 current plants and for new plants in common.

2 MR. OKRENT: Let me comment in this way on  
3 what you said, Hal.

4 One could, following the lines, I think, of  
5 what is in the letter, aspire to improved design aspects  
6 in future plants, and not necessarily do it only on the  
7 basis or even with the basis that I am trying to seek a  
8 factor of ten.

9 You might decide there are certain features  
10 where, in fact, these are important aspects either for  
11 prevention or mitigation for things that we can't  
12 anticipate, and for prudence purposes we will make the  
13 decision early partly on the assumption that if they are  
14 made early enough, the cost factor is different than  
15 trying to add them in just before they get a  
16 construction permit, which is what the current plan  
17 would have you do.

18 They have designed it. They have done the  
19 PRA. Just before you issue the CP, you say, but add  
20 this dedicated shutdown heat removal system, which  
21 completely changes a lot of the plant.

22 MR. BENDER: There has been so much focus this  
23 afternoon on the matter of design features that somehow  
24 or other the question of quality and its impact on the  
25 safety goal is missing. I think the public is much more

1 aware of the quality issue than it is of the design  
2 features.

3           Somehow or other I have begun to wonder  
4 whether in our zeal to improve the design arrangement,  
5 we aren't forgetting that we have to make judgments  
6 about how much quality represents adequate, and how you  
7 judge it, and there hasn't been any discussion of that  
8 today. Somehow or other, if that is not in the safety,  
9 where is it?

10           COMMISSIONER AHEARNE: By quality, do you mean  
11 design, construction, operation.

12           MR. BENDER: Design, construction, operation,  
13 the mistake-oriented problem, the degree to which you  
14 conform to written specifications, and the importance of  
15 imposing standards and complying with the letter of law  
16 as those codes and standards are written. There is more  
17 controversy right now about that matter than there is  
18 about the design features.

19           CHAIRMAN PALLADINO: Mike, I think you have  
20 got a point. We have it in other documents, but we  
21 don't have it in our policy document, so to speak.

22           MR. KERR: In a sense, implicitly you do if  
23 you do the PRA right.

24           CHAIRMAN PALLADINO: Yes.

25           MR. KERR: It may be impossible to do it, and

1 that is one concern.

2 MR. BENDER: It is darn hard to do the PRA, at  
3 least so far not much has been done along those lines.  
4 We have just looked at the designs.

5 CHAIRMAN PALLADINO: I take that as a cogent  
6 point that we talk about it in other forums, but not in  
7 the policy forum that you speak about.

8 Are there any other comments or questions?

9 MR. RAY: It might be presumptive of me to say  
10 this, but the benefit from the viewpoint of carving  
11 communications of an exchange between the committee and  
12 the commission, such as accrues from today's meeting, is  
13 so significant, I wonder if we could aspire, on a  
14 tentative basis, if not today in the near future, agree  
15 on a preliminary schedule of a series of such meetings  
16 that is set up with some frequency over which we will  
17 not fall.

18 COMMISSIONER ASSELSTINE: I think that is an  
19 excellent idea.

20 COMMISSIONER GILINSKY: We certainly ought to  
21 meet more frequently.

22 CHAIRMAN PALLADINO: I thought we had such a  
23 frequency, but somehow it wasn't properly monitored. We  
24 thought that we were going to try to do it every other  
25 month.

1           MR. RAY: That would be excellent for a  
2 beginning.

3           CHAIRMAN PALLADINO: I think we ought to try  
4 to meet that schedule, unless we have other  
5 suggestions.

6           MR. RAY: This need not be limited to a  
7 specific issue, if you will, or problem. It could be on  
8 the general philosophy of design, or any regulatory  
9 matters, and so on.

10          CHAIRMAN PALLADINO: Let me make the following  
11 suggestion that you might think about for the next  
12 meeting we might have. I will suggest a topic, and I  
13 will see if we have topics suggested by our Commission,  
14 and then you and I can get together and say, let's agree  
15 on these topics for the next meeting.

16          MR. RAY: I think that\* would keep us more in  
17 tune with the regulatory needs than perhaps waiting for  
18 a problem to surface and then resolve it on a somewhat  
19 expedient basis. It might be in the best general  
20 quality that we could achieve.

21          COMMISSIONER ASSELSTINE: I think that it is  
22 useful to focus on just a couple of topics per meeting.

23          MR. RAY: Yes.

24          COMMISSIONER GILINSKY: I think that is true.

25          MR. RAY: It won't take a half day for it, or

1 something like that.

2 COMMISSIONER GILINSKY: I found today's  
3 meeting a good deal more useful than some of the ones we  
4 have had where we go over a whole series of items and  
5 spend a few minutes on each one.

6 COMMISSIONER ASSELSTINE: Yes.

7 CHAIRMAN PALLADINO: I agree.

8 MR. RAY: You could call them tutorial from  
9 the viewpoint of both sides. I don't mean to be  
10 demeaning in that sense, but it serves that purpose both  
11 ways.

12 CHAIRMAN PALLADINO: We very much appreciate  
13 your coming up and being frank with us. I think your  
14 comments are having an important impact. I would  
15 suggest that the Commission hold another deliberative  
16 session to review the comments we got today, as well as  
17 the written comments, discuss them with the staff and  
18 see to what extent, if any, there should be an addition  
19 to the policy.

20 MR. RAY: Thank you for the opportunity to be  
21 here.

22 CHAIRMAN PALLADINO: The meeting stands  
23 adjourned.

24 Whereupon, at 4:15 p.m., the meeting was  
25 adjourned.)



NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

COMMISSIONERS JOINT WITH ACRS

is the matter of: Discussion with ACRS on Severe Accident Policy

Date of Proceeding: February, 10, 1983

Docket Number: \_\_\_\_\_

Place of Proceeding: Washington, D. C.

were held as herein appears, and that this is the original transcript thereof for the file of the Commission.

Patricia A. Minson

Official Reporter (Typed)

Patricia A. Minson

Official Reporter (Signature)



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, D. C. 20555

January 10, 1983

Honorable Nunzio J. Palladino  
Chairman  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Dr. Palladino:

SUBJECT: ACRS REPORT ON SECY-82-1B: PROPOSED COMMISSION POLICY STATEMENT ON SEVERE ACCIDENTS AND RELATED VIEWS ON NUCLEAR REACTOR REGULATION

During its 273rd ACRS meeting, January 6-8, 1983, the Advisory Committee on Reactor Safeguards discussed SECY-82-1B, "Proposed Commission Policy Statement on Severe Accidents and Related Views on Nuclear Reactor Regulation," dated November 24, 1982. We also considered the memorandum of October 25, 1982, Samuel J. Chilk, SECY, to William J. Dircks, EDO, "Staff Requirements - Discussion of Severe Accidents - Policy Statement and Research Plan...." In our review, we had the benefit of a Subcommittee meeting held on December 21, 1982. The Committee has commented on earlier drafts of this SECY paper in reports dated February 8, 1982 and September 14, 1982.

As a result of the October 25, 1982 memorandum, S. J. Chilk to W. J. Dircks, the ACRS arranged a series of three Subcommittee meetings to discuss the proposed NRC research program in support of a regulatory approach for dealing with severe accidents as described in "Nuclear Plant Severe Accident Research Plan," NUREG-0900. The first of these meetings was held on December 21, 1982. You may recall that in our report of August 18, 1982 on NUREG-0900 and in our report of September 14, 1982 on SECY-82-1A, "Proposed Commission Policy Statement on Severe Accidents and Related Views on Nuclear Reactor Regulation," dated July 16, 1982, we expressed a number of concerns about what we considered to be the lack of a coherent and workable approach to dealing with severe accidents in the licensing of new plants and in the regulation of existing plants. We concluded that we could not judge the appropriateness or the adequacy of the research program without having examined one or several feasible approaches to which a research program could be related.

With these comments in mind, we requested the NRC Staff to present, during the Subcommittee meeting of December 21, 1982, whatever additional information had been developed on approaches to deal with severe accidents. We were surprised when we were informed that SECY-82-1B was, in the Staff's view, what the Commission is likely to adopt as its policy. The substance of SECY-82-1B is, so far as we can see, little different from that of SECY-82-1A.

1/10...To EDO for Appropriate Action..Cpys to: Chm,Cmrs,RF, faxed  
to: EDO...83-1293

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5 pp.

In its statement of purpose, the policy statement is said to have been "revised to reflect Commission and ACRS comments." In our opinion, the policy statement of SECY-82-1B does not reflect the comments we have made in previous reports to the Commission.

Our comments on the various drafts of SECY-82-1 are summarized below together with some further recommendations. Additional details can be found in the attached excerpts from several previous ACRS reports.

1. As we understand the proposed policy, judgment as to whether an applicant for a license has dealt appropriately with severe accidents will depend heavily on the results of probabilistic risk assessment (PRA). Decisions will involve comparison of the results of the PRA with the numerical guidelines suggested in Revision 1 of "Safety Goals for Nuclear Power Plants," NUREG-0880. There is general agreement that large uncertainties exist in our ability to predict both the probabilities and the consequences of severe accidents. Furthermore, there is no generally agreed upon method for comparing the results of a PRA with the guidelines given in NUREG-0880.
2. For existing plants, it appears that some as yet undefined set of plant specific and generic PRAs will be used to draw generic conclusions about groups of plants. An effort will then be made to draw conclusions about specific plants. The process to be used is not yet defined, nor is it clear what methods will be used to define it. Indeed, we observe that experience gained with PRAs suggests that it may be inappropriate to use generic results in the evaluation of individual plants.
3. No specific guidance is given as to an appropriate balance between prevention and mitigation of severe accidents. Except for some rather general comments about the need to explore the behavior of containment systems, and some equally general comments about filtered vented containment systems and core retention devices, mitigation is largely ignored. It appears that in principle, under the proposed policy, only an appeal to prudent engineering practice or the use of ALARA in risk reduction could be used to generate containment specifications, for example, and requirements for other mitigation systems important to public health and safety.
4. We have in several reports expressed reservations about a strong dependence on PRA alone in decisions dealing with severe accidents. We note, however, that the Commission policy as expressed in SECY-82-1B would use PRA as a principal criterion in detecting and correcting weaknesses in design. We recommend that before issuing a policy statement on severe accidents, the Commission give consideration to the possibility of including more specific directions for systems or approaches for dealing with severe accidents. As examples we suggest:

- (a) A statement that effort will be made to specify the performance of containment systems including subsystems for heat removal. It may not be feasible to do this at present, but an effort to do so can guide research that may be needed to determine if it is possible.
- (b) Specifying improved performance for decay heat removal systems.
- (c) Giving direction to a licensee that a plant design must include specific consideration of features to decrease the probability of damage from sabotage.

It appears to us that because of the close relationship that must exist among a safety goal, a policy on severe accidents, and a siting policy, a much more integrated approach is needed.

We recognize the considerable effort that has gone into the various drafts of SECY-82-1 and associated documents. We understand that the task is difficult. We nevertheless consider SECY-82-1B to be seriously flawed.

Sincerely,



J. J. Ray  
Chairman

Attachment:

List of Relevant Comments from Previous ACRS Reports

References:

1. SECY-82-1B from W. J. Dircks, Executive Director for Operations, to NRC Commissioners, Subject: Proposed Commission Policy Statement on Severe Accidents and Related Views on Nuclear Reactor Regulation, dated November 24, 1982.
2. SECY-82-203A, from W. J. Dircks, Executive Director for Operations, to NRC Commissioners, Subject: Revisions to Nuclear Plant Severe Accident Research Plan, NUREG-0900 (Draft), dated August 30, 1982.

Comments from Previous ACRS Reports

- "We believe that, before embarking on the course proposed for future CPs in SECY 82-1A, a concerted effort should be made by the NRC Staff and the ACRS to develop policy guidance on as many of the relevant safety issues as are tractable, and to propose an alternate approach to the Commission in which such policy guidance is provided to applicants for future standard plant designs." (Ref. 5, p. 2)
  - "With regard to existing plants, we believe it would be productive for the NRC Staff to draft alternate positions on the most significant safety issues and to establish what would be needed in order to evaluate the alternatives." (Ref. 5, p. 3)
  - "Neither the original nor the revised version of NUREG-0900 contains a delineation of an approach for dealing with severe accidents. This is needed to judge the appropriateness of the proposed research program. We continue to urge that the work necessary to provide one or more approaches be carried out. We look for requirements that might be placed on components or systems required to deal with severe accidents, description of what is now known about these, specifications of what, if any, information is required to describe system performance with the necessary accuracy, some indication of whether the information can be obtained from research in the time and with the resources available, and what research is planned to obtain the needed information." (Ref. 3, p. 1)
- "As an example, we note that, in the draft Implementation Plan for Safety Goals (July 16, 1982) provided to us, the NRC Staff concludes that it is not now feasible to specify the performance of containment systems. The NRC Staff further expressed an opinion that the information and approach needed for such a specification should be developed. We, therefore, looked at NUREG-0900 for a description of what new information is needed to specify performance of the various kinds of containments and containment systems now in use or proposed. Although there are elements of the program that could certainly contribute to more accurate specification of containment performance, we find no systematic descriptions of what information is needed or what part of the proposed program is designed to provide the information." (Ref. 3, p. 2)
- "We recommend that alternate containment performance criteria be developed and evaluated for existing nuclear power plants as part of the trial implementation program. A separate set of alternate trial containment performance criteria should be developed and evaluated during the trial period for plants yet to be designed." (Ref. 4, p. 2)

- "With regard to future plants, we believe that the NRC should examine and evaluate the safety-related changes now proposed or underway for LWRs in countries like France, the Federal Republic of Germany, Japan, Sweden, and the United Kingdom before arriving at its own judgment on what is appropriate for the U.S. For existing nuclear power plants, it is premature to assume that the available PRAs provide a generic basis for decision-making. On the contrary, despite their uncertainties, the PRAs indicate the existence of important plant-specific differences which need to be factored into the formulation of policy. Again, the specific backfitting approaches currently underway or contemplated for LWRs in other countries should be examined and evaluated for their relevance to U.S. policy." (Ref. 5, p. 3)
  
- "In our recent reports specific attention was called to the need for organizing the research under this Decision Unit to answer questions likely to arise in connection with the Commission's stated intention to modify the licensing process to take specific account of accidents more serious than those generally identified as Design Basis Accidents." (Ref. 2, p. 9)  

"However, there is still a lack of definition of even one approach to deal with the severe accident issue. Considering the difficulty of the problem, effort should probably be made to define several alternatives." (Ref. 2, p. 9)
  
- "We find that the NRC program, as proposed, is not responsive to [previous] recommendations [that funding be reallocated to provide the information needed for the severe accident rulemaking]. The programs ... should be restructured so that the primary priority is to provide the information needed for decision-making concerning features to mitigate the consequences of accidents involving severe core damage or core melt, for reactors in operation and under construction and for reactors yet to be designed. This would allow the elimination of a substantial portion of the longer-term experimental and code development work." (Ref. 1, p. 9)
  
- "A focused priority effort is needed with respect to risk contributors such as seismic events, design errors, operator errors of commission, sabotage, and systems interactions to provide a methodology suitable for incorporation into PRAs on a trial basis or to identify and evaluate sources of uncertainty which make this impractical and to suggest regulatory approaches in light of these uncertainties." (Ref. 2, pp. 8-9)
  
- "Insofar as feasible, all accident initiators and risk contributors (other than sabotage) should be included in PRAs and in benefit/cost analysis. If the uncertainties are such as to make a meaningful

quantification, for some initiator or contributor impossible, this should be documented in sufficient detail and an allocation of risk to this contributor justified." (Ref. 4, p. 3)

- "We believe that, in view of the continuing uncertainties to be expected in the art of PRA and a continuing inability to satisfactorily treat all initiators and other contributors to core melt frequency, and in view of the potentially very large differences in release magnitudes among different core melt accidents, containment performance design objectives are needed and should be developed expeditiously." (Ref. 6, p. 5)

Related ACRS Reports:

1. "Review and Evaluation of the Nuclear Regulatory Commission, Safety Research Program for Fiscal Year 1983," NUREG-0864, dated February 1982
2. "Comments on the NRC Safety Research Program Budget for Fiscal Years 1984 and 1985," NUREG-0875, dated July 1982
3. "ACRS Comments on Nuclear Plant Severe Accident Research Plan," NUREG-0900 (Draft), dated August 18, 1982
4. "ACRS Report on the Draft Action Plan for Implementing the Commission's Proposed Safety Goals for Nuclear Power Plants," dated September 15, 1982
5. "ACRS Report on SECY 82-1A: Proposed Commission Policy Statement on Severe Accidents and Related Views on Nuclear Reactor Regulation," dated September 14, 1982
6. "ACRS Comments on the NRC Staff Questions to the Commission Concerning the Policy Statement on Safety Goals for Nuclear Power Plants," dated September 15, 1982