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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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BRIEFING ON ACCIDENT MANAGEMENT PROGRAM

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PUBLIC MEETING

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Nuclear Regulatory Commission

One White Flint North

Rockville, Maryland

Monday, January 23, 1989

The Commission met in open session, pursuant to notice, at 2:00 p.m., the Honorable LANDO W. ZECH, JR., Chairman of the Commission, presiding.

COMMISSIONERS PRESENT:

LANDO W. ZECH, JR., Chairman of the Commission

THOMAS M. ROBERTS, Member of the Commission

KENNETH M. CARR, Member of the Commission

KENNETH C. ROGERS, Member of the Commission

JAMES R. CURTISS, Member of the Commission

STAFF AND PRESENTERS SEATED AT THE COMMISSION TABLE:

SAMUEL J. CHILK, Secretary

JAMES MURRAY, General Counsel

VICTOR STELLO, JR., Executive Director for Operations

TOM MURLEY, NRR

FRANK CONGEL, NRR

ERIC BECKJORD, Director, Office of Research

BRIAN SHERON, Director, Systems Research, Office of Research

P R O C E E D I N G S

(2:00 p.m.)

CHAIRMAN ZECH: Good afternoon, ladies and gentlemen.

The purpose of the meeting this afternoon is for the NRC staff to brief the Commission concerning the staff plans for the Accident Management Regulatory and Research Program.

The staff last briefed the Commission on this subject as part of the briefing on the Integration Plan for the Severe Accidents Closure, SECY-88-147.

Today the staff will discuss the approach for implementing the Accident Management portion of the Integration Plan for closure of severe accident issues and describe the research projects to support this effort.

I was disappointed that we did not receive the staff's paper on this important subject earlier. Today's meeting is for information only. There will be no vote taken at this meeting. In SECY-89-012, which we just received, the staff requests Commission comments by Friday, this Friday, January 27th.

I would just say to the staff, I am not sure we can do that. I would ask the Commissioners to address this important matter as they can, and make

their comments when they are satisfied. But it would have been much more helpful for the Commission to receive this paper at an earlier date because it is a very important subject.

I understand that copies of slides and the staff paper are available as you enter the meeting room today.

Do any of my fellow Commissioners have any opening comments to make?

(No response)

CHAIRMAN ZECH: If not, Mr. Stello, you may proceed.

MR. STELLO: Thank you, Mr. Chairman.

I apologize for the late date at which you received the paper. And it is perfectly acceptable for us to have the Commission reflect on this important topic and make its decision at, hopefully, sometime in the near future.

Our purpose today is, as you have already outlined, to brief you on the status of how we intend to deal with the accident management issue, which we explained in the Integration Plan.

Briefly, in the way of background, as we discussed and looked at this issue, it became apparent that the agency had an enormous amount of data and

information which we believe the utilities would find to be very, very helpful as they were reviewing their plants, in response to the IPE generic letter. And may be able to accommodate as part of their process implementing some of the lessons that we see are apparent from looking at the many PRAs that are already done and the vast experience within the agency and the laboratories to help understand this issue.

In that context, our suggested approach is to provide a list of about 20 procedures to the utilities that they could evaluate with the insights from the various PRAs, not to suggest that they are to consider those as requirements, because each utility and each facility has differences, but rather to have the benefit of that experience as part of their consideration.

So we would propose to put those out in a generic letter for their consideration as part of the process.

We also, pursuant to the Commission's instructions, have been asked to withhold certain funding in accident management. And the paper that you have that you have to refer to, 89-012, already reflects our consideration of that program, and recommends to the Commission its approval of going forward with various research programs related to accident management, as

required by the SRM on that subject.

So what we would hope today to give you is the background and rationale for the approach that we want to take. And with that introduction, I will ask Dr. Murley to begin the briefing. And then we will just go around the table as we complete the briefing this afternoon.

CHAIRMAN ZECH: Thank you very much.

Dr. Murley, you may proceed.

DR. MURLEY: Thank you, Mr. Chairman.

I will start with the second slide, if I could, please.

(Slide)

The Accident -- Slide 2.

The Accident Management Program that we are talking to the Commission about today is within the Integrated Program that the Commission has approved for closure of the Severe Accident Program. It is an essential element of that plan. I think it's, if not the most important, perhaps one of the most important aspects of the entire Severe Accident Program.

The other elements, of course, that you are aware of are the individual plant examinations, the containment performance improvement, severe accident research program, and there are other elements of

improved operational safety performance that we are working on.

Slide 3, please.

(Slide)

What is accident management? What do we mean by it?

Well, it is in essence those actions taken by the plant staff that either prevent core damage; or even once a plant has exceeded its design basis, to terminate the progress of any core damage, and to retain any damaged fuel or debris within the vessel; or even once the accident has progressed beyond that stage, to take actions to maintain the containment integrity; or to take actions to minimize off-site releases.

It involves, of course, a good deal of analysis, pre-planning, preparatory measures, procedures -- severe accident procedures for operators, additional training, and perhaps even additional instruments and equipment. By and large, the intent is to use the capabilities of the plant that exist and to involve the operators in dealing with the accident.

May I have Chart 4, please?

(Slide)

One way I like to look at accident management is that it involves the operator and the operating staff

in the defense in-depth safety philosophy. Traditionally, defense in-depth has been focused on hardware, plant systems and safety systems but, in fact, the operating staff can play a key role. By extending the operating procedures well beyond the design basis into severe fuel damage regimes, we can use the basic design of a plant, we can use the innovative capabilities of the operators to better cope with accidents.

So I think that is the major emphasis in accident management programs is the notion of bringing the operators into the defense in-depth philosophy by training them in a regime that heretofore they have not been deeply trained in.

Can I have Chart 5, please.

(Slide)

The objective that we have is to have each licensee implement an accident management plan for his plant. We have been talking with NUMARC, and have had several meetings with them on this subject. And, in fact, I received a letter dated January 9th. Let me just quote from that letter from NUMARC.

"With regard to accident management, we have general agreement that we should proceed with the development and implementation of an accident management

framework for each nuclear power plant."

So I think we have, in essence, the agreement with the industry to proceed down this path. As Mr. Stello said, we are not requiring, and we do not expect to require at this stage, that there be any licensee to implement detailed severe accident procedures. Rather, we would ask them to develop a management plan -- an accident management plan that would allow them to evaluate information that we are sending them on severe accidents, to prepare and implement operating procedures for severe accidents, and to train the operators and management in those procedures.

With that introduction then, I will turn it over to Eric Beckjord.

COMMISSIONER CARR: Maybe I misunderstood you, but I thought you said you wouldn't expect them to have procedures, you would just expect them to have a plan, a framework, and yet the last two things talk about procedures there.

DR. MURLEY: Yes, at this stage I should say we are not expecting them to implement right away, procedures. We do expect them, as they analyze the insights that we are sending them and the guidance that we are sending them, to evaluate whether it applies to their plant. And ultimately, if it does apply and we

agree that it will lead to improved safety, that it would lead down the road to severe accident procedures.

MR. STELLO: Let me help, isn't it fair to say that there are already some plants that already not only have the procedures but, in fact, have done some training in this area?

DR. MURLEY: Absolutely.

MR. STELLO: And it is sort of a mixed bag at the moment as to how much each utility has done. Hopefully, as they implement this program, everyone will get on essentially the same footing. And by looking at these insights, then we would -- I would hope that any utility that looks at something that can be a significant contributor to reducing the potential for core melt may, in fact, institute that procedure and institute that training.

Now, they would certainly be encouraged that they do so. There is no requirement that they have to have it done at any time, or no requirement --

CHAIRMAN ZECH: It is your intention to make it a requirement in the future?

MR. STELLO: As part of the IPE process, we may see something that does, in fact, warrant backfitting and, if so, we will.

COMMISSIONER ROBERTS: But any new requirement

would be a backfit.

MR. STELLO: Either a backfit, or a new rule. But I don't think that -- or at least it is my expectation it won't come to that because the bulk of this is really -- it is minor in terms of what we see in hardware, and major in terms of just writing procedures and training. And I think they'll be, at least the indications that I have from the industry, very receptive of that.

COMMISSIONER CARR: Well, have you and NUMARC agreed on the definition of framework?

DR. MURLEY: In principle, yes, but --

COMMISSIONER CARR: Because I must admit that it didn't come clear to me in all this paper here, what you really wanted.

DR. MURLEY: Well, we are working with NUMARC, and EPRI is under the guidance, I would say, of NUMARC, in developing what we mean by this accident management plan, this framework, that we would expect each utility to have.

When we talk at the conceptual level, we have agreement. When we get down to details, sometimes there is some different understandings. So, I would say, in honesty, that we still have some work to go on what the details mean.

Now, just to make sure we don't mislead, I think there are some elements of the Accident Management Program, for example, that are very similar to what we will be talking to the Commission about later this week on BWR Mark I containment that involves implementing some hardware changes. There we might be expecting some new requirements, and there we would follow the backfit rule and procedures, and so forth.

But here all we are asking for -- and the industry has agreed to -- is to have an accident management plan at each plant. And then as time goes on, the exact procedures, I think, will be so plant-specific that it is really too early to expect details. Although, as Mr. Stello mentioned, some plants have already gone ahead and implemented some of these.

CHAIRMAN ZECH: But are we going to eventually require an accident management program?

MR. STELLO: We already do. They are required now to have in place emergency procedures for accidents.

CHAIRMAN ZECH: They have emergency procedures, but I guess my thought is that as you developed these IPEs, and as we go ahead with PRAs, and if you come up with something that does, indeed, look like it would be an improvement to safety, that we will either take action to do it, if we think it doesn't

require backfit; or, if it requires a backfit in accordance with our procedures, we will subject it to the backfit analysis.

I presume this is what we intend to do?

MR. STELLO: Correct. It may be either procedure or hardware.

CHAIRMAN ZECH: Right.

MR. STELLO: There might be a piece of hardware for which an analysis shows it is clearly cost-beneficial to make that change. If so -- and you will see some of that when we deal with the Mark I, where we propose to, in fact, using the backfit rule, to go and backfit plants. And they are both procedure and hardware. It will be the same approach.

CHAIRMAN ZECH: Disciplined approach.

MR. STELLO: Yes, sir.

CHAIRMAN ZECH: Good, okay.

COMMISSIONER CARR: Have you got some sample accident management plan I can look at? If I had this kind of guidance, I couldn't put it together because I don't really know what you want.

DR. MURLEY: No, we don't have it, but we are working on it. We understand that EPRI is also working on kind of a draft accident management plan. And that would be our next step, really, is to work with the

industry to make sure our ideas and theirs merge.

COMMISSIONER CARR: Well, we ought not to request it from them until we know what it is we want.

DR. MURLEY: That's correct.

CHAIRMAN ZECH: All right, proceed.

MR. BECKJORD: Mr. Chairman, I would like to make three points. First, on the purpose of accident management, which Tom Murley already referred to on Slide 3 -- that is, the goal of preventing core damage after the initiation of an accident, and so forth -- I note that the International Nuclear Safety Advisory Group, INSAG, in its recent report on basic safety principles for nuclear power plants -- I believe you all have copies of it -- stated that "severe accident management and mitigation measures should reduce by a factor of at least ten the probability of large off-site releases".

I am convinced that this is a realistic goal.

The second point --

COMMISSIONER CARR: But isn't that a motherhood-type statement that says if you manage it right, you will reduce the risk. Having said that, though, it doesn't give you much more guidance on how to do that.

MR. BECKJORD: No, there is no -- that's the

opinion of the authors of the INSAG report, and I think it is a realistic goal.

COMMISSIONER CARR: Well, again, it says if you are having an accident and you do things right, you will reduce the risk, and I agree with that. It is the what to do that bothers me.

MR. STELLO: Let me try to clear something up.

COMMISSIONER CARR: Accident management has burst on the scene since I have been here, as the buzz word in getting things something or another, and I confess I am really confused as to what that means. And I agree with the ACRS, you ought to give me a good definition of what that is.

MR. STELLO: At the risk of doing it at the table, let me try --

COMMISSIONER CARR: No, no, you don't have to do it now.

MR. STELLO: Let me try. We have, after TMI, instituted emergency procedures. Those emergency procedures include accident considerations which are both the design basis accidents, which we have come to call -- those that are part of Chapter 15 analysis -- as well as accidents that go beyond that. We developed those procedures following TMI, and published in NUREG-737, a whole list of specific kinds of requirements that

detail procedures that ought to be developed for that purpose.

COMMISSIONER CARR: To take care of a TMI-type accident.

MR. STELLO: And some that are beyond that. ATWS procedures, for example, were part of the process. Containment venting in a BWR was issued as part of the 737 package, for the accidents beyond the TMI accident.

What we suggested is that the industry now needs to think more carefully, and the industry agreed, and the letter that Dr. Murley was reading speaks to the fact that they have appointed a group that will put together a program, a plan, for doing this, for each utility to follow. So there is a portion of it that is missing, and that's that guidance that you are asking for that doesn't exist yet, that each utility would follow in some systematic way to complete the entire process of accident management. That's not done.

That guidance, that description you are looking for --

COMMISSIONER CARR: That presumes you know what the accident is.

MR. STELLO: You don't know what the accident is. You know what the symptoms are that you are going to try to deal with. You have a lack of water in the

steam generator --

COMMISSIONER CARR: Well, we knew what the symptoms were at Three Mile Island, only we misinterpreted them.

MR. STELLO: That's correct. And that's what we are trying to correct. But we are going beyond --

COMMISSIONER CARR: We may misinterpret them in the next one, and do you have a plan for misinterpreting? Is that what you are trying to give me?

MR. STELLO: Well, if you misinterpret, you have a core melt down and then you would be dealing with core melt down severe accident procedures. But you will have those procedures in place, too.

CHAIRMAN ZECH: Let me just step back a minute. Isn't severe accidents, as we use that term, meant to describe accidents beyond the design basis accident?

MR. STELLO: Yes.

CHAIRMAN ZECH: And isn't accident management, as we are discussing it here today, management of those accidents that we term severe accidents -- that is, above the design basis accident?

MR. STELLO: Yes.

CHAIRMAN ZECH: So we are talking about the

accidents beyond the design basis accident, when we talk severe accidents and when we talk accident management. I suppose the term accident management could really refer to accidents of any kind. But in the way we are presenting it, I believe, we are trying to say accident management as it would refer to severe accidents, that is accidents above the design basis accident. I think that is what we are discussing, is that correct?

MR. STELLO: Yes.

CHAIRMAN ZECH: At least that's the foundation.

COMMISSIONER CURTISS: Could I ask a point of clarification? On Slide No. 3, you define accident management as actions taken by plant staff to prevent core damage. Does that assume that the severe accident that the Chairman referred to, the sequence is already initiated, or does this initiative include steps that the plant staff would take to prevent a severe accident --

DR. MURLEY: Can I tell you what I meant by that?

COMMISSIONER CURTISS: -- after initiation.

DR. MURLEY: Yes. There are some situations where the plant is beyond its design basis, but where the core hasn't begun to be melted, or be damaged. And

there are some actions that the operators can take, that can cope with situations like that.

Then the second bullet there means that even once you are into severe damage, there are actions the operators can take. Perhaps an example --

COMMISSIONER CARR: That presumes they recognize the conditions and properly assess what is going on which, in my opinion, if they had done that, they probably wouldn't have been in the severe accident position anyway.

DR. MURLEY: Well, to some extent that's correct. If they misdiagnose the situation, as happened at TMI --

COMMISSIONER CARR: That's how they got where they were.

DR. MURLEY: -- then you will get to some point. But what this is meant to do is that at some point, if they then recognize the situation, that it is much more serious than they had thought, and yet, say, the fuel is melting, or even the containment -- or the pressure vessel has been breached, the aim of this is to provide them with something they can do at that stage, whether it is to get another source of water, another source of electrical power supply, or some action they can take to recapture, or to bring the situation back to

a stable state.

I agree with you that part of an accident probably involves the operators misunderstanding or misdiagnosing the situation, but the intent here is to provide them with the tools and the means that once they recognize they've got a problem, there are things they can do.

MR. STELLO: Can I use a specific example to illustrate this, it may help answer the question, to prevent core damage. Let me assume that you had a situation where you lost feedwater, normal feedwater. Your emergency feedwater systems didn't work. And what I would visualize they would have -- you are clearly beyond the design basis -- is perhaps a mechanism to depressurize the steam generator and hook up maybe even with hose bits which some plants have, and hook up a fire pump to put water, or another source of water, in the steam generator to prevent the core from being damaged. That, to me, would be within this accident framework.

What they have to recognize is that what they are dealing with is a problem where they didn't have water in the steam generator, and have procedures necessary to provide that source of water through some other mechanism.

The hardware changes we might talk about for this procedure then, for example, would be to make modifications to the feedwater lines to put in the proper connections, so you could use a fire pump. And then you develop the procedures and the training, so that the operators, if they were ever faced with that situation, would then know how to use that backup source of water, to prevent the core from being damaged, as an EG.

I don't know if that helps clarify it, or not.

COMMISSIONER CURTISS: Let me ask one other quick question, I don't want to spend too much time at this point. But is the premise of this initiative that we should do everything that we can in that situation, a severe accident, to encourage the utilities, or require the utilities to take all of the steps that we can identify to manage the accident, or do we have some target? Are we looking to reduce it by an order of magnitude, as INSAG has suggested, or is there some target where we say we have reached the necessary plateau of things that we are going to require, or ask the utilities to do, where we are comfortable saying that they can manage the accident?

MR. STELLO: It is too early to say we have a specific target, but rather at the present time what we

have are some ideas that they ought to think about. They may elect to do them, even though the contribution, in a quantified sense, is not very large, but their judgment is they are very easy to do, they are very simple to do, and you go ahead and do them.

When they come to a more difficult procedure, or a more difficult technique, then they may want to analyze it further and make the judgment then, that it really isn't worthwhile doing. And that judgment right now is difficult to quantify until we have been into the process.

Hopefully, the whole idea is to just get the utilities to start to think this way, and then we will go from there. It is the concept of getting it in front of them, having them think about it, and then to the extent it is an issue, if we feel strongly about it and it is important, then we will in a very disciplined manner go through the backfit process and make a judgment and a decision on the basis of following our rules and backfit it. Otherwise, they won't be required to do anything. They will make their judgment first and we will look at what they have done, and if they have done a reasonably good job, we are finished.

If they haven't and we think that there is more to do, then we have the option of using the

Commission's backfit rule and going forward on that basis.

And as the Commission has told us, if it doesn't pass the test of the backfit rule and we still feel strongly about it, then we will come to the Commission and ask the Commission to look at what we propose and go from there.

CHAIRMAN ZECH: All right, proceed.

MR. BECKJORD: Yes, sir, let me go on. The second point, there is growing interest in accident management development in NUMARC. EPRI is working on this for NUMARC in the U.S. and also in the world nuclear community. We have active cooperative efforts now with the Federal Republic of Germany and Japan. And I expect there will be more of these in the future.

The third point I want to make is that the accident management research projects for fiscal 1989 and fiscal 1990 are summarized in the commission paper which you have now, and also, specifically in the attachment, Attachment I to that paper, and they are going to be described in the presentations this afternoon.

Research is working on the ongoing projects now listed in Attachment I, but I need Commission approval for the new projects in these two fiscal years.

I do not include approval of the fiscal 1991 budget for accident management in this request because you will have the opportunity to review and approve the fiscal 1991 budget for research, including accident management, in about three months.

So, my request applies to fiscal '89 and fiscal 1990.

COMMISSIONER ROGERS: Could I just ask you to add a little bit on the international -- there is some reference in the SECY, or the appendices, or something, that we seem to be a little bit behind in accident management research, perhaps, compared to what is happening overseas.

Can you elaborate a little bit on that? I think there was a slight reference to that notion in some of the materials that we have.

MR. BECKJORD: Well, I'm not sure whether we are behind on the research aspect of that.

COMMISSIONER ROGERS: Well, it might not be research, it might be implementation procedures.

MR. BECKJORD: In terms of implementation, the Swedes were perhaps the first to look at this very carefully. And they did studies of their own 10 plants, beginning after Three Mile Island, and they have installed a number of changes. And they have changed

procedures, and they've added additional features, as you know, to their plants.

Likewise, the French have developed their ultimate procedures and they've made some changes in auxiliary systems, auxiliary feedwater, is an example.

The Germans have been working very actively on it. And we signed an agreement on accident management about a year ago with them. And I think we have been at one of those meetings.

MR. SHERON: The Germans have required now depressurization of their primary systems, to prevent direct containment heat. And as I understand, they are backfitting their plants with appropriate relief capacity.

MR. BECKJORD: So, in summary, I think that it is probably true that they are somewhat ahead in the procedures part of it, but I don't think they are ahead in the research. The research depends, in large part, on the severe accident research. And I think we continue to lead in that.

CHAIRMAN ZECH: All right, let's proceed.

MR. BECKJORD: That's all I have to say.

MR. CONGEL: Could we have slide 6, please.

(Slide)

Some of the material I will be discussing, I

think, came up as a result of the questions and answers that preceded this. But perhaps I can shed a little more light in the area that the questions were being directed.

I would like to point out first of all that we have 30-plus PRAs that we have looked at in detail for existing operating plants, with others in the process of being prepared and reviewed.

As a result of these, there have been a number of fixes, changes and procedures, other facts that have popped out right away as a potential ending to a serious accident progression. It's the information that the staff has learned from reviewing these that we would like to put out formally to the industry.

As has been said a number of times already, this has been done in various forms, but we would like to have it in one form, in an organized structured approach. Consequently, on this slide where we list the five key elements of an accident management framework, the first one on the list is what we call accident management procedures.

One of the tables that is attached to the paper that was sent up to the Commission lists a number of actions that we want each of the licensees to consider. One is going through its accident management

evaluation. Evaluation of course would be specifically for its plant. Consequently, not all of these actions would be appropriate. It is up to the utility to determine which ones are.

What we want to do is focus their attention in this direction. Clearly, one of the side benefits would be a situation where people understand better what accident progressions may be, they may avoid actually getting into that circumstance, as Commissioner Carr had indicated earlier.

The five key elements include, as I just mentioned, the procedures. The second is training. The training for severe accidents is intended to go all the way up and down the management and the operator chain.

So, not only are the operators to be briefed and informed in this area, but also the technical support staff and the managers, who would be responsible for performing some actions, and have some decisionmaking responsibility, should a severe accident occur at their particular plant.

You will note that throughout our paper to you, and our presentation today, we are making this all at this point low key. It is once again what I consider a technology transfer. But the implications of accepting this technology and feeding it back into their everyday

operating procedures can, indeed, be significant.

After the training and the evaluation of the severe accident, or accident management procedures, the utilities are requested at this point to evaluate preparing guidance. The guidance would essentially formalize for the support staff and the managers just what procedures exist in order to cope with severe accidents.

Some of the evaluation and examination of course would affect the hardware at the plant. Key in determining accident progressions would be the instrumentation that the plant presently has -- how would it operate in the event of an accident? Would it give you the right parameters? Are we measuring the right parameters?

Once again, the emphasis here is what I consider a first-cut approach, an evaluation of what capabilities exist and what ones could be remedied quickly and easily, as a result of an evaluation of what things have already been determined as effective in mitigating consequences of accidents.

The last one on the list is decisionmaking responsibilities. This is something that has not been given a lot of attention as yet, and it really gets into the area of what capabilities exist, who would be

contacted in the event that you were in the middle of a severe accident. Everything else -- well, I can think of several examples in the past where major questions about policy may exist, once you are in a severe accident mode, always handled on an ad hoc basis.

As part of this evaluation, thought would have to be given as to how it would be handled in advance. One of the examples we've used among staff is the so-called Red Adair approach. Red Adair is the famous firefighter for the oil platforms. And our desire is to have the equivalent of a Red Adair staff at all of our operating plants, so we don't have to depend upon the right person being at the right place, at the right time.

Next slide, please.

(Slide)

CHAIRMAN ZECH: By the same token, though, as Commissioner Carr mentioned earlier, too, you just can't always predict exactly the kind of accident you are going to have. And, therefore, I certainly would agree that it makes good sense to use as much foresight as you can and try to have some kind of an organization that would be thinking about a severe accident.

On the other hand, I think you can go too far and try to accommodate a team that would meet every

conceivable type accident that you can conjecture, and I don't think that is what you have in mind. But it certainly would be important, I believe, to have the capability at the plants to look ahead to severe accidents, and I guess that's what you are saying.

MR. CONGEL: That's what I'm saying.

CHAIRMAN ZECH: You cannot predict everything, but you should be thinking about everything. Do you see what I mean?

MR. CONGEL: Yes, I was hoping to get that point across when I was saying earlier that there is a limit on the effort at this point, that we are asking them to put in -- the utility to put in.

When you review the number of PRAs that we have looked at, you will see that there are probably six to eight dominant sequences that occur at a large number of the plants. So, when you see those stick out as dominant sequences, you want to be sure that everyone shares the same insights and knowledge that we do here.

CHAIRMAN ZECH: Exactly. You want to focus on those for each plant, perhaps, that may have more possibility of happening, than those that have an insignificant possibility of happening. Because we have so many custom-built plants, as we know, there are differences, and each plant cannot be generic in this

way, in my judgment.

So when you think severe accidents, we are thinking of very remote possibility, and so forth, as we all know. But I think it is important to focus on the fact that there are differences in the plants and some plants would have a different orientation for severe accidents than others. And I just want to make sure that you would agree with that or, if not, please comment.

MR. CONGEL: Absolutely, yes. I agree.

COMMISSIONER CARR: It looks to me like what you are looking at is not the probability, or possibility of it happening, it is what happens if it does happen, like loss of feedwater. You are saying loss of feedwater is one of the things -- loss of limited resources. So we have two feedwater systems. You want three? Why don't we just make them have three. Can we make them have four? That will reduce it even more.

It is not how many systems they've got that you are looking at, it is the result of losing those systems -- some systems are more important not to lose than others, and we have required them to have backups for those. And now we are saying, but if the backup fails -- we can say that throughout the plant. I can

build you accident sequences you will never take care of. And we are back to that how safe is safe enough routine.

DR. MURLEY: I don't think -- the intent of this was not to push the risk down to some ridiculously low level. It was partly as a result of looking at the sequences, the ones that always seem to come out, like station blackout and loss of all feedwater, and that sort of thing.

Some of the utilities who are doing their own PRAs said, "But we have other supplies of power on-site. We have other supplies of water on-site".

And we said, "But how can you take credit for it?"

And they said, "Well, we will rig up some means", as Mr. Stello said, "of putting fire water into the steam generator", that sort of thing.

So, as a natural result of these PRAs, they, themselves, have developed means of using the capability at the plant. And they realize they've got to have procedures to do it.

So this didn't stem so much from trying to push risk down to some low levels. It is no matter what situation you find yourself in -- and it could very well be because of operator errors, which are very hard to

quantify -- that even if you find yourself in that situation, there are capabilities at the plant that are already there, that they can make use of. And that's the essence, in my mind, of accident management.

COMMISSIONER CARR: I understand that, but you are going to end up with spool pieces that in training are going to get left connected, and if you can have a way to connect salt water to the fresh water site, you will get it. Sooner or later somebody will leave it hooked up.

DR. MURLEY: That's a valid concern that we have to be very careful of, that we don't make some situation --

COMMISSIONER CARR: I think it is very valuable to think about these things and to hold, if you will, midnight sessions on what would we do, if we needed to do this. I think they are very valuable. But when you get to the point, as you are saying, if the three ones that we are worried about, or the two of them, add one more diesel, add one more source of feedwater, then that's very simple, rather than going into what all of these things can happen, and how should we go about taking care of all of them, that gets to worrying me, but go ahead.

You understand my problem, I'm sure.

MR. CONGEL: Next slide, please.

(Slide)

We have already touched on the mechanism we have for interaction with the industry. It is primarily through NUMARC. Of course, NUMARC represents the owners group, and they also have a separate funded research program going with EPRI, that is seeking some of the same objectives that we are.

The manner in which we are going to carry out the implementation is as follows:

The first thing on the agenda are the IPE workshops. Part of the IPE workshop, which begins the end of February, will have a session devoted to accident management.

The generic letter is presently in draft form -- it was attached to the commission paper -- and outlines the features that we intend to emphasize when we send it to the industry. The letter will not be formalized until we have more interaction with industry, and also, solidify some of our own thoughts and, clearly the concerns that are being shown by you at this meeting.

COMMISSIONER CARR: While you are on that, it looks to me like we need to get our research work done, before we do this because, if we are going to tell them

to figure out ways to add water to the plant, we've got to figure out when it is not beneficial to add water. Otherwise, you are going to focus them on adding water and sometimes it may be the wrong thing to do.

DR. MURLEY: Well, I think that that's correct. We recognize that in some cases -- we think it is fairly rare, as a matter of fact. It is almost always the right thing to do, to add water, but we recognize your point, and that's why I don't want to get too far ahead of the research.

And I am afraid when you asked, Commissioner Rogers, are some of the foreign countries ahead of us-- yes, they are, but they are also ahead of their own research.

COMMISSIONER CARR: For instance, the direct containment heating, if they are already taking and putting MODS in to take care of that, I am still not convinced that it is a problem from our research.

DR. MURLEY: Exactly. And there are some accidents that can be made worse by implementing depressurization systems. And that's why I want to move cautiously.

But the things we are talking about, and that are attached to the Commission paper, we are quite confident --

COMMISSIONER CARR: Oh, I have no problem if you put out something that says think on these. That's good words. But when you tell the guy to come back with your plan, I don't know -- I will give you a plan, I will say, yes, I am going to think about them, I am going to put them in my training session a day a month, or a day every two months, we are going to talk about when we want them to go defeat interlocks.

I am not sure I want to tell them to go defeat interlocks. They get used to defeating interlocks, they will think of a good way to do it, when they don't really need to do it. It has happened.

DR. MURLEY: If the utilities were to get beyond our own experience and our own evaluation of these systems, we would look at them very closely, before we would let them do it, yes, or to even put them in their procedures.

But the sorts of things that we are talking about here, and want them to evaluate, we believe we have studied enough that we understand the pros and cons.

Now, I agree, there are some areas in research, and Brian Sheron is going to talk about those in a minute -- that are well down the road. We are not ready to talk about procedures for venting the primary

system, for example, in a core melt situation, but that will come.

COMMISSIONER ROGERS: Just on this interaction with industry topic, what has happened so far? What has taken place with owners groups and with EPRI, and NRC on this topic?

MR. CONGEL: We have had two formal meetings with NUMARC to discuss this specific topic. And the result of the second one was summarized by Dr. Murley just a few moments ago, when he quoted from the letter.

COMMISSIONER CARR: You have had several meetings, when was the last meeting?

DR. MURLEY: December 8th was the last meeting, and we talked there, as I mentioned, about the general principles, where they agreed to proceed with this accident management framework for each nuclear plant.

COMMISSIONER ROGERS: But can you give us some flavor of the response? Is it a positive one? Is it--

DR. MURLEY: Yes, I think that the utilities themselves, and particularly EPRI, realize the importance of this. And they realize that it is a big step to be gained in safety.

It is hard to quantify it right now, but the feeling is there that there is a big step to be gained

in safety by utilizing the inherent capability of the plant in off-normal accident conditions, and that by planning ahead -- not trying to out-guess every accident sequence that you can get -- but wherever you find yourself in this situation, there are some things I can do. They seem to be very positive.

CHAIRMAN ZECH: So you would say, in general, that there seems to be an emerging consensus between NRC and EPRI, as regards accident management is concerned?

DR. MURLEY: I believe so. Clearly, at the level of the conceptual stage that we talked about, there is clearly agreement there.

COMMISSIONER CARR: Well, they've all heard the same words. Accident management is what we are talking about these days. They can read that sign, obviously, and I don't think there is any utility out here that wants to have an accident. And if he does, he wants to have it managed well, I'm sure.

DR. MURLEY: But there are enough examples where utilities have gone on their own. And without mentioning the plant, I can give one example. One of the dominant accident sequences that they found in their risk assessment was loss of all electrical power. And they said, "But if I had a way to charge the batteries, I could find means of opening some valves, and I could

get this water supply over here that is normally not available".

So they brought in a gas-fired battery charger, generator, a small thing that they have on-site. They wrote some procedures for it, and they trained their operators in those procedures.

So, their point is that even if they were to find themselves for some reason in a loss of power, they can get some electrical power back.

COMMISSIONER CARR: I think that's great. And I think our responsibility, we ought to put out a notice and tell everybody, hey, these guys found this problem, and this is what they did about it.

DR. MURLEY: And this is exactly what we are doing, Commissioner.

COMMISSIONER CARR: And if we do only that, then I think it is a great idea. But it looks to me like we are going a lot beyond that, if I end up saying not only that, tell me everything else you are going to do.

DR. MURLEY: I don't think we meant to push beyond our knowledge, because we don't intend to do that. It is only once we understand these certain steps --

COMMISSIONER CARR: So the plan doesn't have to encompass everything they can think of.

DR. MURLEY: No, no, certainly not, not at this stage. As the research goes on, maybe five years, or 10 years down the road, whenever, we find that we think there are some additional steps to take, we would send that out to them and ask them to evaluate that.

COMMISSIONER CARR: So our guidance may say "Show me how you are going to consider additional feedwater, or additional air supplies, another source of power" -- are we going to be that specific in our requests?

DR. MURLEY: Use the diesel-driven fire pump, for example, to enhance containment spray. There is a way to do that.

MR. STELLO: There is a table in the back of the paper --

COMMISSIONER CARR: I read the table. I like the table. If you just want to put out the table, that's --

MR. STELLO: That's what we're talking about.

COMMISSIONER CARR: -- those are good thought words. Just put out the table. It is the other words that bother me.

MR. STELLO: The whole idea is to get this table out in front of the industry, which is a compilation of --

COMMISSIONER CARR: Well, we've made it a lot more complex than that, it seems to me.

MR. STELLO: I am not sure I understand why it should be viewed that way.

COMMISSIONER CARR: Well, watch the words about framework, if all we want them to be aware of things --

MR. STELLO: Maybe this has gotten so formalized that we have lost sight of it. The whole idea --

COMMISSIONER CARR: I agree with you.

MR. STELLO: -- is very simple. Here are 20 lessons that you can glean from PRAs. A way to think about them -- and you might want to do something about them -- how do you go about doing it? -- which are the usual things of writing procedures, getting the guidance and the training, and decide who has the decision to do what. That's accident management framework. That is accident management. I think it is that simple.

In the final analysis, what you are going to have in front of you is a procedure for someone to do something, and for someone to have the responsibility to say "Go". It's that simple.

COMMISSIONER CARR: And the training.

MR. STELLO: Well, by definition you don't

want someone --

COMMISSIONER CARR: Some procedures we don't like to train in, we walk through, you know.

MR. STELLO: Well, I can't think of anything we wouldn't want to have any training in. We want to have some kind of training if they are procedures.

COMMISSIONER CARR: Even if it is a walk-through?

MR. STELLO: If that's all you can do, yes. Because some of these accidents, in terms of analyzing them, you are beyond the state-of-the-art of putting them on simulators, you can't simulate them.

COMMISSIONER CARR: Excuse me, go ahead.

MR. CONGEL: The only point I can make at this stage is that the table that we were just referring to is the first step. We certainly don't expect our accumulation of knowledge to stop, and that as we gain more knowledge we will be putting out analogous types of tables.

The third bullet on the slide 7, the last item on slide 7, says that there will be accident management strategies that will be developed by the NRC-PRA people.

COMMISSIONER CARR: One of my hang-ups is why did you pick the vehicle of a generic letter?

COMMISSIONER ROBERTS: The regulatory basis

is 50.54(f).

COMMISSIONER CARR: That's not the only way we communicate.

MR. STELLO: No, we could issue an information notice. We could put out a NUREG and just put them on a distribution list. I didn't see anything wrong with a generic letter.

COMMISSIONER CARR: Well, from all the words you are telling me, what we want to do is just make sure they are aware of these two tables. If that's all we are going to require, I don't see why it requires a generic letter.

DR. MURLEY: I think we do expect a little more than just putting this in front of them, that's the main purpose of this. But if they were to get a letter --

COMMISSIONER CARR: That's what I meant, what is it you expect? That's what I really wanted to know.

DR. MURLEY: Yes, okay. If they were to get the letter that we were to sign out, and it goes, say, to a vice president, and he puts a buck slip on it to the plant manager and says, "Why don't you look into this, or take care of it?" -- that's not enough.

There needs to be a framework that includes their engineering staff looking at whether they can

bring in, for example, a gas-fired generator to charge their batteries, and how they would hitch it up. It needs -- once they decide that it is feasible for their plant, they need to write some procedures for it. It needs to go over to their training staff, to see how they would work it into the curriculum.

There's a lot of things like that that we regard as the framework. We want to work with EPRI, so that we don't sit back here inventing it --

COMMISSIONER CARR: Okay, that's good.

DR. MURLEY: -- but that they do it in a disciplined way.

COMMISSIONER CARR: Okay, post-IPE because, if you are going to review it, you are going to review it on the basis of their IPE look at it, I would assume, or their PRA, or something plant-specific. That's what it says on the next chart.

DR. MURLEY: It would move in parallel with the IPE, because we think we know enough, generated from all the PRAs we've done and that the industry has done, that we can present this information to them. And those that want to take advantage of it now, and want to develop this disciplined way to take advantage of it, can do it.

COMMISSIONER CARR: They can do that.

MR. STELLO: Yes, but I think the simple question you are asking, I think, is we will do our review and make a decision after the IPE.

COMMISSIONER CARR: That's what I think.

MR. STELLO: The next slide says that, yes. That's the way we are going to do it.

COMMISSIONER CARR: But you also say in here we expect them to do some things before their IPE is done. I don't know what those things are.

MR. STELLO: How about, as a minimum, look at the list, read it. If you see something in here that you already know, for whatever reason, that really is significant to your plant, we would expect you to do something about it.

If you do something about it, please do it in a disciplined, careful manner.

COMMISSIONER CURTISS: Correct me if I am wrong, but I guess I understood the next slide to say in those instances where a utility doesn't agree with the steps that ought to be taken, then the backfit decision would be made after the IPE?

MR. STELLO: After the IPE is done and all of the information is in front of you.

COMMISSIONER CURTISS: But isn't there a considerable exchange of thoughts, and maybe

formalization of requirements, before the IPE process, that a utility goes along either willingly, or less willingly with the process?

MR. STELLO: Well, I expect most utilities will take those things that they see in this list, or that they get out of the IPE that they do, and they will do them on their own. And, hopefully, when we are finished, there is nothing left to do, there is no backfit, nothing. It will all come to pass as just part of their own process, and we will look at it and say, "Yes, thank you. You did a good job", we're done. I hope that that is in most of the cases.

COMMISSIONER CARR: But if we want them to do something as a result of this, we ought to put a rule out that says, "Do it".

MR. STELLO: A rule, or backfit?

COMMISSIONER CARR: If we write this generic letter, they don't have to do anything.

COMMISSIONER ROBERTS: We are arguing over semantics. But when I go to your presentation "each NRC licensee shall implement an accident management plan". I think that's a new requirement.

COMMISSIONER CARR: But the plan doesn't require them to do anything. Unfortunately, that --

COMMISSIONER ROBERTS: We are arguing over

words.

CHAIRMAN ZECH: Part of our problem, as far as I am concerned is we have, again, so many custom-built plants. We are talking individual plants, and that's why it is so difficult to come up with something.

It sure seems to me that the whole discussion would show us, if we had standardized plants, we would be an awful lot better off, but we don't. So, we have to use judgment. I do think involving the plants themselves -- the IPE program, I think, makes sense--and involving them to the point that they tell us their views and involve them, involve EPRI, because we do, indeed, have to look at each plant individually.

And I think that's what your program is designed to do. And I think perhaps that is the difficulty the Commission is having in following it, because we keep coming back to the point that each plant is different and, therefore, that is real. And because that is real, we do, indeed, have to look at where are the weaknesses. And we are thinking about, of course, very severe accidents.

So, because of the difference in the plants, I think it is appropriate. I think what you are doing is appropriate. But I think it is very difficult to articulate this program because we have so many

different plants. It is important that they be looked at individually. I think that's what you are telling us.

MR. STELLO: They will have to be looked at individually.

CHAIRMAN ZECH: And you are trying to put out some rules that will apply to all of them, to make those rules general enough that they will apply, yet specific enough so that at least they will be involved in this thinking on severe accidents.

Isn't that what we are trying to do?

MR. STELLO: Yes.

CHAIRMAN ZECH: And it would be a lot easier if we had standardized plants, but we don't. So we are trying to manage individual plants. And we are trying to develop a severe accident type management approach to things, with individual plants. That's the challenge that we have. It is a real one, but I think the endeavor is extremely important.

So, I would say let's proceed, if we can.

DR. MURLEY: Okay, can we move to Slide 8 then, which we've covered, in essence, in the conversations today.

(Slide)

We would expect to work with each licensee,

but before that even, we are working with NUMARC and EPRI to outline what would be an appropriate accident management framework. And the intent of that is to make sure that the accident management procedures are developed, as we said, on a disciplined basis, that it involves all the appropriate people at the staff, like engineering, like operations, like training and so forth.

Now, that is our fundamental goal right now. And we believe -- I believe, that we have the industries, NUMARC's agreement, on that goal.

Then once we have that framework, we are also asking them to look at individual procedures that they might look at for their plant, that could be implemented within this framework that we talk about, this disciplined framework.

Now, if there are disagreements where we think clearly for some plant that he really ought to have a way to have a backup battery charger, for example, and he disagrees, and we think that it ought to be made a requirement, then we would, after the IPE is completed, and we understand the risk analysis that has been done for that plant, then we would make backfit decisions at that time. It is not our intent right now to make individual plant backfit decisions.

That concludes the implementation section, and there is now a discussion of the research program.

CHAIRMAN ZECH: All right, let's proceed.

MR. SHERON: Slide 9, please.

(Slide)

The role of the research program is, as it says, to provide insights for accident management, filling in gaps in knowledge on the progression, mitigation and stabilization of severe accidents.

I would digress for one second, and give you a little different perspective on accident management and its benefits. And that is that if we look at our risk assessments right now, we really don't treat the operator, and the operator's intervention very well. And it does contribute a substantial uncertainty to a risk assessment. I see one of the real benefits of accident management is, basically, making the operator more predictable in the event of a severe accident.

It is obvious that an operator is going to try and intervene in a severe accident, and do something. He is not going to just stand there and watch this thing happen. I think one thing we would like to do is make that more predictable. That would, I think, reduce a lot of the uncertainty introduced into risk assessments, and I think it would go a long way towards shoring up

credibility on our PRA assessments.

So, I suggest that --

CHAIRMAN ZECH ~~COMMISSIONER ROBERTS~~ To just suggest a quick thought on that, before you go off that subject. I understand fully your point that it is human nature to want to do something when you see something severe happening. But on the other hand, sometimes an action that is very appropriate might be to do nothing. And I hope that at least that kind of thinking would take place. And we wouldn't just tell people "never mind thinking, just do something".

I recognize the human tendency is to do something, and we all have that, I'm sure. But on the other hand, there are times when it is appropriate, in the interest of safety, to think and watch, and do nothing -- watching what is going on, and perhaps, that action itself could be more appropriate than just doing something, without thinking.

MR. SHERON: Yes, sir. I think one of the major elements of our program is to look at the adverse consequences of actions. As mentioned before --

CHAIRMAN ZECH: Actions that you take should be very confident that they are going to help.

MR. SHERON: Yes.

CHAIRMAN ZECH: That's all part of our new

program, or at least new since Three Mile Island. As you know, the new event, or diagnostic-oriented type procedures for taking actions, that every action helps prevent the more severe state.

So that philosophy, I think, should carry into even the severe accidents, in my judgment. That's the point I am trying to make.

MR. SHERON: Yes. And we are doing that extensively. In the depressurization, for example, as Dr. Murley said, you know, there are situations where depressurization is detrimental to the event.

CHAIRMAN ZECH: The action should make sense.

MR. SHERON: Correct.

CHAIRMAN ZECH: Or even if it is no action, that should make sense, too.

COMMISSIONER CARR: The experience around accidents, though, is there is always a bunch of managers there trying to figure out what the accident is, and what they should do. And you can't always do that.

So, I'm not sure we are helping them here--we are helping them prevent having the accident in the first place.

MR. SHERON: I think what we want to do is make sure that the operators have the best information

and tools available to them, in the event they have to manage such an accident. They should have the best information. If there is information that can be obtained in advance, that would help them make their decisions, then --

COMMISSIONER CARR: The thing we are discussing here, though, is having them available to them -- another source of water, or another source of air, or another source of electricity.

MR. SHERON: Yes, that's one portion. That's the prevention portion.

COMMISSIONER CARR: That's different than what they are going to be facing in this accident.

MR. SHERON: Yes, sir, that's the prevention portion. Given that, even despite a lot of efforts, one may still be faced with a core melt, you know, scenario.

Then there are other actions. For example, one that is classic that's been brought up is the question of should one dump water onto a molten core, and what are the consequences. There are questions, does a steam explosion occur? Do you generate so much additional steam that it overpressurizes containment, the additional hydrogen that is generated? Is the operator prepared and understand the consequences of such an action?

Spraying down -- if I recover electric power, after I have melted through and have a containment full of steam and hydrogen, if I divert water to the containment sprays and spray down the containment in an attempt to lower the pressure, I condense the steam -- I look for a lot of hydrogen, which could detonate.

A lot of questions like that we don't know the answers to --

COMMISSIONER CARR: That's the one we're waiting on you for.

MR. SHERON: -- but we feel that with research and analyses, looking at uncertainties, the pros and cons, we can get much better insights on whether those are, indeed, good actions to take.

(Slide)

On Slide 10, the Accident Management Research Program is a two-part program. We have a short-term, which is basically an assistance type of program to NRR, which is to assist in the closure aspects of accident management.

If you remember in the integration plan we said that one element of closure was the accident management portion. And that was when plants have in place a framework for accident management, which meant that as information, strategies, et cetera, come

available, they had a way of systematically putting it into this program.

We will be assisting them in developing the candidate accident management strategies, refining them -- the ones in the table; looking at helping develop an outline, what an acceptable framework for an accident management program would be. This would be done, again, in cooperation with EPRI and the NUMARC people.

And then assisting in the development of the appendices to the proposed generic letter, which basically are the table of candidate strategies, and then the development of a framework.

The second part of the program is a longer-term program, we call this confirmatory and it is post-closure. It is not required for the closure process at all. But, basically, it is to look very systematically and in a comprehensive manner at some of these accident management strategies -- primarily, once one has a core melt situation, what does the operator see and do?

(Slide)

On Slide 11, you will see one of the chief elements there is to, basically, provide technical information and guidance for the staff, for when we are faced with reviewing the industry's proposed programs.

If the industry comes in and proposes, for

example, to depressurize, to alleviate direct containment heating, we are probably going to be called upon to decide is that a good thing to do, or not. We need to get that information, all the information we have on the subject, to the reviewers, so that they can either agree, or disagree with that conclusion.

We will be defining a lot of supporting studies that are needed from other ongoing programs--for example, the Severe Accident Research Program itself, our Human Factors Research Program, the PRAs which are being done like 1150.

We also want to gather information that is being generated elsewhere, for example, by the Containment Performance Improvements Program which you will hear more about later this week, the IPEs which will be developing other information, and international programs -- work that is being done by Germany and Japan, for example, and what they are learning.

(Slide)

On Slide 12, as you know, we already have some ongoing projects which were started last year, the last fiscal year, in this area. We are continuing to study the efficacy of the depressurization for alleviating direct containment heating. The question is can an operator depressurize? At what time in an accident must

the decision be made to depressurize? Are the relief capacities on the existing plants adequate to depressurize? Are there any adverse consequences to depressurization.

Obviously, if you have a core that is degrading and you are depressurizing it, you are dumping a lot of steam and hydrogen into the containment. The question then -- you are also reducing the coolant inventory in the reactor, which means you are leading to a core melt faster.

So we are trying to look at, for example, does this really -- do the benefits of this outweigh the possible detriments?

Recriticality, this is a small program. It is a question that in some plants the control rods will melt before the fuel will. There is a potential that if the control rods melt out of the core, and then you reflood it with unborated water, are there any adverse consequences that need to be brought to the attention of an operator?

COMMISSIONER CARR: You say there is a potential for that in some plants?

MR. SHERON: Yes, sir.

COMMISSIONER CARR: How can we let them build them like that?

MR. SHERON: Well, it is just the fact that the melting points of the control rods in the BWR, for example, are lower than the fuel in the stainless -- in the channel boxes, and stuff. So the control rods will melt out first.

MR. STELLO: I think theoretically is a better word than potential. You could, because of the difference in melting points, do calculations.

MR. SHERON: Experimentally, we have shown that this occurs.

COMMISSIONER CARR: That's not very good. I'm not sure it makes any difference.

MR. SHERON: No. All the control rods have a lower melting temperature than fuel.

COMMISSIONER CARR: I guess the question is, should they have?

MR. STELLO: I think by their nature they have to.

DR. MURLEY: We didn't require these plants be designed to accommodate core melting conditions, we obviously didn't think of this.

I'm not so sure -- there is a lot of research that needs to be done, but I am not at all sure that recriticality is such a problem, even if it theoretically were to occur because inherent Doppler

feedbacks and things like that may just let the plant sit there and boil. I think we need to study that. But I am not at all alarmed that this is a serious concern.

MR. SHERON: I would point out, a lot of the research we are doing is to gain insights on what an operator may see as a consequence of his actions. And to make sure that the operator doesn't misinterpret those reactions.

In other words, if recriticality may occur, but it is not a big problem, I think that is something we would like the operators to know. And they should not worry about it, if they see things happen in their plant.

We are looking at the instrumentation requirements that an operator may need during a severe accident. Again, the misinterpretation, if the instruments are not reading correctly, or giving false information, the operator can take a false action. So, we want to look at those. We want to see if an operator is, indeed, called upon to take a certain action, based on certain symptoms, that the information he is receiving is, indeed, correct.

And then with the appendices to the generic letter, we will be continuing to do more research in those areas, looking at, again, accident candidate

strategies. As we discover things, we will be continuing to do PRAs in the future, and will be learning things. And as these become available, we will be analyzing them and assessing them, and passing them on to the industry.

(Slide)

On Slide 13, you will see that the new projects which we are requesting your approval is $1.37 million in this fiscal year and in FY90 we propose $3.9 million --

COMMISSIONER ROBERTS: Excuse me, could I ask a question?

MR. SHERON: Yes, sir.

COMMISSIONER ROBERTS: Can you relate Slide 13 to Slide 10? And are these items long-term, confirmatory, post-closure?

MR. SHERON: Yes, you've given us the -- I think we have already gotten approval for the funding for the short-term work, which is not much, I think it was 300K.

COMMISSIONER ROBERTS: So all of this is long-term, confirmatory, post-closure?

MR. SHERON: Yes, sir.

COMMISSIONER CARR: And all of them start in '89? Or all of them are funded by that 1370, or some of

them pick up in '90?

MR. SHERON: I think some of them pick up in '90. We start some in FY89, we will be starting some in FY90.

COMMISSIONER ROBERTS: Does it go beyond FY90?

MR. SHERON: Yes, sir.

COMMISSIONER CARR: The way I read it it is $4 million a year, after FY90.

MR. SHERON: Yes. But we said we would request your approval through the normal budget approval process.

CHAIRMAN ZECH: Are all of these figures you are giving us here on Slide 13, accommodated in the five-year plan?

MR. SHERON: Yes, they are. I xeroxed a copy here, and the numbers you see in the five-year plan are slightly higher. That's primarily because they also include the ongoing programs which we already had. This is only for the new starts.

CHAIRMAN ZECH: I understand. But they are accommodated in your --

MR. SHERON: Yes, sir.

CHAIRMAN ZECH: And beyond 1990, they would also be in the five-year plan?

MR. SHERON: Yes, sir. We are not asking for

any new money.

COMMISSIONER CARR: At about 4 million a year, it says.

CHAIRMAN ZECH: All right, you may proceed.

MR. SHERON: The areas we would be looking at, as I mentioned before, in-vessel strategies, primarily consequences of cooling a degraded core, or just ways that one might be able to cool a core that has started to melt down, but is still in the vessel -- questions about having it retained in the vessel.

Ex-vessel strategies, ways to reduce releases, possible paths on which one can filter any effluent. Questions, as I mentioned before, about if I recover systems -- what strategy should an operator use? Should he put water -- if the containment is at pressure already and you put water on a molten vessel, you are going to generate a lot more steam, you may over-pressurize the containment right then and there. Should I put water on the vessel, should I put it in the containment -- questions like that.

COMMISSIONER CARR: Those are tactics, right? Strategies are should you put water in at all? And tactics is where should you put it.

MR. SHERON: Well, that would be a question, as we said -- should you even put water in? If you

recover it, I think it would be -- right now, if an operator had the opportunity to put water back into the system, I think he would do it. I'm not sure we have a basis to tell him not to, at least now. Hopefully, the research will answer that.

As we said, we will be looking at the information needs for accident management -- what does an operator need in terms of information in the control room, to make the right decisions? We will be giving assistance to NRR in the implementation of a framework that the utilities are developing.

As I said before, consequences of cooling a degraded core, that's basically, the in-vessel strategies. The uncertainties affecting accident management, I think, is a very key area. Given our understanding of phenomena associated with severe accidents, which is, indeed, very complex, uncertainties are going to play a large role in what we would ultimately recommend to the industry.

One of the things we want to do is get a real handle on how big these uncertainties are and whether they affect -- whether our decision would go one way, or the other.

And diagnostic computational aids, these are things that a support team in the tech support center,

for example, might have available. These might be graphs and monographs that we would normally use for calculating, for example, times to core uncovery, and the like. We have been experimenting with some of these in the incident response center as part of the drills. So, I think there is some information available on their usefulness.

(Slide)

Slide 14, is our conclusion -- mainly, we think we have a realistic regulatory approach formulated which would assure the implementation of it by the utilities. I would just point out again, this is a key element in our closure process. We think we have a focused accident management research program developed. We've put a lot of thought into it in terms of what the programs are that we want to pursue.

We have broken it up into a small program which will support the closure process, and then a longer-term confirmatory research program which will complement the ongoing efforts by the industry, and I think, also, provide a vehicle for utilizing much of the information coming out of the research program in severe accidents.

And, finally, we are requesting your approval to get started on this program. Our contractors are

ready and waiting to start work on this.

MR. STELLO: We're through, Mr. Chairman.

CHAIRMAN ZECH: Thank you very much.

Any questions from my fellow Commissioners? Commissioner Roberts?

COMMISSIONER ROBERTS: No question, but a comment, and I'm supportive of what you're doing, but the draft letter attached to the SECY paper says the regulatory basis for the issuance of the letter is 10 CFR 50.54(f), and that's a request for information, but the draft letter requires licensees to implement a plan, and to me that's a new requirement, and has to be justified under 10 CFR 50.54(f). That is my opinion. I'm not asking for discussion. That's all I have.

CHAIRMAN ZECH: All right. We'll ask the staff to take that for consideration. Commissioner Carr?

COMMISSIONER CARR: I've got a lot of questions, most of which I have addressed. One is global strategies we haven't addressed, and the other one is framework. I still don't know, when you say we're going to assess this thing in global strategies.

On page 3 of your paper -- we've already discussed that this is going to be part of the IPE in some point, and that's fine.

Point one up there says you're going to develop technically sound strategies. I've worked with strategies all my life, and I don't understand the term strategy in the approach we're taking here, but in paragraph three there, you say -- you're assuring that the nuclear plant staff is trained in procedures and guidance to follow in the event of an accident beyond the design basis, and that the utility management is trained and prepared to deal with severe accidents.

I would say maybe they'll be prepared to deal with some or a range of severe accidents, if we've thought about it ahead of time.

MR. STELLO: Those for which you have the procedures and at least some insight --

COMMISSIONER CARR: For the ones that somebody's conjured up and it happens like they conjured it, they may be able to hack it.

MR. STELLO: Well, let me try to use this without generating a new example.

COMMISSIONER CARR: Very few guys will get mixed up again on TMI type accidents.

MR. STELLO: Yes, I agree with you, but there are probably a whole host of scenarios that can lead to, say, a loss of feedwater. It doesn't make any difference how you lose it, it's how you deal with it.

There are many ways in which you can come there, how are you going to deal with that, but there are probably some particular accidents, severe accident sequences, that are going to be beyond what you will have in the procedure, and I would expect that that will, in fact, be the case; not all.

COMMISSIONER CARR: In para four there, it looks like that ought to go first, before the first three. We ought to provide the technical basis before we require them to do something.

I'm still hung up on strategy. On page 4 you talk about "On the basis of existing PRAs the staff has identified several generic accident management strategies", and my question is, for instance?

The first bullet on page 4 in the SECY paper. I just throw that on the table because when I'm trying to understand this thing --

DR. MURLEY: I wonder if maybe we're using "strategies" a little different from what you're used to.

MR. STELLO: We are.

COMMISSIONER CARR: We are.

MR. STELLO: You are. In Table I.

MR. CONGEL: It refers to the table.

DR. MURLEY: Table I.

MR. STELLO: Table I.

COMMISSIONER CARR: "Several generic accident management strategies".

CHAIRMAN ZECH: I hope you mean tactics.

COMMISSIONER CARR: I think those are -- yeah. Why don't you just say, hey, you need more feedwater, you put in another feedwater system, or if you want more electricity, you give them another generator.

CHAIRMAN ZECH: Tactics, not strategies.

COMMISSIONER CARR: In the second bullet, "Operators, technical support staff, and managers responsible for responding in the event of an accident should be generally aware of the progression -- (i.e., their symptoms) -- ". That's where you're going to get hung up, is telling them the symptoms of these severe accidents.

I'm not -- that's where we always get the accidents from, is somebody didn't recognize the symptoms, and we go around and patch that up after it's over.

Most of our accident things we've put into place is because somebody almost had one, or somebody did have one, and we said, "Oh, now we know what the symptoms are and we can put those on the simulator and we can train in those".

Figuring out the symptoms for accidents that haven't happened yet is a pretty tough especially when, as you say, you can't put it on the simulator.

MR. STELLO: But I think the idea prior to TMI, the procedures were based on understanding events. We've gotten away from that, and now we key on what are the symptoms you're trying to respond to, and you ought to understand symptoms.

I mean, if you don't have radiation, you haven't damaged the core yet, but if the temperatures are starting to rise in core exit, you're uncovered. Symptoms. To the extent you can. You're never going to get it all or be perfect, that's the whole idea.

Someone will have made a mistake, that's what got you in trouble, most likely.

COMMISSIONER CARR: But you're going to come up with those symptoms and their timing and give them to these guys so they can train with them, that's what it says there.

MR. STELLO: Yes.

COMMISSIONER CARR: That's going to be an awfully tough job.

MR. STELLO: In a general sense, the types of things that Sher was talking about a moment ago in terms of timing -- how long without water will the core

uncover --

COMMISSIONER CARR: The reason it's going to be tough is, you're going to make the licensee do it. The next bullet says "Each licensee will be expected to make available for the technical support staff and managers, a set of guidance for diagnosing the progress of severe accidents".

MR. STELLO: I think you would have to have some of that in order to operate from the tech support center -- already have, in many cases.

COMMISSIONER CARR: On page 5, "Approach for Accident Management Implementation. . . . In addition, we expect NUMARC to provide industry's perspective and bring about the necessary industry-supported initiatives on accident management". What and when do you expect those?

DR. MURLEY: Well, we are working now with NUMARC, and their agent in this -- in the details, is EPRI. And my understanding is they are working quite vigorously on this, and I think -- did we have a plan for meeting with EPRI soon, Frank?

MR. CONGEL: Yes, we have a meeting Thursday, this coming Thursday.

COMMISSIONER CARR: Well, I'm trying to get a handle on what initiatives you expect to come out of

that, and when do you expect to get them. Have we outlined that yet?

DR. MURLEY: Why don't you discuss --

MR. CONGEL: On Thursday, we're going to discuss the results of actually the meeting that we're having today, with NUMARC. We have a couple of other things on the table, and I might have one of my staff people come up with the outline, but as a result of the last meeting that we had with Dr. Murley involved, all of our philosophy was laid on the table.

The respective staffs went separate ways to develop some of the matters which we want to carry out to actual implementation. Our next meeting is going to be the next round of discussions on the manner in which we plan to do this implementation.

MR. STELLO: Do you know, Frank, when NUMARC -- do they have a schedule of when they expect to have a product?

MR. CONGEL: No.

MR. STELLO: Can you make a guess? You haven't made an estimate? No guess?

CHAIRMAN ZECH: You're going to talk about this Thursday? Is that what you're telling us?

MR. CONGEL: We'll probably talk about it Thursday.

COMMISSIONER CARR: Don't give me a guess if you haven't got one.

MR. CONGEL: Pardon?

COMMISSIONER CARR: I said don't give me a guess if you haven't got one.

MR. CONGEL: I do not have a guess.

COMMISSIONER CARR: The next paragraph I discussed -- "The regulatory mechanism for obtaining improvements in industry accident management capabilities will be through the issuance of a generic letter". I guess my question is, why not a rule? When you come back, you can tell me why not.

MR. STELLO: It can be a rule.

COMMISSIONER CARR: Can't be?

MR. STELLO: Sure, it can.

COMMISSIONER CARR: Oh. Well, we're going to require improvements.

MR. STELLO: But I wouldn't know what to put in a rule except to tell each licensee, "Do good on a case-by-case basis. Tell us what you did and we'll decide if you do good".

COMMISSIONER CARR: Is that the way we write generic letters?

MR. STELLO: That's basically what you're writing. You're putting out a generic letter saying

"Here are some ideas. Put together a program as part of your IPE, look at them, and tell us what you propose to do for your accident management plan for your facility". It's case-by-case. They're all going to be different.

Rules are very good when you know, or have a fairly good idea of what you want to require, but I don't know how we could justify with any kind of specificity now, nor do I think it would be wise to do so.

COMMISSIONER CARR: I agree with that. I'm just not sure that a generic letter is going to accomplish what you want to accomplish. The last sentence in this thing says what we're requiring them to do -- let me get the generic letter out.

The last sentence in the generic letter-- "Within 90 days of receipt of this letter, licensees should submit a response certifying their commitment to implement an Accident Management Plan that provides a framework for evaluating and implementing severe accident procedures".

So, the guy writes back and says "I commit to doing it", period, end of commitment. That's all he's required to do.

MR. STELLO: And it will probably be some years as he's actually going about the process of doing

it.

COMMISSIONER CARR: If that's what you want, then I can understand. Okay.

On page 6, "... improvements in accident management capabilities can be realized prior to completion of an IPE. Examples of such improvements include near term implementation of certain accident management procedures (to be included in the Generic Letter on accident management) ..." Is that your table? I'm at the top of page 6, second sentence.

DR. MURLEY: Yes, that was the intention, was the examples that we've listed in the attachment to the Generic Letter.

COMMISSIONER CARR: They are not all-inclusive?

DR. MURLEY: Oh, no.

MR. STELLO: But while they are not all-inclusive, they are the best judgment of the staff of those that are most important.

COMMISSIONER CARR: Those are the only ones we know about now, from what you've told me.

MR. STELLO: That's correct.

COMMISSIONER CARR: But we're giving them the benefit of our expertise and what we've gathered together, and those are the examples we're going to give

them.

MR. STELLO: That's correct, and we think that's not a bad list.

COMMISSIONER CARR: Okay.

DR. MURLEY: And my guess is that as the IPE proceeds for each plant, they will find some of their own. It depends on their involvement --

COMMISSIONER CARR: But we've got to wait for the end of the IPE to get their plan back.

MR. STELLO: For it to be finished, for sure.

DR. MURLEY: To be finished.

COMMISSIONER CARR: But you're saying that this is outside the plan. Take care of these examples outside the plan, is what you're saying.

DR. MURLEY: Yes, because we have done enough study and know enough ourselves, of the generic applicability of these examples, that we're quite confident they will apply to most, if not all, plants. So, let's not wait. Go ahead and look at these.

COMMISSIONER CARR: You give the option to the guy in the third paragraph to do this -- "Generic accident management procedures could be incorporated into emergency procedure guidelines by the vendor owners groups and assessed by NRC according to existing channels of review".

Suppose he opts to do that? That will delay the program, won't it?

DR. MURLEY: No, I don't think so because, for example, take the BWR emergency operating procedures. They are going through periodic upgrades, and we're now on revision four of the emergency procedure guidelines. It could be that revision five might include some of these advance notions of severe accident procedures, in which case we would review it the way we normally review EOPs.

COMMISSIONER CARR: Okay. Next page, there's a lot more on strategy that I don't understand, that somehow you've got to explain strategy to me. We won't take the time to do it now.

And the same on page 8. You're still talking strategies. And you've got the paragraph, next to the bottom on page 8 that says "Even though this research will concentrate on all consequences of potential actions, ... currently expected that the ultimate guidance to the operating staff is to always add water during the course of a severe accident". We really want to tell them that, huh?

DR. MURLEY: Well, at this stage, yes, because we're fairly confident that -- you know, we're talking about probabilities, to some extent, and it's always --

COMMISSIONER CARR: Well, all these are low probabilities we're talking about anyway.

DR. MURLEY: Once you get into this situation, our knowledge today tells us that in most cases, if not all, but let's say most cases, it's going to be proper to add water.

COMMISSIONER CARR: Unless he's got a solid plan.

CHAIRMAN ZECH: So, you want to keep the core covered?

MR. STELLO: Yes.

CHAIRMAN ZECH: I think.

MR. STELLO: I think the issue here is, if the core was uncovered or partially uncovered and you were operating the plant, would you add water? I think our judgment is yes.

COMMISSIONER CARR: If you know the core is uncovered or partially uncovered --

MR. STELLO: If you know it was covered or partially uncovered, you'd add water.

COMMISSIONER CARR: I mean, we've got all those "iffies" in there.

DR. MURLEY: If you don't know, you'd still want to add water because you may have a bubble in the head, the top of the vessel, that leads you to think

your pressurizer is full and --

COMMISSIONER CARR: Three Mile Island thought they were solid, so they didn't want to add water.

DR. MURLEY: Exactly right.

COMMISSIONER CARR: And I would bet you the next guy that thinks he's solid isn't going to want to add water either.

DR. MURLEY: Well, what we're saying here is we think you ought to.

COMMISSIONER CARR: I want to be sure you want to tell them that, that's all I'm saying.

MR. STELLO: Yes. For that case, yes.

COMMISSIONER CARR: Okay.

MR. BECKJORD: There may be situations in which you want to limit the amount of water that you're adding, limit the rate.

CHAIRMAN ZECH: But you generally want to keep the core covered.

MR. BECKJORD: That's right. That's right.

DR. MURLEY: And if you don't know --

COMMISSIONER CARR: I'm not arguing that point. That's not what they're telling him to do, though.

On the Generic Letter, Attachment 2, first page, the guidelines -- it says "NRC staff through

NUMARC is going to develop guidelines that define a generic framework", which are great words, but it says "These guidelines, to be developed as part of an industry initiative" -- bottom paragraph -- "should address each of the key attributes of a utility Accident Management Plan". What are the key attributes of a utility Accident Management Plan? Is that those things you listed over there that says the parts?

DR. MURLEY: Page 3 of the commission paper, Commissioner.

COMMISSIONER CARR: Are the key attributes?

DR. MURLEY: Yes.

COMMISSIONER CARR: One, two, three, four?

DR. MURLEY: Yes.

COMMISSIONER CARR: That's what the guy, in responding to the Generic Letter, has got to do.

DR. MURLEY: Yes. Maybe we haven't stated it as eloquently as we could, but the essence is to do it in a systematic, disciplined way -- have your engineering staff look at, as you said, item 4 of those four is probably the most important, do a technical basis for assessing the effectiveness of --

COMMISSIONER CARR: But this plan -- this is outside of appendix where you give them the samples. All these things only affect the plan, and you're

telling them the samples are different than --

DR. MURLEY: We're saying "Here are some sample strategies" -- or "tactics" I think is a better phrase -- but "Here are some samples that we believe might apply to your plant because we've done a lot of study of them", but what the framework is, is they've got to have a means for taking these examples and evaluating them for their plant, doing it in a systematic way.

COMMISSIONER CARR: And the utility response says "Within 90 days submit" -- what you were talking about -- and "in each case, the best estimate schedule, including for implementing the accident management plan". I guess I don't understand how you implement a framework. What we're requiring them to submit is a framework for evaluating and implementing, and now we want a schedule for implementing. I think we're ahead of ourselves.

DR. MURLEY: Well, perhaps, but what we have in mind here is "tell us when you're going to have a procedure in place so that you can take one of these examples we've given you and do the analysis in your own organization, to see whether it applies to your plant. Also tell us whether you've got a procedure in place so that you can take this same example, assuming it applies

to your plant, and write a procedure for it".

So, this framework is really, if you will, a large superstructure of procedures for taking these examples and developing, analyzing and developing procedures --

COMMISSIONER CARR: Well, the framework is not doing anything except laying out the system that's going to do something later.

DR. MURLEY: Well, that's a way of saying it, yes, because right now most utilities don't have a means of making use of this great information we're giving them. They don't know what to do with it other than send it on a buck slip down to the plant manager or something.

COMMISSIONER CARR: Well, then they may not 'til they have their PRA or their IPE done, which is what I think may happen.

DR. MURLEY: Well, I think these examples are simple enough and generic enough that they could analyze now, but in some cases it may be that they decide they want to wait until their PRA is done.

MR. STELLO: Over half the plants have either a PRA or IPE equivalent.

COMMISSIONER CARR: I hate to say it, but I think we ought to make them all have one right away and

we get through with that problem.

I don't have anymore questions, but I would advise you to sit one of your guys down and have them try to comply with that Generic Letter before you mail it.

MR. STELLO: Okay.

CHAIRMAN ZECH: Commissioner Rogers?

COMMISSIONER ROGERS: On your research program, new research program, I notice that the list of topics in your slides is a shorter list than that in Attachment 1, and one of the missing items in that list of new projects is the BWR accident management insights. There are four items left off that list on the slides that were in the list in Attachment 1 -- BWR accident management insights, strategies related to direct containment heating, guidelines for industry audit, and support for plant exercises.

Are those located someplace else in your research program, or where are those? They are not dropped, presumably, but they are not explicitly mentioned in the list, on the slide list.

MR. SHERON: I think it was just a matter of trying to condense it down into something that would fit on the screen.

COMMISSIONER ROGERS: I see, the slide isn't

big enough to hold everything. Okay. If that's the answer, so be it. I think it would have been nice to have seen or heard about that because they just seemed to disappear from the scene, but they all are included in --

MR. SHERON: Yes, sir.

COMMISSIONER ROGERS: -- because the numbers are the same, the dollars are the same. Okay.

Some of the questions that Commissioner Carr raised in the very early discussions, I think were some items that I was particularly concerned about as well-- the whole question of introducing new elements of complexity into the system to deal with these already remote circumstances that might occur. It seems to me that this is something we have to approach with a great deal of care.

Adding new hardware to deal with a very unlikely eventuality, but hardware which could easily create another problem of its own through an error is something that I, frankly, would be quite worried about.

I think that the saltwater example that Commissioner Carr gave is just the kind of thing that one can well imagine happening. Cross-connects that are added -- we've already heard in the last year or so about an occasional cross-connect valve that was open

when it shouldn't have been, nobody knew about it, so on and so forth.

So, it seems to me that a very thorough analysis has to be done of each of the proposed fixes, and I'm concerned about that because it seems to me, in some cases, they are going to require pretty sophisticated systems analysis to make sure that what looks at first blush to be something that would help, in fact, doesn't have some consequences that are pretty tough to see but if you look at it very carefully you see there is a circumstance under which further problems could arise, and I just wonder how that very close look is going to be taken.

Is it going to be taken by us? Is it going to be taken entirely by the licensee? How are we going to analyze the innovative solutions that are proposed by, let's say, operators that might sound very good but it really takes a very sophisticated design engineer to look at the possible consequences of something like that, to decide that that isn't such a great idea after all, and how are we going to do that?

DR. MURLEY: In the first instance, we would expect the licensee to do the analysis himself, to assure that any changes that he's proposing are appropriate for his plant and won't make the situation

worse.

COMMISSIONER ROGERS: Even if they are just procedural changes?

DR. MURLEY: Yes, even if they are procedural changes, that's correct. We would, in the normal course of events, review those. We're going to discuss later this week, an item on direct core's venting in the BWR Mark Is, and you'll recall that we required the owners group and some utilities to do very careful analysis before we were satisfied ourselves that they had covered all the bases.

So, to summarize, we would expect the utility to do his own analysis, and hold them responsible for making sure it's a safe change to make. We would also do our own independent reviews, generally.

COMMISSIONER ROGERS: Well, it seems to me it's something that requires a great deal of look, hard look, when new procedures are suggested to deal with a very unlikely set of circumstances that led you into this accident mode in the first place, and --

DR. MURLEY: I agree wholeheartedly.

COMMISSIONER ROGERS: -- that they can't be entered easily at all, and that they really have to be analyzed very, very carefully. And that's why the Appendix 1, with some of the procedures for developing

global strategies, including procedures for defeating interlocks and overriding component protective trips in emergency situations -- that one really, I think, raises the hackles on the back of all of our necks when we see something like that because we know how careful one has to be to not casually move into something like that, and the question is, are you going to turn the ACRS loose on some of these possible fixes? I would hope so.

MR. STELLO: Oh, they will be involved, no question, if some of these come up, and have been.

MR. SHERON: We did brief them last week.

CHAIRMAN ZECH: You briefed them last week, you say?

MR. SHERON: Yes, sir.

CHAIRMAN ZECH: Thank you.

COMMISSIONER ROGERS: The whole question of moving ahead on some of these things before the IPEs are completed has been difficult to appreciate. I think the protracted questions that we've had here today have been because we've had a lot of trouble dealing with that suggestion that it was possible to move ahead before the IPEs, and I think that some of your comments about the significance of the table at the end have helped to straighten us out a little bit on that, but I think we did not enter this meeting -- at least I didn't -- with

a full appreciation of the significance of that table in terms of how key it is to what you expect could be done early on, and it seems to me that this generic letter and how you present it has to clarify that more than the proposed draft does.

DR. MURLEY: I might just add, Commissioner, that to some extent the generic letter outline was just that, an outline. We realize it's not close to final form, but we felt we ought to tell the Commission this is the direction that we're heading.

We expect to work with NUMARC and with EPRI to flesh out more clearly what we mean by this framework, and I guess I agree with you that it's not immediately clear from reading this, just how to go about it, but we expect to do that, and when they get our letter, we will have had many, many meetings working with them, so they'll know exactly what we mean.

COMMISSIONER CARR: I took it as a draft letter. I just thought you wanted some comment on it, so I gave you some.

DR. MURLEY: And we appreciate it.

COMMISSIONER ROGERS: Very generously, I think.

I'd just like to stress in your new projects, the cite that there are two main purposes of the long-

term research -- the second one, to evaluate the potential disadvantages of seemingly advantageous accident management actions, and I certainly would like to stress that that be looked at very, very hard in each case. I think that's as important as the first objective.

Thank you very much.

CHAIRMAN ZECH: Thank you. Commissioner Curtiss?

COMMISSIONER CURTISS: I just have a couple of quick questions. On the funding issue for the research, the $4-5 million that we begin in FY90 and continue on at that point, how much of that is going to be recovered through user fees on the industry? Is it envisioned a large part of that would come back to the agency?

MR. STELLO: The way we are structured at the moment, it would be 55 percent, or 45 -- which number?

COMMISSIONER CARR: Well, if the law goes to 100 percent, it would be 100 percent.

MR. STELLO: If the law goes to 100, it will be 100, but it's whatever was in the fee now. I think it's either 45 or 50.

COMMISSIONER CURTISS: Forty-five percent of that amount would be recovered?

MR. STELLO: Oh, yes, that's included.

COMMISSIONER CURTISS: Okay. Second question. On the equipment operability issue, what are we doing on the research side with fire and seismic, and how much research remains to be done on the severe accident context on those two issues?

MR. BECKJORD: Well, with regard to fire, we don't have anything active now except a study, a fire risk scoping study, and we have some elements that we would expect to begin in the next fiscal year, fiscal '90.

COMMISSIONER CURTISS: Does any of that research affect what you're doing here?

MR. BECKJORD: No.

COMMISSIONER CURTISS: Okay. That's all I have.

CHAIRMAN ZECH: Thank you.

Well, just a comment or two. First of all, this whole subject of accident management in severe accidents I think is very important. I think it's responsible action to take. Again, we are talking about very remote possibility accidents, but we're talking about accidents above the design basis accident, beyond the design basis accident, and it's also a very complex subject because I think most of us have realized that the plants out there are complex enough already.

We would hope to enter into some kind of simplicity as far as not only the hardware but the procedures are concerned, but we recognize also that it is very responsible -- at least I do -- to consider this very remote possibility of a very severe accident. And, so, to have the utilities involved and have EPRI involved I think is very good, and I would commend the staff to continue working with EPRI as you have done, continue working with the ACRS and with other industry groups that could contribute to this subject.

I do think we have to look very carefully at any requirements we lay on in this regard because, again, we don't want to adversely affect safety. We want to enhance safety.

I think the IPE process and the PRA programs that are already underway are excellent programs. They certainly relate with this program. I think what we are trying to do is logically make procedural and perhaps hardware changes that would, indeed, give us added confidence that if a severe accident did happen, that it could be handled, could be managed, and I think that's what we're trying to do, but it's a very complex subject.

I think the staff, frankly, is doing a very commendable job. I recognize the difficulty of what

you're trying to do. I think the regulatory people working hand-in-hand with the research people is the right thing to do. I think we've certainly got some top-notch people in this agency involved in this program.

So, I would just say that I think the staff is doing the right thing in a very complex area, but also a very important area. I would encourage you to continue your associations with the outside agencies, and we'll look forward to reviewing, again, the paper you've presented us. We've already given you plenty to think about today, but we'll get back to you also with specific comments as you've requested, on the SECY paper. But, again, I think it's been a very informative and very important briefing, and I commend the staff for the actions that you're taking.

Any other comments from fellow Commissioners?

(No response.)

If not, thank you very much. We stand adjourned.

(Whereupon, at 3:57 p.m., the meeting was adjourned.)

CERTIFICATE OF TRANSCRIBER

This is to certify that the attached events of a meeting of the United States Nuclear Regulatory Commission entitled:

TITLE OF MEETING: BRIEFING ON ACCIDENT MANAGEMENT PROGRAM

PLACE OF MEETING: ROCKVILLE, MARYLAND

DATE OF MEETING: JANUARY 23, 1989

were transcribed by me. I further certify that said transcription is accurate and complete, to the best of my ability, and that the transcript is a true and accurate record of the foregoing events.

Reporter's name: _____
(if other than transcriber)

AS OF JANUARY 23, 1989

COMMISSION BRIEFING ON

ACCIDENT MANAGEMENT

MONDAY, JANUARY 23, 1989

OBJECTIVES OF PRESENTATION

1. To obtain approval of the NRC Accident Management Program Plan, as part of the previously approved Integration Plan for Severe Accidents.

2. To obtain approval of the Accident Management Research Program through FY 90.

ACCIDENT MANAGEMENT IS AN ESSENTIAL ELEMENT OF THE NRC INTEGRATION PLAN FOR CLOSURE OF SEVERE ACCIDENT ISSUES, PRESENTED IN SECY-88-147 (MAY, 1988).

OTHER KEY ELEMENTS OF THIS PLAN INCLUDE INDIVIDUAL PLANT EXAMINATIONS, CONTAINMENT PERFORMANCE IMPROVEMENT AND THE SEVERE ACCIDENT RESEARCH PROGRAM.

ACCIDENT MANAGEMENT

- ACTIONS TAKEN BY PLANT STAFF TO:
  - PREVENT CORE DAMAGE
  - TERMINATE PROGRESS OF CORE DAMAGE AND RETAIN WITHIN VESSEL
  - MAINTAIN CONTAINMENT INTEGRITY
  - MINIMIZE OFF-SITE RELEASES
- INVOLVES PRE-PLANNING AND PREPARATORY MEASURES

IN EFFECT, ACCIDENT MANAGEMENT:

- EXTENDS THE DEFENSE IN DEPTH PRINCIPLE TO THE OPERATING STAFF
- EXTENDS THE OPERATING PROCEDURES WELL BEYOND THE DESIGN BASIS INTO SEVERE FUEL DAMAGE REGIMES
- HAS THE GOAL OF ENHANCING OPERATOR SKILLS AND CREATIVITY TO TERMINATE SEVERE ACCIDENTS BY PROVIDING FOR INNOVATIVE USE OF EXISTING PLANT CAPABILITIES.

FUNDAMENTAL OBJECTIVE OF ACCIDENT MANAGEMENT PROGRAM:

EACH NRC LICENSEE SHALL PREPARE AN ACCIDENT MANAGEMENT PLAN WHICH PROVIDES A FRAMEWORK FOR

- EVALUATING INFORMATION ON SEVERE ACCIDENTS
- PREPARING SEVERE ACCIDENT OPERATING PROCEDURES
- TRAINING OPERATORS AND MANAGERS IN THE PROCEDURES

FIVE ELEMENTS OF A FRAMEWORK FOR ACCIDENT MANAGEMENT:

1. Accident Management Procedures
2. Training in Severe Accidents
3. Accident Management Guidance
4. Instrumentation
5. Decision Making Responsibilities

INTERACTION WITH INDUSTRY

- NUMARC
  - OWNERS GROUPS
  - EPRI

MECHANISM FOR IMPLEMENTATION

- IPE WORK SHOPS
- GENERIC LETTER
- CANDIDATE A/M STRATEGIES DEVELOPED BY NRC PRA EXPERTS

APPROACH FOR IMPLEMENTATION

- DEVELOPED WITH EACH LICENSEE ON AN INDIVIDUAL BASIS
- BACKFIT DECISIONS WILL BE MADE AFTER REVIEW OF IPE.

ROLE OF NRC SEVERE ACCIDENT RESEARCH PROGRAM IS TO PROVIDE INSIGHTS FOR ACCIDENT MANAGEMENT BASED ON FILLING GAPS IN KNOWLEDGE ON PROGRESSION, MITIGATION AND STABILIZATION OF SEVERE FUEL DAMAGE ACCIDENTS

NRC ACCIDENT MANAGEMENT RESEARCH PROGRAM

SHORT-TERM: NEEDED FOR CLOSURE

- o CANDIDATE ACCIDENT MANAGEMENT STRATEGIES
- o FRAMEWORK OF AN ACCIDENT MANAGEMENT PROGRAM
- o APPENDICES TO GENERIC LETTER

LONG-TERM: CONFIRMATORY POST-CLOSURE

- o ORGANIZED AND COMPREHENSIVE BASIS FOR EVALUATION OF GENERIC ACCIDENT MANAGEMENT STRATEGIES, BOTH IN-VESSEL AND EX-VESSEL.

LONG-TERM (CON'T)

- o TECHNICAL GUIDANCE FOR REVIEW OF INDUSTRY PROGRAM
- o DEFINITION OF SUPPORTING STUDIES FROM RELATED ONGOING PROGRAMS (E.G., SARP, HUMAN FACTORS, PRA)
- o INTEGRATION OF APPROPRIATE RESULTS FROM OTHER PROGRAMS (E.G., CPI, IPE, INTERNATIONAL)

NRC ACCIDENT MANAGEMENT RESEARCH PROGRAM

ONGOING PROJECTS:

- o DEPRESSURIZATION TO MINIMIZE DIRECT CONTAINMENT HEATING
- o RECRITICALITY
- o INSTRUMENTATION REQUIREMENTS
- o APPENDICES TO GENERIC LETTER

NRC A/M RESEARCH PROGRAM, CON'T

NEW PROJECTS: (FY89: $1370K
FY90: $3935K)

To Confirm Closure Decisions

- In-Vessel strategies
- Ex-Vessel strategies
- Information needs for A/M
- A/M framework implementation
- Bounds of coolability of a degraded core
- Uncertainties affecting A/M
- Diagnostic computational aids

CONCLUSION

- A REALISTIC REGULATORY APPROACH TO ACCIDENT MANAGEMENT HAS BEEN FORMULATED TO ASSURE IMPLEMENTATION AT UTILITIES
- A FOCUSSED ACCIDENT MANAGEMENT RESEARCH PROGRAM HAS BEEN DEFINED TO SUPPORT BOTH REGULATORY CLOSURE AND POST-CLOSURE CONFIRMATION
- REQUEST COMMISSION NOTE THE REGULATORY APPROACH AND APPROVE THE RESEARCH PROGRAM THROUGH FY90

POLICY ISSUE

(Notation Vote)

January 18, 1989 SECY-89-012

For: The Commissioners

From: Victor Stello, Jr.
Executive Director for Operations

Subject: STAFF PLANS FOR ACCIDENT MANAGEMENT REGULATORY AND RESEARCH PROGRAMS

Purpose: The purposes of this paper are:

1. To describe the major goals, framework, and elements of NRC's accident management program, and the approach of implementing the Accident Management portion of the integration plan for severe accident closure (SECY-88-147), and

2. To summarize the research efforts planned or now underway to furnish confirmatory information and technical support to the staff in support of Accident Management,

3. To obtain approval of the Accident Management research program through FY90.

Background: Accident Management encompasses those actions taken during the course of an accident by the plant operating and technical staff to: (1) prevent core damage, (2) terminate the progress of core damage if it begins and retain the core within the reactor vessel, (3) maintain containment integrity as long as possible, and (4) minimize offsite releases. Accident management, in effect, extends the defense-in-depth principle to plant operating staff by extending the operating procedures well beyond the plant design basis into severe fuel damage regimes, with the goal of taking advantage of existing plant equipment and operator skills and creativity to find ways to terminate accidents beyond the design basis or to limit offsite releases.

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R. Barrett, NRR, 49-21089

The NRC staff has concluded, based upon PRAs and severe accident analyses, that the risk associated with severe core damage accidents can be further reduced through effective accident management. In this context, effective accident management would ensure that optimal and maximum safety benefits are derived from available, existing systems and plant operating staff through pre-planned strategies. Furthermore, the International Nuclear Safety Advisory Group (INSAG) in its report on Basic Safety Principles for Nuclear Power Plants concluded that accident management and mitigation measures can significantly reduce risk. Accordingly, accident management is considered to be an essential element of the severe accident closure process described in the Integration Plan for Closure of Severe Accident Issues (SECY-88-147) and the Generic Letter on the Individual Plant Examination (Generic Letter 88-20).

In the IPE Generic Letter, the staff deferred the requirement to develop an accident management plan, stating that we are currently developing more specific guidance on this matter and are working with NUMARC to (1) define the scope and content of acceptable accident management programs, and (2) identify a plan of action that will ultimately result in incorporating any plant-specific actions deemed necessary, as a result of the IPE, into an overall severe accident management program. Since that time we have made considerable progress towards development of an Accident Management Program that would lead to enhanced accident management capabilities in the nuclear industry. This program will be supported by an Accident Management Research Program, which will be coordinated with and use the results of other programs, including the Containment Performance Improvement Program (CPI), the Severe Accident Research Program (SARP), and the Human Factors Research Program. A summary description of the Accident Management Program and supporting research programs is presented below, and in Attachment 1.

Discussion:

The fundamental objective of the proposed Accident Management Program is the following:

Each NRC licensee shall implement for each nuclear plant an "Accident Management Plan" which provides a framework for evaluating information on severe accidents, including that developed through conduct of the Individual Plant Examinations (IPEs), for preparing and implementing severe accident operating procedures, and for training operators and managers in these procedures.

The "Accident Management Plan" developed by licensees for each plant will be expected to have four subsidiary objectives which are:

(1) Developing technically sound strategies for maximizing the effectiveness of personnel and equipment in preventing and mitigating potential severe accidents. This includes ensuring that guidance and procedures to implement these strategies are in place at all plants,

(2) Assuring that installed instrumentation and equipment called for in the diagnosis and control of accidents beyond the design basis are identified and assessed to determine their availability and capabilities, and the need for incremental improvements to existing systems to assure their availability is assessed,

(3) Assuring that nuclear plant staff are trained in the procedures and guidance to follow in the event of an accident beyond the design basis of the plant, and utility management is trained and prepared to deal with severe accidents, and

(4) Providing a technical basis for assessing the effectiveness of specific accident management strategies and capabilities.

The NRC Accident Management Program is aimed at promoting the most effective use of available utility resources (people and hardware) to prevent and mitigate severe accidents. This would largely be achieved through incremental improvements in the existing emergency procedures and training programs, and by additional planning for severe accidents that could strengthen the support provided to the plant operating staff in case of a severe accident. Hardware changes or other plant modifications to reduce the frequency of severe accidents are not a central aim of this program, although limited, minor modifications may be identified during the process of developing an Accident Management Plan.

Elements of a Utility Accident Management Plan

To varying degrees, accident management capabilities already exist at all U.S. reactors, largely in response to regulatory requirements, implementation guidance, and review criteria, such as that set forth in 10 CFR 50.47 and NUREG-0737 Supplement 1. However, these capabilities are not as strong and comprehensive as they might be

through use of a more disciplined approach. The risks associated with severe reactor accidents can be further reduced through implementation of utility accident management plans which incorporate improvements to current utility capabilities in five general areas:

° Accident Management Procedures

On the basis of existing PRAs the staff has identified several generic accident management strategies that can greatly enhance a licensee's ability to cope with the accident scenarios that tend to dominate risk in PRAs. This information will be provided to each licensee with the request that they evaluate its benefits for their plants.

° Training In Severe Accidents

Operators, technical support staff, and managers responsible for responding in the event of an accident should be generally aware of the progression of severe accidents (i.e., their symptoms and timing) and should be proficient in potential response strategies. Licensees' accident management plans are expected to be aimed at upgrading existing training programs as needed to ensure that training for these personnel includes an appropriate treatment of severe accident management. This will be done with as little impact as possible on the current training curricula for licensed plant operators.

° Accident Management Guidance

Each licensee will be expected to make available for the technical support staff and managers a set of guidance for diagnosing the progress of severe accidents and planning the appropriate response. The NRC staff will work with industry (e.g., NUMARC/EPRI) towards the development of generic guidance to licensees in this area.

° Instrumentation

Licensees will be expected to review instrumentation changes that might be needed at their plants in order to implement their accident management procedures. Currently, the NRC Office of Nuclear Regulatory Research and EPRI are independently assessing the need for and availability of instrumentation during various accident scenarios. When comparing the

results of this assessment to Regulatory Guide 1.97 which describes acceptable standards for post accident monitoring instrumentation, it is expected that the impact on existing instrumentation will be minimal.

- Decisionmaking Responsibilities

  Each licensee's "Accident Management Plan" will be expected to include a review, and modification if necessary, of the plant's current decisionmaking authority for accident management strategies, to assure: well-established, clear lines of authority and communications for severe accident conditions, assigned responsibilities for specific key decisions and established authority and criteria for procedural overrides and ad-hoc equipment/procedure modifications.

Approach For Accident Management Implementation

The staff intends to work with industry to define the scope and attributes of a utility accident management plan which meets the four major plan objectives, and to develop guidelines which describe the plant-specific implementation of such a plan. The principal interaction to date with industry on accident management has been through the Nuclear Management and Resources Council (NUMARC). A working group has been established by NUMARC to address the matter of severe accidents, with accident management being a high priority. In addition, we expect NUMARC to provide industry's perspective and bring about the necessary industry-supported initiatives on accident management. The staff also plans to interact through NUMARC with the owners' groups for each reactor vendor since the prospective accident management procedures and equipment improvements are closely related to the emergency procedures guidelines that have already been developed by the owners' groups.

The regulatory mechanism for obtaining improvements in industry accident management capabilities will be through issuance of a generic letter. A draft of the generic letter will be circulated to utilities through NUMARC and to the public for comment. Additionally, the contents of the generic letter will be discussed at workshops associated with the IPE generic letter. An outine of the generic letter is attached to this Commission Paper (Attachment 2).

It is the staff's view that many elements of accident management are sufficiently well understood and separate from the IPE analysis, that improvements in accident management capabilities can be realized prior to completion of an IPE. Examples of such improvements include near term implementation of certain accident management procedures (to be included in the Generic Letter on accident management) and the revision of training curricula for emergency response personnel to include current insights on severe accident progression and phenomena. In this regard, industry will be encouraged to implement accident management improvements as soon as practical.

The staff intends to be flexible with regard to implementation of aspects of accident management requiring plant-specific information to be learned from the IPE, recognizing that some licensees are well advanced in PRA and severe accident studies for their plants, whereas other licensees are only beginning to consider severe accident analysis in response to the IPE Generic Letter. Indeed, some licensees have already made significant advances in several of the general areas of accident management mentioned previously. Thus, the details of the development and implementation of plant-specific accident management plans will be pursued with each licensee on an individual basis.

Implementation of the Accident Management Program is expected to be accomplished through an extension of existing industry programs, and evaluated through existing regulatory mechanisms. For instance, new training requirements could be integrated with the existing INPO training program. Generic accident management procedures could be incorporated into emergency procedure guidelines by the vendor owners groups and assessed by NRC according to existing channels of review. Other aspects of the program, such as hardware modifications and implementation of computational tools, could be implemented through internal utility mechanisms such as their 10 CFR 50.59 process, and would be subject to NRC audit and inspection in the usual way.

NRC Accident Management Research Program

The NRC research program has an important role to play in contributing to the Accident Management Program. Our understanding of the physical progression of severe core damage accidents is incomplete, and the NRC will rely on the research program to supply needed information and provide insights for accident management, particularly in the area of limiting

potential radioactive releases and stabilizing conditions should the reactor vessel be breached. Research information will be developed in this severe accident regime for many years, and as a result we can expect that licensees' accident management plans will be further upgraded as new research information is evaluated and a consensus reached that revisions to severe accident strategies can reduce risks further.

Research activities will center on assessing the feasibility of various strategies that might be implemented by utilities to prevent or mitigate severe accidents, and on identifying those which should be considered for inclusion in utility accident management plans. This will include an investigation of specific accident management strategies applicable to the period before the core would penetrate the reactor vessel (in-vessel accident management) and those applicable following postulated reactor vessel penetration (containment and release management). In all cases, the design and operational requirements for strategy execution will be evaluated, but emphasis will also be given to examining potential circumstances under which certain operator actions could worsen accident consequences or adversely impact the ability to achieve a long-term, stable state. Much of the information needed for accident management research will be drawn from several existing NRC programs (e.g., the CPI and Severe Accident Research Programs), as well as existing programs in other countries.

Research activities are divided into a short-term effort and a long-term program. The short-term effort will support two principal elements in the closure plan: (1) definition of example severe accident management strategies (primarily preventative) which can be formulated from existing insights reports, PRA studies, and completed research; and (2) development of a framework which defines the necessary components of a functioning utility severe accident management plan. The products will be documents to be included as appendices to the generic letter on accident management.

The long-term research program includes those activities of a confirmatory nature, which are not required for closure. The short-term program to achieve closure is proceeding effectively with the present knowledge base. The long-term program can be considered as an augmentation to the existing Severe Accident Research Program (SARP) and will draw heavily from the results of SARP. In fact, SARP will provide improved knowledge and phenomenological modeling for such complex processes as steam explosions,

degraded core coolability, crust formation, hydrogen behavior, vessel depressurization, direct containment heating, etc., which will then be used to evaluate both the benefits and the adverse effects of candidate strategies. The research program has been formulated to provide the NRC staff with an organized, comprehensive basis for evaluation of generic accident management strategies. The program will define supporting studies needed from related programs (e.g., SARP, Human Factors research, PRA studies). It will also integrate all appropriate results from these programs, and others related to accident management (e.g., CPI, IPE and international research), into a practical assessment for generic accident management strategies. It is anticipated that these strategies will be primarily mitigative in nature. Upon completion, it will provide a reasonably detailed evaluation of both the instrumentation and training capabilities needed to support these strategies.

The long-term program will also evaluate the potential adverse effects that could occur if and when these strategies are applied. Examples are strategies such as water addition to a degraded core and use of special emergency equipment. Each must be analyzed carefully to fully understand the consequences of these strategies. Some of the specific issues to be addressed include: instrumentation needs for proper diagnosis of the course of events and their observable symptoms; the capability of existing equipment to bring the reactor to a long-term stable state; the effect of timing of human action on the success of candidate strategies; the consequences of adding water to a degraded core; and the uncertainties in phenomenological knowledge and its consequences on strategy development.

Even though this research will concentrate on all consequences of potential actions, it is currently expected that the ultimate guidance to the operating staff is to always add water during the course of a severe accident.

The NRC resources associated with reaching closure on accident management will be approximately 5 FTE of staff effort and about $500K of contractor assistance over the next twelve months. Resources for the long-term research program are $1.4M in FY89 and $4M in FY90 (See Attachment 1). Resource needs beyond FY90 are expected to be similar, and will be submitted for Commission approval as part of the normal budgetary process.

Recommendation: That the Commission note the approach proposed herein for implementing the accident management portion of the Integration Plan for Closure of Severe Accident Issues (SECY-88-147), and approve the accident management research projects for FY89 and FY90.

Scheduling: This paper is scheduled to be considered at an open meeting on January 23, 1989.

Victor Stello, Jr.
Executive Director
for Operations

Attachments:
1. NRC A/M Research Projects for FY89/90
2. Outline of Generic Letter

Commissioners' comments or consent should be provided directly to the Office of the Secretary by c.o.b. Friday, February 3, 1989.

Commission Staff Office comments, if any, should be submitted to the Commissioners NLT Friday, January 27, 1989, with an information copy to the Office of the Secretary. If the paper is of such a nature that it requires additional time for analytical review and comment, the Commissioners and the Secretariat should be apprised of when comments may be expected.

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NRC A/M RESEARCH PROJECTS FOR FY 89/90

A. Ongoing Projects

1. Depressurization to minimize direct containment heating.
   An analytic study of station blackout (TMLB') at the Surry plant, using depressurization through the PORV. Results indicate that the pressurizer surge line could overheat and rupture, leading to reasonably early depressurization.

2. LWR recriticality.
   An analytic study of injecting unborated water, as well as water with increasing levels of boron concentration, into an LWR core: (1) when the control blades have melted, but the fuel rods are intact; and (2) when the core geometry has degraded.

3. Instrumentation requirements.
   Development and demonstration of a structured methodology to determine adequacy of existing plant instrumentation to monitor severe accidents.

4. Report on candidate A/M strategies; Appendix I to the Generic Letter.

5. Report on framework of an A/M program; Appendix II to the Generic Letter.

B. New Projects (FY 89/90)

NRC has a longer-term program to conduct research directly related to A/M. This longer-term research would focus on assuring integration of completed ongoing resarch (from CPI, SARP, PRA, and international cooperative programs) to effectively evaluate A/M guidance, while simultaneously evaluating potential disadvantages of seemingly advantageous accident management actions. Our longer-term research program has been thought out in detail and discussed with the various contractors scheduled to conduct the research. The following tasks will be covered by this program in FY 89/90.

In-vessel A/M candidate procedures
Ex-vessel A/M candidate procedures
Information needs for A/M
A/M framework implementation
Bounds of coolability of a degraded core
Uncertainties affecting A/M
BWR A/M insights (MARK-I, III)
Strategies related to DCH
Diagnostic Computational Aids
Guidelines for industry audit
Support for Plant Exercises

The total funding required to complete these tasks is $1370K in FY 89 and $3935K in FY 90.

Attachment 2

Outline of Generic Letter

SUBJECT: Accident Management
(Supplement to Generic Letter 88-20, "Individual Plant Examination.")

1. Objective

   Licensees shall certify to the NRC that they have put in place an "Accident Management Plan" providing a framework for evaluating information on severe accidents, for preparing and implementing severe accident procedures, and for training operators and managers in those procedures.

2. Elements of a utility Accident Management Plan should include the following:

   - Procedures: Each licensee should, in the context of performing their IPE, evaluate and implement severe accident procedures. The staff has identified general strategies which should be included and has compiled a list of "example" procedures (see Appendix I) which should be considered for early implementation (e.g., prior to completion of the IPE where the licensee determines this to be of benefit to his plant protection and to public safety).

   - Training in severe accidents should be provided for operators, technical staff and managers responsible for responding in the event of a severe accident.

   - Guidance and computational aids for diagnosing and responding to accidents should be provided to technical support staff and managers.

   - An assessment of the need for and availability of instrumentation should be performed.

   - A review of utility decisionmaking processes for severe accident response should be conducted.

3. NRC/NUMARC Interaction

   NRC staff will work closely with industry groups (e.g., owner's groups and EPRI) through the NUMARC Severe Accident Working Group (SAWG) to better define the attributes of an Accident Management Plan and to develop guidelines that define a generic framework for a utility to evaluate and organize its resources to prepare for and respond to severe accidents (to be supplied as Appendix II). These guidelines, to be developed as part of an industry initiative, should address each of the key attributes of a utility Accident Management Plan and provide a basis for responding to the generic letter.

4. Utility Response

   - Within 90 days of receipt of this letter, licensees should submit a response certifying their commitment to implement an Accident Management Plan that provides a framework for evaluating and implementing severe accident procedures.

   - In each case, a best estimate schedule should be included for implementing their Accident Management Plan.

5. Regulatory Basis 10 CFR 50.54(F)

6. Appendices:

   I. Candidate Procedures for Near Term Implementation (draft attached)
   II. Framework of an Accident Management Program (under development)

Each utility should systematically seek to identify and implement effective procedures (and associated hardware) to optimize the plant's accident management resources. These procedures should at least address three global strategies derived from operational experience and PRA insights which have significant potential for reducing plant risk:

- Procedures for conserving and/or replenishing limited utility resources during the course of an accident. These resources would include, for example battery capacity, borated water, and compressed air.

- Procedures for using plant systems and components for innovative applications during an accident. This would include enabling crossties of support systems or the use of fire systems, or CRD pumps (in the case of a BWR), for decay heat removal. In addition, this category includes procedures to connect alternate electrical power sources to meet critical safety needs during an accident scenario.

- Procedures for defeating interlocks and overriding component protective trips in emergency situations. An example of this strategy would be the ability to reopen MSIV's in a BWR ATWS event.

These three strategies, and others as appropriate, should be applied to each of the applicable major safety functions of the plant: reactivity control, coolant inventory control, heat removal and containment performance; as well as to the principle support functions: RCS depressurization, electric power, equipment cooling, and air systems. In the context of performing the IPE, each utility should be alert to identify and implement effective procedures associated with these strategies. Your evaluation should not be limited to the strategies given in Table 1. For instance, procedures to maintain containment function and delay or prevent possible early containment failure should also be assessed.

Table 1 contains a list of "example" procedures for each global strategy. These procedures are categorized according to the safety functions they relate to and the types of plants they apply to. These procedures are to be evaluated on a plant-specific basis and considered for near term implementation prior to completion of the IPE (absent sound arguments to the contrary).

This letter assumes implementation of existing EPGs addressed in the ATWS and Station Blackout rules, in addition to feed-and-bleed and BWR containment venting provisions of the EPGs. There may be some areas of overlap between these existing emergency operating procedures and the procedures described in Table 1, however, the NRC believes the benefits from additional utility review and strengthening of existing procedures would include both reduction of risk magnitude and uncertainty from severe accidents and moreover would outweigh the costs of any duplication of effort.

TABLE I

Generic Accident Managment Procedures For
Near Term Evaluation and Implementation

Global Strategy / Example Procedure	Affected Safety Function	Plant Applicability BWR	Plant Applicability PWR	Principal Safety Objective Prevention	Principal Safety Objective Mitigation
I. Conserving and Replenishing Limited Resources					
° Procedure to refill RWST with borated water, or CST with condensate. Assure adequate supply of boron on site.	Coolant Inventory Containment Performance	X	X	X	X
° Maintain ECCS suction to condensate systems to avoid pump failure due to high suppression pool temperature.[1]	Coolant Inventory	X		X	
° Procedures for throttling containment sprays to conserve water for core injection.	Coolant Inventory	X	X	X	
° Procedures to conserve battery capacity by shedding non-essential loads.	Electric Power	X	X	X	X
° Procedures for use of portable battery chargers or other power sources to recharge batteries.	Electric Power	X	X	X	X

[1] This may require re-examination to defeat existing interlocks

TABLE I (CONTINUED)

Global Strategy / Example Procedure	Affected Safety Function	Plant Applicability BWR	Plant Applicability PWR	Principal Safety Objective Prevention	Principal Safety Objective Mitigation
° Procedures to enable emergency replenishment of gas supply, or otherwise assure operability of air operated components.	Air/N_2	X	X	X	X
° Procedures to enable early detection, isolation, or otherwise mitigate the effects of an interfacing LOCA.	Coolant Inventory Containment Perf.	X	X	X	X
II. Use of Systems/Components In Innovative Applications					
° Procedures to enable emergency use of available pumps to accomplish safety functions					
- Use of diesel fire systems for injection to BWR core, PWR steam generators, or containment sprays.	Coolant Inventory Heat Removal Containment Perf.	X	X	X	X
- Use of CRD pumps (BWR) or charging pumps (PWR) for core injection.	Coolant Inventory	X	X	X	
- Use of alternate injection (e.g., hydro test pump)[2] when RCP seal cooling is lost.	Coolant Inventory	X	X	X	
- Procedures (and associated hardware) to enable emergency crosstie of service water and CCW to RHR (BWR) or Feedwater (PWR).	Heat Removal Coolant Inventory	X	X	X	

[2] Risk signficance of seal failure is strongly dependent on the seal design.

TABLE I (CONTINUED)

Global Strategy / Example Procedure	Affected Safety Function	Plant Applicability BWR	Plant Applicability PWR	Principal Safety Objective Prevention	Principal Safety Objective Mitigation
- Use of condensate, or startup pumps for feedwater injection.	Heat Removal		X	X	
" Procedures (and hardware) to enable emergency connection of available AC power sources to meet critical safety needs.	Heat Removal	X	X	X	X
- Use of diesel generator or gas turbine generator to drive CRD pumps for core injection.	Coolant Inventory	X		X	
- Procedures to enable emergency crosstie of AC power between two units or to onsite gas turbine generator.	Electric Power	X	X	X	X
" Procedures to enable emergency connection of injection systems to alternate water sources					
- Procedures to assure appropriate recirculation switchover and to cope with the failure to switchover in LOCA.	Coolant Inventory Heat Removal		X	X	X
- Procedures to enable emergency connection of service water or feedwater systems to rivers, reservoirs or municipal water systems.	Heat removal Equipment Cooling	X X	X X	X X	 X
" Procedures for Reactivity Control					

TABLE I (CONTINUED)

Global Strategy	Example Procedure	Affected Safety Function	Plant Applicability BWR	Plant Applicability PWR	Principal Safety Objective Prevention	Principal Safety Objective Mitigation
	- Procedure to initiate SLCS in case of potential core damage and to guard against boron dilution when core injection is restored.	Reactivity Control	X		X	X
	- Ensure abundant supply of borated makeup for long-term accident control.	Reactivity Control	X	X	X	X
III. Defeating Interlocks and Component Protective Trips in Emergencies.						
	° Procedures to reopen MSIVs and Turbine Bypass Valves to regain the condenser as a heat sink.	Heat Removal	X	X	X	
	° Procedure to extend RCIC availability by either raising the turbine exhaust pressure trip set point, or overriding the trip function.	Coolant Inventory	X		X	
	° Procedures to enable emergency bypass of protective trips for diesel generators and injection pumps.	All	X	X		

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Meeting Title: Briefing on Accident Management Program

Meeting Date: 1/23/89 Open X Closed _____

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