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NUCLEAR REGULATORY COMMISSION

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In the Matter of: ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

JOINT MEETING OF THE

SUBCOMMITTEE ON SAFETY PHILOSOPHY, TECHNOLOGY
AND CRITERIA
AND THE SUBCOMMITTEE ON CLASS 9 ACCIDENTS

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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Nuclear Regulatory Commission
1717 H Street, N.W.
Washington, D.C.

Wednesday, September 8, 1982

The Subcommittees met at 10:30 a.m.

PRESENT FOR THE ACRS:

DAVID OKRENT, Subcommittee Chairman
WILLIAM KERR, Subcommittee Chairman
MYER BENDER
DAVID WARD
CHESTER SIESS
J. CARSON MARK
PAUL SHEWMON
DAVID WARD

DESIGNATED FEDERAL EMPLOYEE:

GARY QUITTSCHREIBER

NRC STAFF:

MICHAEL GRIESMEYER

P R O C E E D I N G S

MR. OKRENT: This meeting will now come to order.

This is a joint meeting of the Advisory Committee on Reactor Safeguards, Subcommittees on Safety Philosophy, Technology and Criteria, and Class 9 Accidents.

I am David Okrent. Next to me is William Kerr. We are the subcommittee chairmen. Other ACRS members who are here or are expected to be here during this session include Mr. Bender, Mr. Moeller, Mr. Ward, Mr. Siess, Mr. Mark and Mr. Shewmon.

The purpose of the meeting today is to review issues regarding severe accident policy, backfitting policy, safety goals and their implementation.

The meeting is being conducted in accordance with provisions of the Federal Advisory Committee Act and the Government in the Sunshine Act. It will be necessary to close portions of the meeting to discuss material of a pre-decisional nature and material provided in confidence from a foreign source. Mr. Gary Quittschreiber is the designated Federal employee for the meeting.

The rules of participation have been announced as part of the notice of this meeting previously

published in the Federal Register August 18, 1982. A transcript of the open portions of the meeting is being kept and will be made available as stated in the Federal Register notice. It is requested that each speaker first identify him or herself and speak with sufficient clarity and volume so that he or she can be readily heard.

We have received a written statement from Westinghouse regarding severe accident rulemaking. We have received a request for time to make a statement from the Atomic Industrial Corps regarding the proposed NRC safety goals draft implementation plan.

I believe that the first portion of the agenda will be closed. The agenda calls for this topic to begin in a minute or two and to end no later than 11:45. So at 11:45, we will go into open session. Can we go into open session earlier if we finish the first one sooner?

MR. GRIESMEYER: I think we can.

MR. QUITTSCHREIBER: Yes, you can.

MR. GRIESMEYER: We will announce.

MR. OKRENT: No later than 11:45 we will go into open session on the next part of the agenda. So I will have to at this time ask that those attendees who cannot be participants in the closed meeting leave the

room and we will go into closed session.

[Whereupon, at 10:35 a.m. the open session of the meeting was recessed and a closed session was commenced, at the conclusion of which the subcommittees reconvened in open session at 12:15 p.m.)

MR. OKRENT: The meeting will reconvene.

My apologies for running beyond the stated time of 11:45. I guess that is in the best ACRS tradition of not managing to meet the schedule. In any event, Mr. Stello is next, I believe, to discuss the EDO point of view on the implementation plan for the safety development.

MR. STELLO: I too, I guess, have a list of questions.

MR. OKRENT: We try to be fair to everyone.

MR. STELLO: You have been prolific in writing questions in August. There are several lists that came out in one day. Perhaps the best way to proceed is to make sure that the questions you have raised for the EDO to respond to in your memo of August 26 to Mr. Dircks -- you raise a number of questions, and maybe what I could try to do is make some general comments and then try to get to answering the questions.

As the committee is aware, the safety goal has had quite a bit of work and is still having an awful lot

of work done to it. It has had a variety of comments from the public, from industry, from the ACRS itself. The Staff has interacted with the drafters of the policy statement. The Staff has prepared an implementation plan trying to follow the policy statement itself, and yet I think there still remains a great deal to do.

So that what we talk about here today will be helpfull, perhaps, in having the committee form more judgments that it may wish to offer to the Commission as it considers redrafting and recasting where it ought to go with the safety goal. And in that context and in that spirit, we have a variety of us here from the Staff who will give you our views

I will try to identify the response as you request from the EDO's point of view, but we haven't constrained ourself in that regard. As you ask each of us for questions, we will not hesitate to suggest that there are some of us who will not agree with what others have said, and we will feel quite free to bring that to your attention.

So in that spirit, I will try to give you what I believe are, to the best of my ability to do that, the EDO's current thinking about the questions you have raised.

You asked the first question: What specific

ways does the EDO believe the draft action plan is not yet suitable for use? I wonder if I might be permitted to ask the question, does the committee have the questions that arose as a result of the last briefing of the Staff with the Commission on this subject and the questions that followed from OP's staff?

MR. OKRENT: The Subcommittee now has them. I don't know whether they did have them because I am not sure when that reached the ACRS, but they are at the back of the yellow thing you were just handed. On page 10 there is something called "Staff Questions to Commission on Safety Goals."

MR. SIESS: Where did those come from? The Staff questions to the Commission. What was that in?

MR. STELLO: It was in a memorandum from Remmick to the Commission.

MR. OKRENT: You may not have noticed it in your mail, but you do have them there now.

MR. SIESS: All right.

MR. STELLO: Rather than trying to read through that list, I think the list generally gives you the flavor of what it is that remains outstanding before the EDO is prepared to say that he is ready to go forward with the implementation plan. There are clearly some fundamental issues raised in these questions.

The Commission is being asked to give the OP staff, both for the purpose of redrafting safety policies itself and for the Staff to have the benefit of that Commission guidance, to revise the implementation plan consistent with the policy that the Commission wishes to move forward with.

I think those questions generally give you the reasons why there is reluctance. I think it is a rather complete list and they are very appropriate. That is the reason, and the memorandum that transmitted that, the implementation plan, gave some other observations also useful for that purpose.

Your second question is: Does the EDO support Mr. Denton's proposal that all significant benefits be included in the cost-benefit analysis? I think that is a very difficult question to deal with as you are unfolding a policy, but I think there are some general principles that the EDO holds, and one is that the Staff ought not get itself in the business of economic regulation.

There are certain things that utilities ought to be worried about and ought to have the responsibility in terms of economic costs that they suffer if the do things improperly with a plant. Something as simple as bad maintenance that can yield a trip with a plant that

gets a plant down for a few days, one can ask whether there are analyses one should do and get into in terms of down-time. Taking it further, if there is an event in a plant which causes a substantial release of fission products within the primary system, the containment, a substantial cleanup, even closing the plant, should that be included? I think that is a consideration of economic regulation. EDO believes it would be better to leave that to the industry rather than the safety regulators at the NRC.

If I were to try to describe, then, that principle in its most general terms, it would be a principle of saying those things that can happen offsite to the public health and safety that are a result of the release of fission products beyond the site boundary, those are the kinds of issues that ought to be in our equation of cost benefit; and to that extent I think that there is a disagreement between Mr. Denton's views and the EDO's views.

I stated EDO's views, and I think Mr. Denton's views, as best I can recall -- he has some representatives -- is those kinds of costs should be included in the cost-benefit.

MR. OKRENT: The offsite?

MR. STELLO: The plant, yes.

MR. OKRENT: Offsite but not onsite?

MR. STELLO: Yes.

MR. OKRENT: Mr. Kerr?

MR. KERR: Vic, in trying to think about the implications of what you have said, it seems to be almost inevitably when you make a decision, for example, as drastic as shall we shut down a plant, you take into account the economic implications and not just the safety implcations alone, unless part of the safety implications are what does this do to the economic status of the system.

I am not disagreeing with what you said earlier; I am just trying to understand. When you say you don't think you ought to get into economic regulation, that is one thing; but it seems to me one cannot ignore, and I don't think one should ignore, the economics of the situation in making safety decisions.

MR. STELLO: I don't understand your question. Let me ask a question to make sure I do. Are you talking about regulations in terms of making backfit decisions on plants or are you talking about the implementation of the safety code and how the safety code should be as a matter of policy? If you are making a backfit, a backfit decision is you have to shut down a plant to put in a particular fix that will have the

plant down for three months. That is a cost and would be included in the cost-benefit balance in deciding to add the requirements.

I think that is another issue that is different from the issue of what happens if you have an accident in a plant, which is what the safety goal is addressing, and the plant is lost because of the accident.

MR. KERR: I guess I am really trying to decide -- I am saying there are certain economic issues that come into the decision-making process; is there a clear-cut way of deciding which one to do and which ones not to do, in your view?

MR. STELLO: No.

MR. KERR: Okay.

MR. STELLO: I think it is part of a process that will have to be developed. I have tried to give you what I think the EDO's view is on it. There are very strong arguments which could be made on the other side, which is put all cost and all benefit into the equation, put everything there and then see how it all balances out.

MR. KERR: What you are telling me, I think, is at this point the EDO office says here is about the point at which we think the line should be drawn but

other people might reach different conclusions.

MR. STELLO: Yes, and how the Commission will come down on this issue has yet to be decided. I don't think that the Commission has decided. Clearly there is a consistency in the logical approach going either way. It is clearly a policy matter which the Commission itself must decide.

MR. MATTSON: Could I try to compare NRR's thinking on the subject I think with what the EDO's thinking which has just been described is? They are not that far apart, and I think the way Vic said them, they sound farther apart than they are. I think we all agree we are not in the business of economic regulation, but if a maintenance change or a design change only has implications for the equipment of the utility and has no safety implications, we don't have any business factoring in the benefit of the change to forcing them to make that change. We shouldn't even be considering those things.

But for those things which have significant -- and I want to emphasize the word "significant," although I don't know how to define it -- significant public health and safety implications in deciding whether to make a change or testing whether it meets a cost-benefit guideline of the safety goal, NRR would take into

account all costs insofar as you are able to estimate, both the cost of saving the equipment that the utility owns as well as the cost of offsite cleanup, onsite and offsite, the implication for both the utility and the public in making a decision about a change.

MR. OKRENT: Who would pay ultimately if the utility has to put a plant down for three months to fix something? It is not the stockholders. It ends up going to the rate payers.

MR. STELLO: I don't believe there is anyone in this room that could give you an answer that would be universally acceptable. I don't believe there is one.

MR. KERR: No, I don't think so. The individual state commission --

MR. STELLO: Each public utility commission has certain policies which could cause the answer to be rate payers or stockholders or some combination.

MR. OKRENT: Suppose they are running a coal plant and the turbine fails and the plant is not available for three months and they have to buy power from Utility X. I think in the end they have an existing rate, but if they did not make a profit over tha period, then factoring in that kind of cost the next time they would come to the PUC and say we only made 2 percent instead of the percentage we should have made.

MR. STELLO: So instead of making 3 percent this year, they have made 1 percent, so the stockholders lose the 2 percent profit they would have made. Let me finish, Roger, in that context, then. The stockholders have picked up the 2 percent burden because the PUC didn't let them put it in the rate base for that year.

MR. OKRENT: Unless the same thing had happened the previous year and the year before that so that it is factored into their expected.

MR. STELLO: That's right.

MR. OKRENT: So my point is over the years, then, except for some unusual event, this is factored into the rate base, I believe.

MR. STELLO: But you are making it sound as if it comes out on balance, and I am saying you cannot make any such conclusion because if over the years there has been bad performance with this utility historically ten years ago making a 10 percent profit and now they are only showing 3 percent, and maybe it is more. I don't know, I don't think there is any sharp way to answer it because it is controlled by the Public Utility Commission.

Now, they have to allow them to make enough money to survive or they can't generate electricity, but whether that "enough money" is less or more than they

would have made had you not had this problem, I don't know how you would answer.

MR. OKRENT: My impression is that over the years, down time ends up being a cost that the rate payers have to pay for just as insurance on the plant is a cost that the rate payers have to pay for.

MR. STELLO: If that is your belief, I won't debate it, but we are often called to go to public utility commission hearings and they ask us was that downtime the result of an NRC requirement or something the utility fouled up with. And if they conclude it is something the utility fouled up, they don't let them put it in the rate base.

MR. OKRENT: I have to agree there will be differences among the states and things are fluctuating recently.

MR. STELLO: So that no overall, universally acceptable conclusion is possible, I don't think.

MR. MATTSON: But I think in the case where NRC does require some things or where you are considering a change in requirements, it would be fair to assume it is passed on to the consumer, because it is usually stated that if NRC requires it, it is a legitimate cost of doing business in the eyes of the public utility commissions.

MR. STELLO: Not necessarily. Most of the time I agree with you, but I think at Nine Mile Point, even some of that was being debated.

MR. OKRENT: This has nothing to do with the point except indirectly. I was wondering whether the NRC even considered developing a class of safety improvements which it identified and said these are potentially desirable and we will let the PUC decide whether they want to provide the rate increase to pay for that.

MR. STELLO: Up until you made that comment, I hadn't heard any prior consideration, but now that you have brought it up, I guess it is considered, at least for this moment. I don't know of any serious work in generating such a list, however, going on in the Staff.

MR. OKRENT: All right. There remains a difference, then. How would EDO treat the following?

MR. STELLO: I am not finished with your list.

MR. OKRENT: No, on the same question. If you have an accident like TMI and you damage the plant and you have offsite psychological effects, are they costs offsite or what?

MR. STELLO: That is such a complicated question at the moment that I don't know what one could

say. You know the facts as well as I do on where we stand with that issue with respect to TMI up through and including the courts, and I guess it is pending before the Supreme Court as to what the law does or does not require, and I think it will depend upon the outcome of the Supreme Court decision as to what the answer to your question is.

If the law says it is something that must be considered and included, then I suspect that we will abide by the law. If the law is such that it does not indicate that we are required to do it, then it is a matter of policy and it will be up to the Commission to decide that policy. In either case, I can't give you any more than I just did.

MR. OKRENT: Okay.

MR. STELLO: Now number 3. Does the EDO support the use of design objectives and operating levels, and if so, are they in agreement with the numbers proposed for use by the Staff and does the EDO have any specific comments or suggestions in this regard?

I think you need to start by answering this question from a very philosophical point of view, and that is: where will we go with the safety goal, at least for the near term? Will the safety goal be one that one envisions as a way in which to cause us to study and to

analyze the whole fabric of regulation to determine whether or not there indeed may be some holes in that fabric as we try to understand safety from the new-found tool of PRA, which needs quite a bit of comment on issues which has been made before and I won't bother to repeat?

If that is the way we finally go with safety goals for the near term, then it would appear that the issue of operating levels which are more closely aligned to actions that one would or would not take in an operating plant would be less needed and therefore you wouldn't have to include them in implementation plans.

On the other hand, if it is decided that indeed one had to develop a safety goal which was going to be thrust immediately into the licensing and decision process of the day-to-day business of the agency, I guess then the question would arise as to how to develop operating levels and decide on appropriate causes of action, and it would seem then to be more appropriate.

It is the EDO's view that it would lean toward a use of the safety goal for some trial period which would align itself more toward this generic, sweeping review of where we are going, looking at how to prioritize research programs and what we ought to do, the development of new regulations, so that then you

would not need to include them.

Again, I hasten to add that is clearly a decision that the Commission will have to make, and it is, in fact, one of the questions that has gone forward to the Commission itself to address. I don't really think we can discuss in a great deal of detail how we ought to move forward with them today until we really get more guidance from the Commission.

I can see the whole structure of a safety goal into the routine day-to-day decision process as being one that needs to be put in very carefully and very slowly. I think it has high promise, especially the concept of starting to look at what we have already have and can learned from PRA analysis, but it clearly can make the licensing process very cumbersome, trying to change from a decision process which would have a go or no-go gauge built into the policy. I don't believe that is the Commission's intent. I don't believe that is what they want to do, but they will need to speak to it as they answer these questions.

MR. KERR: Vic, I would assume the Commission would also look to people who are going to have to use this for a good bit of guidance on what they think is practical and usable and makes sense. I recognize that you have to look to the Commission for policy guidance

on how to put this into effect, but don't they also look to the Staff for a great deal of guidance on what the Staff's experience would indicate is practical at this stage?

MR. STELLO: I think the Staff has made it reasonably clear that thrusting the whole safety goal approach in a licensing process would be a mistake, and we do not recommend it. We recommend a go-slow approach.

MR. KERR: Can you respond to question 3 in that context then? If you were using it on a trial basis, does it make sense to talk about design objectives and operating levels or is that too specific at this point?

MR. STELLO: If the trial use is to use it on individual cases and hearing processes, it makes more sense if that is what you are going to do, but that is not what is recommended. So if you use it the way it has been recommended, that we forward this, there is clearly less need. Now, if the Commission decides they want to use it --

MR. KERR: Wait. Do you have a view on the most useful way which one could try it out to see if it will work? I certainly don't know at this point. I don't have an opinion that yes, this will work.

MR. STELLO: I tried to describe that. Maybe

I haven't done it well. Let me try it again. If you look at the collection of PRAs we now have and you assign them to a group, perhaps Research or somewhere, and you give that group this collection of PRAs and the policy guidance now contained in the safety goal, 10^-4 core melt, the link to cancers, the early fatalities, and even the ALARA concept, and you ask this group to take these collections of PRAs, use them, examine the PRAs, examine the regulatory approach, what has been called the deterministic way in which we have regulated, and look, are there inherent weaknesses or gaps in this regulatory approach that ought to be fixed up? Are we going too far such that we ought to back up and reexamine the regulatory process and use the safety goal on a trial basis?

In that way I think it could teach us a great deal and allow us to become more proficient at the uses as we move forward into clearly the more complex issue of trying to make individual decisions on individual cases with the safety goals. That is the way in which I believe there is a general belief on the Staff's part as to moving forward.

MR. KERR: Thank you.

MR. OKRENT: I think the committee indicated in its comments of June that it thought that one had to move cautiously into the application of this methodology, and I suspect you will find agreement with looking at the existing regulations as to where they are asking for things that are superfluous and where there may be gaps.

But it is a fact of life that things arise with some frequency that resemble the decision making involving operating levels. In other words, you identify something and you make some estimate crudely of the magnitude of the situation, and you decide some way I will fix it right away, they cannot start up until they fix it; we have a couple of years to think about this or whatever; we will try to study it quickly in the next 6 months and then decide.

Those are decisions which at least resemble this idea of design objectives from an operational level. So I think if you just say, well, we are going to apply safety goals only to looking at the fabric of regulations, I think it is a little bit of a fiction. This other part is part of the regulatory life.

MR. STELLO: It is today.

MR. OKRENT: Yes.

MR. STELLO: If someone did an analysis and

you knew what the likelihood or probability whether it was a PRA or something someone did simply and crudely, you would take that into account in the decision-making process, just as everything else. You say that like it is new.

MR. OKRENT: No, it is not new.

MR. STELLO: It has been going on ever since I have been in this business. What else is new? Why are you making the point? We have always done that. To the extent you have the information, you use it, clearly.

MR. OKRENT: The point is that there is not, so far as I know, Commission guidance on how these decisions should be made on these indiivdual things which are not usually ASLB things, they are things beyond the Staff, NRR has to arrive at some decision on.

MR. STELLO: Are you saying you think the Commission ought to issue a speed limit like we have in the safety goal at the moment that says, if it is 10^{-2}, do this; 10^{-3}, do that; 10^{4}, do something else? Do you advocate that that would be a good thing to have at the moment? I guess I at best have a lukewarm feeling toward doing that. I think it would distract us from the real purpose of how to move forward.

MR. KERR: In making the aux feed case, did you not almost do that?

MR. STELLO: I said I have no problem in a limited sense if I do a probabilty analysis to take it into account. If I have the information, I will surely. And, in fact -- Roger, help me -- I think in San Onofre we came close to giving them a number saying, with respect to the PORV. Did we not have a standard we were looking at in the aux feed?

MR. MATTSON: In the Standard Review Plan.

MR. STELLO: 10^{-4}. And I am not surprised. We had other numbers for external events and hazards of 10^{-6}. I have forgotten the standard of review. 2.0, 2.23? That has been there for, what, 10-12 years?

MR. BERNERO: Ever since the Standard Review Plan started.

MR. STELLO: I am all for whatever we can develop to use as tools in the decision process. But I do not know that we are ready to codify it in the way of a standard as Commission policy.

MR. MATTSON: Maybe it is useful to try to compare the formal on-the-record decision process that has to occur in a legal hearing process. The weight of evidence and proving one is in conformance with a deterministically stated regulation, and the less formal, less judgmental process that one goes through as one sorts out new information and decides what action to

take in the context of those regulations.

Now, the implementation plan, the way it is written today, attempts to say, keep PRA and the safety goal out of the licensing process, but still have operating levels that can be used in making those less formal decisions about what is important and what is unimportant.

The EDO proposal, the decision Vic has described, says, it is probably difficult -- I am reading into it -- it is probably difficult to keep out of the formal process those rules-of-thumb, those operating levels. And in the spirit of go slow, do it right, do not rush into this and mess it up, the removal of the operating level keeps the use of the PRA and safety goals in the informal process less formal, less susceptible to manipulation by the optimist and the pessimist, each of whom has a sharp pencil in the licensing process. It will interfere with everyone in rushing too quickly with the safety goal of the PRA.

MR. STELLO: Moving right along, question number 4. On page 3 of your memo the phase is used, "Where the average individual received low doses, a few millirem per incident," how were you defining average individual? Help me to make sure this is right. Is an average individual average biologically and locationally

within 1 mile of the plant?

MR. OKRENT: Within 1 mile?

MR. STELLO: On page 3 it is the 1-mile annulus, I think.

MR. OKRENT: Gee. It says, "A large number of incidents where the average individual would receive relatively low doses." I was under the impression that those were not the kinds of things you would be doing very much with. If the average individual within 1 mile only receives a few millirem, not that I want to give anybody a millirem, but I get a few millirem just flying to Washington and back. I did not think that this was what the safety goals were addressing.

MR. STELLO: Wait a minute. What do you think it means to say a .1 percent increase in cancer? That means 20 millirem.

MR. OKRENT: Yes. But accidents are an infrequent event.

MR. STELLO: But the revised safety goals also had routine releases.

MR. OKRENT: Is this comment in terms of routine releases?

MR. STELLO: I would have to go back to read the comment. The present version of the safety goal, as presented, now includes both accidents and routine

releases. The .1 percent cancer increase turns out to be 20 millirem. 20-millirem incidence. 20-millirem incidence are now to be evaluated according to the current draft of the safety goal in terms of routine operation and accidents and transients.

The accident releases are one issue, and routine releases are another issue. Whenever you get down to trying to evaluate into the few millirems, you now clearly raise the question of is that even required for routine events, routine operation? I do not remember the regulation with a great deal of precision, but in Appendix I it says if you have a real individual and he can get a dose in excess of 5 millirem, then you have to do ALARA to the tune of $1,000.

MR. KERR: But that is within a 50-mile radius, too.

MR. STELLO: Yes. This is an issue that I think needs very careful consideration, because it could go beyond what we do for routine releases. And my recollection is that was the thrust of the comment.

MR. MARK: Vic, the comment referred to "latent cancer fatalities."

MR. STELLO: Yes.

MR. MARK: And that is not the 1-mile zone, that is the 50-mile zone.

MR. STELLO: No.

MR. MARK: There is nothing about latent cancers in the 1-mile zone in the proposed goals.

MR. STELLO: In the present version, latent cancers are calculated out in a 1-mile annulus with the belief that if that is okay, it is okay all the way out.

MR. MARK: Do you mean it has a 1-mile radius?

MR. STELLO: 1-mile annulus from the site boundary, out 1 mile. If you had a circular site boundary, it would be everyone from within the site boundary out to 1 mile further, from that point out.

MR. SIESS: The exclusion boundary plus a mile.

MR. MARK: That is for the prompt fatalities.

MR. STELLO: That is for both now.

MR. MARK: It is for both?

MR. ERNST: There is a proposed numerical guideline for latent cancers to the average individual and for prompt death to the average individual. Both of these average individuals are out to 1 mile. There is also a societal limit proposed which goes to 50 miles.

MR. MARK: And that only considers delayed cancer?

MR. ERNST: Yes.

MR. STELLO: I have had a chance to read this. If you read on page 4, it says, "The

implementation plan had a proposal in it to use an ALARA down to 1/10th of design objectives." And as I told you, a tenth of a percent increase in cancer risk is 20 millirem. 1/10th of that is 2 millirems. So you would be doing ALARA down to 2 millirem. That at least conceptually could be contrasted to be inconsistent as to what we do for normal operations.

Dave, you look puzzled. Have I gotten through to you yet or not? Hello?

MR. OKRENT: I think I have the drift of what you are saying. I would not want to try to explain it.

MR. STELLO: Have I failed to explain it with sufficient clarity so that you can understand it?

MR. KERR: I can understand the 2-millirem limit for normal operation when in Appendix I you go down literally to microrems for the individual at the radius of a 50-mile zone, and that is for normal operations.

MR. STELLO: Right.

MR. KERR: I must admit I think this is a lot of nonsense, but it is done.

MR. STELLO: The analogy is if you take 1/10th the design objective and suggest doing an ALARA, you will be doing ALARA down to dose levels of 2 millirem. If a real individual is getting 2 millirem a year for

normal operation, do you need to do an ALARA? I think the answer is: no.

MR. OKRENT: I do, too, but I wish someone would go back and change Appendix I correspondingly.

MR. STELLO: No, I think Appendix I said the maximally exposed individual, not more than 5 MR.

MR. KREE: That is the maximum that could be released, but now, having the release, you have to do ALARA by calculating the man-rems within a 50-mile radius, and you do not cut off at any 2 millirems.

MR. STELLO: That is right. It goes beyond that.

MR. MATTSON: But the ALARA prescription in Appendix I has never been used, because in getting down to the 5 --

MR. KERR: I do not care whether it is being used or not; it is there.

MR. STELLO: I am trying to draw that analogy because of the fact that if you take 1/10th of the design objective, you are doing ALARA down to 2 millirem, which clearly seems to be beyond what was intended.

MR. BERNERO: Excuse me. One thing you should point out when you are doing routine-release ALARA calculations, you are dealing with a spectrum of

population, the worst of which people receive a few-millirem dose and the rest are receiving down to the micro-rem.

When you do the same sort of calculation of the same range of an accident calculation, you deal with people at the front end of it who might have received fatal doses -- many, many rem -- and then grading downward to the micro-rem. So you really do not have the same sort of calculational problem in the accident ALARA as you have in the routine-release ALARA.

MR. KERR: I do not see what the calculation technique has to do with it. We are talking about the people in both cases and the exposure.

MR. BERNERO: Except if you went in and took the accident calculation of integrated man-rem and said, what I am going to do now is stop the computer when it gets down to, say, 1 millirem, I will not count anything below 1 millirem, you will not make a big difference to that calculation, the result will not change very much. In the Appendix I it would. If you stopped the computer at 1 millirem, you will stop with the first few people at the site boundary.

MR. KERR: I did not realize we were protecting computers. I was talking about people.

MR. BERNERO: I am talking about the result,

the integrated man-rem to a population group from routine release as against the integrated man-rem from accident release.

MR. OKRENT: Okay. Why do we not go on, Vic?

MR. STELLO: I will take that to mean that I have now persuaded you that what I say is true.

(Laughter.)

Could you elaborate on your final comment that the Commission may wish to consider the effect that its discussion of PRAs and the safety goals might have on this hearing? And I assume that that must refer to the Indian Point hearing. The Indian Point hearing clearly deals with an issue that is a PRA issue. How it is dealt with and to the extent that we forge ahead, I think we will be generating some sort of precedents, not being in a position to have allowed whatever goes on in that hearing, define and set forth the precedents of what to do for all time. It is a recognition in calling to the Commission's attention that that is the reality of what is going on.

MR. OKRENT: I could not tell whether the Commission had to watch what it said when we talked about PRAs and safety goals because this might affect the hearing, the term used is "the effect its discussions of PRAs and the safety goals might have."

Or is it just any decision they ultimately take might have on the hearing?

MR. STELLO: All of those.

MR. OKRENT: Okay, I will let it go at that.

MR. STELLO: Whatever conclusion they reach can have an effect on the hearing.

MR. OKRENT: Oh, conclusions.

MR. STELLO: Whatever they say on this issue. And they need to take that into account.

MR. SIESS: And by "say," you mean formally, not in discussion?

MR. STELLO: Yes. I think they would need to speak, to the extent that they come forward with it, if it is to be used and then how.

MR. KERR: This is a good question to invoke the principle of res ipsa loquitur.

MR. OKRENT: Does that mean we go to lunch?

MR. SHEWMON: I will second that motion.

MR. STELLO: Call for a question, Robert's Rules of Order.

MR. OKRENT: It looks to me like we are a little behind the agenda. Can we eat in 37 minutes?

(Chorus of nos.)

MR. OKRENT: 45 minutes. All right, we will be back at 1:40.

(Whereupon, at 12:55 p.m., the meeting was recessed, to reconvene at 1:40 p.m., this same day.)

AFTERNOON SESSION

(1:45 p.m.)

MR. OKRENT: The next speaker is Dr. O'Donnell, who has asked for time to comment.

Please come to the podium.

MR. O'DONNELL: Good afternoon. My name is Ed O'Donnell. I am a division vice president with Atomic Industrial Forum, and I am also chairman of the AIF subcommittee on PRA.

As you know, the AIF has been very closely following the development of the NRC safety goal policy, and we have had several meetings with the subcommittee. We have reviewed the February draft policy statement issued for public comment and filed our detailed comments on it with the Commission on May 18.

In addition, we have reviewed the more recent documents that were presented to the Commission in July, including the draft Staff implementation plan for the safety goals and the proposed revisions to the policy statement. We are in the process of developing detailed comments on those documents, which will be submitted to the Commission shortly.

We welcome the opportunity to share our thinking with the subcommittee this afternoon on this matter. We basically have a concern that the documents

as presented in July are losing sight of the original reasons for developing a safety goal policy, which, in our view, are to provide a statement of the Commission's views on what is an acceptable level of risk and to serve as a means for improving current deterministic requirements by using PRA to identify, where necessary, if cost-beneficial changes are warranted in existing regulations.

The safety goal policy, as we understand it, was never intended to provide an additional layer of licensing review or to act as a substitute for deterministic regulations. Unfortunatly, we believe the documents as presented, if they were adopted, would do pretty much that. And I will summarize for you our major concerns on these documents.

I hope you can read that. If not, I will discuss them in great detail in the 15 minutes allotted me.

As it is my only slide, you will have a great deal of time to study it.

MR. SIESS: Gary, make some copies of it.

MR. GRIESMEYER: Shall I just make copies of it, Ed?

MR. O'DONNELL: There is just one slide, and I will cover it all in detail. We are limited in time

anyway.

Our first and major concern with the documents is with regard to the use of safety goals and the PRA in individual plant licensing reviews and hearings. As we read -- and this concern deals with the implementation plan -- as we read that document, it very clearly indicates that the Staff intends to require safety goal PRAs as part of licensing applications for future plants and for selected operating license plants, for plants in the pipeline and will, in fact, require those plants to meet various safety goals.

It indicates that for an operating license application and for operating reactors, certain fixes will have to be made if the plant exceeds operating limits. And for high-population density sites, it indicates the safety goal PRAs will be required. And for INREP, whatever that is, that the PRAs will have to be submitted for Staff review.

All of this very clearly is moving in the direction of requiring PRAs to be part of license applications and part of the licensing process. The document pretty much accepts the fact that the Staff believes that hearing boards will have to get into these issues and have to rule on acceptability of PRAs and whether or not plant applications meet or do not meet

the safety goals.

All of this, we feel, is counter to the initial objective, which was to introduce PRA and safety goals as a means of generically improving the existing licensing and regulatory process. We feel it is very important that the implementation plan steer away from enbumbering the existing licensing process -- that is, the process of review and hearings on a specific application -- from introducing these new elements.

The second item deals with what we feel is a clear lack of assignment of burden of proof for justifying changes to existing requirements.

Again, getting back to the framework we believe should be in place in using PRA and safety goals to justiry changes, the implementation plan does not really address the issue of the burden of proof, and we can only assume that in the absence of the acceptance of that burden by the Staff, that will be assigned to the applicant or the licensee.

That is, it will be up to the individual applicant or licensee or the industry in general to bear the burden of disproving that some new proposed requirement is, in effect, not needed, rather than placing the burden on the Staff or the proponent of a change to demonstrate that it is, in fact, needed. So

we feel that the implementation plan should much more clearly assign the burden of proof for justifying changes.

As we have stated in our position papers on this matter, we feel that safety goals and PRAs have a very important role to play in controlling change. Change basically occurs in three areas: through generic rulemakings, through exemptions to regulations, and through backfitting.

And once a plant has demonstrated compliance with existing regulations, changes to those existing requirements should be justified by the body or proponent of the change with respect to the cost-benefit role, and the party proposing the change should bring forth the evidence that a demonstration that this change is, in fact, necessary and cost-beneficial.

MR. OKRENT: Before we leave that point, I guess if I tried to remove myself from the arena and ask myself what I would like to have happen, not only in nuclear reactor safety but elsewhere, I guess I would like a licensee who is responsible for the safe operation of a plant to accept that responsibility, and where a question arises, provide the reasons why it is acceptable to continue running, just as much as I would like the regulatory agency to examine what is going on

and where they find something questionable, state why they think it is questionable and what change should occur and why.

You seem to be suggesting they should all be in one court: the NRC. Am I misreading you?

MR. O'DONNELL: Yes, I think you are misreading that, Dr. Okrent. What we are really saying is, we need to somehow get control of the process of regulation. And the most burdensome thing to the industry, and I think the Staff, has been the lack of a feeling that we are already at some acceptable level of safety, and from here on after, changes will be basically in the area of fine-tuning and improving the process.

MR. OKRENT: Are you saying we are at this level? I am not quite clear that we know we are at this level.

MR. O'DONNELL: I am not sure that we know, but I think that should be the first question answered: where are we?

MR. OKRENT: Ah, I agree with that. And who should try to develop those answers, in your opinion?

MR. O'DONNELL: I think the main job, the main responsibility for answering that question, rests with the Regulatory Commission. Having issued 70 or 100 or

more licenses which basically purport to indicate that these designs are acceptable, I think the basic responsibility for reevaluating that decision-making process rests with the Regulatory Commission.

MR. OKRENT: It seems to me again that that is only half of what I as a citizen would be looking for. I do not see why the licensee, who is responsible for safe operation, does not have an equal burden of examining the safety of his plant if new techniques are developed by which he can examine it and sort of share the burden. And I have not seen the AIF come in with what I would call a shared approach.

MR. O'DONNELL: I think what we are proposing is a shared approach. In fact, we are proposing that if the industry or an applicant is proposing to do something less than currently required in terms of seeking an exemption or a reduction in requirements, that burden rests with the industry if it is proposing that change.

A minute ago you were asking if we knew what the safety level was, and you agreed to some point this remained to be ascertained.

MR. O'DONNELL: That is true. I think I have my own notions about where the level is, but I think the Regulatory Commission bears the obligation to make that determination and not the industry. If you are asking the industry to say whether the ground rules that are already in place are adequate, I think that places an unfair burden on the applicant who is going to be proposing a design that ostensibly meets what at any point in time are the acceptable requirements for getting a license.

If you are saying, okay, you meet those requirements but still we want you to come in even after you have your operating license and show us that yes, you have a continued level of safety, that is somehow acceptable with respect to a different set of rules.

MR. OKRENT: I believe in the United Kingdom there are some requirements, but there is a general law which is that a licensee or the operator of a factory or so forth is supposed to keep the risk as low as practicable or practical. In other words, the person running the thing has some responsibility, and it is not just to meet the minimum requirements. The British from

time to time have criticized the U.S. approach, saying the licensees only meet what the NRC says, and you sort of fall into the pattern of those who criticize, as I listen.

MR. O'DONNELL: I would be surprised if the British put into practice exactly what you say. Basically the use of the ALARA principle in that sense, that is, it is always up to the licensee to prove that he has done everything that is cost beneficial, is in effect institutionalizing instability and leaving always open to question the issue of whether or not your plant is safe enough, and I don't think a stable regulatory process can operate very long and have many applicants continuing come forth with applications unless they know what the groundrules are and they have some idea that meeting these requirements will at least get them a license and give them a good level of confidence that they will be able to operate the plant.

The issue of whether you need to do better, I think, is an issue that should be shared between the industry and the Regulatory Commission; but again, somewhere someone has to bear the burden of proof for saying this change is required, and I think the process we propose is one which imposes discipline on both the NRC and the industry in that if the NRC wants to do

something that will drive risks further down, they bear the burden of proof. If the industry wants to back off from a requirement or seek an exemption, they bear the burden of proof.

MR. KERR: May I get into this dialogue?

MR. OKRENT: Please.

MR. KERR: The implication I get is that changes occur only through some system that may be slightly artificial, called a regulatory process. As I have observed changes in this business over the years, some changes have occurred simply because people were ignorant of the physical processes and the complexity of the systems with which we were dealing. It didn't have anything to do with the regulatory process. It had in some cases to do with ignorance. It had in some cases to do with mistakes, and once incidents occurred, I think everyone involved agreed changes were needed.

Now, it seems to me when those situations arise or when one finds them by looking, that the responsibility for corrections ought to be shared, for a number of reasons. In the first place, the people who own these plants have a tremendous investment. If they don't operate them, they lose a lot of money. In the second place, I think the technical capability for suggesting the changes that need to be made lies perhaps

more in the industry than it does in the regulatory process and hence is likely to give better cures or fixes or better risk reduction processes if the industry is involved.

And it concerns me to hear you say, and I can't really believe that you mean this, that you think the responsibility for risk reduction lies in the regulatory system. I don't understand this attitude at all. It seems to me that the responsibility must be shared if it is ever to work because I think the people who are going to make the system safe are not those who sit in the regulatory system but those who operate the plant and those who design it and those who make changes when they seem to be needed to reduce risk.

MR. O'DONNELL: I think the key point in your statement, Dr. Kerr, is that we have found changes which everyone agreed were justified. I think that is the key issue. If everyone can agree they are justified, I assume they would be made. What we are talking about here is putting in place a mechanism for demonstrating that justification. If that comes from the NRC Staff in terms of a risk-benefit or cost-benefit analysis --

MR. KERR: But Dr. Okrent raised the question of who was responsible to see that the risk was acceptably low. The impression I got from your response

was you felt the industry had no responsibility for that at all.

MR. O'DONNELL: Oh, no. Let me clarify that. I think the industry has done a great deal. In fact, the industry is doing all of these PRAs the Staff is currrently reviewing as part of its determination, so there is definitely a shared responsibility there. My point is the ultimate decision on this has to rest with the Commission as in any decision on acceptable risk.

I think the industry has gone a long way towards doing the risk assessments and looking at plant designs with respect to PRA, but if you are saying that we are going to have a regulatory structure that constantly calls into question the acceptability of any plant that is licensed, that in effect is institutionalizing the problem we have had all along, that is, having some means of cotrolling changes.

MR. BENDER: Ed, I had a couple of different aspects of the problem I wanted to explore with you. One is you made the point, I thought, earlier that one of the reasons why the industry as individuals couldn't do it was there were 70-odd and there will be 100-some odd licenses around, and one organization by itself couldn't do more than measure the adequacy of the plant against the existing regulation. Was that the point you

intended to make?

MR. O'DONNELL: I am --

MR. BENDER: Shall I try it again?

MR. O'DONNELL: Yes.

MR. BENDER: If there are 70-odd licenses out there somewhere and each one is based upon some set of regulations that were used in the licensing process initially, then it would probably be difficult for one licensee to decide to do better than the other 70 by himself. Is that the argument you are making?

MR. O'DONNELL: No, I don't think that it is.

MR. BENDER: Well, I would have thought that would have been a tenable argument, but perhaps it is not. Let me ask you the other half of the question, then. When one looks at the requirements for safety in these plants, the Regulatory Commission has a viewpoint that has to do with its obligation to the health and safety of the public, and it doesn't really try to make judgments about how much it costs to do things or whether the utility can afford to do them or not, because it doesn't set the rates.

Is there an obligation on the part of the utility to come in and make a case to the Commissioners about how much it should be willing to pay for certain kinds of safety improvements?

MR. O'DONNELL: I don't know. Certainly the utility would have an obligation, I guess, in the economic sense to its shareholders and rate payers that it was doing everything reasonable to protect its economic investment. Whether that is an argument that needs to be made to the Nuclear Regulatory Commission is, I think, a different matter. The Nuclear Regulatory Commission's charter, I think, is focused on safety and not on economic issues, so I think, yes, they do have an obligation to protect their investment, but no, they do not have that obligation to the NRC.

MR. BENDER: Can they argue, for example, that no, we cannot make this improvement because our rate base won't permit it unless you put into the regulations that it is a requirement? Can they make that type of argument?

MR. O'DONNELL: Perhaps. I think the way we envision the cost-benefit process working would not encompass that question. The way we see this thing working is that if the NRC determined that some change was in fact cost-beneficial with respect to allowable direct costs as offsetting against radiological risks, then that change ought to be made whether or not the utility could recover the cost of that through some mechanism or another.

MR. BENDER: That is only one basis for judgment. I guess a lot of us are not too happy with the man-rem basis for judging improvements, but there are other things you can deal with. There are reliability questions having to do with how reliable a piece of hardware ought to be and whether the basis for assuring its reliability is well-founded or not. Who should take such initiatives to determine whether the facts in the case justify a claim of reliability on a piece of hardware? And if it turns out the claim can't be substantiated, whose obligation is it to take action to do something different?

MR. O'DONNELL: I guess you would have to look at the issue. If the regulatory staff was proposing something indicated to be a cost-beneficial change and you could justify that on a generic basis, I think the burden would shift to the individual applicant to somehow demonstrate that for his specific case, that judgment was not applicable.

MR. BENDER: I am dealing with it in a slightly different form. I think the contention which has been made properly is the Regulatory Commission is not in the business of redesigning or even designing the plants initially. It is up to the applicants and licensee to do the design, so they cannot offer you a

design and say this is what should be done. Instead, the Regulatory Commission's practice might be to say the level of reliability for this piece of hardware can't be justified by the experience up to now: what should the utility do to correct the situation?

Would the industry be responsive to that kind of question?

MR. O'DONNELL: I think this gets into the need to reexamine existing requirements. If the NRC has done a study or commissioned a study or utilities have done a study that calls into question the reliability of some piece of equipment, I would think it would be appropriate to reevaluate the existing deterministic requirements that apply to that piece of equipment in the context of overall risk, and if those existing deterministic requirements do not deliver what is felt to be an adequate level of reliability or protection against risk, then a change would be made in the deterministic requirement.

The station blackout issue, I think, is a good one. Currently there is no hard and fast criteria that deal with that issue, and it is something the Staff is evaluating on a probabilistic basis. I would hope the end point of that analysis would not be design all of your electric power systems to 10^{-5} reliability. But

if there is a need to change existing requirements, that would be done deterministically. That is, there would be some requirement that you have to maintain the plant in a safe condition in the absence of AC power for some reasonable period of time.

MR. BENDER: If I accepted the deterministic position that said I will get the answer by deterministic methods, whose job is it to do the determination?

MR. O'DONNELL: The problem we have with the existing implementation statement is I think it places the burden on the industry for justifying the existing design, with the penalty being that you shut the plant down or you don't get your license. That is a pretty stiff penalty and will, I think, discourage in essence, as I said, again, the institutionalization of instability. If you make that the penalty for not justifying why you are okay, then no one will take a chance on submitting a design they are completely unsure of in terms of getting a license or continuing operation. If you set the penalty level that high, then you basically have a completely unstable regulatory system.

If you want the industry to accept some responsibility, I think it has to be in a less

threatening situation; we want you to seek out changes, we want you to look for ones that are cost beneficial, but not in the sense that if you don't do what we propose, you are out of business.

MR. OKRENT: Mr. Ward.

MR. WARD: What would you think, following up on what you have said, of an approach that went something like this. The NRC would enunciate a safety goal, perhaps something like the existing one, and this would be a goal, a statement to the public or to whomever it is that cares, but then the NRC would take upon itself the responsibility and hold the bag for translating that sort of goal into some rather few and rather unambiguous -- as unambiguous as possible -- criteria for plant operation and design. Perhaps these would be largely deterministic. Perhaps some of them would be probabilistic and be reliability numbers for large systems or something like that. Maybe some of those would be new if this is really a whole new process; maybe some of those would be different from existing deterministic requirements.

But if we believe the PRA process and if we believe the validity of the safety goal and the NRC does its best job, these perhaps are important, new, specific criteria. Would the industry then be willing to examine

the existing plants and new plants against those criteria and accept that as part of its task and then the whole process would, the NRC would say to the public this is the risk that the industry is giving to the public; we have translated that into some specific criteria for which we hold responsibility; the industry has told us they will now meet those specific criteria? Is that a process that could work and that the industry would be willing to do its half of?

MR. O'DONNELL: I think the industry has already done a good part of that process in doing a lot of the risk studies that you were describing. To date we have about, I guess, a dozen or more PRA studies of specific plants, some done in more degree than others, and about half of them, I would say, have been done by the NRC Staff and its contractors, the other half by the industry. We think it is time for the Staff to step back and see where we stand with respect to all of the studies that have been done: what do they mean in terms of "overall levels of risk," and what areas do they identify as candidates for future change? But I don't think we are at the point where we can say yes, the industry is willing or the NRC should even endorse the idea that we are going to set these numerical goals for each and every plant that has to be met as a condition

for licensing or a condition for continued operation.

MR. WARD: What sort of numerical goals? I guess that is the question. Are the numerical goals in terms of latent cancer deaths?

MR. O'DONNELL: Yes.

MR. WARD: Or in terms of the reliability of a system in the plant? Which do you mean?

MR. O'DONNELL: The goals should relate directly to the thing the Commission is trying to get at, that is, public risk, and that is basically risk to individuals and the public of fatalities posed by radiological releases. Other goals that are related to core melt incidents or internal plant system failures are really things that are intermediary and in and of themselves of far less importance than the basic issue of whether or not you are exposing individuals and the public to unacceptable levels of risk. And one or two of the bullets on the slide really deal with this issue. What we feel in the Staff's implementation plan is an undue emphasis on these internal plant occurrences that may or may not pose undue levels of risk to the public.

Now, our statements of policy goals, we very clearly indicated that although we endorsed a goal for core melt probability, that this was secondary in importance to the primary goals on individual and

population risk and that the failure to meet that goal in itself did not indicate a condition of undue risk or need for any protection action. That issue needs to be resolved in the context of the cost-benefit balance.

We are very much concerned with statements in the Staff's implementation plan that they intend to even go further in terms of disaggregating this internal plant performance goal into, first of all, individual goals for containment failure for partitioning the causes of a potential core melt into internal and external failures, having subgoals for individual accident sequences that are well below even the proposed core melt goal.

And lastly, I think what represents potentially the greatest misuse of PRA in assigning reliability goals for plant systems that may be involved in some sequence that leads maybe to a core melt: that is, in essence, turning the whole PRA thing upside down and introducing PRA and reliability goals as though they were deterministic criteria without determining, number one, whether the existing deterministic criteria are adequate or not.

We have a number now, as we discussed this morning, on aux feedwater system reliability. That is embodied now in the standard review plan and it is

something that people are living with. Whether or not that was necessary as a means of improving the reliability of aux feedater systems, I don't know. But if we get to that level of detail and specify for each and every system in the plant a number, that is in essence adopting PRA in a deterministic sense, and I think that is counter to the overall objectives of introducing these things as a means of improving existing regulation. That would be in effect putting another layer on top of what we have.

MR. OKRENT: Time to finish up. I was the first to interrupt you.

MR. O'DONNELL: Feel free.

MR. OKRENT: I will try not to do it any more.

MR. O'DONNELL: I think I am getting close to the end. The Staff's intent to introduce economic factors into the cost-benefit balancing process is another area of great concern. We feel that these issues, both with respect to plant onsite and offsite property damage, are not directly related to safety. I think they would have the effect of having Staff and applicants arguing about issues that may or may not be of economic benefit to the utility without in the first instance deciding whether they are even of any safety importance.

I think there is a problem in the mechanics of how you would do that in terms of the advisability of equating present day direct costs with potential future probabilistic costs. By that I mean if some requirement is imposed now that may impose a direct capital cost and downtime cost on a utility and it is justified by a presentation of analysis that these will be offset in the future by averting some accident of extremely low probability, that is a very tenuous exercise.

Economic factors if introduced into the process would be in effect the most uncertain element of the whole process. They would include not only uncertainties involving the prediction of accident and offsite effects but things even more nebulous in terms of economic impact: what is the future cost of replacement power, what is the future value of real estate? These things are not static in time as even some of the more nebulous radiological parameters are at this time. They don't change with time at least.

Economic factors are extremely difficult to predict into the future. I have seem estimates for core melt, the cost of an individual core melt, that range from $1 billion to $100 billion per core melt. These types of estimates can very easily swamp out any consideration of the direct costs and can lead to

decisions which essentially are not in the best interests of the public in that they would commit very scarce present day funds to solving what may potentially be a future accident and thereby save some future cost.

The last two comments on the slide deal not really with the implementation plan but with the policy plan, and again, we have stated in our May 18th letter our great concerns about setting individual risk levels at .1 percent of background risk. We feel this is inconsistent with the stated qualitative goals of ensuring that no individual bears undue risk and that the societal risks of nuclear power are comparable to competing energy sources. I think at this level it would be orders of magnitude less than the corresponding risks of competing energy sources.

In addition, I would just like to mention the recent change in the policy statement that would include normal operation as a risk to be considered under the safety goals, will have the effect of eating further into the accident risk goal for latent fatalities. This was discussed this morning. I didn't quite follow all of the discussion, but I think there is a real danger here in that if we establish a goal of .1 percent of latent cancer fatalities to an individual, which works out to be about 2×10^{-6}, if a plant has an incident

where a spill or a gas leak develops that exposes calculationally some individual to 20 millirem, that plant could be held to be in excess of its safety goal for that year. And if one believes the implementation plan, therefore there could be reason or the position could be held that that plant should be shut down for the remainder of that year.

I think all of this -- I don't think that we argue with the concept of including normal operation per se, but it just provides additional reason to make the goal itself a more reasonable value.

Finally, the change in the safety goal policy that has changed the wording on core melt probability to "loss of protective features" leading to core melt we think is an area that leads to potential problems in terms of implementation. It in effect would shift the goal of 10^{-4} encompassing additional states of plant operation which are not in and of themselves core melt but could be considered to be precursors or leading to core melt.

I think it allows room for a great deal of mischief in terms of not allowing credit for intervention by operators or corrective action which would in effect change those sequences from a loss of protective features leading to core melt to ones which

do not lead to core melt and in effect could be interpreted as not providing any credit for non-safety systems.

I would recommend the Commission go back to the original wording on this, with the probability being discussed as core melt, not some state leading to that.

That is basically the conclusion of my presentation. I will hope the ACRS will find these comments useful in making its own evaluation of what the Staff is proposing, and I would be glad to answer any questions the Staff might have.

MR. OKRENT: Thank you, Dr. O'Donnell. I will, if I can, ask the Subcommittee members not to ask any more questions at this time unless they are vital, because we are running almost 40 minutes behind the agenda.

So thank you again, and we had better go on to the next item, which is Mr. Rathbun, I believe. There he is. Do you prefer sitting there or coming up to the podium, whichever you prefer.

MR. RATHBUN: Dr. Okrent, I think we will stay here.

MR. OKRENT: Okay.

MR. RATHBUN: Thank you, Dr. Okrent. Let me at the beginning introduce a new director of the Office of Policy Evaluation, Mr. Jack Zerbe, to the right of Jerry Wilson here. He is the new director and taking the place of Dr. Forrest Remick.

The ACRS provided us with a set of questions dated August 30. We have prepared some very brief oral responses to those questions which I will get to in just a moment.

First off, let me just say where we are and the plans for where we go from here with respect to the policy statement, NUREG-0880 and revisions to it. I believe you have all received a copy of a July 14 memorandum -- July 12, I am sorry -- a memorandum from Policy Evaluation to the Commission, which proposed a set of revisions to the Commission's policy statement in the light of public comments which had been received and was discussed at a briefing with the Commission on July 14.

OPE also sent to the Commission on July 8 an abstract of the public comments which had been received on NUREG-0880. After discussing with the Commission the changes which we had proposed and recommended, the Commission decided to ask us to provide them with a set of questions, the answers to which would become guidance to us in revising NUREG-0880, as well as the Staff's implementation plan. I think the Committee members have copies of those questions.

Do you all have copies of those?

MR. OKRENT: Yes.

MR. RATHBUN: All right. The Commissioners have not responded as yet to those questions, and in consultation with the Chairman's office they believe that this would be an excellent opportunity for the ACRS to prepare answers to those questions and, if feasible, to discuss your perspectives on those questions with the Commission in your briefing this Friday.

What we will do when we receive the answers to the questions from the Commissioners is, since they quite likely will not all agree on their perspectives -- yes, yes, it is true, I am sorry to say -- in their perspectives on what should be revised, we will draft a guidance memorandum for the Commission to review and submit it to them around early October, hopefully reflecting your input through the meeting on Friday, and then reflected in their answers to these questions.

After the Commission has approved that guidance to us, to the NRC Staff, in revising the implementation plan and to policy evaluation in revising the Commission's policy statement, we will overhaul and revise these documents in accordance with their wishes, with the objective of having the package back to the Commission approved and ready to go out for public comment again at the end of this year.

The public comment period may be thirty to

sixty days and, of course, we would have to do another analysis of public comments and submit it back to the Commission again for another round. But, anyway, I think that we could work together on this and it could be helpful to us to get your comments back on those questions.

Now in our perspectives in our July 12 paper there are three particular points that I would really like to emphasize that we put up front in that memorandum, and they have to do with the trial period use, which was one of your questions in the August 30 memorandum, and also the role of safety goals in the NRC's regulatory practice.

The three key figures, we believe, central to further development are as follows. First, as the July 12 memorandum stresses, we recommend the Commission endorse the key principle of application, namely that the Commission intends that the goals, the benefit-cost guideline and design objective would be used in conjunction with probabilistic risk assessment and would not substitute for NRC's reactor regulations in 10 CFR Part 1. Rather, individual licensing decisions would continue to be based at present principally on compliance with the Commission's regulations.

Secondly, a key principle of application which

we recommend to the Commission specifically to endorse -- and this was put in in response to some conversations we had had with NRC Staff -- concern that the policy statement itself might extend the use of PRA. We asked the Commission to endorse a principle that the regulatory decisions to use probabilistic risk assessment should be made on the basis of an appraisal of its value in the specific application.

Thus, the implementation of an NRC statement of safety policy should not of itself mandate the use of probabilistic risk assessment.

Thirdly, recognizing that we simply could not foresee every potential problem which might result from NRC's use of its safety policy statement, we recommended that the Commission establish a two-year trial period to permit an evaluation of the benefits of its safety policy. In that period of time we would hope that we would all learn and we would be in a better position to make further refinements and adjustments to the goals and guidelines at the end of that time.

With respect to the August 31 ACRS question, I apologize. We really have not had a lot of time to sort these things out. But, nonetheless, here goes.

You asked with respect to initiators and allocation of risk. We said our intent -- this is from

your August 31 list of questions.

MR. OKRENT: There is a memo --

MR. SIESS: I had them all at once.

MR. OKRENT: They were stapled together with a forwarded memo from Fraley to ACRS members, schedule and outline of discussion. Do you have that?

MR. SIESS: No, I took them apart. I had more than one set.

MR. OKRENT: Maybe Gary can give you his copy.

MR. SIESS: I lose something in the transfer.

MR. RATHBUN: Let me go on. You had asked our reaction to the Staff's implementation plan, which proposed not to include several initiating mechanisms or failure mechanisms which were essentially, as I recall, external events.

On that particular matter, since we are not practitioners of probabilistic risk assessment and do not have our own expertise in that area, we took the position that we would defer to the Staff in that regard and follow their lead. And they had said, as I am sure you know, that they proposed not to include, at this time anyway, risks of flood, I think, seismic, sabotage and the like.

On the second question, you referred to a

paragraph you had written on sabotage and why we had not included it. I think that, as I recall, we did not have a particular problem with that paragraph, but in order to facilitate an already very complicated process we wanted to keep the OPE recommendations and the Commission's discussion focused on what we believe to be a key issue. I do not think we differed, though, between what we had said and the thrust of the ACRS paragraph on sabotage.

You have a set of questions on societal risks -- three, to be exact -- and the first one of those let me see if I can paraphrase it. ACRS suggested that societal resource considerations enter into siting policy, and you made reference to European regulatory groups, indicating the absence of such a consideration in NUREG-0880 as a deficiency and an important, if not a dominant, factor in the decisionmaking process.

Of course, we recognize that a major reactor accident could represent a loss of a valuable societal resource. I suppose the question that we would have is in what form would we put in such a goal. I think on this and also the desirability of including economic damage we have taken the position that the regulatory charter is one focused on the protection of public health and safety.

And although we recognize that there are important economic consequences, our recommendation to the Commission was to keep the focus on that. I know that is not what the Staff has recommended or, for that matter, what the ACRS has recommended.

MR. OKRENT: Could I explore that a bit?

MR. RATHBUN: Sure.

MR. OKRENT: I would be the first to admit difficulty in trying to quantify a criterion related to "societal resource." But I think in fact more than one country in Europe -- and I think Sweden and France are a minimum of two examples -- have the point of view that the loss of access to a large land area is a very important concern.

And, in fact, it may be, in the end, a driving concern because as people tend to think more and more delayed release is a likely mode, if it is a likely mode among unlikely modes, that gives time to talk about evacuation and to calculate lower and lower manrem kinds of things, except as they relate to one's ability to clean up an area or a loss of an area.

Of course, you end up with a tradeoff there and in fact in those countries, and perhaps in others, they have taken steps to try to cut down that kind of effect, in other words, to reduce, if you will, what I

call the resource effects of the delayed release accident. It is currently not mentioned in NUREG-0880 and it is conceivable that one might have qualitative words. It is also, in a sense, one way in which what you might call risk aversion is reflected in people's actions.

Well, I just want to give some individual thoughts. As I noticed, there was no spelled out, crystal clear recommendation in those thoughts.

MR. SIESS: Two points. One follows what Dave was saying, although maybe not exactly. I think people would find a significant difference between being evacuated and not being allowed to return, leaving aside farm land, et cetera. And you said the law is directed toward public health and safety.

Does the Atomic Energy Act only refer to the public health and safety of the common defense and security and not mention the general welfare?

MR. RATHBUN: I think it does mention the general welfare. Of course, I am not an attorney, but this issue of whether or not the general welfare stretches to include considerations of economic factors has at least come across my desk and, I think, come to the Commission's attention before.

And, as I recall, when we did discuss it with

attorneys the reaction was that, quite frankly, the reference to the promotion of the general welfare was more or less a platitudinous statement that practically all laws had.

MR. SIESS: But the fact that it is there would not exclude considering societal resources. If it were not there, you might have a problem including them, although it certainly does not exclude them.

MR. OKRENT: I think the public health is directly related to this, because the reason -- let us say you have trouble getting back to where you left is a health consideration. You can go back and get some radiation rather than later. These are not separate things, really.

It is not that economic resources are completely separate from health at all.

MR. RATHBUN: I think the point is certainly valid. As seen from society, it would certainly make a difference whether people living near a plant had to leave an area and then were not able to return, vis-a-vis being able to return.

With respect to a goal, qualitative or guideline, on this matter, as well as a number of other matters, let me say that one of the philosophical inclinations we have had throughout this is to try to

establish something of a minimum set of both qualitative goals and numerical guidelines and design objectives, for no more than the practical or pragmatic reason that every one that we get into becomes a point of, I must say, major controversy and intensive discussion.

It is increases the difficulty of getting a policy statement in place. It is not to say that some of these suggestions for additional goals and guidelines are not useful. We have had to establish a fairly high threshold for inclusion.

MR. SIESS: Look, leaving them out does not necessarily make them go away.

MR. RATHBUN: That is true.

MR. SIESS: Once you have formal safety goals and guidelines, that does not mean everything will be restricted to just what you have tried to restrict it to.

MR. RATHBUN: Yes, that is true, too.

Your second question is to the effect or states that a draft policy statement of July 12 has neither a qualitative criterion or a quantitative design objective relating to societal risk and goes on to discuss that. It is true that the July 12 paper had deleted a numerical guideline now called "Design Objectives on Societal Risk." But it did contain the qualitative goal on societal risk.

I must say, though, that the desirability of inclusion of a design objective for societal risk was a major topic of discussion with the Commission and that is one of the questions which was before them and in the package of questions dated July 20 I think you all have on your desk. It quite likely will be the Commission guidance that we put back in a guideline on societal risks.

Our thinking in terms of deleting it from the July 12 recommendation to the Commission was that we could carry the control on societal risk by the guideline design objective on individual risk, coupled with the benefit-cost criterion. But, as I say, I think the Commission will ask us to come up with a societal risk guideline and, as I mentioned before, we would appreciate on that particular topic your suggestions.

Number three --

MR. OKRENT: Excuse me. You are correct in your answer. You had interpreted the ALARA criterion as a societal risk one. I guess in framing the question I had not put it into the next category, and that is why I phrased it the way I did. But you do call that your qualitative societal risk, and I stand corrected.

MR. RATHBUN: Yes, although there was an issue associated with that second qualitative goal, and that

has to do with our proposed deletion of the comparison of equal to or less than risks of alternative means of generating electricity. That also was a question before the Commission.

Your third question has to do with the $1,000 per mancem and whether or not we believe that is an acceptable surrogate for all costs. I do not think that we have argued that precisely, but, as we said in our July 12 memorandum and as I said just a moment ago, the focus that we have taken in NUREG-0880 and the July 12 paper is that we believe we should restrict ourselves to health effects -- protection of public health and safety. But we recognize that others may differ.

At the bottom of page 2 on your August 31 memorandum, you have introduced a set of questions under the heading "Decisions Under Uncertainty." And your first question says a reference is made to operating limits of the actual plan. Does OPE support the specific operating limits proposed? If not, what changes are recommended?

We have not proposed revising the operating limits. I think that we understand the practical needs for some sort of a concept, an action threshold of some sort. Whether or not these are the precisely right ones is a question for which I do not have an answer.

MR. OKRENT: Is that not sort of a policy kind of question? In other words, what are the right levels for different kinds of action?

MR. RATHBUN: Yes, it is, and I was just about to say I think some of the language in the Staff's action plan which suggest that these would be requirements if the Commission endorsed the principles that I laid out at the beginning of the presentation here would have to be modified in one form or another.

I think that as far as the approach of using design objectives, specific operating limits, however it is termed, has some sense to it in that that is one mechanism that we might have for differentiating in practice an application between new plants, new CPs, and plants at the operating license stage or operating reactors.

But you are right. There is a policy aspect to it and precisely how the Commission will come out I think will be in significant measure determined by their response to the first three issues, at least the first two issues, that I have laid out.

At the top of page 3, question number 2, the Commission believes -- you are asking the Commission believes that by meeting the design objectives established to implement these qualitative goals the

risks from operation are equal to or less than the total risks of operation of repeating technology. What does OPE believe the term "meeting" means?

Well, I must say I think our response to that must be that "meeting" should not be read in the requirements context, in the de facto rule, or something of that nature.

MR. OKRENT: You see, the sense of the question and actually the one before is how does one deal with the decisions under uncertainty, whether you have a policy suggestion in that regard, really. If we knew all of these things precisely, then it would just be a question of do you like the number.

MR. RATHBUN: Yes, I understand, Dr. Okrent. Where you are going here is how do you treat this when you have a variance about your best estimates and, as far as those kinds of questions go, if we interpret them in a technical sense of how do you handle it under conditions of uncertainty, I think we would go with the Staff's proposal on the treatment of uncertainty.

There are a host of questions which were in NUREG-0880. I think in their question number 3, and you referred to those later, but our recommendation to the Commission in the July 12 paper, page 9, as I recall, suggested that we should follow the Staff's suggested

recommendations.

All right. Number 3, page 8. It states that the design objective should be viewed as aiming points rather than numerical benchmarks, subject to revision as further improvements are made in probabilistic risk assessment. You raise the question why should the design objectives depend upon the methodology used in the PRA.

The point is well taken. It is not at all clear that they should. However, I think that while we may change the language in that regard I think that we should build in flexibility in accordance with this two-year period of trial use, which would permit us to revise the policy statement for whatever reason, not just tied to improvements in PRA. So we may have tied it to the wrong thing.

MR. RATHBUN: Numbers 4, 5, and 6 really all have to do, I guess I would argue, with implementation. You said in number 4, the ACRS recommended the use of mean rather than median values; why do we favor the use of median rather than mean, and so forth and so on. Again, we are not practitioners of PRA, and I think our judgment is we would be best advised to leave that to the people who would use that.

But if I know the ACRS has strong views on that particular issue, and when you brief the Commission, I would bring up the point and argue for means.

MR. OKRENT: I thought, in fact, I could recall a document from the Staff prior to the implementation plan in which they also recommended mean. But they were constrained to the use of median in the implementation plan because they had to write something compatible to somebody else. Maybe I am wrong, but that is my recollection.

MR. RATHBUN: I will defer to Mel Ernst and Bob Bernero on that one.

MR. ERNST: It is not clear what the time frame is. I think at one time we had contemplated mean, and I think the rationale for going to median is that at least whatever number you calculate will be less subject

to radical changes due to the changes in the distribution of the tails, and you would still have the opportunity to compare the mean to the median to see what the uncertainties might be.

And if you got large changes in mean compared to median, you would know then to try to hunt out the origin of these uncertainties and address them as a separate matter. But at least you would not have to redo 50 PRAs every time the data base changed to see what change it might make in the bottom-line number.

MR. OKRENT: I understand the point. But I find it really, I will say, unsatisfactory from a definition of risk or for the reasons given. If, in fact, tails are very uncertain, to ignore their effects by treating the median seems to me is the wrong way to do it. I would have to say I am unable to say what the mean is or something different. Anyway, maybe we just disagree.

MR. ERNST: I would heartily agree we should not ignore the implications of the tails. It is just another way of looking at it.

MR. RATHBUN: Question number 5 referred to Dr. Budnitz, and Dr. Budnitz noted the possible desirability of reducing uncertainty. The uncertainty of the risks development even if the median or the mean

was unaffected in a significant fashion.

I guess I am going to argue that we do not have a specific reaction or comment to that, for reasons I have already cited. And in addition, that and 6, as I indicated on our July 12th recommendation, it was at least as far as technical questions such as this was to follow that.

At the top of page 4 there were questions on severe accidents. Our reading of that was we were not sure they were intended for us.

(Pause.)

MR. OKRENT: It is possible they were put in the wrong list of questions. There were many papers floating around. Maybe we will save them.

MR. MATTSON: I would be glad to have him answer them.

(Laughter.)

MR. RATHBUN: I could not improve on what Roger Mattson has to say on that.

MR. OKRENT: We will see if there is another page 8 then.

MR. RATHBUN: I would say the same thing of the questions on page 5. There are three of them there. At the bottom of page 4 there are five questions under the heading "Specific Issues." The first of these

refers to some of the improvements under consideration for light-water reactors in several European countries and suggests that these might pose significantly lower risks than the corresponding reactors in the United States which met safety policies defined by OPE in the Staff Action Plan; if this were the case, what would be our reaction?

We have a couple of comments from foreign, not governments but entities. And I must say that there has been quite a bit of interest in this regard. We have met with people from Israel and Japan. But in drafting NUREG-0880 we were really thinking about problems in the United States. We figured we would have quite enough of a job in front of us to focus on that. And I guess we just do not have a particular reaction.

I appreciate we have been informed, obviously. As you all know, the problems of siting reactors in Japan and in Europe have significant differences than this country. And precisely how it is that our numerical guideline objectives would fit or not the foreign reactors, I just do not know or what we would do in response.

If you have a view on that, let us know.

MR. OKRENT: I think it is more than a hypothetical question.

MR. RATHBUN: I realize it is.

MR. OKRENT: And the countries you mentioned were not the ones one might pose as the particular example.

MR. RATHBUN: Let me ask you this. Let me turn it around and ask you a question. In what way do you think experience in foreign countries should, as a policy matter, influence the development of a Commission statement on acceptable risks for reactors in the United States? Obviously, they are concerned about it. They, as we all know, look to what we do in developing their own regulatory approach.

MR. OKRENT: I will give you a partial and individual opinion. It seems to me you want to know what these countries are doing and why in some detail so that you can decide whether or not you agree with them on their bases and also whether their bases apply in your case. That is one kind of a thing. That might be the technical question. The Staff may maintain that it all in their pocket.

I saw a recent response to the safety research report that the ACRS wrote in July that suggests that the Staff is completely up to date on what is going on. If so, I would love to have the documents that do all of these examinations of what are the differences,

evaluations of them, and come up with a conculsion as to why it is applicable or not.

I would suggest if the documents do not exist, the information does not generally exist in the NRC except piece by piece in people's minds. The other part of the thing is, I suppose, quasi-political. The NRC has to be prepared to defend why it is either being more or less stringent than other sophisticated countries in the business if they have the same kinds of reactors, I would say, and, in some cases, at similar sites. So it is a question, I think, that has two parts, and they both have to be thought out.

MR. RATHBUN: I understand. Thank you.

The second question under "Specific Issues," it says, the ACRS recommended in its report of June 9 that a containment performance criterion be developed for plants to be constructed. For plants already in operation, the ACRS recommends that a plant-specific evaluation be performed. That was a specific issue which we addressed in our July 12 memorandum to the Commission.

And we came down on the side of not recommending that the Commission include such a performance objective for containment. The reasons are stated in the July 12th memorandum. Here are my notes.

Let me see if I can summarize them.

Among other things, a number of commenters expressed opposition to such a guideline. We stated in that memorandum that we believe to perform a valid, not arbitrary, design objective would require more information on severe core damage and coremelt scenario than we believe is now available; and furthermore, that the individual prompt mortality risk design objective would act to a significant degree as a containment, de facto containment performance objective.

MR. OKRENT: Can I offer a little question on this? If I take the Staff's operational level of coremelt frequency, 10^{-3} per reactor-year median, and now let me assume just for purposes of discussion that the mean may be a factor of 2 or 3 larger, which is not an uncommon calculation.

If I have no basis for judging containment performance, given the average coremelt, which I assume has gone into the 10^{-3} figure, I am not sure how I can reach a conclusion that a reactor having 10^{-3} is close to the safety goals.

I do not know how I could arrive at the general feeling of confidence that seems to pervade the Staff in writing SECY 82-1A and so forth. Do you see my problem? It seems to me there is a little

imcompatibility. Either you have a feeling that there is something about containment that will work and you can put something down that is not going to just fall down on its face, as it were, given the average coremelt or something.

MR. RATHBUN: I see what you mean. I must say I do not recall whether it was in the July 12th paper or not, but there was something of a philosophical inclination against specification of containment availability performance design objective with us. And it goes something as follows: that the purpose of the policy statement in the original is to establish Commission perspectives on acceptable risks. We put forward for public comment numerical guidelines, not design objectives, for individual and societal risks, the overlay of acceptable risks.

Now, one could equally as well, I suppose, work the problem from plant-specific things, things within the plant. And our feeling was that having specified the externals -- that is, the limits on individual and societal risks -- that it was redundant to go around specifying things inside.

And while we adopted the 10^{-4} coremelt probability, we were not willing to include a containment availability guideline since, in effect,

that would be 100 percent redundancy.

Let us see now, question number 3 under "Specific Issues," does OPE support the ACRS response to question 4, which was the Commission's question 4 in NUREG-0880? And that was on risk aversion, as I recall. And what we said in our recommendation to the Commission was that the Commission not include a specific risk aversion factor because such a factor would be arbitrary and based upon subjective presumptions of public perceptions of risk.

In addition, we went on to state that we believe it would overemphasize the importance of preventing very rare severe accidents which contribute less to the overall risk than that contributed to the more frequent, less severe accidents. Now, again, I am, of course, familiar with the alpha model.

MR. OKRENT: I am sorry, but the ACRS did not use an alpha model.

MR. RATHBUN: No, I understand. But I think, as a point of philosophy once more, as I mentioned earlier, being somewhat stingy and adding additional criteria or additional design objectives or what and sticking to a pretty much minimum set, but once more we recognize people may differ on this particular matter.

Your statement, as I recall, was something to

the effect that the Commission's policy statement should explicitly include measures intended to reduce the likelihood of large accidents, but did not, as you correctly pointed out, refer to the alpha model which was in, I think, NUREG-0739.

On the fourth question, does OPE disagree with the second general comment in the ACRS letter of June 9, 1982, which recommends distinguishing between plants yet to be designed and plants in operation or under construction, both in the policy statement and the implementation plan? If so, why? If not, how is this addressed?

In the policy statement it was not addressed. It was not addressed in the July 12th revision. Only in the most inferential way was it addressed in NUREG-0880. I think our thinking was that that would be an aspect of implementation rather than logically a part of the Commission's statement on acceptable risks, more an aspect of application.

Number 5, OPE suggests a trial period of 2 years should be adequate to have an evaluation of safety policy. What does OPE expect to be evaluated in 2 years? And what is meant by the terms "benefits of the safety policy"?

Well, "benefit," I suppose, is general in this

sense, in this sense a general word. But what we are really pointing toward is explicit recognition of the fact that a policy statement used in conjunction with PRA is really experimental, it is really trial. We will see how it works and keep our options open for revising it in the light of what the experience teaches us.

That concludes what I have to say.

MR. SIESS: Question: could you run back through that containment integrity answer where you said that specifying containment integrity as well as coremelt probability would be 100 percent redundant?

MR. RATHBUN: Sure.

MR. SIESS: Will you take me through that logic again?

MR. RATHBUN: Yes. What our thinking was is that you could, I suppose, come up with a policy statement which said, we will focus exclusively on plant-specific parameters, coremelt probability, availability of auxiliary feedwater systems, containment performance, so forth and so on, and simply take the position that consequence modeling is so iffy and so subject to assumptions and so loaded with variance that we will not move with it at all.

MR. WARD: That sounds like a good idea.

MR. RATHBUN: Yes, that is a possibility. And

I think one of the Commissioners in his reaction to NUREG-0880 took that very position. Alternatively, one could say that what would we really want here is the Commission perspective on what constitutes acceptable risks as seen by the public, something that would communicate to the public the Commission's perspective how safe is safe enough.

The policy thrust that we followed, and have followed in the past year, in the development of NUREG-0880 was the latter: that what we wanted to do was come up with a Commission-sponsored specification of how safe was safe enough as seen by the public.

But in discussions with the Staff, we have become persuaded that we would need something additional and that something additional in terms of plant performance was coremelt probability. Where we fell off the train was when it went into a specification of a containment performance.

MR. SIESS: Getting away from the qualitative goals into the quantitative guidelines, were your quantitative risks expressed in terms of doses to the public?

MR. RATHBUN: Yes, I think that is right.

MR. SIESS: And from getting inside the reactor outside to the public the containment is one of

the barriers; is that right?

MR. RATHBUN: That is right.

MR. SIESS: So if you stop with challenges -- that is, coremelt -- and put your emphasis on preventing coremelt at some level, which would be about the historical rate from what Dr. Okrent said, 10^{-3} multiplied by 3, would about give you the reactor-years for TMI, would it not?

MR. RATHBUN: If I follow correctly, I think that is right.

MR. SIESS: It is somewhere in the neighborhood, but TMI would not be an acceptable risk, if there had not been a containment, would it?

MR. MATTSON: The answer is: no.

MR. RATHBUN: No.

MR. SIESS: So, in setting that, you must have some idea in the back of your mind that containments will work reasonably well most of the time.

MR. KERR: Is this the case? Because I have heard comments that containment has little to do with the risks at TMI.

MR. SIESS: There were an awful lot of curies inside TMI.

MR. KERR: Yes, but a lot of them got out, too.

MR. SIESS: Not much.

MR. KERR: There was very little iodine that the containment contained. Most of the iodine was in the water.

MR. SIESS: Well, there were some filters it went through, Bill, and I think without the filters in the aux feedwater --

MR. KERR: I do not know. I have just heard statements that would contradict this. Is the Staff's consensus that the containment was quite --

MR. BERNERO: I will speak from having been a member of one of the inquiries into Three Mile Island. There was a reluctance to calculate on some speculative basis what if the containment failed, because that meant postulating a failure mode, did someone open a door, a vent valve, or what? But there was a depreciable curie inventory in the air in the building and off-site doses. So they would not be of the very, very severe category. I doubt very much you would have gotten early fatalities, but you could have gotten pretty substantial doses from the noble gases.

MR. KERR: But very little from iodine.

MR. BERNERO: Yes. Presuming all of that water was there and sucked it up like it did, yes.

MR. KERR: What this appeared was xenon. Krypton was all that was eventually, anyway, was it not?

MR. BERNERO: It is short-lived noble gases.

MR. WARD: It got right out after it decayed.

MR. KERR: Krypton does not decay that much.

MR. SEISS: There was something up in the top of that thing that grabbed a lot of rads that was not in water.

MR. KERR: Agreed.

MR. SIESS: If that stuff had gone out in a few minutes with no containment, I think you would have had.

MR. BERNERO: In principle, if there were no containment and all, you would have to ask yourself could the water have been around to collect all of the iodine, with the cesium, the solid activity that got out, would it have been scattered around in the landscape?

MR. SIESS: And I am not sure if that was Dave's average coremelt either.

MR. OKRENT: Oh, no. By the way, I took the Staff's operational figure of 1 in 1,000 per year as the point below which it must be fixed according to the implementation plan, above which they would use ALARA. I say that was the median, so the mean might be a factor of 2 larger, which is the way you usually calculate it. And then I say, if you start with that figure, you

really need some kind of containment effectiveness to meet the safety goals. That is all.

MR. MATTSON: Could I interject something here, because I am afraid we might get lost in the squabble over TMI. I think you are on a good path. Let me try a substitute question. If I got two events with the same probability of giving a coremelt, one is a vent V and the other is S2D, are I not interested in the containment performance? Let us say they are both 5 x 10^{-4}. So I am in some range of wondering whether I meet the safety goal. Forget an operational limit for a moment. Is that not where you were headed?

MR. SIESS: More or less.

MR. MATTSON: That there are questions, even though you are close to the coremelt probability, where you still need to answer the question.

MR. RATHBUN: That is certainly true, and I do not think there is anything that we have said anywhere that would suggest that a containment performance is unimportant. The only thing that we have stood back from is putting in an explicit statement, that is all. It is not to say explicitly or even inferentially that it is not important.

MR. SIESS: One point, let me try. I think one of the reasons for the coremelt is if you have only

the dose limit, the dose guideline, then at least theoretically it is possible for someone to meet that entirely with mitigation.

MR. WARD: Right.

MR. SIESS: 100 percent tight containment. And you do not believe zero probability of containment failure; therefore, you want to look at the challenges to containment.

You could argue the other way: If you never had the accident, you would not need the containment. But I doubt if anyone would try to go that path. Is it that reasonable to assume that if you do not put in separate guidelines, they could go all mitigation rather than a combination of prevention and mitigation anymore than they would go all prevention and make it just one?

MR. BENDER: You have to think about the coremelt accident in combination with containment unless you are going to limit which kind of coremelt accidents you talk about.

If it is a coremelt like TMI, which some people would say is not a coremelt but only a massive release of radionuclides and had no pressure buildup associated with it and took a long time to get the iodine out and the iodine came out along with a lot of water, then the importance of the containment device was

not great.

The way it worked, it could not have stood any significant pressure because there were openings that would have let it out, would have let the stuff out to the environment.

So that particular accident did not need much of a containment to work. But if you wanted to make the postulate that the need for containment was associated with a large radionuclide release followed by a very large high-pressure steam release, then a different kind of containment function has to be considered and the containment reliability under high pressure might have been the crucial issue. Now, there is no way to have --

MR. SIESS: I am not sure you need high pressure. They were pumping it out at TMI.

MR. WARD: I am not talking about TMI. I said it depends a lot on which combination of accidents you are talking about. You cannot just talk about one coremelt, you have to talk about a sequence of events.

MR. RATHBUN: Again, I think there is an implication here to the effect that by virtue of the fact that we only had coremelt as a plant internal probability, that somehow we were not thinking about containment performance.

Rather, I would say our position would be that

we are thinking about it and containment performance is important, and what we are gauging it against rather than containment performance per se is the individual and societal risks design objectives.

MR. SIESS: I you have a containment performance criteria and a coremelt criterion, then presumably you would not need the societal dose calculation except to explain to society what you were defining the risks in terms of. Is that right?

That is right.

MR. SIESS: That is one reason you think it is redundant to have both. It is actually redundant to have one unless you want a direct split between prevention and mitigation. I will think about that.

MR. RATHBUN: Let me say with respect to the point on containment and also the propriety of including economic damage, those are, in my judgment, at least, the two central, the two key points that the Commission will simply have to decide. The staff and yourselves in the ACRS have made recommendations on both of these points and we have had recommendations, and you will probably bring it up again on Friday, I suppose. But I attempted to explain the position we took and why we took it.

MR. OKRENT: I will ask one question and then take the chairman's prerogative of going to Mr. Ernst because I want to cover a bit on Mr. Ernst and a bit on Mr. Mattson before 5:15 or we will lose Dr. Kerr. I want him to have a chance to ask any questions he has. But just one question.

Is your view of the term "implementation plan" pretty much consistent with the material that is in the draft action plan to implement policy? Is that what you envision as the meaning of the term?

MR. RATHBUN: Dr. Okrent, I think basically so, but again, subject to the caveats that I laid out in the beginning.

MR. OKRENT: Okay. We will come back to the question.

MR. RATHBUN: We reviewed it in the office and we certainly concurred in the presentation of it in discussion with the Commission, recognizing that both that and the policy statement would probably have to be revised.

MR. OKRENT: All right. I will propose we take a five or six-minute break and reconvene at 3:30.

[Recess.]

MR. OKRENT: Mr. Ernst is up next. I think what I will try to do is end this discussion temporarily, that is, on implementation plans, no later than 4:30 so we can spend 45 minutes on the severe accident rulemaking. Then we will come back to the implementation plan. All right?

MR. ERNST: Before I get started, I did want to say there are a couple of comments I would like to make. One was that during the past six months or so and a couple of times today, there has been a discussion about the 20 mr and its relationship to the safety goal, and I think it is probably not too unclear about the

relationship; but I just wanted for the record to say that 20 mr is equivalent to the safety goal only if one assumes that every individual within one mile of the reactor gets 20 mr every year, which is quite different from the most exposed individual concept that we have in our regulation. I think if you had a plant at 20 mr for every individual within a mile every year, everyone in this room would be quite concerned about the operation of that plant.

The second comment is I had lunch with Vic Stello and we chatted a bit about the morning's proceedings, and I think there was an area that may not have been well explored. He indicated he would want to clarify it but he had to leave, so I will take the liberty of saying what I think he was saying in this area.

I don't want to say that I am exactly representing him or the EDO, but I think the EDO's posture on the operating limit question and the use of the safety goal in the licensing is that there would be not a need for the operating limit and that use of the safety goal in a licensing case, a case-specific application would be essentially at the direction or guidance or approval of the Commission on a case-by-case basis.

He was not saying it would never happen. He was just saying as a matter of policy it would be precluded to be required by the Staff to be applied in a licensing case, and if it ever came to be on some other motion like a licensee came with a risk-based argument on some basis or if for some reason the Staff had a new requirement, that would have to come to the Commission for its guidance on the application at that time during the trial use period. I think that is a fair statement.

I have before me, so we are all talking from the same list, a seven-page document of discussions dated August 27 from Mr. Fraley to Mr. Dircks.

MR. OKRENT: Excuse me. We wanted the Staff to know how the applicants feel.

[Laughter.]

MR. ERNST: I didn't bring my written filing with me, but if you wish to swear me in --

[Laughter.]

The first question deals with containments in general and their ability to deal -- well, containments vary as well as their ability to deal with so-called "similar core melt accidents," and since various accident scenarios can lead to widely differing risks, does Staff feel core melt frequency alone is a sufficient trigger point?

I think the answer is -- "alone" may be a poor word. I think the action plan said --

MR. KERR: How about "by itself"?

MR. ERNST: Well, "by itself" in the context of the action plan, I think we particularly say that the safety goal would not be used alone in the decision-making process. On a perhaps more substantive point, I guess the Staff believes that the core melt trigger is still a pretty good trigger. One really, I think, has to believe that core melts are not good for you and that it is a good trigger point when you start getting core melt frequencies of higher than what one might consider normal to take a look at that and regulate that area, and you can get some perspectives even though you don't do a specific containment analysis. You can still have some perspectives of the type of accident sequence and its importance to get some judgment as to the importance.

So I think the Staff position was that you do want to develop this containment perspective and develop containment performance guidelines in the future, but right now it is maybe not the best of all worlds but it is adequate to use core melt as a trigger.

The second question, I think, is mostly akin to the first, and I am not sure I would have much of a

different answer. The third question, I guess, has to do with the fact that there will be substantial variances in the number of close-in and far-out people, and therefore, in implementing the safety goal, how would the Staff take this into consideration?

I think in the implementation of the safety goal, you do have individual risk numbers that should be met which should take care of the close-in population. The close-in population is usually relatively small anyway. And then this individual guideline clearly has an impact on the safety of the further-out people because if you regulate by the individual and have dispersion, clearly the further out people will be more protected. And in addition to that, there is an ALARA concept, so in sites with much higher than usual population, there would be an additional consideration.

I don't know whether that is a sufficient answer, but that would be my general interpretation of the action plan.

MR. MARK: The action plan refers to normal sites, sites of high population. Without telling you how to decide whether your site is one or the other, what is the thought on that? Is everything above the average a high population by definition so that that number will keep sliding as the years go on?

MR. ERNST: I can't say whether the number would slide as the years go on. I don't have my crystal ball with me. I will say the origin of high population and average, I think, has its basis in a SECY document of, I think, a couple of years ago, and I forget the number, but it talked about what to do about high population sites and it categorized all sites in, I think, five categories, and I think that was in general the context under which we talk about high population density sites.

MR. MARK: So it is the upper quintile, if that is the word, of sites are high population. That is the definition?

MR. ERNST: I think the topmost had three or four sites in it, the next group had six to ten or thereabouts, and so on down. I have forgotten the exact numbers. It is about a two-year-old document.

The fourth question has to do with interdiction of land, its impact on property and things of that sort. I guess the opinion of the Staff as transmitted in Mr. Dircks memo, I think he stated that Staff believes that offsite property damage should be considered, and I believe Vic Stello indicated this morning that the EDO believed that these offsite impacts should be considered.

Now, how it might affect the implementation plan, again, as was pointed out, I think it is somewhat of a challenging matter to figure out how one would calculate this in a monetized fashion, but I don't think it is insurmountable. I guess, as a matter of fact, even if it doesn't make the safety goal, one must consider under NEPA or one could be constrained under NEPA, I think, to consider such impacts in citing policy.

I think there is an important point there and that is that safety goals and risk calculations are not the sole determination of how people should regulate, and in citing policy one should well consider a number of factors that wouldn't necessarily be included in the safety goal ALARA calculation. We still have that kind of flexibility. I would trust that that flexibility would be exercised.

The fifth question, I think, deals with the same subject, and I don't think the answer would be much different.

MR. OKRENT: By the way, it is not clear to me that that is only a siting question, I would say.

MR. ERNST: That is correct, it is not. If you have an existing site, the question is what kind of modifications would you make, that is true. So my comment on siting would have to do only with new plants.

MR. OKRENT: Okay.

MR. ERNST: The sixth question has to do with small doses to a number of people and whether or not health effects calculations were the best way to describe the safety goal. To some extent I guess this is a matter we did not address in the implementation plan because the implementation plan is clearly addressed to implementing the safety goal. If the safety goal were changed, the implementation plan would be changed.

As a comment, though, on prioritization of generic safety issues, which we have discussed with the ACRS several times, initially our prioritization scheme was to look at curies released, and this has since been modified to look at man rem and whether man rem per curie is a function of the category of release. So clearly there are different ways to look at the problem. One could look at curies if one wanted to.

It is not really a question of whether one is so much better than the other; I think it is a question of if you go to curies, should you be interested in the toxicity of the various isotopes or not. If you go to man rem, I guess that would be another way to go rather than to look at cancers, but there certainly is a relationship between cancers and man rem, and I don't

think the basic argument would be resolved by just choosing a different parameter.

Bob, were you going to say something?

MR. BERNERO: Yes. I was just going to add that interpreting that question as I did, if one accepted the WASH-1400 list of release categories, this question implies the possibility of assigning a release category probability limit for each one. It would be a very cumbersome method in that regard to do that.

MR. ERNST: Moving on, question 7 says if NRR were asked to provide its recommended safety policy, how would it differ from the July 1982 draft safety policy prepared by EDO? I guess the answer to that is NRR has not focused on this to a large extent. We are basically awaiting Commission guidance to redraft the safety goal. There have been a few issues discussed, I think. The EDO, I think, is clearly concerned about addressing routine releases in a quantitative way, in a routine, quantitative way for PRAs. There are some --

MR. KERR: What does "concerned about" mean: he would like to see it done, or he would like to see it ignored?

MR. ERNST: I believe that they feel it would not be worth the trip to the store, that it should not be calculated on a routine basis. But there may be some

other observations on that. There seems to be some concern about degraded core versus core melt, and I believe the Staff would prefer the core melt definition instead of the degraded core which came out in the July issue. And I guess those are probably the two issues I can think of. There may be some others, although I don't think there are. There is not an NRR position on this, I guess, except for -- I mean an EDO position, except for the routine release and "containment performance and uncertainties."

Let me turn the mike over to Roger. I am not sure he will say it, but containment performance is not just strength, it is a number of other things. It is a pretty complex subject, and I guess in generating the Staff position on containment performance, we feel that the performance guidelines would be useful to have. However, in setting performance guidelines, you really ought to know before setting standards how containment is performed, the verification process you go through in determining whether they are met; and I think this is the one or two-year period.

Roger?

MR. KERR: Excuse me. It seems to me that as an alternative to saying you ought to know how they perform, one could say one needs coupling between the

core melt goal and the safety goals, guidelines or whatever they are called, and coupling has to be provided by something. Containment doesn't do it all, clearly, but I don't see why initially one can't say we are going to allocate some fraction of this to containment and some fraction to something else, recognizing that it can be achieved. I don't see why one has to know at this point how containment is performed in order to set up a possible allocation.

MR. MARK: I would like to add to that you can't possibly begin to compute health effects until you have decided how containment performs.

MR. ERNST: That is true. I think that is exactly true where there is probably a little less visible containment performance guideline and a little more flexibility if one doesn't establish it right now.

MR. MATTSON: Rather than deal with that hard to answer question, let me tell you what we know about containment. First of all, we know it is not possible to make a simple statement about the goodness of containment. You wouldn't want to say something simple like I want a 10^{-1} containment. What does that mean? 10^{-1} for what?

We have come to appreciate that it is the integral performance of containment that is important,

it is not just strength or its ability to deal with localized loading and penetration design, basemat design. There are a lot of things that can affect its performance. To state one simple number about it doesn't help. So far about all we have is an agreement that there is an integral performance and what I think are two conflicting marching orders from the Commission. One the one hand they say in their safety goal they don't want to speak to containment performance, despite our recommendation to the contrary. On the other hand they say to us in SECY-81.2A we want you to send a signal for strong containments. Well, how strong, and in what way strong?

That gets us back to the reasoning I mentioned a moment ago to integral performance, and that is a containment performance standard. What is it we are looking for? Maybe the difference can be explained by saying they want a qualitative goal for containment, not a quantitative goal. We are wrestling with that.

About all the agreement we can reach to present to you today is we are willing to try to put down some performance criterion for containment. We don't know yet how to write it. We would like to sit down with a small group of you who have an interest and a small group of us who have an interest over the next

several months and see if there is some meeting of the technical minds that can occur on how one would go about phrasing such a thing, let alone what the numbers are, and hopefully if there is progress made on the safety goal, we could see how this coupling you speak about might occur in the form of this containment performance objective.

At this point we don't know how to put the thing down. We need some suggestions. Integral performance is important to us. We would like to assign the project to some people.

MR. KERR: Recognizing if Part 100 were redone today it probably wouldn't be done in the way it has been done, nevertheless one has containment performance specifications there which say leakage of a certain fraction of iodine, leakage of a certain fraction of noble gases over a period. That is not necessarily the way to do it, but we don't really have a containment performance specification. Whether we will get it or not is another question. No one really knows whether we can get it, whether it will exist in an accident situation. But it is there and it is part of the regulations.

MR. MATTSON: That is true, and you can measure how good such a containment is in severe

accidents with PRA.

MR. KERR: I'm sorry, you can't. You can't measure how good it is. I don't know of any way to measure how good it is in a severe accident.

MR. MATTSON: I didn't mean to provoke you with the word "measure."

MR. OKRENT: Is there a reluctance to do it in this case in your experience with Part 100 which says it is meaningless?

MR. MATTSON: No, no. Is there a reluctance to what?

MR. OKRENT: Specify containment performance.

MR. MATTSON: We don't have a reluctance; it is the Commission that does. I am indicating to you a willingness to sit down and try to do it.

MR. OKRENT: I thought from previous comments by the Staff -- not you, but other members of the Staff -- that there was a reluctance on the part of the Staff at this point to do it. It is really simply reflecting the Commission's view and not the Staff's view, this reluctance.

MR. MATTSON: That is true.

MR. OKRENT: Okay.

MR. ERNST: Does that get us on page 3? Question 4 asks if there is a technical basis.

MR. KERR: I'm sorry. Was the answer to question 2 on page 2 that no, the staff does not now feel it can specify containment performance, or was the answer that we reflect the Commission's reluctance?

MR. MATTSON: That is what we were discussing, whether we should make that clear. We don't know how to write it today. We are willing to sit down and begin to write it. It may take some time to write, but we are willing to sit down and try to think through what such a performance objective would contain and what the specifications should be.

MR. ERNST: I think there was a reluctance to say this is it, not a reluctance to sit down to figure out what it should be.

MR. MATTSON: On August 6 you got into a long dialogue about the inability to do some of these things because of the incompleteness of our ability to measure containments against a performance objective, statements to the effect that we could measure better with a large drive than we could with other kinds of containment. It would be several years before we knew what to do with other kinds of containment, so we are still in the position that it may be a couple of years before you know how to use this thing. And there is also a coupling between the performance standard and the

measurement of the containment if you believe in integral performance, because the progress of the event sequences affect how you state an integral performance objective. But given all of those things we have said before, we are clearly indicating a lack of reluctance to sit down and see what such a thing could contain.

MR. KERR: Number 3 on page 2 is really not a question, is it; it is an exhortation, I presume?

MR. MATTSON: Question 3, how we set the date.

MR. KERR: I think that is an exhortation and not a question.

MR. MATTSON: Yes. We are going to work hard.

MR. ERNST: Page 3, item 4, there is a question relating to, I guess, our judgment that the largest range of uncertainties are presently found in the area of containment performance as opposed to coremelt estimates. And maybe Roger has some reports or something. I think this is just a best judgment of the Staff.

Inherently, I guess, a large number of the possible uncertainties that would occur in coremelt estimations likewise could occur in containment performance estimations. On top of that, you have your phenomenology uncertainties about how coremelt progresses and the transport of fission products. So that was the general basis for the judgment that you have larger uncertainties.

MR. MATTSON: Just to follow up on that, some of the tone in these questions and the tone of the subcommittee meeting on August 6 was that the technical basis for some of the judgments was not always clear. We are trying to be responsive to that tone. We could, for example, the next time we get an opportunity to

rewrite this, try to state the range of uncertainties for some of the things discussed at that juncture in the implementation plan to show right in the place where the judgment is made why the judgment was made the way it was.

Is that really the interest of the ACRS? Is that what you are trying to tell us? Are we hearing you correctly? Or is there another bone you are trying to pick? Do you disagree with the judgment, for example?

MR. KERR: I can only speak to me, but it is an interesting point and, I think, an important one. There was curiosity as to whether someone had really studied this, and there exist numbers that indicate estimates or whether it was somebody's best judgment. And we are not trying to be against good engineering judgment, but is it really based upon someone's estimate of the contribution of human errors?

MR. MATTSON: We will attempt to say in that location the next time we rewrite it what the basis is, although it is not easy and there is a lot of judgment.

MR. WARD: Let me ask a question now. When you say the uncertainties of containment performance are very large, do you mean containment leakage, containment failure modes? Or do you mean the behavior of the atmosphere of the containment and the dispersion of that

atmosphere?

MR. ERNST: Yes.

MR. WARD: Which? I mean which is predominant, the behavior of the air cells in the atmosphere and the dispersion or the failure or the containment structure?

MR. BERNERO: If I could volunteer, you really have to start at the onset of the coremelt and take it through the whole estimate there. You are starting from there, what happens within the reactor coolant system; what containment is provided by the reactor coolant system itself; the progression of coremelt out of there; the behavior of the coremelt with the reactor vessel with the basemat of the containment; the transport across or through the containment atmosphere; various plateout mechanisms; and a whole host of questions about failure modes and failure pressures and temperatures of the containment itself.

MR. OKRENT: You realize that if I were a biologist, I could make a list of things ten times as long trying to get from 1 MR to cancer. But the point --

MR. OKRENT: I am not sure the uncertainties the biologists face are smaller.

VOICE: They are larger.

MR. OKRENT: In other words, this question

asks, how do you know it is really this containment that would have a larger uncertainty than some other containment.

MR. BERNERO: I would interpret the uncertainty as the effect of low-level radiation as being generally confined in this context to the low end of the scale where we depict the linear model, the linear quadratic, and so forth.

And if you use alternative models for doses in that range, how much do you change the overall effects of reactor accidents as against when you go through the whole containment performance and count the different estimates over ranges sometimes of a factor of 100 of what is retained in the reactor cooling system, what plates out before it even gets to the wall.

MR. OKRENT: Let me just leave it. But I think if you take zero as the lower limit, which some people suggest are low doses, then you have a big range from 1 MR, you know.

MR. BERNERO: You have a big variation only for those who receive doses in the range of 1 MR and less.

MR. OKRENT: No, I can go up. At 10 MR you do not know much better. At 100 MR --

MR. BERNERO: The uncertainty decreases

rapidly as you get up into the range of interest of R doses.

MR. OKRENT: I am not sure. I will let Dr. Mark comment.

MR. MARK: I do not think you are on a very solid surface even at 100 MR. That is just natural background and you do not even know what that does. Where I live, 200 MR does not seem to decimate the population either.

MR. SIESS: And that is on top of the other junk.

MR. BERNERO: Let me fall back on Roger's proposal where the comment is made we should attempt to qualify or state the uncertainty.

MR. MATTSON: I think we are up to question 5 on page 3. I will try to answer it. It is clear that the quantitative assessment performance criteria are not independent of the rest of the design. Let me give an example in the auxiliary feedwater system.

The 10^{-4}, 10^{-5} criterion in the Standard Review Plan was developed as a result of work done after TMI, building on WASH-1400 and reviewing auxiliary feedwater systems for the operating plants. It did not evolve from this proposed safety goal or even in anticipation of the safety goal.

Whether or not that 10^{-4} or 10^{-5} criterion makes sense in view of the safety goal, we have not addressed yet. The proposal in the implementation plan is once the safety goal is finalized, it is not just performance criteria for other systems that have to be addressed, it is also those that already exist, those quantitative criteria. And they will be dependent upon the rest of the design.

For example, if a reactor manufacturer has a four-loop plant for which the typical dominant sequences are influenced in a major way by aux feedwater systems, then the necessary reliability of aux feedwater systems in relation to safety goals would be different than another reactor manufacturer, say, a three-loop PWR for which the aux feedwater system was not in that many or those particular sequences or they were not dominant in the same way. You do have to take account of the rest of the design to understand that.

There was a fair amount of work involved in rationalizing, I believe is the word we used in the implementation letter, the existing reliability criteria and developing any new ones we might want to use.

I think that also bears on what Mr. O'Donnell was saying earlier this afternoon, that you do not replace deterministic criteria with reliability criteria

overnight. He seems to read that into the implementation plan. That is an incorrect reading. You have to look at what the deterministic criteria buys you, and you have to rationalize a new criteria vis-a-vis the safety goal; then you have to make a decision as to which is the way you want to regulate.

MR. OKRENT: I wonder if I could interrupt this going down the questions and ask sort of a general question. I have been trying to decide in my own mind what does one mean by the term "implementation plan" or what should one mean?

I guess it seemed to me that what I read was an outline of what the Staff hoped to do and an outline on how they would apply it on a trial basis. But there was sort of a paragraph on what I would call process, the nitty-gritty of how one would get numbers and evaluate them and arrive at judgments.

Do you feel that this thing that I call process is part of the implementation plan or a part of something else? Am I wrong in reading the thing, or what?

MR. ERNST: No, I do not think you are wrong at all, Dave. I think we had some of the same questions when we started writing the thing, and we have in the pack, by fiscal year anyway, some nice things that one

should do to improve one's knowledge of the plan. We have up front some indications of this kind of application for a plant you would or would not use a safety goal or would or would not require a PRA; those kinds of things. And those are certainly elements of an implementation plan.

Fundamentally, though, the document tries to describe a philosophy of implementation, realizing you cannot answer all of the details in a 20-page document or so, which is what we are striving for to have people read it and try to understand it. I felt that maybe the philosophy of implementation may be more important than some of the details.

As far as your paragraph on how you evaluate PRAs or what is required to be in PRAs or how you handle data bases, I guess we are looking more to the development of what one might call an INREP manual, and perhaps an internal audit manual for PRAs, that kind of thing, to provide that level of detail of prescription about how one does things.

MR. OKRENT: There were several questions that Mr. Rathbun said really goes over to the Staff. They relate to how do you deal with uncertainty and, I guess, how do you make decisions when different people give different answers, like on ATWS and so forth. To me,

that is perhaps not only equally part of the process but, to some extent, the harder part. And I did not see really anything in the implementation plan in that area.

MR. ERNST: Yes. That is very difficult. Let me diverge a little bit. We might be asking more of the safety goal and the implementation plan than these documents can reasonably deliver. I think we are trying to somehow find our way around the fact that there are substantial uncertainties in PRAs, and clearly there will be substantial questions about whether or not a certain safety goal is or is not met.

I submit that most any, if not all, safety goals proposals and implementation plans would be subject to probably about the same set of questions that were developed for this one. I think how you deal with uncertainty and how you deal with PRAs and safety goals, in my personal opinion -- I do not think it is too personal; I think I would probably get some votes right here -- is that if you had no safety goal and no PRA, you would still have the same kinds of decisions to make. They would still inherently have the same uncertainties except you might or might not address the uncertainties as quantitatively as you would with the safety goals.

And it seems to me that one ought to strive to

get the useful parts of the safety goal and PRA, make use of the useful parts, recognize the infirmities, and at least you have a process that requires some discipline to go through and try to estimate risks. And at least it documents it so people can argue about it. And sometimes some people will win the argument, sometimes other people will win the arguments. But at least the arguments, I think, are a little more quantitative, maybe a little more on target as to what is useful and not useful from a public risk standpoint. Those, I think, are my perceptions of the merits of the process.

MR. KERR: I could interpret that to mean we cannot really use quantitative safety goals at this point to make decisions. It is fun to play with them and we can get some additional insight, but they are not good for making decisions. That may be the case. Maybe no one is willing to admit it at this point. I do not know.

But to talk about philosophy being more important in practice gives me some pause, because I do not think we have a philosophy yet, or even a practice, with using safety goals. We have -- and when I say "we," I include both the NRC Staff and the industry -- we have spent literally hundreds of millions of dollars

now on PRA, I am sure, and I include the original study in that amount. But there is some uncertainty in that statement.

(Laughter.)

MR. BERNERO: It is almost like low-level health effects.

MR. KERR: I do not think anyone has a good idea yet about what one does with them. At present, we have a number kicking around, and it corresponds. People review them, and they ask quesions about them, and they review the answers to these questions, and they ask more questions. But I have not seen any evidence that anyone says, when we get to this point we will take these numbers and do something with them.

I do not mean the task of making that decision is easy, but at some point it seems to me we have to say there is so much uncertainty in this process that we cannot use it for decision making; we can use it as additional information, or we can say, here is the way we are going to handle these uncertainties in the decision making process.

It is that sort of thing it seems to me somebody has to develop at some point. And it is easy for us to say, why do you guys not do it? That is sort of what we are saying. How are you going to make a

decision if you do not have at least some methodology in mind?

MR. MATTSON: I do not know if the "father of PRA" wants to speak, but I think you are looking for something too dramatic to be concluded from PRA. If you are looking for the fine-tuning in the small system design changes that have occurred as a result of PRA, there is a long list.

MR. KERR: I am just looking for what somebody is going to do with one in deciding that either a plant should or should not be operated.

MR. MATTSON: Those kinds of decisions have been made with every one that has been done. The decision has been to keep operating but to make some design changes, all the way from the event B design changes that came from WASH-1400 to the Indian Point emphasis on fire protection as being something we should get straight fast and get them in conformance with Appendix I.

I think for almost every PRA you can point to those kind of decisions that have been made. That is why in SECY 82-1A we said there are no big-ticket items on the horizon, because the PRAs do not disclose the need for them.

MR. KERR: It is true the decisions have been

made, but they have not been made on the basis of numerical PRAs, because one has not demonstrated a given proven safety. One has said, these look like weak points. You would have seen those weak points independently of numerical numbers. You could look at event B and see it was a weak point. You did not have to put any numbers in it at all, and you could say, if I eliminate that, I will have eliminated that weak point.

I am talking about numerical safety goals, not qualitative systems analyses, which I think, by the way, are very valuable. It is the numerical part I am looking for.

MR. ERNST: Let me --

MR. KERR: It may be it is impossible to do at this point. I am not at all convinced that it is possible.

MR. BERNERO: Let me suggest, we have two major PRAs that were filed by owners recently. One was the Zion PRA and the other, the two Indian Point PRAs. The seismic risk was dominant in both PRAs, but quite different in the level of threat it seemed to pose. I think indeed even the postulated existence of a Commission-sponsored safety goal gave much more regulatory attention to the seismic risk in Indian Point than it did to the seismic risk in Zion. For that very

reason, it was level.

MR. KERR: Run through that again slowly. I did not understand what you were saying.

MR. SIESS: Put some numbers on it, Bob.

MR. BERNERO: The coremelt probability from seismic contributors at Indian Point is something times 10^{-4}, roughly 1×10^{-4}. If you use the owners' analysis and if you use Sandia, you come up with a higher number. If you go to Zion, it is substantially lower. It is an order of magnitude lower, and, therefore, the Staff, for example -- and I think this is true of the Commission as well -- is far less apprehensive about seismic risk at Zion than it is about seismic risk at Indian Point.

MR. KERR: Let me ask this: before this was done, was the Staff equally apprenhensive about seismic risks at the two sites?

MR. BERNERO: They did not know. The Staff just did not know. I think it would be fair to say that the Staff was.

MR. KERR: Bob, come on, do you mean to tell me you think an earthquake in central Illinois is about equally probable to an earthquake --

MR. BERNERO: I was going to say the debate about the Ramapole fault system around the Hudson River

area, it is probably fair to say there was greater apprehension about Indian Point.

MR. KERR: I would certainly think there would be.

MR. SIESS: How much difference was there?

MR. BERNERO: I thin it is roughly an order of magnitude if you use the owners' analysis.

MR. SIESS: And what do you think the uncertainty range is for each of them? Four orders of magnitude? Three?

MR. BERNERO: Yes, three, something like that.

MR. SIESS: So how can you get that much comfort from one order of magnitude difference if you have three orders of magnitude uncertainty?

MR. WARD: Or that much apprehension.

(Laughter.)

MR. SIESS: This is what bothers me. One order of magnitude of difference in the sense of earthquake risks is nothing in view of the uncertainty. It is lost in the noise.

MR. BERNERO: If you look at the spectrum of contributors to risk, say, at Indian Point, you have the internal elements, you know, the blackout and things like that. You have three different external, so-called external, elements of note: fire, seismic, and wind.

And there is a different and substantial uncertainty on all of those three external ones, called external ones. And I think most people would agree that that unceratinty is greater than the uncertainty on the internal events contribution. I think we do not know enough to say there is exactly this order of uncertainty and I will measure exactly this difference and I will or will not act on the number.

No one in the Staff or in the industry, for that matter, suggests rigorous use of the seismic risk number. It is an indicator. And I think what both sides are doing, what both parties are doing, is sensing the higher estimate and looking at using it as a screening tool, looking at those things that it points to and looking at them using all wisdom available. I do not think anyone is intending to make it is 1.1×10^{-4} it is unacceptable, it is $.9 \times 10^{-4}$ it would be acceptable. No one wants to use it numerically that way.

By the order of magnitude, the sense of urgency can be put there, and by using it as a screening tool, the focus of attention can be put on the control room roof or the containment building or the hill next to the containment number 2 or whatever it is.

MR. SIESS: That is PRA without safety goals.

MR. BERNERO: The safety goal is a backdrop

for that level of urgency.

MR. SIESS: But PRA without safety goals is still a great tool.

MR. BERNERO: There is no denying that.

MR. MARK: You seem to me to have run down the usefulness of PRA, because I learned from this implementation plan that PRA is useful in making realistic evaluation of the strength of existing structures. There are apparently some things it can do with realism and precision. I was surprised, I must say. In fact, I do not believe it yet.

(Laughter.)

MR. BERNERO: No. Ernst must have said that.

MR. ERNST: I would never have said that.

(Laughter.)

MR. OKRENT: We have about 8 minutes before I am going to change the subject temporarily to the SECY 82-1A. And I am going to give Bill Kerr the use of the 8 minutes, if I may.

MR. KERR: Would you be willing to turn to page 3 and deal perhaps with question 3 under "Accident Initiators," whoever?

MR. ERNST: I think Bob has hit on some of these already. Sure, external events have been modeled. I think it is fair to say that the research in

this area to try to come up with a methodology is still under way. In fact, I thought I saw the milestone being fiscal year 1984 or something like that when the program should bear fruit.

I think it is not so much a question of whether people can go out and model things and come up with numbers as a question of verification, have they done it reasonably well, do we reasonably agree with them so that we can reasonably agree with the bottom line?

And I guess the position of the Action Plan is, let us be cautious before we just run out and everybody independently model a bunch of plants and calculate seismic risks; let us at least get some better consensus on methodology.

As far as the dominant contributors are concerned, I think dominant contributors are interesting, but I think you arrive, as Bob mentioned, at different conclusions from Zion compared to Indian Point. Without a safety goal, without some judgment of what is risk important, one might say, go fix dominant contributors, in which case you do exactly the same thing on Zion as you do on Indian Point. So I think there is a benchmark kind of usefulness to a safety goal.

Do you want to add anything to methodology

there, Bob?

MR. BERNERO: (Nods negatively.)

MR. ERNST: On the consideration of whether external events may change the cost-benefit balance --

MR. KERR: The question, as far as I interpreted it, was that in a sense one is ignoring external events when at least in some cases it appears that most people who have modeled external events have concluded that these are the dominant contributors.

Now, part of your answer seemed to say, we are going to wait to calculate those until research tells us how to do it better. In the meantime, in a trial period, it will not matter much. Is that what you are saying? But in the long term, when we try to get down to using this stuff, we will have to take it into account, but we will know more then?

MR. ERNST: Again, I think one must take the safety goal proposal in its entirety. I think the policy expression is that the existence of a safety goal itself should not mandate a number of PRAs.

The implementation plan suggests -- and I guess the EDO would further modify it, but the implementation plan suggests -- that in the near term over the next couple of years, about the only PRAs that may be requested -- and this would be subject to

Commission approval on a program-by-program basis -- might be the first group of INREP plants or maybe one or two more high-density sites. But basically, the only decision in the foreseeable future would be whether to do an INREP or not.

MR. KERR: It would follow, for example, if one takes this attitude and the situation comes up that piping had not been analyzed in five plants, we would say that is an external event, we do not know how to model it, we will ignore it. I am being a little ridiculous.

MR. ERNST: No, no. Let me finish my sentence. So in the near term, there are only a few plants that may or may not be affected, depending upon the decision on INREP.

Another question is: for those few plants, should you include external events? INREP, if approved, would be coupled with SEP. SEP looks at external events in a deterministic way. And the judgment of the Staff is in looking at the plant in that manner, if it meets present requirements, that the risk likely is acceptably low. And that is just a technical position which could be reversed in the future. We just do not know that much yet about what the actual level of seismic risk is.

But from the standpoint of analysis,

probabilistic analysis, in the near term we are saying we feel reasonably comfortable with that decision in the near term and why we have to make a hard decision on this.

On one hand, the Commission says it is in the safety goal; on the other hand, the plant says they don't know how to do it probabilistically, and that is the debate you are having. On the other hand, General Electric comes in with GESSAR and says they don't want to address seismic events in the FDA review for future applications, and the Division of Engineering says they don't know how to do earthquakes in PRA space. And yet the dominant risk in the two most recent PRAs is seismic. How can you ignore that? And yet the precursors aren't seismic precursors today, they are still human errors and equipment failures, and how can you ignore that? If it is really not seismic that is the dominant risk, and I don't believe it is, then spending all of these high powered researchers worrying about the seismic problem is certainly the wrong thing to do.

MR. OKRENT: I must say I don't understand your use of the term the "precursors" are not seismic. Let me postulate for a moment a pressure vessel which has the probability of 10^{-4} per reactor year. You would not have expected to see it yet, but I doubt that you would say that the precursors haven't shown a pressure vessel failure and so it is not an important contributor.

MR. MATTSON: Multiple failures in the operation of nuclear power plants continue to occur month in and month out.

MR. OKRENT: You have a minute, Mr. Kerr. What else would you like to ask?

MR. KERR: I guess I don't understand the answers to the question, but it may be because the question wasn't well put. I was not trying to say that earthquakes are the most important contributor. I don't know whether they are or not. I was simply saying that people have concluded in some cases, people who have done very serious PRAs, that they are, and if we are going to ignore them for a while, I assume it is because we want to wait until we learn how to deal with them. But we aren't saying we are going to ignore them from now on just because we can't calculate them or something.

MR. MATTSON: No one said ignore them. People said study further. And the tendency that we sense on your part is to force us to a decision that we are not ready to make yet.

MR. KERR: I am just assuming that at some point when you put the safety goal into practice on other than a play basis, that you can't ignore the seismic problem, and I am trying to find out what it is one would do to get from here to there.

MR. BERNERO: I think the better way to put it is to uncouple the two. As a practical matter, it makes little difference if I say I am going to look at internal events and give it half a safety goal, I will give it half of the 10^{-4} and I will give external events half of the 10^{-4} and carry on separately or I will use the safety goal independently for each of the causes, the initiators. It is a factor of 2 difference. We are trying to uncouple the thing.

We do have fairly good mechanisms for dealing with internal effects for evaluating or estimating the threat of internal events. We have a lot of data indicating to us we should be paying attention to those, and we can carry on constructively and sensibly with that. We don't ignore external events. They constitute perhaps substantial threats: wind, fire, flood and earthquake. But the problem is we can get wildly or widely varying values of that risk.

Look at what is happening at Indian Point, factors of 10 or 20 coming out of the peer review on external events, and we are trying to uncouple the two and develop better methods for getting numerical estimates of risk from external events. In the meanwhile, the potential for using external event risk analyses as a screening tool is still a real benefit.

To go up to Indian Point and look at the roof at the control room, don't spend so much time looking at the wall of the control room. It is the roof that appears to be the problem. What the absolute level of the problem is is a difficult issue because the methods are just not that good.

MR. KERR: Does that make it clear?

MR. OKRENT: And he didn't tell you that they found a factor of 10 or so on internal events in Zion, the same reviewers.

MR. SIESS: Yes. Are you all that sure that the uncertainties in the internal events are that much lower than the uncertainty in the external events?

MR. BERNERO: I think so. I think it would be worth asking the people who really do it.

MR. SIESS: You said 10 or 20 as if it were large. For the internal events what do you consider the uncertainty? What did WASH-1400 have?

MR. BERNERO: I wouldn't use WASH-1400's estimate of uncertainty now, I think, and Joe Murphy is right here.

MR. SIESS: Why?

MR. BERNERO: I think they were underestimated. But in a recent IREP study we made an estimate of the two sigma band on internal events, and I

thought it was a factor of 10 on data, data uncertainty for internal events.

MR. SIESS: How much would you add to that for the incompleteness uncertainty?

MR. BERNERO: I don't know. There is one contractor that regularly modifies that. We do not.

MR. OKRENT: Look, we better go on to the next topic. We will come back to the implementation plan, but let's talk about SECY 82-1A.

MR. MATTSON: I have two ways we could proceed. One way is a slide show of about six slides that march through 82-1A, and another way is to forego that and just go through your list of questions. Which would you rather do?

MR. SIESS: Which list of questions are you working on? Next time I hope you label these A, B, C, D and something.

MR. MATTSON: I have a four-page list dated August 26.

MR. SIESS: I have it. It says severe accident policy, 82-1A.

MR. OKRENT: What would you prefer, Mr. Kerr? How would you like them to proceed?

MR. KERR: I am putty in their hands.

MR. SHEWMON: Why don't we let them present

their Vu-graphs, then. I find reacting to our questions somewhat disembodied, but maybe that is because I have done less preparation than anyone else for this meeting.

MR. OKRENT: We have one vote for that and nothing for anything else.

MR. SIESS: Did you prepare the slides before or after you got the questions?

MR. MATTSON: After.

MR. SIESS: All right. I vote for the slides, too.

MR. MATTSON: The points on this first slide are used as the titles of some subsequent Vu-graphs, so I wan' say there are five main points I want to make about hat is in the paper. And given that you have probably read that slide already, I won't summarize your reading.

The basic purpose of 82-1A was to try to bring for your discussion and the Commission's discussion and the policy-makers and the Staff a plan for how to proceed with severe accidents. A couple of things we tried to achieve in the plan from the beginning were, first, to make the next generation of plants safer than the first generation of plants and to provide a mechanism for making decisions in that regard; and second, to provide incentives for industry to resolve

the severe accident issue rather than NRC going off, researching it and making the decisions themselves.

So, as you consider the approaches that we have taken, remember those are two of the underlying principles, making reactors safer than the first generation, and providing incentives to industry. So the paper, in updating an earlier version of the paper provided last February and had your review, Commission review and a number of comments, the paper summarizes again the developments that have occurred since TMI.

You all know about the severe accident things that have already been added to the standard review plan and the Commission's regulation, either in the CP rule or the hydrogen interim rule. You all know that PRA results and research results are still coming in, are still under review. You have heard some of the controversy surrounding what they mean, an area that is still in flux and final conclusions haven't been reached.

You should all know of the status of implementation of the TMI backfits. If you view them th same way I do, I think significant progress has been made implementing those changes.

You should all know of the IDCOR program and its progress on studying whether design changes for severe accidents would make any difference to four

typical designs. You have heard in great detail about the NRC research program and how it is now divided into two phases, one to support a decision process in 1984 for operating reactors, and another phase following that to clean up any items still needed for confirmation, much like the ECCS decision process of the early 1970s, decisions in 1974 and confirmatory testing for another six or eight years in the case of ECCS.

We have heard today about the safety goal and we know its status. It should be obvious that 82-1A has to continue to be in flux and revision so long as the safety goal is in flux and in revision, although we have to stay flexible to accommodate whatever the outcome is there. It is much like you have heard the research people say about the research program. It will go forward or should go forward even if there is no safety goal at all. The safety goal provides a way to make some of the measurements necessary for the judgments mentioned on severe accidents, but you could always make those judgments with the same judgment-dominated process that has existed in years past.

What SECY 82-1A proposes is what it proposed in the first instance, to replace the generic severe accident rulemaking with several plant-specific, standardized design approvals, in rulemaking, that is,

using Appendix O to Part 50 to approve for ten-year referencing in further CP applications those standard plant offerings of whatever manufacturers would come forward. This slide summarizes that we know of three designers who have expressed an interest, one review already under way, GESSAR II, another for which the initial meetings between the applicant and the staff will begin later this month, the Westinghouse advance design, and an expectation that when 82-1A is finally approved, that CE will file an application for operating CESSAR in accordance with the requirements of 82-1A to give it forward referencing approval.

MR. SIESS: It says FDA for GESSAR II. Is that a typo or have I missed something?

MR. MATTSON: Final design approval.

MR. SIESS: What happened to the PPA?

MR. MATTSON: They have had that already.

MR. SIESS: And GESSAR II?

MR. MATTSON: Yes.

MR. SIESS: What did they call it?

MR. MATTSON: We have two FDA reviews for GESSAR. One is the STRIDE package. The other is improvements on that package for future reference.

MR. SIESS: I have a 24-volume SAR on GESSAR II. Is that what you are talking about?

MR. MATTSON: Yes.

MR. SIESS: I just got that six months ago. Have you already done a PDA on it?

MR. MATTSON: Yes.

MR. SIESS: Have we got a PDA letter on GESSAR II? I am completely lost.

MR. MATTSON: Maybe we are lost on the number reference. It also has a different number. Chemi, is it 238?

MR. SPEIS: Yes. That was done before TMI.

MR. MATTSON: Yes, some time ago. This is the Hartsville design, right?

MR. SIESS: So GESSAR II is a new name for what was originally a Hartsville --

MR. MATTSON: I can straighten it out for you later. I will get it for you tomorrow.

MR. SIESS: So what we have is an FSAR on GESSAR II.

MR. MATTSON: Yes.

MR. SIESS: And it is really in two pieces, one piece to get an FDA under the current requirements, and another to get an FDA for future referencing, that is, a ten-year certification under this rulemaking approach, much like the two approvals that CESSAR would have. It has in essence an FDA today under the old

rules that can be used for the plants now under construction that follow Palo Verde. They can reference that FDA approval and not have to go through all of the OL that FDA went through, much like Palo Verde did, and then another FDA approval for future referencing.

MR. SIESS: That is on this same document?

MR. MATTSON: Yes.

MR. SIESS: Will there be amendments?

MR. MATTSON: I'm not sure how they will handle the different amendments but they have to address more in the second review than they do in the first, and the "more" is what is described in 82-1A.

MR. SIESS: The paper we have now is just for the first review?

MR. MATTSON: In the case of CESSAR, yes. In the case of GESSAR --

MR. SIESS: No, GESSAR.

MR. MATTSON: In the case of GESSAR, I am not clear on how they handle the severe accident information. We are receiving some of that information.

Demi, is it not in the docket, do you know?

MR. SPEIS: It is in the docket.

MR. MATTSON: You should be getting both, Chet.

MR. MATTSON: Let me dwell a moment on what the policy requires that is different between these two

kinds of FDA approvals because it is really the substance of what 82-1A says has to be done for the next generation of plants that wasn't done for the first generation of plants.

First of all, it says that they have to address the unresolved safety issues. That means come to an agreement with the Staff as to what should be done about those unresolved safety issues insofar as they apply to those designs. They also have to by inference address the dominant contributors in the PRA. If there is a safety goal and if it has cost effectiveness or dollar values/man rem averted in it, you would have to show what design alternatives had been considered for reducing the risk in accordance with that $1000 a man rem.

MR. SIESS: That PDA was on the one they call 238 NI?

MR. MATTSON: Yes, that is it. That is right.

MR. SIESS: Okay.

MR. MATTSON: It requires that there be specific design features considered in these forward referencable standardized plant approvals, such as filtered events designed for sabotage protection, consideration of external hazards like seismic and so forth.

MR. MARK: That man rem bit, they could handle that just by moving it a few miles further away or going to a different state or something. There would be no need to change the design.

MR. MATTSON: The idea would be you would pick some envelope of sites for which you wanted to certify the design, and you would try to characterize the worst site you wanted to sell that design for, I presume, and then show for those site characteristics what the risk was for the design you proposed.

MR. MARK: But it is a flexible thing. It is site dependent.

MR. MATTSON: Yes, but the approval is for a standardized design. It would have to be for an envelope of sites to remove that site dependence if the standardized plant approval is to mean anything at all. Otherwise you have to go through the approval again case by case in future applications, which would defeat the purpose of standardization in the first place.

MR. OKRENT: I am sorry, what is your impression that SECY 82-1A would ask one of these standard plans to do for sabotage? You ticked off a few things.

MR. MATTSON: In the case of sabotage it acknowledges that it is difficult to handle in the PRA,

and all it requires of them is that they show what design consideration they have given to the question of sabotage. The Staff in turn lacks definitive criteria on design considerations, never having made such a requirement, the thought being that the process of proposal and review and review by the ACRS and the Commission ultimately would lead to some sort of understanding of what was required for design considerations of the sabotage.

MR. OKRENT: And on severe accidents what was it that they would have to do?

MR. MATTSON: There is a number of things they have to do for severe accidents. One, they have to do a PRA before they get an approval. That moves the PRA back into the design process. The second sort of thing they have to do is address their consideration of either the dominant contributors to risk and what you could do about them to reduce the risk, or through consideration of some specifically listed design changes. They would have to show what the cost effectiveness of making changes to the design they propose would be, so they have to consider filtered events for each of those designs.

MR. OKRENT: Would you say in the Zion PRA these features have been addressed?

MR. MATTSON: No.

MR. SIESS: There is a chapter at the end. I am trying to understand how you define the word "addressed."

MR. MATTSON: Not in the same way they would have to be here is what my answer meant. It is my understanding they addressed filtered vents, for example, in Indian Point. I am not up to date on Zion.

Chemi, do you want to address it?

MR. SPEIS: They have been addressed in both.

MR. MATTSON: But whether they did not address them in the context of a safety goal, that that is what we have by the time 82-1A goes forward. So there would be more.

MR. OKRENT: Zion as they calculate it meets, I think, the safety goals, so it would only be on an ALARA basis, and they did do an ALARA calculation using their numbers and so forth.

MR. MATTSON: In concept that is what we have in mind. We haven't reviewed that to say whether that is acceptable for a future plant, but in concept it is that kind of consideration, yes.

MR. OKRENT: And how would the decisions be made, then, on either things like that or whether or not you wanted another HPRCI system on the PWR and so forth

in the review of these standard plans? I am trying to understand how this will bring order to a diffuse severe accident rulemaking.

MR. MATTSON: If you presume that they didn't have these alternates in the design they proposed, that their basic design didn't include them, and we presume that is the way they came in, they would still be required to consider them as add ons. And to show what they would do to reduce the risks as measured by their PRA for their site envelope and to estimate what they would cost, and if there is a safety goal, to show whether or not that cost-benefit was above or below the safety goal guidance. If there was no safety goal, then you would have to make some judgments without the guidance of a safety goal as to whether it was cost effective to require those add-ons.

MR. OKRENT: For some people, including myself, who think there are going to be large uncertainties in many of the most interesting cost-benefit calculations that one could do here -- if there are not uncertainties, there will be differences of opinion on the calculated results -- are you suggesting that the PRA methodology is sufficiently mature that it will lead one to the right answer; there is a right answer?

MR. MATTSON: I am not suggesting you could do it with the PRA alone. The paper says you would have to step back and view the uncertainties and think about what it really meant to add those things anyhow, despite what their cost-effectiveness might be, and make decisions on them for each of these designs.

MR. OKRENT: So how are we going to get this decision making done in a way that is more orderly and less ad hoc when we do it one vendor at a time, which is the way it seems to be, rather than in some kind of overall context where you would have to consider the differences among vendors but nevertheless it is an overall context? I am trying to see why you think --

MR. MATTSON: You really have to make it in an overall context before you make it for any of these vendors under the plan put forward in 82-1A. You have to make a decision in early 1984 for all of the operating plants. Now, given whatever the ensemble of PRAs is at that time and whatever our research program and the IDCOR program have told us about the cost-effectiveness of retrofits, the laundry list we are all familiar with, you are going to make a generic decision anyhow in 1984 for future plants where the goal is to somehow make them safer where you can afford to do that. The idea is to tune the decision to the design

specifics, given whatever policy guidance the Commission issues in the form of a safety goal.

MR. OKRENT: Do you feel that if the Commission adopts a safety goal by the end of 1982, it is going to be other than on something which I will call a trial basis? In fact, even in the application to the Commission's own regulations I have to assume that it will only be an input to decision-making.

MR. MATTSON: That is true.

MR. OKRENT: Since the uncertainties will be there.

MR. MATTSON: But it is for these generic kind of decisions and for these standard rulemaking decisions that we are urging the safety goal be used in that trial period. This is the kind of decision we think it is made for, to decide whether and how much severe accident mitigation equipment to add to the various classes of plants as one element of the decision.

MR. OKRENT: I must confess I still have trouble. On the one hand, I hear and I agree that there are large uncertainties in PRA and that there will be problems that arise from these uncertainties in trying to make decisions on whether you can see the level or whether something is cost-effective and so forth. But then I seem to hear in connection with these proposed

specific standard plan rulemakings that somehow we will be able to use PRA and make the decisions using PRA as a principal if not the principal guiding source of information.

Am I hearing this incorrectly?

MR. MATTSON: No. I think, as Bob did beautifully before, it is a way of ordering your understanding of what the sources of uncertainty are and what their importance are to the elements of the decision. For this there is no better substitute for PRA as a sole source of a decision-making process. AS Mel calls it, the bottom line item, it is something you have to stay away from, but as a way to order your thinking about what the sources of uncertainty are and how they affect your decision, there is no better accounting system we know if, is there?

Let me try to jump to something that might be more productive. I think we have an example that would illustrate why we are reticent to make or urge the Commission to make policy decisions on some of the severe accident systems today. The best example I know of, and maybe you will pick it to pieces, is filtered vents, where we have had an ongoing dialogue with you in subcommittees and the full committee on what filtered vents would do for severe accident mitigation.

We have tried to put together a series of slides -- Chemi, I don't even know whether we have enough copies for everyone -- that talks about the evolution of knowledge on filtered vents over the last couple of years, the studies that have gone on that, on the one hand, say they help you a lot, and on the other hand, say they don't really affect overall risk. On another hand, when you look at the uncertainties and fragilities for seismic analysis in the last two PRAs, they say if you design the right kind of filtered vent, they may help you a lot for the dominant contributors.

How can we make a precipitous decision on something that seems to change every time we turn around and a new analysis is done?

The assessments of overall risks in the context of further understanding, more research in the plant laid out the way we have laid out this one. We would propose to make those decisions rather than jumping to decisions on any one of them now. If it would be useful to understand filtered vents as an example of why we prefer the more studied approach, putting it off until later, using tools which today are not suitable for making these decisions, but maybe in the course of time, we offer that.

MR. OKRENT: I am not sure the alternative is making a decision today, which is the one you suggested. In fact, I do not recall any schedule on which a decision was to be made in less than about two years, as I remember.

It seems to me, though, you are proposing to make fairly binding decisions, things that will stand for ten years on these specific FDAs.

Taking up the order of a year to review or some not too long time -- I may have missed it by some, but not many, years to review the FDA, and without the benefit of some kind of broad policy guidance based upon engineering judgment or whatever it is the Commission would use. So this is where I find myself at a loss to understand the philosophy in SECY 82-1A, frankly, unless

I have misread it.

I got the impression the Staff thought it could proceed with the GESSAR and what might follow and in fact arrive at conclusions in a rather quick period of review. Did I read it wrong?

MR. MATTSON: I think you do, because the Staff cannot make the decision on GESSAR. The rulemaking would be a Commission rulemaking. The judgmental processes would occur. It is not a year. It is two years. It is in full light of the entire laundry list of things to be considered in 82-1A. It is a significant jump to even require consideration of those things in a design.

Where have we ever required consideration of design alternatives as a part of approval prior to the approval?

MR. OKRENT: But the Staff would propose to the Commission that they adopt a certain rule on GESSAR 2 without having a broader policy as to what it might do with regard to --

MR. MATTSON: That is the down side, no question. But this side has GE actively working to develop the answer and Westinghouse actively working to develop the answer, and IDCOR actively working to develop the answer, and as I sit here today, over and

over asking the question of the industry what are you doing to address these questions, and unless you got a different answer than I did, the answer was not much except for these incentives, which have created a willingness on their part to work like IDCOR, like GESSAR, like Westinghouse, hopefully like CESSAR.

So I run the risk of being inconsistent because Commissioners change as time goes on and there is a few years of difference between GESSAR and CESSAR, but I have some of the best talent in nuclear engineering in the country working on the question with a vested interest in making an acceptable answer.

MR. OKRENT: I had assumed IDCOR was in response to the Staff's schedule for severe core damage rulemaking, not to SECY 82-1A, but maybe I am wrong.

MR. MATTSON: You are right. We have kept them working in this context.

MR. BERNARO: Roger, I think it is worth adding the IDCOR program and degraded core cooling research program are noted by the Commission as continuing and they are a fundamental part of this. The analysis of GESSAR 2 is not in vacuum. It is not the only severe accident consideration.

MR. MATTSON: That is how I tell you what I want you to have in your research program. It is what

my staff says they do not know how to answer in GESSAR 2. Please help them understand what the core does on the floor of a Mark III instead of a large, dry Indian Point containment.

Well, let me see what I can provoke with the next several slides. I will skip the one with the schedule, and they are just part of 82-1A. You have probably seen it before.

MR. KERR: Roger, is it conceivable that there might be a mechanism for a pressure suppression containment of the type being proposed by GE would be unacceptable? Is there any way that possibility could come out of a study that is being carried on?

MR. MATTSON: Yes.

MR. KERR: It would come out of this on the basis of a probabilistic assessment of performance?

MR. MATTSON: We understood the core melt progression in Mark IIIs, and we understood the level of risks predicted for those plants and compared them against what we thought we wanted, either judgmentally or in the safety goal, for future plants, and as we continue the dialogue on what constitutes a strong containment, as the Commission calls it, it is possible.

This slide just acknowledges the fact that an

important question while severe accident issues are being resolved is what do you do with plants in the pipeline and how should hearing boards conduct themselves on severe accident issues. 82-1A again summarizes what we have done to date.

It makes the statement that we at this point are unprepared to make decisions on additional severe accident requirements until further research and further thinking is done, and then says the Commission wants the decisions on the examination of severe accident requirements to occur generically -- its level, not case-by-case, in the auspices of hearings.

That is, it holds the status quo at essentially where it is today on severe accident requirements -- something I think the ACRS overlooked, and the difficulty it had with this concept in August and in chastising the staff about our failure to stay in communication with you.

We had proposed this body as one forum for testing that judgment of whether there were additional things that ought to be considered for more prompt implementation than this 82-1A approach would require. We said in there that IDCOR and the NRC should come to this body periodically and talk about the progress being made in severe accident research and that the Commission

itself once a year would ask the question of what progress has been made, and should there be some modification of the 82-1A policy statement.

That is, do we learn something quicker than we thought we were going to learn it. And it tells us some action ought to be taken other than the status quo while the 82-1A approach is still under way. We thought that was useful.

MR. OKRENT: I must say I have reviewed about as much research in the sense of it being research and not as it relates to policy as I feel is profitable, and I would be more interested in seeing proposed rules or alternative rules and look at the pros and cons of these and have them examined -- seriously, penetratingly, so forth and so on.

Doing research is like forming a committee to study something in many ways.

MR. BENDER: There are other viewpoints, as you probably know. I guess I personally do not find myself too much at odds with Roger over the matter of studying the matter more before he tries to formulate a rule, since whenever you formulate a rule, as is being seen now in just trying to develop a rule associated with this severe accident policy business, people tend to interpret the formulation as being the rule.

And it seems to me that it is wiser to try to understand how the various alternatives might be implemented. But I was more concerned when we wrote our letter not so long ago about this process, Roger, by the fact that while the industry has some things going on and NRC has some things going on, there does not seem to be much order to the effort.

Is my interpretation wrong? Is there order? Is there some set of answers that will really come out on some date and you know what kind of questions you are trying to answer?

MR. MATTSON: Well, for the operating reactors, that is an important question, to which our answer is not acceptable yet.

(Laughter.)

MR. MATTSON: The place you can see the current status of our answer is the revised NUREG-0900, the severe accident research plan. In that research plan are the questions as we have been able to articulate them, NRR and in research, that we are trying to answer. When you read them at a superficial level, they make sense. They are logical. They seem complete.

But when you get down to the technical level of what is the question you are trying to address and

you look at the letters NRR sends to research and the way research modifies SECY or NUREG-0900, you will detect there is not convergence yet on what are the unknowns. Is it more important to understand how the core drips from the lower support plate down to the vessel or more important to understand the coolability of the debris bed on the containment floor?

And in the coolability of the debris bed on the containment floor, whether the accident characteristics you are most interested in are those one-for-one. Do they have a one-for-one correspondence to elements of the research program, because the approach being proposed for the decision in '84 is through PRA to say what we expect the current risk to be from operating plants, classes of operating plants, how we could reduce that risk through design changes of a specific character, a list of specific things to consider, and what would it cost.

And if we get to '84 and we thought uh-oh, we left out a question, we should have asked that question in '82 because it will take two more years to answer it, then the decision will not occur in '84. We will have left something important out.

The dialogue on what those questions are, whether you agree they are the right questions, whether

you as a forum for NRR and Research agree that they have all of the questions down, they are probably suitable for planning purposes, for making budgets, for estimating costs. But are they suitable for answering all the technical questions. More is needed in that area. I will not pretend more is not needed.

But on the question of future plants, that process is already under way, following 82-1A as it exists today. We are saying to General Electric and will say to Westinghouse here are the questions we need answered. Here are the design alternatives you have to consider.

You have to do a PRA. What does that mean? How good a PRA can you do at this stage of design? That list of questions is before us, and that is what they are using today. If it is not complete, then your comments to us should be what should be add to it.

MR. SIESS: Roger, I am sort of on Dave's side about trying to rule. I do not think you would try one, but has anyone even thought about the possible kinds of policies -- I will say policies rather than rules -- that might come out of this and as to whether they all lead to the same needs of knowledge?

For example, one policy would be no change. We do not need to think more than we have now.

MR. MATTSON: There is a group of people working on that problem, and that is IDCOR, on the premise that there is nothing more needed, that you can prove with the existing state of knowledge or another year and a half manipulation of that. For the four reactors there is nothing else needed.

There are people working on that premise.

MR. SIESS: All right. It takes a certain body of research to permit that decision to be made.

MR. MATTSON: Yes.

MR. SIESS: Now another policy might be that you cannot build any more reactors. It would take some body of research to provide the knowledge to make that decision.

MR. MATTSON: 82-1A attempts to reach a consensus opinion among the Staff elements, the Commissioners and you all that that is an alternative that we can rule out. It attempts to say that reactors can be built and sited safely in the United States.

MR. SIESS: All right. Taking that as a premise, a policy might say design the plant so that the probability of a core melt is 10^{-6}, 10^{-7}.

MR. MATTSON: Why would anyone draft a rule headed in that direction when there is no one pointing the agency in that direction? Instead, the Commission

is pointing the agency in the direction of a probability of core melt of 10^{-4}.

MR. SIESS: That is because they are assuming something about containment.

MR. OKRENT: The U.K. is.

MR. SIESS: I just put that on with nothing about containment. Now that would lead you to research in one direction. Now if your rule was going to be to mitigate the consequences of a core melt, no matter what its probability, that would lead you down another research path, would it not?

MR. MATTSON: Yes. Well, you know, you are not going too far afield from what I think the Commission is trying to get into 82-1A's policy statement but is having some difficulty getting cooperation.

For example, what constitutes a strong containment? I think we are all being told the Commission is not very inclined to put in a containment performance objective and a safety goal. They are inclined to put something in 82-1A about what constitutes a good containment.

So should we be putting in their mouths words for them to say on what constitutes a strong containment? That would be part of the policy judgment

you are looking for now. We have gone as far in our proposal to them as we felt comfortable going on what constitutes a strong containment. Should we go further? Is there more that you would want to say about what constititutes a strong containment?

MR. SIESS: My point is the kind of research you do depends on where you might end up. It is conceivable that any place you would end up you would need the same research to get there, but I do not believe that. There is a lot of research on when, how and whether it gets out of the vessel.

MR. SHERMON: Let me develop it in a different way. You said your goal at one point was to reduce risk. Actually, I think you misquote the IDCOR people, or at least I heard them at a different meeting than you attended. And their argument is that what you ought to do is research that will indeed reduce risk.

And what the research program is let's try to understand more and more about all kinds of things and maybe then someday we will know enough to go back and say what is important to risk. So in a sense you could say IDCOR's approach is closer to your goal of reducing risks by looking at, indeed, those elements which seem to contribute to it as we all understand it in the research program.

And, in a sense, which head is trying to push you is the same way of can you find out what elements are important, how you think you can get your risk down low enough and then work on those topics, and, at least to go back to the research program, that is what many of us do not see there perhaps as well as you do.

I am not sure that is a question.

MR. MATTSON: Well, you are close to articulating an alternative approach that I have not seen you write down.

MR. SHEWMON: We have written repeatedly we do not understand the connection between the research program and where you people want to end up with your regulations.

MR. MATTSON: Maybe you need to read the latest draft. I have been reading it the last couple of days and I see the connection.

MR. SIESS: The research program looks to me like let us learn everything about everything and then we will know what to do.

MR. MATTSON: Chet, there have been things cut out of that research program because it looked that way to you and to us. If you look at the NRR comments and the ACRS comments on the research program, they are almost an overlay.

MR. SIESS: Yes. I would like to see an answer to them.

MR. MATTSON: The research people are moving in that direction.

MR. KERR: Which version of 0900 should I read?

MR. MATTSON: August 30.

MR. BERNARO: The SECY 82-03A, which is transmitted to you.

MR. KERR: 82-03A?

MR. BERNARO: Yes. The SECY paper is 82-203A.

MR. KERR: Dated what?

MR. MATTSON: August 30.

MR. BERNARO: August 30.

MR. KERR: I have not seen that.

MR. SIESS: We would not have it yet. Do not worry.

MR. KERR: I am glad to know the problem is settled. I feel better about it.

MR. MATTSON: I did not say it is settled. I said we need to keep talking. We need your input on what the technical questions are. You people have an interest in MARCH. Do you agree with IDCOR, NRR and RES views on deficiencies in MARCH that should be fixed in

the next generation of codes or two generations or whatever.

I think Bernard has two generations of those codes. Are we fixing the right ones of those or what we think are the information needed to make the right decision in '84 -- those kinds of things.

But that is not the alternative you are proposing, and I do not understand yet what I hear from various elements of the Committee that they think they are telling the Commission is an alternative approach for making policy judgments now.

MR. SHEWMON: Is this the latest 82-A that we are talking about in the handout for tomorrow?

MR. GRIESMEYER: We have not seen it yet.

MR. KERR: Are you talking about 82-1A or 82-03?

MR. SHEWMON: I do not know, to be quite honest. I would settle for either one and be happiest with both.

MR. KERR: 03 is apparently a new description of a research program. 1A is a description of a policy on severely-damaged reactor cores.

MR. SHEWMON: Okay.

MR. MARK: That is what we had been talking about until the other was mentioned.

MR. MATTSON: You would not nibble on my thing about filtered vents. I would say that I think in 82-1A we have stated the signal on filtered vents incorrectly. We do not acknowledge the uncertainty created by the seismic domination of risk in the two most recent PRAs. That says filtered vents may have more value for large, dry PWR containments than you can read in 82-1A.

So one thing we will be doing as a result of some of the questions you have asked is suggesting to the Commission when we meet with them on 82-1A that that at least ought to be changed. If we were to go through 82-1A and some of its specifics, there are probably other modifications that could be made that would be more acceptable to you and still acceptable to us.

But I do not know how you suggest we proceed.

MR. OKRENT: I will suggest we take a break, after which we will come back to the implementation plan and then to SECY 82-1A in that order, because we did not finish the implementation plan. I want to have some discussion.

We will reconvene in about seven minutes.

(A brief recess was taken.)

MR. OKRENT: We will reconvene and go back to the question of the staff's action plan implementation. Where were we when we were so rudely interrupted by me?

(General laughter.)

MR. ERNST: It seems to me we might have gotten to the bottom of Page 4. I am not sure. I don't quite know how to answer the last question at the bottom of Page 4 anyway, other than what we have really already talked about in one form or another. ALARA is basically symbolism for considering costs as well as benefits. The philosophy -- we have been doing it subconsciously, if not quantitatively, for a long time. This is just a quantification of what one might call good engineering judgment about what is sufficient for safety versus what is not.

MR. OKRENT: Yes. I guess this question again relates to process, in other words, how is decision-making going to be affected? Even in this trial period, how do you plan to accomplish decision-making in view of the large uncertainties that are going to be present for many of the more interesting issues? Well, maybe by tomorrow you will have an answer on that.

Dr. Mark?

MR. MARK: On that question, when I read what

was referred to here, I couldn't believe the word "benefits" was the word intended, but it would rather more be usefulness, efficacy, or something of that quality.

MR. ERNST: I am sorry, sir.

MR. MARK: I said I couldn't believe the word "benefits" in the way I usually understood it was the word intended. I thought "usefulness" or "applicability" would be more my idea, to find out whether you can live with the darned thing, and whether it was having a good effect as a benefit.

MR. ERNST: My use of the word "benefit?"

MR. MARK: The word "benefit" came out of the implementation plan.

MR. ERNST: I think the "benefit" terminology there that you are talking about, the incremental reduction in risk is a benefit.

MR. MARK: You are talking about the reduction in risk. You are talking about the fact that you can work with it and it helps you in doing your work. That is what I supposed you meant, the benefits from the point of view of making decisions.

MR. ERNST: Maybe we are talking two different subjects.

MR. BERNERO: I was about to answer it in the

same way Mel did. We speak of using PRA to evaluate the cost benefit of design changes. What is entailed in both actual resource costs and in competing risks to make a change to a plant and how much risk you avert or how much risk you reduce as the benefit.

MR. MARK: If that is the case, then the answer in two years is zero or open question mark, because you are making changes that would be in effect two years from now.

MR. BERNERO: No, you are looking at the plant with and without a postulated feature and evaluating the level of risk the plant poses as it stands against the level of risk you estimate it to pose given that you have incorporated the feature.

MR. MARK: Okay.

MR. OKRENT: Before we go on, I should note that you have been handed copies of something called Filtered Vented Containment Systems, which the staff mentioned prior to the break. I suggest you might look at it. If you have questions today or tomorrow, they can give you additional information, but I guess it is intended to be semi-explanatory to the intelligent layman, which we are supposed to be.

MR. SIESS: This came from -- Oh, thank you.

MR. OKRENT: Why don't we go on? We are on

the top of Page 5.

MR. ERNST: Top of Page 5 addresses staff justification, 10^{-3}. I guess the staff justification is that if 10^{-4} is construed to be a design objective, then what does one do if one does not operationally meet the design objective? And at what level does one feel that it is no longer an ALARA question, but a very strong mandate to fix. I am not sure anybody is completely wedded to 10^{-3}. I don't know whether 10×3^{-4} would be all right. It is a hard judgment to call, but the staff also did not suggest a time frame. They just said above 10^{-3} extended operations should not be permitted.

You could probably have the same words at 10×3^{-4}. I don't know. But if you look at the incentives for fixing, for example, if you get upwards of 10^{-3} at a typical site, I think the man rem works out to something on the order of several million dollars a year, a reactor year incentive to fix, and at most populace sites it would be a decade higher than that just from radiological, not even including off-site property damage or perhaps even on-site property damage.

So, it is not an insignificant incentive, plus clearly the description in the action plan, I think, is

strong toward trying to achieve the 10^{-4}. So, if you had reasonably close calls, I don't know what the number would be, a factor of three or so one way or the other in ALARA. Consider the fact that an ALARA would not be the sole basis for decision-making. I think you would look at other factors that might influence that decision at that time.

I don't think the action plan should be construed as putting the numbers in, turning the crank, and the decision comes out. That kind of a process. The goal should be to try to get the design objective. At least that was the intent in the action plan.

MR. OKRENT: I guess when I look at this I try to ask myself, suppose I lived downstream of a dam, and I asked the state what the failure probability was at which they would not use ALARA considerations, but would require some kind of a fix without prejudging how long would be acceptable, and so forth.

If they came back to me and said 10^{-3} per reactor year, but we haven't allowed for A, B, or C as possible failure modes versus a limited set of failure modes, and this is just our best estimate, and the uncertainty in this number is unspecified, and if I asked them, could it be a factor of ten, they said, well, it could be a factor of ten to two sigma, I just

can't say, I am not sure I would feel that I considered that adequate.

Now, you know, dams have different modes of failures, just as reactors have different kinds of accidents, so the picture is not radically different if you want to put it that way. If the Teton Dam failed, there would be a modest number of casualities, if the major event occurred where it all gave way once, which would strongly affect the nearest medium-sized city.

On the other hand, if he came to me and said, gee, this is a 99.9 percent confidence number, everything is in it, I might react to that one in 1,000 more strongly myself. It is partly in that sense that the question is posed. If you say one in 1,000, it means different things depending upon what the qualifications are that go with it, and I was wondering whether you had thought this through and decided that within the statements of the draft action plan this is okay, or what.

MR. MATTSON: Let me answer it.

MR. OKRENT: It is not an easy question.

MR. MATTSON: I think we are trying to discuss it too abstractly. If you were to get information that was 10^{-3}, it would be it is 10^{-3} because of A, B, and C. Essentially, the situation we have at Indian

Point. It is 10^{-3rd} because of earthquakes, fires, and hurricanes. And so you look at the hurricanes, and you say, gee, what could the uncertainty be with the hurricanes? Can you really get that big a hurricane that quickly, that much surprise? What would really happen to the city of New York as the hurricane passed over it? How important is that? You are looking at the range of uncertainty for that contributor. If you look at seismic, is it really 10^{-3rd} because of seismic, because that is real or because of the way it was analyzed? You look at the uncertainty in the analysis and quickly find large sources of uncertainty, some above and some below 10^{-3}.

Similarly with fire. I don't think anyone is trying to make the statement that it is 10^{-3rd}. It could be an order of magnitude. Instead, I think the statement is mean or median 10^{-3rd}. Then you look hard at what the contributor is and make decisions on it based upon the consideration of uncertainties and other things.

MR. ERNST: I think to some degree it is the intent behind the thing, and I guess that could be subject to question. In my view, the intent is that core melts would be 10^{-4} or less. That should be the way the plan would be looked at. I guess it is to say

there may be some good reasons why they should not be, but it should be more that than make me assume good reasons why I should lower the core.

It reminds me of a paragraph in the action plan on Page 19. I know, because I looked at it only an hour or so ago when there was a comment made that the action plan didn't assign the burden of proof. It does. It says if you are significantly above the design number, the burden of proof as to why you shouldn't fix something should shift to the industry, and if you are substantially below the design number, the burden of proof clearly should shift to the NRC.

I think if one looks at the entire action plan to get a gist of intent, one wouldn't be saying, you will have a lot of plants at 10^{-3}.

MR. OKRENT: The note I have on that page is, what about the situation where the staff says it is larger and the industry says it is smaller?

MR. ERNST: I guess we have had that problem for 25 years now.

MR. SIESS: You know what happens.

MR. OKRENT: Sometimes these numbers are put down and the authors have in mind a variety of ways in which they would use them in decision-making if they were the ones. On the other hand, they have a habit of

being applied by other people.

MR. ERNST: I think that is exactly why you have to consider the plan in its entirety. Although it may have been better crafted, I think we tried to think of things like that, and most of the paragraphs have some usefulness, like the burden of proof sought. Out of context, you wonder what that means. In context with 10^{-3} or 10^{-4} it comes with a little more meaning.

MR. OKRENT: Well, have you considered whether you would want mean or high confidence values for that operating limit, given your freedom of choice?

MR. ERNST: Well, I guess there are two ways to express it. If one assumes, perhaps reasonably, that 95 percent confidence ban is equivalent to a decade plus or minus, then one can choose a decade different number at 95 percent confidence or a decade different number at 50-50, whatever. I don't know. You have a -- well, I don't know the answer to that question. I don't think anyone sitting here with me knows either.

MR. OKRENT: How about Question 3?

MR. ERNST: I think if one makes a back of the envelope calculation on a typical site, one gets roughly a $2 million number, and I think that is roughly comparable to the loss of plant, maybe another billion replacement power. I don't have a number for off-site

property damage. It may not be the same order of magnitude in some locations. I don't know.

MR. BERNERO: You used the term "average core melt", and if one gives weight to the types of containments and the expected performance of containment, you will have a lot of core melts that don't have substantial off-site costs but do wipe out the roughly $1 billion plant, and half a billion dollars or $500 million worth of replacement power. If you look at the extreme events, you are going to get substantial off-site cost, but if you look at the average core melt, $2 billion, $3 billion in the ATWS form, we are even getting into the argument that has been made before that changes like TMI changes on all plants, safety changes that are costly should be ascribed to being one of the costs of core melt.

So, you can change that number into $10 billion or $20 billion if you want as an exercise, but you need a working tool, and for a typical core melt given there is a reasonable containment performance, a couple of billion dollars is a reasonable number.

MR. ERNST: I think there is another comment there is no question on, but maybe the comment should be made, too. That is, the $1,000 per man rem is argued by many to be too conservative. One could perhaps argue

that is a surrogate for risk aversion, and maybe a few other things. It is clear that at a typical site, assuming typical kinds of containment performances and core melt accident sequences, that is in the same ball park of benefit as the benefit of preventing a core melt would be to the utility or the rate payer for loss of plant.

If, however, one changed the $1,000 a man rem and perhaps for very good analytical reasons to something like 100 or so, then I think there is a legitimate concern about where is your incentive in ALARA?

MR. OKRENT: Actually, based upon what I am told by people who do crack calculations, if you brought the 50 miles, you might only get on the order of a fifth of the total man rem that you would calculate out to very large distances. Is that your impression?

MR. BERNERO: It varies with the site. At Indian Point, you get a very large fraction at 50 miles. At Palo Verde and places like that, you get almost none of it. In general, for the more populace sites you do get from the average on up, from the average site on up, I think you get a large part of the man rem dose in the first 50 miles.

MR. OKRENT: You don't get more than a half, I

don't think.

MR. BERNERO: I don't think you get more than a half except on Limerick's, possibly not even Limerick. On Indian Point you do. Limerick and Zion, I am not sure.

MR. ERNST: Indian Point is like 85 or 90 percent.

MR. BERNERO: Yes, on Indian Point you get a very large percentage, and it varies from site to site. I am not sure where you are going, what you are trying to do.

MR. OKRENT: Well, by the way, if in fact at Indian Point you get 85 to 90 percent within 50 miles, and at Big Rock, if I could take another site, you get only 20 percent within 50 miles, this would go counter to some statements we have heard other members of the staff make that all sites east of the Rockies look roughly the same, or east of the Mississippi look roughly the same with regard to latent effects, that it is the distances beyond 50 miles that dominate.

MR. BERNERO: You shouldn't compare Big Rock Point to Indian Point. You should compare Indian Point to Newboldt Island, to Peach Bottom. That came up in the Perryman site, where all of the alternate sites for Baltimore Gas and Electric had major population

centers.

MR. OKRENT: But there have been discussions of the siting task force where they have said that they thought, I believe, that all sites looked roughly the same. I am quite sure that was -- well --

MR. ERNST: I think that was sort of a broad statement. I was on the site policy task force some years ago, too, and I think it was more in a broad PRA context, and it is hard to separate them. There weren't decades of difference between them.

MR. OKRENT: If for some sites this is an order of a factor of five, in other words, 50 miles only picks up roughly a factor of five of the total --

MR. ERNST: One-fifth?

MR. OKRENT: Yes, I am sorry, one-fifth of the total, then let's say instead of, well, we will call $1,000 a man rem is really $200 per man rem, then there are genetic effects, psychological effects, and so forth, so it is not completely clear that $1,000 a man rem is as large, let's say, a disparity from numbers that EPA might commonly use, let's say 2.5 million or 1.5 million or in that range, as you frequently hear.

MR. MARK: Does anyone know what the radiation dose at 50 miles from one of the bigger releases is estimated to be?

MR. OKRENT: Do you mean the average one? Because it would depend on the scenario. If it rained, they might get --

MR. BERNERO: It could be lethal at 50 miles.

MR. SIESS: At 50 miles, did you say?

MR. BERNERO: In a rain, the Dorset disaster sort of thing, where the worst accommodation of all of the worst thing, a very low probability combination, but you can get a lethal dose at very large ranges.

MR. MARK: Over 300 rem?

MR. BERNERO: Yes. In effect, you can get a feel for that if you look at the emergency planning document, NUREG-0396, where it calculates the probability of given doses in range of miles.

MR. SIESS: If you get that at 50 miles, could you get worse at 25?

MR. MARK: It mustn't rain at 25 if you are going to have this kind of a dose at 50. It has got to be clear.

MR. OKRENT: One rain per accident?

MR. SIESS: One rain per accident. Okay.

MR. BERNERO: A rain at the site, of course, is almost optimum. It clunks the stuff down right away.

MR. SIESS: It increases the rem but not

necessarily the man rem.

MR. BERNERO: I think the whole dialogue on the $1,000 a man rem on the value impact analysis, one of the things I think that bears repeating is, some value for health effects alone is a weak tool. A complete display of the costs, the impact, a complete display of them, at least the off-site ones, is something that we have recommended. An orderly display of the cost of early death, the costs of radiation injury, the costs of latent cancer, the costs of evacuation, the costs of interdiction of property, the costs of cleanup, and so forth. Those are legitimate and reasonable costs, and they ought to appear in the equation.

MR. OKRENT: I guess the ACRS agrees with you in that area.

MR. BERNERO: Yes. Staff has said that. The Commission, on the other hand, has hewn very tightly to the health effects only.

MR. MARK: All right, and they are assuming no evacuation, everyone stays outdoors and waits?

MR. OKRENT: Oh, no, no, no.

MR. BERNERO: No, no, no. The Commission is silent on the subject. Now, in a risk analysis, one normally does a model of evacuation and a sensitivity

analysis for everybody was confused, they stood outside and got in the cloud, or everyone responded quickly and got out of the way. You find out what your uncertainty is in the emergency response.

MR. MARK: But the new statement of the goal says people in the vicinity, and I was told this morning that means people within one mile of the site boundary. They can all be evacuated with about a 99 percent probability, and therefore there aren't any doses anyway.

MR. OKRENT: That is right.

MR. MARK: So the safety goals can be met by just having a bunch of buses ready.

MR. OKRENT: That's right.

MR. SIESS: As long as it is not caused by an earthquake.

MR. OKRENT: That's right.

MR. ERNST: I think staff would look closely, and this is part of the prescriptiveness of doing PRA's. I think you look closely at the assumptions. However, whatever evacuation plan you might choose would not affect the ALARA aspect of this.

Not if you include proper damage. Again your evacuation potential exists even up to 50 miles, and you have lots of time.

MR. MATTSON: If you listen to what we say today about how we are planning to use the safety goal and PRA in the next two or three years, it is so generic that you will not base this question on individual site-specific issues anyhow. You will find a generic model for addressing all of the generic safety issues you want to consider in the course of those few years, and you won't have to fine tune the work.

MR. MARK: But you can't talk about health effects in a generic way. They are site specific. They depend upon evacuation. The only thing you can do there is something analogous to or similar to release quantities.

MR. BERNERO: One of the reasons for the staff implementation plan being so heavily into core melt is the most likely item of discussion in a case-specific forum is core melt, system reliability, core melt likelihood or core melt frequency.

MR. MARK: I perceived that when I read it. I thought this is great, that is where we should have started.

MR. OKRENT: Question 4 on page 5.

MR. ERNST: I think the answer to the first part would be yes, if you evaluated a certain sequence and it looked like it was a dominant sequence and that proposed improvement would also improve other sequences, yes.

MR. OKRENT: All right. Question 5.

MR. ERNST: Well, I had two notes down here, both of which I guess you will have other questions. One is good QA, and the other is prescriptive guidance. I think it is recognized that you can take dominant sequences and split them up enough so that you could have enough letters after the sequence so that you could make them non-dominant. I think the Staff would just have to be aware of this possibility.

MR. OKRENT: It is not an unreal question.

MR. ERNST: That is true, but in the next breath I think you would have to give the Staff analysts credit that if they thought they saw a dominant sequence or a bad sequence, they would be able to sharpen the pencil the other way and figure out it was bigger than 1×10^{-5}.

MR. OKRENT: Question 6.

MR. ERNST: I guess the answer is no, certainly not at this time. The 10^{-6}, 10^{-7} really is a screening kind of criterion rather than what we are

talking about in the safety goal. I wouldn't anticipate any change at the present time.

MR. MATTSON: That doesn't mean there might not be other screening criteria invented while the safety goal is under discussion. For example, in PTS there is another screening criterion being discussed, and the number that seems to be bandied about today is 10^{-5}.

MR. OKRENT: For what?

MR. MATTSON: Pressure vessel failure. When you begin to look at plant-specific --

MR. BERNERO: A crack in the pressure vessel.

MR. MATTSON: I am not trying to tell you the final answer on PTS today. I am trying to tell you that although we say 10^{-6}, 10^{-7} may not change in the way it is applied in the current standard review plan, new screening criteria being discussed today may be more influenced by the safety goal. Whereas in the past they might have been 10^{-6}, 10^{-7}, today they would probably come up somewhat because of the 10^{-4}.

MR. OKRENT: Now, that is an example of where the containment criterion is relevant because you would be talking about a scenario that would give you trouble with a containment performance criteria, and it is, I think, well worth your while to be cautious in that

regard.

MR. BERNERO: Thank goodness all PWR are in relatively large containments, with a few exceptions.

MR. OKRENT: Well, but you had better know what the likelihood is of different releases. You don't need seven categories. Three categories are sufficient, like SST-1, 2 and 3. Given the vessel failure, it seems to me in adopting criteria and also what confidence you have to have in the number, to some extent this question is raised with that in mind as well as other things.

MR. SPEIS: We had that in mind when we talk about numbers like that, simultaneously looking at the potential release categories because it could be unique categories because of the failure of the vessel in some peculiar way. So we are thinking of that. We are covering this type of thought.

MR. SIESS: So the 10^{-5} on the scenario would not be an absolute. If that scenario did not lead to a high release category, you might -- or is it not -- back to question 4. You know, if one scenario contributes more than 10 percent -- or is that 10 percent to the risk, risk of core melt? Right. That might be one percent of the risk to the public or it might be 40 percent of the risk to the public or something like that, depending on what release category

it was?

MR. ERNST: I think you would have to consider that. I don't think the factor of 10 applies only to core melt. You would have to consider the risk of the sequence.

MR. SIESS: The way it was stated, though, it says core melt frequency -- right? -- without regard to the particular kind of melt.

MR. OKRENT: You know, there are some fairly major policy questions related to this number you just mentioned in connection with pressurized thermal shock, and it is the sort of thing that when you arrive at a decision, in my opinion, it should be carefully documented. The reasons given for why it is acceptable, it should be well publicized, and I would provide ample time.

MR. MATTSON: This wasn't an attempt to spring a number on you so you couldn't comment on it. The people developing that decision aren't even here today. It was an attempt not to bliniside you by answering 10^{-7} or 10^{-6} would remain unchanged, that you would keep seeing 10^{-6} or 10^{-7} on all the decisions the Staff was making. You will not. You will see other numbers.

MR. OKRENT: I have already seen other

numbers. I could look at the standard review plan for aux feedwater and if I want to derive a number a little bigger than 10^{-6}, right?

MR. MATTSON: No, that is supposedly based on 10^{-6}.

MR. OKRENT: You can get a little bigger than 10^{-6}.

MR. SIESS: But 10^{-5} on a crack in the vessel as compared to 10^{-6} on an initiator, they are not all that far apart, are they? I mean a crack in the vessel doesn't necessarily mean a core melt.

MR. SPEIS: You can discriminate it, but we are talking about a crack that is supposedly with an RS, but still there is a discrimination between that.

MR. SIESS: But more or less means what, goes all the way around, 360 degrees this way? That would be a core melt. I would buy that.

MR. SPEIS: Not always.

MR. SIESS: I had it going circumferentially across the vessel.

MR. BERNERO: Whichever way the weld goes.

MR. MATTSON: I think you are getting a long way into this without the people who know about it being here. I think you are probably making a record you don't want.

MR. OKRENT: I would also like to see how you keep it cool.

Why don't we go on to the next questions?

MR. ERNST: The 10 percent discount factor is supposed to be a real discount factor without any inflation built in.

MR. OKRENT: Now, there is a paper by Stripp which says that 4 percent discount is the real discount rate. Have you seen that? It was done with NRC funding.

MR. ERNST: Yes, I have seen 4. As a matter of fact, we will have shortly the first draft coming out on prioritization of generic safety issues that uses 5. I don't think that 10 is hard and fast. I think the 10 came basically from our environmental kinfolk who have been using 10 percent in environmental statements. The OMB guidance is 10 percent. I don't know how hard and fast we are with that 10 percent.

MR. SIESS: A 10 percent discount and a 5.4 percent inflation.

MR. BERNERO: And there is also the issue of whether one applies a discount factor to future health effects because on latent effects you can make the future vanish that way.

MR. OKRENT: I am aware of that. If the Commission is going to discount future health effects at

this rate or keep them at 4 percent, I am not sure why they are going through all of the trouble they are on high level waste storage.

MR. ERNST: The costs are discounted in this proposal, not the benefits. The health effects are not discounted at all.

MR. OKRENT: But the economic costs would be?

MR. ERNST: Yes.

MR. OKRENT: But they end up being a trade-off with health effects. If you try to reduce the health effects, you can incur larger economic costs and vice-versa. So I am not sure --

MR. SIESS: Does that provide a regulatory bias by discounting one and not the other?

MR. ERNST: It would provide some bias.

MR. SIESS: In that direction.

MR. ERNST: It might be a factor of 2, something like that, over a 30-year lifetime if you used a 4 percent, 10 percent, something greater than that.

MR. OKRENT: So you are saying that the 10 percent is something you are still thinking about?

MR. ERNST: Well, it is in the paper. I am just saying that in the paper we have coming out, we are using 5. The only reason 10 is there is the OMB guidance, and I am not sure whether it should stay there

or not. I have no strong feelings about it. Actually personally I have some feeling that it should be lower. I don't think that represents the true expected return on money nowadays.

MR. OKRENT: Why don't we go on.

MR. ERNST: Whose PRA results have we used? I don't know, do you?

MR. SIESS: I thought it was obvious you used the Staff's.

MR. ERNST: We will use yours.

[Laughter.]

MR. OKRENT: It is a fairly essential question.

MR. SIESS: There is quite a range there between the Staff and et cetera.

MR. MATTSON: If that becomes a source of unwarranted burden, everyone will abandon PRA and safety goals as an approach to regulation. If it isn't a source of difficulty, people will do it.

MR. SIESS: Roger, if you made a PRA right now and industry made one independently of NRC, how much do you think you would differ?

MR. MATTSON: Well, the only test I have that is current is Indian Point. They made one and our contractor made one, and I don't know -- I know what our contractor did superficially and I know what the Indian

Point folks did, and I guess at the moment I believe the Indian Point people more than the contractor.

MR. SIESS: How much did they differ?

MR. MATTSON: A factor of 4 on final.

MR. SIESS: Were they independent in the NRC use of the word?

MR. MATTSON: Now you are over my head. I have to turn to someone else.

MR. ERNST: I don't think the contractor went in and second guessed the systems analysis work.

MR. BERNERO: Excuse me. To my knowledge, the first benchmark we have of independent PRAs is Browns Ferry where the Staff/contractor PRA is now published and the industry owner PRA is soon to be published, and that is the Browns Ferry plant where we did an IREP study, internal events only, simultaneously with the owner and his contractor doing a Pickard Lowe Gerrick -- whatever it is -- internal plus external event, and that is the first benchmark where we have --

MR. SIESS: Do you have it or you will have it?

MR. BERNERO: We have ours out. They haven't come out with their publication but they have been kept separate to be independent. They are also diverse in methodology.

MR. SIESS: Can you separate the internal

events in theirs for comparison?

MR. BERNERO: Yes. Traditionally we expect we will be able to because the Pickard, Lowe and Gerrick reports so far published make it easy to separate the events.

MR. SIESS: Suppose NRDC did one. Do you have any idea, would that be as close? Of course, they would probably have to get someone to do it.

MR. BERNERO: The closest we have come to a public interest group doing one is selected scenario calculations or consequence analyses that have occasionally come up. There is no sign we have ever seen of a full-scale PRA.

MR. MATTSON: But let's say that we aren't doing plant-specific ones because that doesn't seem the way we are headed. We are not doing licensing case PRA. Instead, we concentrate on generic PRAs to make generic decisions somehow. I am not sure what a generic PRA is.

MR. SIESS: Independent of safety goals.

MR. MATTSON: But we published one and used it as a basis to issue a new requirement. It goes out for public comment, and the AIF publishes one that says we should do less. And the Union of Concerned Scientists publishes one and says we should do more. Doesn't that

difference of opinion and range of uncertainties help you understand what the things are that you should concentrate on in making the decision? You don't rely on any of them in making the decision.

MR. SIESS: You are separating PRAs now from safety goals completely.

MR. MATTSON: I am? Why?

MR. SIESS: Well, in a safety goal I have a number to meet, and the fact that someone is higher than I and someone lower doesn't help me decide whether I meet the number.

MR. MATTSON: But I look at the sources of the differences, make decisions whether I do or don't.

MR. SIESS: You are answering the question essentially as I did. You use the Staff's rate.

MR. MATTSON: Not if the Staff made a mistake and someone pointed it out.

MR. SIESS: I am not talking about a mistake. How much did the Indian Point surveys differ in terms of certainties?

MR. BERNERO: They aren't different PRAs. What they are is the owner did an extensive PRA and the Staff and its contractor up-raised that PRA and came up with alternate figures by way of incorporating corrections they deemed necessary.

MR. SIESS: Was there any alternate figures on the uncertainty level?

MR. BERNERO: I don't know. I didn't read that much of the report.

MR. SPEIS: Supposedly they came up with best estimate figures, not certainties, whatever that means. Let me give you an example. For hurricanes, the Staff versus Indian Point differed by a factor of 20 on hurricanes. Overall it is a factor of 3, both internal and external, for Indian Point 2. There are numbers all over the place. The bottom line doesn't seem that much different between what Indian Point did and Sandia did.

MR. SIESS: The external events will be a big source of difference, and if they dominate, they would affect the bottom line.

MR. MATTSON: Chet, if you are interested in understanding differing points of view as you go about making up your mind on some requirement, then you don't want the PRAs and the analysis to necessarily agree. You want differing viewpoints. You want to be able to examine the uncertainty as measured by different interpretations of the same information. Why do we want them to all come out the same?

MR. OKRENT: I don't think there is a suggestion that we do want them all to come out the same.

MR. SIESS: The question was which one do you use when they don't?

MR. MATTSON: The one you believe.

MR. BERNERO: The one you trust.

MR. SIESS: Oh, that puts me on the spot. I don't believe any of them.

[Laughter.]

MR. ERNST: I guess in a half-kidding way I have said sometimes we will believe the Staff numbers on risk and the industry numbers on cost, and the ALARA ought to come out pretty close.

[Laughter.]

MR. OKRENT: Let's go on to item 2.

MR. ERNST: Just thoughts of the top of the head. There is a QA -- maybe quality assurance isn't the proper word, and I forgot what the right word is -- in the PRA manual, but that is part of it. I think there clearly will be industry interface to comment on whatever we do, and our contractors to comment on whatever the industry does. I would anticipate that any NRR-sponsored reviews would be given a QA review by Research -- stop me if I am wrong -- and eventually it has to go for some kind of decisional process.

As I best understand EDO's position right now, however it comes out, we don't know, but the EDO's

position is before you take any action on the basis of a PRA and safety goal of any substance, anyway, it would come to the Commission's attention for guidance.

MR. SIESS: Oh, boy.

MR. OKRENT: If I were to think back to WASH-1400, which I will call a Staff document or a Staff PRA, and if I try to think of the comments that came in from industry, I think they tended to lie on one side of the spectrum of comments. I don't think you got many, if any, from industry that were like the kind you got, let's say, from the American Physical Society on the first draft or you even got from the UCLA on seismic and so forth.

What I am getting at is the following. If the only peers that review it are the industry, you will get a valuable set of comments but it will be only half, and if there is no mechanism for getting the other half, you will have had an imbalance in the peer review, and I suggest you think on that.

MR. SIESS: But you will know which half it is.

MR. OKRENT: You will know which half.

MR. ERNST: Again, that emphasizes the point. I don't know how you do it in the plan. It probably isn't that large. But perhaps we should really pay more heed to what comes out of the PRAs in the way of

sequences in comparison to past results, with a little less emphasis on the bottom line.

MR. OKRENT: I use the term "PRA" or sometimes I change it and say "reliability analysis" to mean things in addition to the full-scope PRA, and the Staff frequently has informed and will frequently have this kind of mini-PRA or reliability analysis done for it, and it seems to me you need to have a process set up for providing the appropriate review of it. Sometimes it doesn't take too much.

If I think of what was done for the SEP plants, the way it was used, it was only semi-quantitative, at best, so it didn't take too much. On the other hand, if we are hinging a lot on the calculation -- for example, Sandia was doing on filtered vented containment but they didn't include external events -- it would have been a major oversight, let's say, to have arrived at the conclusion without the benefit of a critique. But this could be changed radically by external events, okay?

MR. MATTSON: But would you suggest that the implementation plan for safety ought to be so prescriptive as to get clear down into the mix of people involved in a peer review? Isn't that kind of standard knowledge if you are going for a peer review, to get the

right mix?

MR. OKRENT: No, I would say that the word "peer review" is ill defined now. It is used loosely.

MR. MATTSON: Do you think it is possible to agree on all of those details in the implementation plan?

MR. OKRENT: No. Right now it is hard to find in the implemenation plan a statement that the Staff will accomplish or will try to accomplish some kind of independent review or whatever it is and a process will be set up which is commensurate with the importance of what it is being reviewed. I don't think you will find that statement.

MR. MATTSON: It is hard to argue that that specific statement shouldn't be in there or even elaborated on when you look at one.

MR. OKRENT: But it is not in there, I don't think.

MR. MATTSON: Probably not, but in trying to understand the general thrust of your comments on this so I can understand some of your comments on 82-1A too, you say it has a short paragraph, the implementation plan, on the process, and now I am beginnig to understand more what you mean by that. These are very specific examples of what might be involved in how you review and use the various pieces of the safety goal

decision process, marching it through the agency up to the ultimate decision-maker, who has what days for comment and who sends what memo to whom and what element of the Staff --

MR. OKRENT: I think the process in the end is the way in which you are going to apply it and the way in which it is going to be used by the outside and so forth, and really it warrants thought.

One other comment in that area. I can easily foresee a two-year trial period where hardly any of what I will call the hard problems were tested.

As someone earlier said, we will be looking at generic problems where it will not be too crucial to have very good numbers and so forth. I think there are going to be some generic problems which exactly fit that category. But if you restrict yourself to that kind of problem, you will not really have tested PRAs in the street, as it were, and you will have done a disservice, in effect, to the whole thing because it will only be after the 2 years that the gory issues come up.

MR. SIESS: I think it is very important that you commit yourself at least to establishing the credibility of the process of the PRA. And I guess when you think about credibility, you have got to think about credibility to whom. There is the public, which I think is probably the main target. There may be as the public -- although it represents them, there are public interest groups who may or may not represent the public, and I think you may even have problems with the Commission or some fraction of them.

So that how you establish credibility for that 2-year period, unless it is factored into it, may not get you anywhere.

MR. OKRENT: Does that help clarify what we are getting at?

MR. ERNST: (Nods affirmatively.)

MR. MARK: There is reference in the implementation plan to require PRAs presumably done by the applicant under circumstances of high-population sites which are not in this document defined. If you just leave them and say, here is my PRA, do not assess it, or get it assessed, or have a mechanism for it, it may be the kind of thing you are used to seeing from the applicant, look, I do not want to follow this up, but there is a need for some statement in here as to there is a means and we will use it to establish the credibility or something.

MR. OKRENT: We are at the top of page 6, I suppose.

MR. ERNST: The fifth question, I guess the answer is, number one, it is not being required, it not proposed to be, and the present EDO position is that it would not be in the licensing process unless carefully supervised by the Commission.

MR. OKRENT: So it is expected that unless the Commission so ruled, the PRAs not only would not be used by th Staff but reports could not bring them in either, as it were, because the rules of the Commission would say otherwise?

MR. MATTSON: There are practical questions one might ask, given this is the recommendation of the

EDO, like, what do you do about those boards who have already asked for the results and brought them into the hearing process, does the Commission talk to those boards and tell them to stop that or use them in particular ways? Because there are examples when that is going on. There are other examples of where the Commission is fairly well in control of what they want the board to do.

MR. ERNST: I am not so sure how that sorts out. I am not a lawywer, but I do not think a policy statement has the force of law. It could guide the board and it could guide the Staff. But an intervenor -- I am just postulating now -- an intervenor or licensee could bring a PRA in and make a substantive argument under our rules.

MR. SIESS: As I think a lawyer told us this morning, anyone can sue you on anything.

MR. ERNST: The Action Plan was reviewed by the legal department, and we did get a legal sign-off.

MR. OKRENT: Okay. 7.

MR. ERNST: To never have? That is a long time. I think what we are talking about is a 2-year trial period, what happens after a 2-year trial period I think is a separate question.

MR. OKRENT: The INREP program, now.

MR. SIESS: Dave, how many plants are in that category?

MR. OKRENT: Have we seen a paper, by the way, in which there is a definition of what the INREP program would be according to the Staff's recommendation? I am trying to recall whether I have seen it and forgotten it, should have seen it.

MR. BERNERO: It was suppressed, Dave.

(Laughter.)

MR. ERNST: It would have been nice to have seen it, but you have not.

MR. OKRENT: Okay.

MR. MATTSON: And neither have the rest of us.

MR. ERNST: And also it would be nice to see, but I have not either.

(Laughter.)

I think the current schedule for some kind of an interim paper is in the order of the fall or some time.

MR. OKRENT: Is there an INREP guide as to what will be included in it?

MR. ERNST: There has been a draft of an INREP guide, which we have reviewed. Again, it is anticipated to have a draft guide out on the street by toward the end of this fiscal year or early next fiscal year.

MR. MATTSON: I do not think you should attach any connection between the way this is being decoupled from the safety goals. There is nothing nefarious afoot. It was decided it would really complicate the safety goal to try to get an INREP decision in there. It would also complicate 82-1A to get an INREP decision in there. Besides, they were being slow in their specifications anyhow. So they have just been decoupled.

MR. SIESS: The INREP guide you mentioned, is that the guide that came out in a loose-leaf form for some meeting you were having?

MR. MATTSON: No.

MR. SIESS: What was that?

MR. OKRENT: That was an IREP -- I am sorry, IEEE.

MR. SIESS: No; I have a big blue reg.

MR. BERNERO: There is a two-volume NUREG/CR-2300 entitled "PRA Procedures Guide." It came out under the IEEE NAS forum.

MR. SIESS: No; I got a blue thing. It is one volume. It has the holes punched in it. And it was issued for comment prior to the second meeting on INREP.

MR. BERNERO: NUREG-2300.

MR. SIESS: You said two volumes.

MR. BERNERO: You could fit it into one big

binder, but it actually came in two parts. There is also a NUREG/CR called the "IREP Procedures Guide," if you were going to do another IREP, here is how you should do it. And then there is what Mel is talking about, the INREP Procedures Guide, which would synthesize from those, what prescription for an INREP PRA there should be. There were three different things there.

MR. OKRENT: Let us see, while we ae on the subject, let me issue a request that when it is practical we get a copy of a draft "INREP Procedures Guide," and also what your plan is for INREP in time so that if the committee wants to make comments, it can before you have made perpetual plans.

MR. SIESS: Before you cast it in concrete.

MR. ERNST: Yes. Clearly, the first step in our procedures is to get through CRGR and then after that --

MR. SIESS: After that, the ACRS is easy.

MR. OKRENT: And while I am asking, I was just wondering, have we gotten from the Staff copies of all of the documents they had received with regard to --

MR. BERNERO: It is my understanding you are separately getting from international programs copies we are getting; that is, the preconstruction safety report,

the design report, the statement of of case, the nuclear inspector. There is a whole catalog of things.

MR. OKRENT: Would it be fair for me to ask that you check with Dr. Griesmeyer to see if what you have is what we have?

MR. BERNERO: All right.

MR. OKRENT: And if not, we can get copies from you.

MR. BERNERO: The only thing we are lacking now is the main PRA analysis and two peripheral reports.

MR. OKRENT: The Westinghouse report?

MR. BERNERO: Yes. It is not in yet. I was assured this morning it is on the track or something.

MR. OKRENT: Maybe you could check with Dr. Griesmeyer this week.

MR. ERNST: The first question under "Other Specific Issues," I think it has probably been answered during the day, but clearly, Staff already has CRGR and its guidance of the implementation plan. Neither the implementation plan or the safety goal imposes new requirements or new processes. I think that is the simple answer.

Item 5 on page 7 -- oh, that is the 10^{-5} sequence discussion. I read item 5 on page 7, and I do not see -- maybe I need more explanation of how that

might prejudge the outcome. I think it might establish some general ground rules for considering severe accident. But since basically, severe accident is -- at least one part of it is -- aimed at standardized plants, the 10^-5 sequence, it would not apply to that.

MR. OKRENT: Let me see, let me try to reconstruct what could be intended by the question. On page 7 it says: "The ALARA principle will be followed for any future additional risk reduction measures considered for new plants; however, further risk-reduction design measures beyond those already approved will not be required for operating plants if there is reasonable confidence the design objectives have been met."

Now, let us leave the rest of it aside. Then let us reread the question. Does item 5 prejudge the outcome of any severe-accident rulemaking? Might there not be a defense-in-depth basis for a philosophical decision that operating licenses should include containment as practical and not too cost-ineffective, considering all of the uncertainties even if the design objectives have been met, particularly when they are to be met by median values of an incomplete PRA.

Does that make sense now?

MR. ERNST: I should let Roger answer, because

you have two parts: the OR operating reactors and the standardized plants. But I think an overlay on this thing is I do not think the safety goal should preempt anything. It is again another consideration.

MR. BERNERO: Yes. Perhaps if I use an illustrative example of what we would expect as a possible, not necessarily the outcome, but a possible outcome of severe-accident considerations. Laying out generic PRAs -- that is, surrogate plant PRAs -- suitably analyzed to be reasonable surrogates for classes of plants, you could look at large dry containments and numerically calculate that you are below safety-goal levels; in other words, that the plant is safe enough.

Then the Staff might look at that display and say, when I calculate the cost-effectivenss of the filtered-vent containment system, I come out below the line, not far below the line, but below the line, acceptable; however, I have substantial uncertainty in the following areas, and enumerate some of the common-cause failures that haunt us, such as sabotage, seismic, wind, and they have the characteristic of substantially increasing the likelihood of slow overpressure failure of containment for which a filtered-vent containment system has unique benefit.

The Staff in those circumstances might conclude, and recommend to the Commission as part of a severe-accident rule, that in order to deal with the demonstrated value of this containment system or containment system addition and its potential of reducing other events for which we do not have good analyses, do not have good probabilities, that we recommend that as a matter of rule or policy we incorporate this feature in all such containments.

MR. OKRENT: And you would say that what you have just indicated, it would not be in contradiction to the first two sentences on paragraph 5?

MR. BERNERO: No. I think if you go back there it used the expressions "uncertainties and other factors" -- I cannot remember the words.

MR. OKRENT: It says, "However, further risk-reduction design measures beyond those already improved will not be required for operating plants if there is reasonable confidence the design objectives have been met."

MR. BERNERO: Yes. "Reasonable confidence." If one says, I was reasonably confident of this simple numerical calculation, I would go home happy.

MR. MATTSON: There is an inverse to that. And that is, the plant that does not meet the safety

goal, like a lot will not on first blush, what 82-1A says is there are not any big-ticket items for making plants come into conformance with safety goals.

There are design or operational nuances that can bring them into conformance. You see that happening in the Indian Point decision making by the Staff today. It comes in in excess of 10^{-4}. What are the reasons it comes in in excess? Well, maybe the dirt is not plowed the right way outside of containment.

Maybe it ought to meet Appendix R a little faster, and lo and behold, it meets the safety goal. Well, that costs them money. That costs several millions dollars, let us say. Was it right to have spent the money in prevention fixes of that sort, presuming that the PRA was complete and you really knew all of the things you needed to do to come into true conformance with the safety goal?

Or would it be a better judgment to say, gee, those are some examples, I bet there are some others I have not thought of; I will spend that money on a filtered vent because they all seem to be sources of slow overpressure vessel failure in the containment.

Those are harder choices to make. It is human nature to jump to the quick fix and presume it is complete. I do not know how the implementation plan is.

MR. OKRENT: Are there other questions for Mr. Ernst on the draft action plan for implementation at this time?

(No response.)

MR. OKRENT: I guess not. We have two alternatives now. We are supposed to meet for what I hope is not too long with some representatives from the Staff. But I would propose we do that at the end of the day. Whenever we do, it would be in closed session. We did not go through the entire list of questions with Roger. We could do that, though in principle tomorrow we meet with the full committee.

MR. MATTSON: It would be a lot easier to do today because a number of these things have already been talked about. And to make the record complete, we could just refer to where they have been talked about otherwise. The whole thing on the containment criterion, I think we have already answered.

MR. OKRENT: Would you like to try to go through these quickly today?

MR. MATTSON: I would.

MR. OKRENT: Let us start and see how the subcommittee bears up.

MR. MATTSON: I am referring to your Fraley-to-Dircks memorandum of August 26, 1982. It is

four pages long and has 15 questions on it.

MR. OKRENT: And I guess you inherited a view from someone else's?

MR. MATTSON: I do have those marked. If you remember when we get there, I will go through those.

MR. OKRENT: All right.

MR. MATTSON: You say we are drawing important conclusions as to the existing level of risk compared to some set of assumed safety goals. And then you say we are drawing conclusions, important conclusions, about the efficacy of existing containments and the benefit-cost efficacy of various possible design improvements. Then you go on to ask is there a detailed backup and so forth. Let me break it into two pieces.

We are trying to draw a planning conclusion, not a final conclusion, but a planning conclusion, about the existing level of risk. Now, there are probably a lot of ways to state that. Let me try to paraphrase in a little less formal language what I think we are saying in 82-1A.

We are saying, insofar as we know how to do generically today operating reactors are safe enough pending the outcome of further research on severe accidents. Given what we know today, we do not know anything to require generically of operating reactors

for accidents beyond the design basis.

Now, in individual PRAs, like Indian Point, we may find things we may want them to do. But generically, in the severe-accident rulemaking context, they are as safe as we know how to make them -- I am sorry, they are as safe as they need to be today, given our understanding of the current technology. That is a planning assumption. That is how we will conduct ourselves for the next 2 years while we go about assimilating information from individual PRAs, individual licensing actions, and several large programs, one IDCOR and the other our own research program.

It is a planning conclusion, not a final conclusion. We say over and over it is not a final conclusion. We once contemplated making it a final conclusion, and everyone said, and we agreed, you cannot make it a final conclusion yet, you have not written a technical basis for it. The research is not in. And that is true. So it is not a final conclusion.

MR. OKRENT: Is it a planning assumption or a tentative conclusion? Those are not the same to me.

MR. MATTSON: They are the same to me. Which would you rather call it?

MR. OKRENT: As it is worded, it sounds like a

tentative conclusion. If you said, this is a planning assumption --

MR. MATTSON: I am willing to call it a planning assumption if those are better words for you.

MR. BERNERO: A prognosis?

MR. SIESS: A hope?

MR. MATTSON: That is more like "tentative conclusion" to me. That is a little stronger. A planning assumption is what I mean by it.

MR. OKRENT: Well, I guess, in fact, our experience has been that each time a PRA is done, more often than not we find something that tends to go against the conclusion in the sense that there are things that are important enough to be fixed.

MR. MATTSON: Not generically. On that plant.

MR. OKRENT: I do not know what this term "not generically" means. Yes, "on that plant," but it is only individual plants that cause risk. It is not generic plants that are unreal.

MR. MATTSON: My statement is wrong. There are some times generic implications for these things.

MR. OKRENT: There are generic implications for many individual plant findings.

But I will repeat, each time we look at a plant there are some things, in fact, usually there are

some things fixed in the process of doing the PRA. I wonder if there have been any PRAs that do not fall in that category. And then there are some things you want to look at hard in addition to the things included in the PRA which are unresolved issues; they are issues but labeled "unresolved."

I myself do not know how the Staff can arrive at any I will use the term "quantitative judgment" on risk. I think the Staff and the committee have been saying we think these plants can be operated without undue risks to the public, whatever that means. But we are moving into a somewhat different era, and you are making statements now not in the old context, it seems to me, but in a new context, and I guess I find that these are, in fact, really strong tentative conclusions.

Some of them have already been put in a bit of disarray, like whether or not when you include external events, some features are useful. For example, there is an implication here that for large containments filter vents are not very useful. For external events they may be, and in some other events they may be.

So I must say I have a rather strong problem, speaking only for myself, with the way this thing is worded and the tentative conclusion drawn here.

If I understand your words, you wouldn't disagree with a planning assumption that says for now there is no undue risk to public health and safety by not making decisions on severe accident measures until more information is available.

MR. OKRENT: I guess the Commission has proposed the schedule, which I think, if they were to follow through, might lead to decisionmaking in '84, maybe early '84. If in fact they are going to act on that kind of time scale, I would myself say that seems to be an acceptable time scale in which to do it.

But in reading 82-1A, there is a suggestion that upgrading the plants might not be looked at in this context.

MR. MATTSON: How can you? Where?

MR. OKRENT: Where do you get the flavor of that, operating plants would be looked at and a decision will be made? The flavor I get is that they are all okay.

MR. OKRENT: Maybe it is a misreading.

MR. MATTSON: That is the intent of the words in section 7, beginning on page 12, entitled "Further Research on Accidents." As you go along, it is supposed to lay out a decisionmaking process based upon the research on severe accidents coupled to the things that

come in from IDCOR, giving some prognosis about how we think they are going to go, and then alluding to a final regulatory decision on severe accidents targeted for early 1984.

That's final decisions on operating reactors. It doesn't say "operating reactors," I will grant you. "The Commission has considered the question of whether an additional regulation should be issued at this time to require more capability to mitigate the consequences of severe accidents in operating reactors and plants under construction. Although there are large programs presently ongoing which will provide information related to this question. They have not yet produced significant insight."

MR. SPEIS: What page is that?

MR. MATTSON: That is on page 17.

MR. SPEIS: The last paragraph there.

MR. BENDER: Is IDCOR doing everything that needs to be done?

MR. MATTSON: No, I don't believe so. They are not doing any experiments or any fundamental model development.

MR. BENDER: If I read that literally, they are doing what needs to be done.

MR. MATTSON: They are doing what they think

needs to be done in their judgment.

MR. BENDER: What about your judgment? When will you make a decision about what else should be done?

MR. MATTSON: We promise in this policy statement early '84.

MR. BENDER: And thereafter what happens?

MR. MATTSON: In the research program?

MR. BENDER: In '84 you are going to decide what else needs to be done?

MR. MATTSON: Yes.

MR. BENDER: And then what happens?

MR. MATTSON: Here we go, at the bottom of page 20.

MR. BENDER: I don't have it.

MR. MATTSON: I'm sorry, let me come back to your question. The Commission will conduct an annual review. It goes on to say, the Commission expects to conduct its annual review twice, the first in the spring of '82, the second one year later, finally resolving this matter for operating plants and plants under construction by mid-1984.

Now, your question was, where does it say we are going to decide the issue for operating plants, and my answer is right there.

MR. OKRENT: Yes, but the flavor of the thing, the whole flavor is that you have a basis for concluding for the operating plants that there may be no need, or at the moment you see no need for improvement. And by mid-1984 you will not have good PRA's on most of the operating plants.

So I am not sure on what basis you will know in fact what the risk level will be for the operating plants. I don't know how well you will have evaluated containment performance for some of the operating plants. You may be in the early round of looking at that by then, and --

MR. MATTSON: Your statements aren't right.

MR. OKRENT: Correct me.

MR. MATTSON: I will have better and better PRA's. Indian Point and Zion are better than those that preceded them.

MR. OKRENT: I said you won't have them for most of the operating plants.

MR. MATTSON: But I will have them for representative operating plants. There are representative plants in the research program. There are representative plants in the IDCOR program. There are other plants that are doing PRA's as part of the industry-sponsored work outside of IDCOR. And I will

have better, not the best ever, but better PRA's in 1984 than I do today, and I will have research results of a specified nature.

MR. OKRENT: Let's look at what you will have by 1984 if you follow your own plan, if and when you get the INREP plan going.

MR. MATTSON: I won't have anything from INREP in '84. This counts on nothing from INREP.

MR. OKRENT: Well, I must say I would be reluctant to assume that the PRA's that have been done assess the risks for all of the individual plants or that you haven't -- you will not have fallen into, not an identical but a similar problem to that which WASH-1400 did when --

MR. MATTSON: My knowledge will be incomplete in '84, but it will be better than today. And if I put the right things in the research program to anticipate that industry will leave things out, like they did at Indian Point, Zion, and other plants before them, I can influence how well I fill in those gaps in knowledge between now and '84.

But none of us expect it to be a perfect state of knowledge. But the goal is to have a sufficient state of knowledge to make final decisions on severe accident measures. That is the drum we are trying to

beat to get everybody marching to the same step. Here is the goal, here is the time you are supposed to finish your program. Tell us what the answer is. Whatever you need to know between now and then, tell us now so we can spend the money to get it.

Those of you who review what we think we need to know by then, what have we left out. That is all this is trying to say. Schedule a time for making a decision.

People said in the first version we left out operating reactors, so we said, all right, we will address it, we will do operating reactors. Here's the process, here's the schedule. We'll couple it to the research program by specifying the questions for which there are no answers, that we need answers to by '84.

MR. OKRENT: The bulk of the research program hasn't changed, unless it's in this latest draft report. We have not yet received the latest report that was mentioned on severe accidents.

I don't want to belabor this any more. Maybe Mr. Bender will.

MR. BENDER: Can I pursue the point I was trying to make earlier?

MR. MATTSON: Please.

MR. BENDER: In 1984 you will have the IDCOR

information.

MR. MATTSON: '83, actually.

MR. BENDER: Well, whenever. And at that time you will do what, decide whether there is additional experimental work to be done?

MR. MATTSON: No.

MR. BASSETT: If I could respond to that, the IDCOR report will be in in less than a year from now, next July.

MR. MATTSON: The idea is, the IDCOR program and our research program will be measuring how safe are our existing plants. They will also be looking at ways to increase the safety, given an understanding of what the dominant contributors of risk are for the various classes of plant -- how would you fix the dominant contributor in this class, that class, and the other class.

They are also looking at the cost of those things. Simultaneously, the Commission is moving forward with a safety goal. Somehow they are going to tell us, how safe must they be.

MR. BENDER: Hold off for a moment. Let's just stop with what IDCOR is doing and what you are. I asked the question earlier. Maybe you didn't respond the way you intended to. You said you weren't sure that

IDCOR was doing all that needed to be done and you wouldn't know until they got done what else you needed them to do.

MR. MATTSON: Let me try to put more meat on those bones.

MR. BENDER: All right.

MR. MATTSON: We meet with IDCOR. We meet with them every couple of months at a management level for coordinating the programs. We are meeting with them in technical forums to discuss technical areas of mutual interest.

IDCOR has a very simple approach. They take four typical reactors and they look at the risk from those four reactors, and I don't know whether they look for alternative ways to reduce those risks or not.

MR. BERNERO: They claim they will. They haven't yet.

MR. MATTSON: That's essentially the same approach we will be taking in the research program between now and '84.

MR. BENDER: The PRA part of the research program.

MR. MATTSON: Yes. Well, but the PRA part of the research program is the funnel into which all information flows. If the PRA people say, I am

uncertain about how the debris bed is cooled or how the hydrogen burn affects containment or how penetrations fail or about how radionuclides move and those are important uncertainties that have to be removed before I can make any decision on the basis of this PRA, then elsewhere in the research program they put that item in.

MR. BENDER: All right. I am with you so far.

MR. MATTSON: IDCOR isn't sponsoring any basic research. They are going with today's understanding of debris bed coolability, containment response, gas explosions, whatever, and attempting to do the analysis, with whatever uncertainty that yields, to say what the current state of risk is from four typical plants, typical of all operating plants.

Now, I may have overstated something earlier when I said they are going with a predilection that current safety levels can be justified. I don't mean to imply that if they show through legitimate analysis that there are problems of a specific nature that they won't bring them forward. Of course they will. But I would be more inclined to think that the IDCOR program will show what they think is an acceptable level of safety in existing plants.

MR. BENDER: Now, your program complements that program?

MR. BERNERO: To a very great extent, we are in parallel. We are doing more. We are spending more money. We have more resources in our program. We do have substantial physical research to validate, if you can use that term, to validate the risk codes. We are looking at all of the PRA's, and in particular we have started out with the reactor safety study and the four risk plants. We started out with six plants.

MR. MATTSON: But he has big things in there of a fundamental nature, like source term, the whole source term program between now and '84.

MR. BERNERO: Just as one example, the IDCOR program, because of a shortage of resources, chose to develop an alternate code to MARCH, but not an alternate to MATADOR. They are just waiting for MATADOR to use it along with their MAP code, which is an alternate of the MARCH code.

MR. BENDER: That's okay. I am just trying to get some kind of logic into this thing without going into a lot of details.

MR. BERNERO: Okay.

MR. BENDER: Given the two programs parallel each other and probably complement each other to some

degree, they will come together at some point, which right now is the end of next year or --

MR. BERNERO: The end of next year.

MR. BENDER: And you will be prepared to make some decisions at that time.

MR. BERNERO: Yes.

MR. MATTSON: We will then proceed to -- let me think out loud -- write a report that says, IDCOR tells us that the risk is X and that ways to reduce that risk are A, B and C, and their costs are so much per alternative, and recommendations are. Our own research tells us that the risk is, and ways to reduce that risk are, and their costs are.

In parallel there is a safety goal that tells us where our aiming point should be.

MR. BENDER: Okay.

MR. MATTSON: Based on that, we will either recommend a policy statement or rule for Commission action to either require change of the regulatory requirements or endorse the status quo as adequate for severe accidents.

MR. BENDER: How much is this work dependent upon knowing the way in which the core melts penetrate the containment, knowing the way in which debris beds have to be cooled, knowing the rate at which the core

melt penetrates the support structure, knowing the way in which the containments themselves may fail? How much of that goes into this probabilistic analysis and how much of it do you have to have in order to come to these conclusions you are talking about?

MR. MATTSON: The amount we need is in NUREG-0800 item by item. As far as we have been able to specify them today, that's the very question I said earlier needs more attention, to make sure we're not going too far in some areas and not far enough in other areas.

MR. BENDER: And you are going to make that judgment probabilistically or deterministically or some combination thereof?

MR. MATTSON: About how far we go in each area?

MR. BENDER: Yes, whether you are doing the right work at the right pace to get the right answer.

MR. MATTSON: That's very judgmental, because we have long arduous arguments over why are you spending all this money in the vessel, why don't you spend more money on the floor, with this molten core, the same kind of discussion you've had.

MR. BENDER: I don't have any question like that. I want to know why you're spending the money,

period.

MR. BERNERO: If you wished, you could go back to the models we had in WASH-1400 and just make all of the decisions, using those models without improvement. The ACRS for one -- Dr. Kerr is now absent -- participated heavily in the critique of the MARCH code. The first version of it was more or less what was used in WASH-1400.

You are going to have flawed judgments, flawed conclusions, if you take that crude model, that first attempt. We are trying to draw a program up and conduct a program that gets us to a reasonable level of development with which to make sound decisions.

MR. BENDER: I'm trying to discover in my own mind why the experiments you are performing will sharpen up the MARCH code enough to give you this superior confidence that you seem to be displaying.

MR. BERNERO: What does the MARCH code describe? It describes how cores heat up, melt, slump, react in the bottom of the vessel.

MR. MATTSON: I don't understand "superior confidence." All we are saying is we will have looked at a representative sample of plants by '84. We can't say we've done that today.

MR. BENDER: I'm trying to relate it to the

experimental work you've got under way.

MR. MATTSON: The experimental work will be that work necessary to do to look at a representative sample of plants to remove what we see today to be the disabling uncertainty in those analyses.

MR. BENDER: I hear the words, but I'm not sure I'm comfortable with the term "that work," because I'm not sure that you know what "that work" is.

MR. BASSETT: We're not certain either, but it is the truth. So if we're going to predict performance by code, it's nice to know what the performance is so we can check it.

MR. BENDER: If the word were definitive enough and you spent enough money at the right pace, you might come up with the right answer. But I would put a number of qualifications on whether you can do it or not.

MR. MATTSON: And you will probably come to us in two years and tell us you were right.

MR. BENDER: You need to judge those things when you are presenting a program, and I haven't heard much judgment about it up to now. That is about the end of my speech.

MR. MATTSON: Where were we?

MR. OKRENT: Well, we were on one.

MR. SIESS: I thought we at least got to two, didn't we?

MR. MATTSON: The second part of one was whether we are making decisions about the efficacy of possible design improvements. We didn't intend to. We may have overstated on PWR's the case against filtered vents and perhaps a modification of that is in order.

You also imply we are making some decisions without a technical basis. We will try to pull together a summary status report on what technical basis we have for today's understanding of possible design improvements. Just to list where some of that information is, NUREG-0850 of course had a fair amount, but it will be uplated in testimony by the staff in the Indian Point hearing, the Sandia reports that NRC has paid for looking at filtered vents, for example, other recent contractor reports. There are some from UCLA looking at the question of venting as a useful tool for seismic melt.

We will try to pull together in one place some statement of what our basis is. But I think you have to understand, we didn't draw any conclusions in 82-1A about any of these things. We said all of them that we addressed had to be considered in new standard plant applications and all of them will be considered by the

staff in its addressing of design possibilities for operating reactors.

MR. OKRENT: I guess Dr. Kerr and I both got the wrong impression when we read 82-1A.

MR. MATTSON: I don't know how you could draw the wrong conclusion on that, because on every one of them it says it shall be considered. There isn't any room for that. These preliminary conclusions need to be addressed and final conclusions reached for new design before they are applied to future plants, should be examined for future CP applications, hydrogen control systems, reliable containment heat removal. The cost effectiveness of this alternative should be considered in the design of plants for new CP's.

MR. OKRENT: In any event, it seems to me it is relevant for the staff to devote some effort to trying to develop a technical backup position as they think they can today or certainly by the time you have the IDCOR report in hand, and also to know where in your opinion there are weaknesses in this position, what the uncertainties are. If we don't know that, we will be ill prepared to review what the industry submits.

MR. MATTSON: But that is exactly what is in the research program.

MR. BERNERO: That is going on, and some of

the ACRS staff has had the opportunity to participate in some of the meetings. And you were in Chicago, I believe. You have heard some of the results.

We are marking up the decision process of next year this year. We are trying to go through in order to make these decisions: What information and with what gaps in it are we going to face?

MR. MATTSON: Would that be the first opportunity for an ACRS Subcommittee to review the progress toward that decision by both IDCOR and the research program?

MR. OKRENT: Let me say again to some people, maybe I should put it that way. When they read SECY-82-1A and similarly when they read what the staff has prepared for the Committee on the safety of nuclear installations, there is a flavor of a conclusion rather than a planning assumption.

I am saying, if you have tentative conclusions you should be able to document them. Now, if you're not prepared to make those conclusions you should make sure it's not readable that way. Let me leave it that way.

MR. MATTSON: All right, we accept that criticism. But in defense, I will encourage you to note that the planning assumption, as I guess I would prefer to call it today, is in the Commission paper as a policy

discussion pursuant to the issuance of a policy statement.

It isn't in the policy statement. The policy statement is, given that planning assumption, how do we comport ourselves in the management of this research program, the management of the hearing process, the management of the standardization approaches for the next two years while we are holding on this decision.

MR. OKRENT: Let's see. I think we better set a target that by 8:00 o'clock by hook or crook we will close the meeting, if not before.

MR. MATTSON: The second question goes to the point of, there are large uncertainties.

MR. OKRENT: Excuse me. "Close" means we will go into closed session.

By the way, I think with regard to the meeting with Kelber, which has to be in closed session, many of the things of particular interest relate directly to what is in SECY 82-1A.

Go ahead.

MR. MATTSON: You talk in question 2 about the large uncertainties in PRA on the one hand, but the quantitative conclusions about the level of risk or the efficacy of improvement for plants on the other hand. How is there a dichotomy between these two positions?

Even in the face of uncertainty, my answer is, one must adopt certain planning assumptions and that is what we intended them to be.

MR. OKRENT: We have a new term. Go ahead.

MR. MATTSON: Item three. The staff appears to have concluded that the risk is not only compatible, but only modest, if any changes are likely to be needed for future LWR's. The Europeans have done something different than that.

I guess the best examples are the greater AC capability in filtered vented containment systems and more ECCS trains and sabotage protection and so forth. We could get into a debate about whether or not the backfit of filtered vented containment systems or gas turbines or bunkered ECCS are major or minor changes.

MR. OKRENT: Did you say a bunker dedicated shutdown system was modest?

MR. MATTSON: It's a modest change in the sense that it costs a lot of money, but is it a fundamental change to the basic design of the plant? No. It's using the same technology we have today and adding another one, making it harder to have access to. It is a significant change in terms of monetary value of the thing, but is it a significant change in the fundamental design concept? No.

MR. OKRENT: I suspect the same words mean different things to you and some other readers.

MR. MATTSON: They must.

MR. OKRENT: I must say, I have to assume, based upon what I've read about the possible cost of such a system, as well as thinking about some of the problems with building it, connecting it up, and so forth, that it would not be a modest thing to add to an operating reactor.

MR. MATTSON: In terms of costs and difficulty of adding it, absolutely it would not be. I think that is the reluctance to doing it.

MR. OKRENT: A moment ago you said you would classify that in the modest area, I thought, because it didn't imply some fundamental new technology.

MR. MATTSON: Right. So we are using the term "modest" differently. Let's presume I showed a need for such a thing. Is that a fundamental change in the reactor today? I don't think it is.

MR. OKRENT: Okay.

MR. MATTSON: It's a big ticket item in terms of costs.

You imply in this question we've made decisions. We haven't made decisions. That is the difference between a planning assumption and a decision,

I guess.

MR. OKRENT: By the way, do you expect that whatever decision you recommend to the Commission in 1984 following this schedule that is listed here, that you will include in this decisionmaking some discussion of what other countries are doing, an evaluation of it?

MR. MATTSON: I don't think we should wait until 1984. I think your questions today are very germane. We must understand better what they are doing and why they are doing it. There is no excuse for waiting.

MR. OKRENT: I have something from Dr. Minogue telling me you were already up to date on all of this.

MR. MATTSON: I don't know. Dr. Ross has been in to see us. Dr. Speis is going with him to another one.

MR. BERNERO: Much more is being done.

MR. MATTSON: We are learning more. I don't think anyone has told you we know enough here. There's something going on. We need to find out more about it. If several countries in Europe choose to make LER's -- on the last sentence on question 3, if they have a basis that we're cognizant of, it's obvious we need to find out what it is. It may have implications in our planning decisions and we may have missed something.

MR. BENDER: Let me ask about one specific country. The British have announced what they are doing in the press, or at least Mr. Marshall has written a couple of reports on it, and I have been trying to make up my own mind over whether what they are proposing to do represents a substantially different position than the United States has with regard to the safety of water-cooled power reactors.

Does the NRC staff have a position on British, the state of British improvements?

Speaking for myself, I haven't seen them.

MR. BENDER: You are aware of them.

MR. BERNERO: We are not completely aware of them. We are just receiving the last of the documents which explain the differences they have, and in general they have three areas of differences in requirements. Basically, they are talking about a U.S. plant that is not yet licensed and what modifications they would have in order to use it in Britain.

MR. BENDER: They are referring it to SNUPPS. That is a licensed plant.

MR. BERNERO: Yes, it is a modified SNUPPS, and they make changes, A, because they did a PRA and did show that to meet their safety goal they should make it more reliable in some respect or another, and that is consistent with what 821A says we want to do in future plants here, to have PRA as part of the design refinement process.

Secondly, they have some changes they have done apparently for engineering judgment reasons, like improving the accumulator capacity for LOCA response. Thirdly, they have changes related to industrial practice, welding codes, concrete, things like that. We are trying to go through the documentation. They have to understand what they have changed and what

specifics. It is not so simple as the safety goal alone.

MR. BENDER: Who is doing that?

MR. BERNERO: We are trying to organize that right now. We are just getting the documents in. It is just not completely planned yet.

MR. BENDER: Am I incorrect in believing that we could get the same information about what the French are doing?

MR. BERNERO: Not so well documented and so thoroughly on a U.S. plant, which is a beautiful opportunity.

MR. BENDER: And how about the new concepts that GE is developing with the Japanese and Westinghouse is developing with the Japanese? Do we have access to those?

MR. MATTONS: Westinghouse, yes. I guess I am not certain about General Electric.

MR. KELBER: May I comment on that? We did have a meeting with General Electric to review the proprietary safety research that they are doing, and at our request asked them if there was any work on the advanced plant. At that time they told us -- while they didn't go through the general features of the plant, they told us they did not consider any of the design

features they were studying then to have significant new safety implications, and I must say from what they said I think that that statement was probably correct.

MR. MATTSON: But I don't understand something, Charlie. In the case of Westinghouse, their advanced design is partly theirs and partly the Japanese. It is being done in concert. So I know when we see Westinghouse we see Mitsubishi. In the case of General Electric, is GESSAR II, the 238 nuclear island that we have under review, the same plant that they are developing with the Japanese?

MR. KELBER: There are, I believe, some changes, but I think from just a cursory review that was given to us that they are probably correct, they do not have major safety implications.

MR. BENDER: It wouldn't have hurt if Mr. Minogue had answered the question somewhat that way instead of sending us a litany of contacts that had been made between the NRC and other countries, because it was irrelevant to the question.

MR. MATTSON: I guess I haven't seen the question or the response. But in my judgment, we need to do more to understand these things that are going on, and we will.

If I understand Question 4 in 821A, it says

that external events have to be considered for these future design approvals, and the rulemaking is substituted for the generic rulemaking.

MR. OKRENT: How about for the operating plants?

MR. MATTSON: I don't see how we can respond that it is not being factored into the research program, given all of the things.

MR. BERNERO: I just a little while ago postulated a scenario. I don't guarantee that is the outcome, but that is the mechanism by which we intend to treat it in the operating plant assessment.

MR. MATTSON: That also is the source of our looking again at Page 24 of 821A, wherein we had a statement. I will try to read slower. For dry containments, other studies indicate these filtered vented containment systems may be of value. I am sorry, I misread it. The implication here is that filtered vent is of more interest to us for pressure suppression containments than for large dry, and you can read in here a dismissing of further study. We should not have said that. We didn't intend it in the first place. But factoring in the seismic thing, one might change it to read, some recent information indicates these systems may not be cost effective for large dry containments.

That would be our input into the Indian Point hearing ourselves. While other studies indicate that they may be of value if the risk is dominated by large seismic events or for some pressure suppression containments.

MR. OKRENT: In the French case, where I believe they have in mind going this route, I think part of the logic and maybe an important part relates to this question of societal resources as much, if not more than health effects, because it is with the assumption that these are slow pressure buildups compared to ours, which in general means that you have a reasonable chance of doing a good job on evacuation unless you live in an area where the wind is always changing and there is no way of predicting.

So, the contamination question is, I think, stated, and the Swedes also state that, but I don't find that thought at all here.

MR. MATTSON: I would respond that that is kind of a detail. If I turn to my colleague and ask him in looking at the cost benefit of design modifications, and the research program for the '84 decisions, do we include land contamination?

MR. BERNERO: Yes, we have even told the Commission, recognizing that the present draft of the Commission's safety policy statement doesn't include

those terms of the equation. We have gone out of our way to tell the Commission we are nevertheless calculating those terms and displaying them as available for the cost benefit analysis, because they can change the outcome dramatically.

MR. MATTSON: The next question goes to the point of sabotage.

MR. OKRENT: As an example.

MR. MATTSON: Let me talk about sabotage for a moment, and see if we can generalize it. 821A doesn't speak to sabotage for operating plants. 821A does speak to sabotage for new design, and it requires that in proposing a new design, the applicant must show how he has considered sabotage in the design, and we will review it and do the right thing, is the best I can offer.

MR. OKRENT: This is raised as an example for new plants. If you talk about design it seems to me it is hard to change an existing plant with regard to sabotage except for some very specific issues. If you are going to wait for the designer to come in with this document and at that point try to review it from the point of view of design for sabotage, and you are going to try to complete this process in two years, and if you have some thoughts different from what he has done which

involve modifications of design approaches and have a fair shot of looking at it.

MR. MATTSON: I wish we were so smart that we had an organization that had people set aside to do that. We don't have any thoughts on design for sabotage other than the studies Michaelson did at Sandia years ago. The staff hasn't since then looked at design measures for sabotage.

MR. OKRENT: Michaelson didn't do them. I think he looked at them.

MR. MATTSON: He was part of the advisory group that oversaw them. I am sorry.

MR. OKRENT: In fact, there needs to be better communication within the staff, because other parts of the staff have told us that they think there may be almost enough information to develop a proposed rule or a standard.

MR. BERNERO: You are talking about the safeguards people?

MR. OKRENT: Mr. Goller told the subcommittee this once. But the point I want to make is the following. If you are going to really think about sabotage in design, you can't think about it in isolation. In fact, it could be affected by whether you use a two-train or a three-train or a four-train

system. It might influence that decision, as just one example.

It also obviously impacts on certain things that affect your flexibility in operation, what the operator can do, and so forth. I can't see how in a meaningful way the staff would address it if it waits until it has a proposal in hand. It in effect means you have to take whatever is presented to you or reject the whole thing, if I understand the nature of the problem. Even on the question of a dedicated bunker shutdown, if you are really serious about it, you don't add it after people come to you and they have done their drawings of the plant and say, oh, by the way.

MR. MATTSON: Not all of the future looking designs will be of the sort you describe. You are describing the sort where we are in with General Electric, who have taken the position that with small change their current design meets these current concerns, and they will be attempting to justify that.

In the case of Westinghouse, it is different. They are coming in with a full year of meetings and a long agenda with questions to consider. What do they think? What do we think? What can we mutually agree should be factored into the design, with a PDA submission not occurring until 1984. That is what

starts this next week, this year-long series of meetings on an identified agenda of issues to get our thinking in before the design is undertaken.

MR. OKRENT: The point I am trying to make is, I find it hard to see how the review of the FDA, unless somehow you are lucky, the Westinghouse one, you can get approaches developed to questions like sabotage and some others in anything that resembles an orderly way, orderly in the sense of factoring things together in an integrated way and trying to not do things that hurt what you are trying to help and so forth and so on.

It seems to me it is a fundamental question concerning the approach proposed in 82-1A, which is to wait until you have individual proposals and try to do the decision-making in terms of it's attractive to try to look at what you call real reactors. I can understand the appeal of that, but I wonder if you can do that instead of making some policy decision. I wonder if it is not some kind of a combination that you really need where there are certain things which are developed by policy and certain things that are in terms of real reactors. Is my concern clear?

MR. MATTSON: Your concern is clear. I don't know how to do it.

MR. BERNERO: If we could go to what we are

talking about on the existing plants, where one would have a risk analysis brought up to date on an existing plant and for virtually every existing plant today there is a fault tree based vital area study which is some measure of its safeguards vulnerability in a complex way, and what you suggest is something perhaps by way of tradeoff studies, what combinations and permutations of systems, systems arrangements, and compartmentalization would optimize both the safeguardability of the plant and the safety of the plant in the conventional sense.

MR. OKRENT: And the reliability.

MR. BERNERO: Yes. It is a very complicated thing. I can understand how to do it conceptually, but I think it would take a very long time, and be very hard to do. It would be to design the optimum plant, or what we would best identify as the optimum plant.

MR. MATTSON: You asked, are there other design aspects related to prevention or mitigation of severe core damage that have the potential for being difficult to deal with at the CP stage. Well, any that depend upon final design details. Most of the people that talk about this standardization rulemaking consideration of severe accidents are talking about advanced design details. Certainly GESSAR II is of that sort.

Westinghouse has proposed a two-step process with a PDA and an FDA for their new design, but in discussions with them, I think we understand that that might all kind of flow together as the design is finalized, because if their concept works correctly they will be moving quickly towards final design detail. Most of the scope is within that proposal. Most of the plants are within the scope of that proposal. So our traditional understanding of the CP level of detail may not be the right understanding in this case. CESSAR, of course, is already at final design.

Question 6.

MR. BENDER: Excuse me, Roger. The fact that CESSAR and GESSAR are both designs which, as I understand it, are not developed through the balance of the plant stage, I have to question whether they present the whole picture.

MR. SIESS: Which ones did you say?

MR. BENDER: CESSAR and GESSAR.

MR. SIESS: GESSAR is a nuclear island.

MR. BENDER: It is a nuclear island, but it is pretty restricted in what it covers.

MR. MATTSON: GE is convinced they can do it. We are committed to reviewing their attempt. There are differing opinions about whether you can write suitable

risk type interface criteria between a nuclear island and the rest of that plant or CESSAR and the balance of plant. CE hasn't filed anything yet. They think they can do it. We will have to look. The policy paper recognizes the point you are making. It encourages as complete a design both in terms of finalized design and the scope of supply as possible. The only other industry spokesmen we have talked to are the folks from Bechtel, who have come in very recently, in the last week, to talk about what they would like to do with extending their design experience in the future, and they also understand the importance of getting as much of a plan as possible and are kind of up in the air as to how to couple up with an NSSS. It is a somewhat fresh view from Bechtel, incidentally, on the question of standardization.

MR. SIESS: What is missing in GESSAR and Westinghouse? There is an ultimate heat sink at one end. What about the curve?

MR. MATTSON: Most of Westinghouse, most of the plant is there. I can't tell you where the line is.

MR. SIESS: Is the turbine there, the turbine generator?

MR. MATTSON: I believe it is. They

essentially replaced the architect engineer.

MR. SIESS: They still have to stop short of the ultimate heat sink unless they are going to make that a standard, too.

MR. MATTSON: There are site specifics, like the ultimate heat sink and the foundation.

MR. SIESS: What is GE short other than the turbine building and the heat sink?

MR. MATTSON: I am sorry, Chet. I am not prepared to address it.

MR. SIESS: I thought they were pretty complete. They had some safety equipment in the turbine building, so we had to look at it.

MR. MATTSON: There are differences of opinion on how much of it you need. That has to be true, because we are willing to consider everything from CESSAR to the Westinghouse approach and there is quite a large difference between the scope of supply between the two, and both manufacturers think this approach will work even though there is a PRA required before licensing.

The Gerrick point in Question Number 6 about strict separation of two-train systems may have negative effects on reliability. I am told by my staff and others they are aware of this. They are watching it. I

have heard what Garrick is saying. I do know that in a couple of examples of trying to increase the reliability of aux feedwater systems, we are seeing the license applicants come in and propose cross-connections in lieu of third pumps as a means of increasing reliability. In one case, cross-connections of a power supply and in another case cross-connections of pipes.

But the point is well taken. The bottom line of your question is, why do we believe the review approach would be effective. Maybe I missed the question. You do the best you can with your understanding of the state of the design art at the time you make a decision, and if we have learned that strict separation isn't always good, I am sure we will apply that in the review process. What other answer can there be to this question?

MR. OKRENT: I guess I had a couple of reasons for raising the question. In the first place, I thought it was an interesting observation, even if it is a possibility not necessarily correct. It does to my mind suggest an interaction with the sabotage thing, and I alluded to it earlier. You don't necessarily have two trains and you cross-connect. Maybe what you do is go for, well, the German approach was four at 50 percent, and if these are separated, that may in the first place

get rid of the question of interconnection, or at least its being this important, and it may help on sabotage, and it may also facilitate maintenance without putting pressure on getting things fixed in a hurry, and so on and so forth. So, sometimes when you go back and look at something, I don't know what they had in mind when they picked four at 50 percent completely, but I can see if it is laid out a certain way that it could have some advantages. The British have gone to four at 100 percent on some systems rather than four at 50.

MR. SIESS: Isn't that what Westinghouse has done, too?

MR. MATTSON: Four at 50.

MR. OKRENT: You would want to know is there a big advantage and what is the difference in cost in going to four at 100 percent, but it seems to me you can't wait until the people come in with a design plan where they have laid things out and sized it, because you want to have quite a bit of knowledge when you start raising these questions for the first time. Okay? So there are a couple of reasons for raising the point. That is one of the reasons why I am concerned about just waiting to get the FDA and then starting to decide using just a PRA plus some judgment.

MR. MATTSON: But the real world is more

practical than that. I mean, I already have an FDA application, and I am starting to consider another. Are you suggesting that the purpose of these questions is to modify 82-1A or to sensitize us to some things that you think might be of interest which ought to be factored into our thinking? If it is the latter, it has already occurred. Is the former necessary in order to get the ACRS to support the approach in 82-1A?

MR. OKRENT: I can't speak for the ACRS. I can speak for myself. I have the kinds of concerns about 82-1A that I have tried to indicate, and as I say, one of them is the doubts as to the practicality of being able to do a good job without having certain kinds of policy decisions to guide the designer before he comes in to you. If you have some things already on stream, I doubt that they are going to meet the kinds of standards I expect I would want in 1985 after looking at what the British are doing, what the French are doing, and understanding it, not necessarily copying it, but thinking these various questions through and trying to develop a more nearly optimum integrated approach.

MR. MATTSON: I think I was almost up to 7 on Page 3. What is meant by the existing severe accident rulemaking is unfocused. Well, we are trying to contrast in the paper focused on real reactors versus

unfocused on abstract generic reactors of some sort. We are trying to force the decision to be more practical faced with real designs than faced with hypothetical designs.

I have to admit that the difference may not be important because we have to make a decision on operating reactors by '84, which has a lot of the generic difficulties with it. How would appropriate consistency among the various decision-making processes be obtained?

MR. SIESS: Before you move away from that, what you said about real versus hypothetical, in going back to Dave's questions about the bulk of the trains, for example, is it your feeling that you can't do a meaningful PRA until you actually have the details of the design that you couldn't do a conceptual one on four at 50 percent trains, four 100's versus two 100's? Or three 50's? Including such things as sabotage, fire, common mode failures?

MR. MATTSON: I think you can do what you called conceptual PRA's to look at the influence of risk on conceptual options. I suppose Bob has done more thinking on that than I, but this process depends upon being able to do that.

MR. SIESS: Because it is really reliability

you are looking at when you look at systems and not risk.

MR. MATTSON: But you have to know whether that reliability is important to the dominant sources of risk in that design.

MR. SIESS: We have a lot of rules and policies now based upon a single failure criterion which is a rather crude reliability approach. Do you think the new standard plants are enough different from anything we have got so that you can't tell whether anything is an important risk once you establish its reliability level and decide what reliability level is appropriate for that system in comparison to risk?

MR. MATTSON: No, I don't think they are that much different. GESSAR, I know, isn't that much different.

MR. BERNERO: GESSAR and Grand Gulf aren't all that different.

MR. MATTSON: I just licensed Grand Gulf. I know what that looks like.

MR. SIESS: So if it were a question of two trains versus four, you could determine what that reliability is and determine whether it is worthwhile in terms of risk, couldn't you?

MR. MATTSON: In the sense of, do I have a

good PRA base for doing that, if that PRA base is influenced by a PRA of Grand Gulf or similar design, yes, that is easy. If it is something new like Westinghouse, then I may have to find a conceptual PRA ground to make decisions between now and whenever they come up with a final design.

MR. SIESS: Westinghouse has a number of systems that are different.

MR. MATTSON: Yes.

MR. SIESS: And you wouldn't know their relative effects on risk until you tried to put them all together.

MR. MATTSON: Yes, I think that's true. Bob?

MR. BERNERO: Yes, and there is certainly from previous PRA work on subsystems, if you want to call them that, the high pressure injection systems or auxiliary feedwater systems, cooling water systems, you can in what you call a conceptual PRA, you can identify missing parts, reliability, a likely or achievable reliability for missing elements, but when you get into very substantial changes like four at 50 percent systems which we haven't analyzed before in this country, it takes a fair amount of work to do something like a conceptual PRA, to at least get a first cut at what sort of overall reliability you might achieve.

MR. OKRENT: Roger, we have to finish this topic within the next five minutes. Let me throw you one more curve ball and just mention it to your thinking and you can pick up whatever question or two you want to deal within the remaining two minutes.

It seems to me another kind of questions which could arise for future plans is should the seismic design basis not be uniform across the plant or all systems that are "seismic category 1?" My intuition tells me to get an optimal risk reduction per dollar. That is the way to go.

If one were to try to think that through, it would take some studies and so forth. It would be factored in partly the design, partly the qualification. I guess there would be some things qualified in a different way higher than they now are. For example, some things might be designed for even less.

MR. SIESS: The Japanese have a 1A and a 1, don't they?

MR. OKRENT: But to give you an example of something that would involve, when one looks at the seismic risk question --

MR. MATTSON: You all have good ideas for future design. It is too bad you cannot find a way for influencing those future designs to have an input.

These are great ideas.

MR. SIESS: I do not think the Commissions have had much influence on future design.

MR. MATTSON: They are trying to through 82-1A.

MR. SIESS: But they are already here. When you talk about "future", are you talking about something beyond the Westinghouse and the GESSAR?

MR. MATTSON: But those people who are proposing those designs are doing so because they want the Commission to speak on what the Commission wants in future designs. They are forcing the issue. It is good they force the issue. The Commission is saying gee, we would like to do that and use standardization and consider the things the Staff tells us are important to consider.

And the Staff is influenced on what we tell them is important to consider by your input. We ought to find a way to get that into a document -- 82-1B or whatever.

MR. SIESS: Or C or D?

MR. OKRENT: Would you believe 84?

MR. MATTSON: I do not think there is anything else on this list of questions we have not already talked about. The decision process for CPs you have to

give full consideration to severe accidents. I do not know how to say it any more clearly than was in 82-1A.

For OLs, NTOLs and OPs, it is what is in NUREG-0900 and the research program measures how safe they are, how you can improve it and whether it is cost effective, bounce it off a safety goal and decide what to do.

Containment. We have talked about Question 11. Strongly containments. I am not sure the ACRS and the Commission are telling us the same thing about strong containments. You saw their letter on strong containments, but I doubt that you attended or read the transcript of the meeting they had with General Electric to talk about what strong meant for Mark IIIs, and some signals we think we received from the Commission in the context of that meeting about the integral performance of containment.

So I think what we have written is fairly close to what the Commission expects to see.

MR. OKRENT: I deliberately put "strong" in quotes.

MR. SIESS: Strong in type is better.

MR. MATTSON: Significant safety improvements mandated by studies at TMI has been accomplished. Obviously, we are not saying that. You are reading it

wrong. I read it again. It is right the way it is written. You could read it again, but you would have to think I was crazy to say I implemented all of those things.

I did -- how many did we do this year? 1,700 OR actions we implemented in the division this year, and there are that many more next year. We ain't done yet.

MR. OKRENT: Okay. Why don't we finish this? Thank you very much, Roger. I am sure the subject will come up again tomorrow.

MR. MATTSON: Could I get some guidance on how to approach this with the full Committee? I would propose to use the same five summary slides and see what that entices.

MR. OKRENT: That is a good point. If I could get the attention of the Subcommittee members --

MR. BENDER: They are listening intently or attentatively. What is it?

MR. OKRENT: Mr. Ward and Mr. Siess, we have been asked by Dr. Mattson how we think it would be best to arrange the portion of the meeting tomorrow when we meet with him on SECY 82-1A. It is a more general question, actually.

There are four subjects on the agenda tomorrow. The first one is with OPE on safety goals.

There I have a suggestion which I want to try out on you, namely that when we meet with OPE we go through that list of questions that was sent to the Commission and ask them things about these questions.

MR. WARD: Do you mean the questions OPE sent?

MR. MARK: Those yellow things?

MR. OKRENT: OPE plus the Staff's and a set of questions to the Commission. It has been suggested from the Commission that if we have comments on these questions, even though we may have commented on some of the subjects before, we should get that to them. So I propose that for the meeting with the OPE tomorrow that is what we concentrate on as far as the full Committee is concerned, to give it a focus.

Then, I think the next meeting would be with the Staff on the implementation plan. Fortunately, Mr. Ernest is not here, so we have in principle until tomorrow morning to think about how that should be organized for the full Committee. But it is a non-trivial question. The total time allowed --

MR. SIESS: The first item is what?

MR. OKRENT: Safety goals. There are two hours allotted. The second item is implementation. There are two hours, if you allow for the break.

MR. SIESS: I would put them in the other order.

MR. OKRENT: Well, then after lunch, backfitting is shown for two hours. I think that is, in a way, the most simple one, since the subject is somewhat confined. And then from 4:00 to 6:00 we meet with the Staff on severe accidents and the regulatory process, 82-1A.

MR. SIESS: I think Roger ought to start off on SECY 82-1A, telling us what he intended to have in it, rather than what is in it, since he has devoted a fair amount of time today saying this is not really what we meant. We gave the wrong signal.

I think the Committee certainly needs --

MR. OKRENT: Or it could have been read by somebody --

MR. BERNARO: With a dark mind.

MR. SIESS: It probably was read by somebody, but I do not think the Committee will be all that up-to-date on SECY 82-1A, so if Roger could paraphrase it and hit the high spots without worrying about what he is changing from what is in it -- let's say the intent. That is what I meant.

MR. OKRENT: All right. Ten or fifteen minutes on the major intent of it, Roger. I mean, I

think you have a feeling for the kinds of questions.

MR. MATTSON: The Commission postponed its session so it could get a reaction from you. I think it is October 6, which is about the time you are back in town again.

MR. OKRENT: We are meeting with the Commission on Friday.

MR. BERNARO: No. They are meeting the Staff. Their meeting with Staff is postponed.

MR. MATTSON: You will have some dialogue with them on Friday and with us tomorrow. What is your goal, to write a letter on 82-1A?

MR. OKRENT: If the Committee can make up its mind, we will try to write a letter at this meeting. I do not know if we will do that.

MR. SIESS: We do not have any other way of communicating with the Commission.

MR. MATTSON: Well, you can write a letter. You can communicate with them Friday. I do not know what good it will do, but you can resurface this question of working together in a small group to try to refine the language so that if it says tentative conclusion and ought to say planning conclusion and it is either acceptable to us to say either and it makes you feel better to say the former -- those sorts of

changes we should find a way not to bother them.

MR. OKRENT: In any event, the suggestion for you is that you try to have ten or fifteen minutes in which you give what you think is the essence of what you are trying to do there and, as Siess said, your intent, so that we do not have to rely on somebody possibly misinterpreting the words.

MR. MATTSON: I will do that.

MR. SIESS: I will propose we now go into closed session for fifteen or twenty minutes with Charlie Kelber and, if so, we will finish on the agenda, which says we finish at 8:30.

MR. BENDER: I cannot believe it.

(Whereupon, at 8:00 o'clock p.m., the meeting recessed, to reconvene immediately in closed session.)

NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

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in the matter of: ACRS/Joint Meeting of the Subcommittee on Safety Philosophy, Technology and Criteria and the Subcommittee on Class 9 Accidents

Date of Proceeding: September 8, 1982

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.

Sharon Filipour

Official Reporter (Typed)

Sharon Filipour

Official Reporter (Signature)

MAJOR AIF CONCERNS WITH

STAFF SAFETY GOAL POLICY AND IMPLEMENTATION PLAN

- USE OF SAFETY GOALS AND PRA IN INDIVIDUAL PLANT LICENSING REVIEWS AND HEARINGS

- LACK OF CLEAR ESTABLISHMENT OF BURDEN OF PROOF FOR JUSTIFYING CHANGES TO EXISTING REQUIREMENTS

- UNDUE EMPHASIS ON CORE MELT FREQUENCY

- STAFF INTENT TO FURTHER DISAGGREGATE GOALS

- STAFF INTENT TO INCLUDE PLANT AND OFFSITE ECONOMIC DAMAGE IN COST-BENEFIT PROCESS

- EXCESSIVE STRINGENCY IN 0.1% INDIVIDUAL RISK GUIDELINE

- RE-DEFINITION OF PLANT PERFORMANCE GUIDELINE TO ENCOMPASS "LOSS OF PROTECTIVE FEATURES" LEADING TO CORE MELT

Filtered Vented Containment Systems:
History/Background

- FVCSs have been studied and made part of containment designs over the past ten years. The following are examples of reactors/reactor designs that include FVCS:
  - Zero Power Plutomium Reactor Facility
  - German SNR - 300 prototype LMFBR
  - Fast Flux Test Facility (FFTF)
  - Clinch River Breeder Reactor
  - Swedish BWR's (initially Barse back)
  - French PWRs (new requirement: no details)

T. P. Speis
9/9/82

Filtered Vented Containment Systems: History/Background (continued)

- FVCS have been studied and continue to be studied both within NRC and elsewhere.
  - Since 1978 RES has sponsored a program studying FVCSs for LWRs.
  - Since 1979 NRR has been applying the FVCS research to licensing applications.
  - Independent assessments have been performed, e.g., by UCLA (1975); by the California Energy Commission (1978); EPRI (1981); and by Commonwealth Edison for the Zion Probabilistic Safety Study (1981).

Filtered Vented Containment Systems Status

- Conceptually FVCSs can be built and, if necessary, backfit into present reactor designs, so that overpressurization failure of containment buildings can be prevented by venting the containment atmosphere and resulting radionuclide releases kept low through filter systems.
- FVCSs are expensive. Estimates range from 10 million dollars to 50 million (costs are considerably less for some BWR designs where the suppression pool is the filtering medium).

Filtered Vented Containment Systems Status
(continued)

- Estimates of Risk Reduction vary greatly (ratios vary from 1 (no reduction) to hundreds) depending on a number of factors:
  - Dominant core-melt accident sequences
  - Consideration of external events
  - Type of reactor/containment system studied
  - Competing and attendant risks
  - Type of containment analysis performed
  - Type of risk measure used (e.g., early fatalities vs. latent effects)
  - How FVCS is integrated into an overall mitigation/prevention strategy

Note: It is important to note that risk reduction values generated in many of the RES programs are not meant to be definitive values of risk reduction achieved with a given system, but rather values to aid in advancing a methodology development, e.g., for the development of value impact methodologies for mitigation features.

Considerations of Options to FVCSs

Why consider options?

- Prudent approach to the study of mitigation features in general
- If FVCSs prove to be relatively expensive, less expensive alternatives are even more important to consider

What options are being considered?

- Passive containment heat removal, e.g., heat pipes
- Independent auxiliary containment spray system

Examples of Risk Reduction Values for FVCSs

- SNL study of FVCSs for Mark-III type containment:
  - Risk reductions range from 2 to 3 for stand alone FVCSs with low volume vents, up to 80 to 90 when a FVCS is included in an overall mitigation/prevention strategy (which includes an ATWS fix)
- SNL study of FVCSs for Ice-Condenser Plant:
  - Risk reductions range from 2 to 3 for adding on a FVCS (assuming effective hydrogen control)
- SNL study of FVCSs for Mark-I type containment:
  - Significant (>10) risk reduction if FVCS is part of a mitigation/prevention strategy
- Staff study of Zion/Indian Point (Large Dry Containments):
  - When only internal events are considered, risk reduction is small (less than 3)
  - When external events are included, potential risk reduction is large (greater than 20) assuming FVCSs can be built to withstand external events

Degraded Core vs. Molten Core:
The Capacity for Recovery

- In past PRAs, little or no credit is given for recovery, that is, degraded cores are assumed to lead to core melt.
- There exists a window of time during which recovery is possible. Depending on reactor type and sequence considered, this window can range from tens of minutes to many hours.
- There appears to be a trend that those accidents which are the major contributors to risk are also those for which recovery is less likely. This is especially true when external events are taken into account.

SECY 82-1A

PROPOSED COMMISSION POLICY STATEMENT ON SEVERE ACCIDENTS AND RELATED VIEWS ON NUCLEAR REACTOR REGULATION

ACRS DISCUSSION OF SEVERE ACCIDENT POLICY STATEMENT

SEPTEMBER 8, 1982

R. J. MATTSON

PROPOSED POLICY STATEMENT ON SEVERE ACCIDENTS AND RELATED VIEWS ON NUCLEAR REACTOR REGULATION (SECY 82-1A)

- SUMMARIZES THE POST-TMI DEVELOPMENTS IN RULES AND LICENSING PRACTICES RELATED TO SEVERE ACCIDENTS
- REPLACES THE LONG-TERM GENERIC RULEMAKING WITH SEVERE ACCIDENT RULEMAKINGS DESIGNED TO CERTIFY SPECIFIC STANDARD PLANT DESIGNS FOR REFERENCE IN FUTURE CP APPLICATIONS
- SCHEDULES A SEVERE ACCIDENT DECISION FOR GRs IN EARLY 1984
- SPECIFIES TREATMENT OF SEVERE ACCIDENTS ON ONGOING LICENSING PROCEEDINGS
- PROVIDES COUPLING AMONG RELATED POLICIES, E.G., STANDARDIZATION, SAFETY GOALS AND USE OF PRA

DEVELOPMENTS SINCE TMI

- LICENSING ACTIONS CONSIDERED SOME ASPECTS OF SEVERE ACCIDENTS (INTERIM HYDROGEN RULES, REG GUIDE 1.97, ETC.)
- CP/ML RULE
  - 100 PERCENT METAL WATER REACTION
  - POST-CP PRA
  - BACKFIT ALLOWANCE FOR CONTAINMENT VENTING
- NEW PRA RESULTS AND RESEARCH
  - DECREASING SOURCE TERMS
- TMI FIXES
- IDCOR PROGRAM
  - INDUSTRY PROGRAM
  - 1981 TO 1983
  - COST/BENEFIT FOR SEVERE ACCIDENT FEATURES
- LARGE NRC RESEARCH PROGRAM
  - PHASE 1 FOR 1984 DECISIONS
  - PHASE 2 FOR CONFIRMATION
- SAFETY GOAL PUBLISHED FOR COMMENT

SPECIFIC STANDARD PLANT RULEMAKINGS

- GESSAR II - FDA REVIEW UNDERWAY
- WESTINGHOUSE - PDA APPLICATION 1984
- CESSAR - FDA APPLICATION 1983

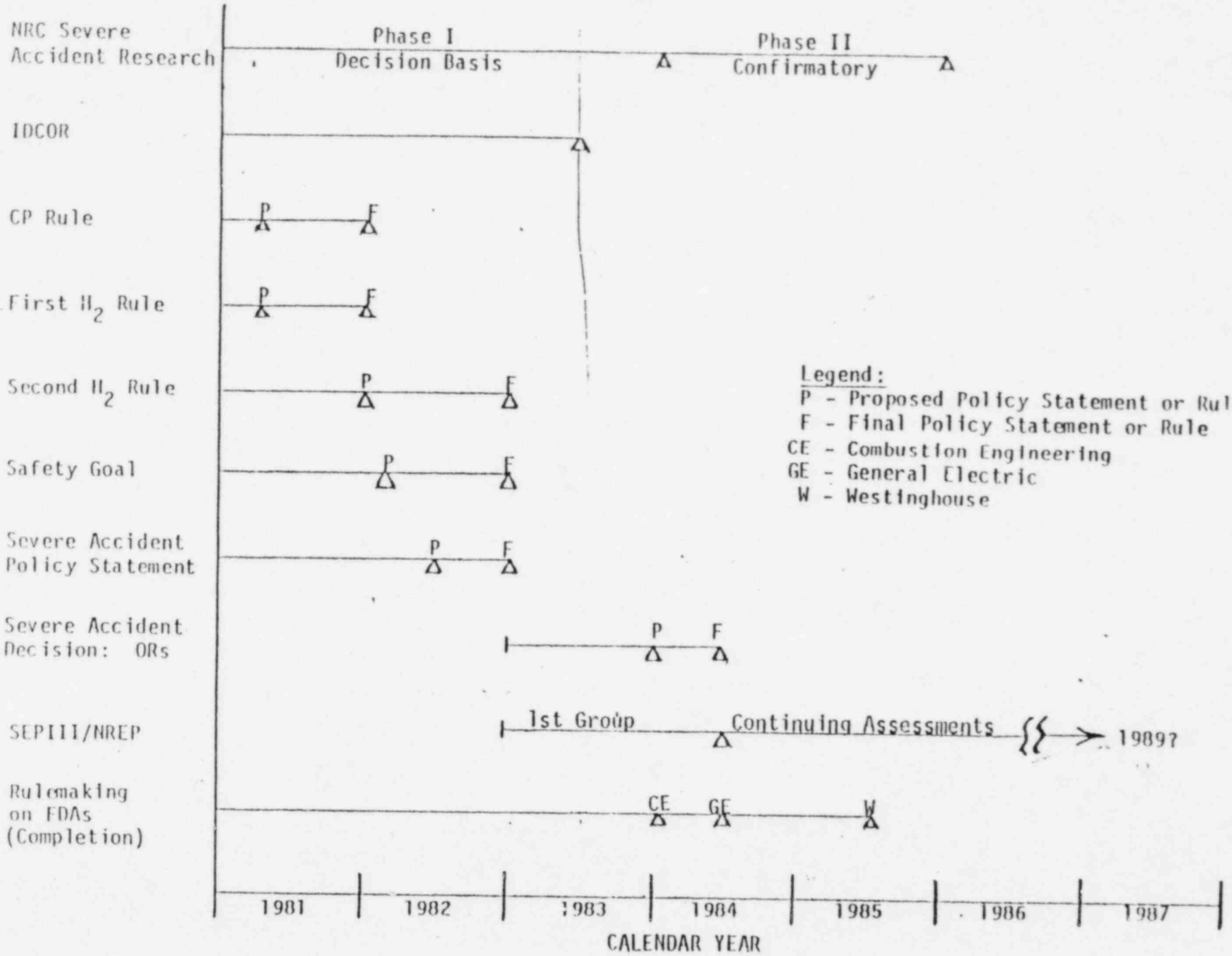

Figure 1--Proposed Schedules for Programmatic Activities of NRC and the Nuclear Industry as Related To Severe Accident Policy Development, Regulatory Decisions and Rulemaking.

TREATMENT OF SEVERE ACCIDENTS IN ONGOING LICENSING PROCEEDINGS

- NO ADDITIONAL REGULATIONS ON SEVERE ACCIDENTS REQUIRED NOW, BECAUSE NO SIGNIFICANT NEW INSIGHTS INTO CONSEQUENCE MITIGATION FEATURES SUFFICIENT TO SUPPORT FURTHER REGULATORY CHANGES, NOR INDICATION FOR CLEAR NEED TO ADD SUCH FEATURES

- WE NOW HAVE:
  - ONE FINAL AND ONE PROPOSED RULE ON HYDROGEN CONTROL (DEGRADED CORE ACCIDENTS) AND RELATED MATTERS (46 FR 58484, 12/2/1981 & 46 FR 62281, 12/23/1981)
  - ONE FINAL RULE FOR PENDING CPs, I.E., THE CP/ML RULE (47 FR 2286, 1/15/1982)

- PROGRAM(S) TO OBTAIN SUFFICIENT INFORMATION IN $\sim$ 2 YRS. TO COMPLETE POLICY DEVELOPMENT AND DECISION MAKING ON SEVERE ACCIDENTS FOR ALL CLASSES OF PLANTS
  - RESEARCH ON SEVERE ACCIDENTS (NRC/IDCOR)
  - REVIEWS OF PRAs ON I.P., ZION, LIMERICK, GESSAR-II, ETC.
  - STAFF STUDIES OF CONTAINMENT FAILURE MODES FOR A REPRESENTATIVE SAMPLE OF OPERATING PLANTS AND PLANTS UNDER CONSTRUCTION AND FOR ALL FUTURE DESIGNS
  - CLOSE INTERACTION WITH ACRS AS TECHNICAL INFORMATION BECOMES AVAILABLE

- INDIVIDUAL LICENSING PROCEEDINGS NOT APPROPRIATE FORUMS FOR BROAD EXAMINATION OF SEVERE ACCIDENT REQUIREMENTS

IMPLEMENTATION GUIDELINES FOR SEVERE ACCIDENT POLICY
(CONDITIONS FOR STANDARD DESIGNS FOR REFERENCE IN FUTURE CP APPLICATIONS)

- COMPLIANCE WITH CURRENT COMMISSION REGULATIONS, INCLUDING TMI REQUIREMENTS IN 10 CFR 50.34
- COMPLETION OF A PRA BEFORE SD APPROVAL THROUGH RULEMAKING AND COMMITMENT TO MEET THE REQUIREMENTS FOR DESIGN FEATURES FOR PREVENTION, MANAGEMENT, OR MITIGATION OF SEVERE ACCIDENTS SHOWN TO BE COST-EFFECTIVE IN THE COURSE OF THAT RULEMAKING
- USE OF UPDATED VERSION OF SRP (NUREG-0800)
- CONSIDERATION OF ALL APPLICABLE USIs
- COMPLIANCE WITH CP RULE REQUIREMENTS