UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Title: BRIEFING ON PRA IMPLEMENTATION PLAN - PUBLIC MEETING

Location: Rockville, Maryland

Date: Thursday, April 4, 1996

Pages: 1 - 62

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NUCLEAR REGULATORY COMMISSION

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BRIEFING ON PRA IMPLEMENTATION PLAN

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PUBLIC MEETING

Nuclear Regulatory Commission
One White Flint North
Rockville, Maryland

Thursday, April 4, 1996

The Commission met in open session, pursuant to notice, at 10:05 a.m., Shirley A. Jackson, Chairman, presiding.

COMMISSIONERS PRESENT:

SHIRLEY A. JACKSON, Chairman of the Commission
KENNETH C. ROGERS, Commissioner
GRETA J. DICUS, Commissioner

STAFF SEATED AT THE COMMISSION TABLE:

KENNETH HART, Technical Coordinator, Office of the Secretary

STEPHEN BURNS, Associate General Counsel for Hearings, Enforcement and Administration

PRESENTERS:

JAMES TAYLOR, EDO

DAVID MORRISON, Director, Office of NRR

ASHOK THADANI, Associate Director for Inspection and Technical Assessment, NRR

GARY HOLAHAN, Director, Division of Systems Safety and Analysis, NRR

CARL PAPERIELLO, Director, NMSS

EDWARD JORDAN, Director, AEOD

P R O C E E D I N G S

CHAIRMAN JACKSON: Good morning. I am pleased to welcome members of the staff to brief the Commission on the probabilistic risk assessment implementation plan. The plan is intended to be a management tool to help ensure the timely and integrated agency-wide use of PRA methods and technologies in the agency's regulatory activities.

During recent years the use of PRAs in regulatory activities has continued to increase. Recently the Commission has tasked the staff to accelerate its efforts to develop a standard review plan and regulatory guidance for the industry and staff use in preparing and reviewing requests based partially or totally on PRA insights.

I expect the staff to provide a discussion of this effort, including its status as well as any anticipated difficulties.

In addition, the Commission would like to hear about the status and progress being made on activities associated with industry initiatives, including quality assurance, in-service inspection, in-service testing, and technical specifications.

Also, we would be interested in the staff's strategy or plan to integrate all of the diverse PRA activities in a structure or framework that will ensure a consistent and stable regulatory process. We would be

particularly interested in comments beyond the fact that we know there is a coordinating group at the branch chief level.

I and my fellow commissioners are pleased to hear from you today. I understand that copies of the viewgraphs are available at the entrances to the room.

Do any of my fellow commissioners have any opening comments?

COMMISSIONER ROGERS: No, thank you.

COMMISSIONER DICUS: No, thank you.

CHAIRMAN JACKSON: Mr. Taylor, why don't you proceed.

MR. TAYLOR: Good morning. As the Commission can see, at the table I have a cross section of all the major technical offices. Bill Russell was to be here. He may be running a bit late. NRR is represented. I won't introduce all these gentlemen, because I think you recognize them.

We provided a paper to the Commission on March 26, and slides. This presentation will be in several parts. The first part will be on reactor programs. That will be given by Ashok Thadani.

MR. THADANI: Thank you, Jim. Good morning.

May I have the first viewgraph, please.

[Slide.]

MR. THADANI: I will go over some of the

background covering the last several months activities.

Gary Holahan is going to go through some of the details of each element that is in the PRA implementation plan, where we stand, and some of the significant issues that have developed as part of the process that we have been going through. He will also summarize what our next set of activities is.

Next viewgraph, please.

[Slide.]

MR. THADANI: The PRA implementation plan was sent to the Commission in March 1995. In April the staff briefed the Commission on that implementation plan and associated activities.

With Commission approval, in August 1995 the PRA policy statement was published, which provided the conceptual guidance on how far to proceed and what some of the significant factors were that needed to be considered.

In November 1995 we responded to Commission questions on the applicability of the process that was used in the maintenance rule implementation, whether that process could be applied in other categories. The staff's conclusion was indeed that process could be applied in several other applications.

Subsequent to that, in November of last year, the staff provided its framework for applying probabilistic

techniques in regulatory activities. There were four parts to this framework. Various regulatory applications which could be grouped in different bins, so to speak.

These bins were screening type decisions where one could go forward with fairly approximate studies.

The next category was risk ranking applications where one would divide systems, structures and components and high and low safety significance, what type of data would be needed.

Finally, the third category was the one that would require very detailed analyses. Examples were if one were to modify technical specifications, particularly if one were to delete certain things from requirements, one would have to go through very extensive evaluations.

That was the first step, definition of different types of applications.

The second step in the process was to make sure we understood our regulatory requirements as far as that application was considered, what deterministic assessments had been done in the past, taking that into account and then going forward with conducting probabilistic assessments, and finally ending up with integrating both the probabilistic studies as well as the deterministic evaluations that had been done through some means, such as perhaps an expert panel concept of integrating these ideas. That was

discussed in the framework paper that was issued in November.

May I have viewgraph number four, please.

[Slide.]

MR. THADANI: As the Chairman noted, in November you asked that we accelerate development of the regulatory guides and standard review plans.

In response to that recommendation, the staff did provide its plans and schedules for accelerating development of the regulatory guides and the standard review plans. The other element in that response was to identify that there would in fact be close senior management attention to this activity to make sure that we do end up with these products on a timely basis.

Today's meeting is going to cover the elements that are covered in the March 26 paper that we sent to the Commission.

We will continue to provide quarterly updates to the Commission as well as semi-annual briefings as asked for by the Commission.

Viewgraph number five, please.

[Slide.]

MR. THADANI: As I said, the policy statement provided what I would call a conceptual framework that was to be utilized in developing the implementation plan. Key

pieces in the policy statement are described here.

That is, whatever applications where probabilistic techniques are used, those techniques must in fact be supported by appropriate methods as well as data.

The decision process should use probabilistic techniques as complementing the deterministic assessments that have already been done.

Finally, it was very important to make sure that one pay close attention to the concept of defense-in-depth, which I guess I will characterize as balance in design. That is, there should in fact still be multiple layers of protection so if one were to make a mistake in one area there still are other layers of protection that are not lost.

Another important element in the policy statement is that at this time PRAs or such analyses are not substitutes for meeting rules, regulations and requirements, that those rules, regulations and requirements must be adhered to until they are revised in a formal revision process by the agency.

This issue has come up again as a result of some information we have received. It was important to make sure that all sectors of the agency knew that that is what the policy statement had indicated. We have gone back to all the regions and other folks at headquarters to reemphasize

this point.

Another guidance that was provided in the policy statement was the staff in the application of probabilistic techniques, if the criteria are based on safety goals or subsidiary objectives of the safety goals, that they be applied only in generic activities, generic decisions.

May I have the next viewgraph, please.

[Slide.]

MR. THADANI: The implementation plan, as I indicated, does go beyond the policy statement and identifies topics, schedules, responsible organizations. Many of these activities in the implementation plan in fact require joint office evaluations and development. I am very happy to say that these interoffice activities are going very well and there is very good cooperation as we go forward trying to implement these activities.

As I said and as the Chairman said, the regulatory guide and the standard review plan development had to be accelerated. We have assigned a high priority. I do want to recognize the effort that a lot of people are putting in trying to make sure we meet those milestones.

In the backup viewgraphs, from viewgraph four through eight, we have the names of staff from Office of Research as well as NRR who are working together in developing these regulatory guides and standard review

plans.

CHAIRMAN JACKSON: Maybe at the end of the meeting you can put them up like credits at the end of a program. I would like to see you do that.

MR. THADANI: I must say that there is lots of enthusiasm. Things are going quite well. I am very satisfied where we are today. The staff meets with the line organizations regularly. As you noted, there is a coordination committee consisting of branch chiefs from NRR, Research, AEOD and NMSS who work with the staff. I meet with the whole group once a month to get an idea of where we are and what some of the issues might be and to provide assistance as I can.

As I said, a lot of progress has been made.

During this period some significant issues have come up. Gary is going to go through those, but I will give you an example or two.

As I said, policy statements that use safety goals for generic decisions. If we have to make plant-specific decisions, should one utilize safety goals or subsidiary objectives for plant-specific decisions? Should these changes be risk neutral or could they lead to some small increment in risk? If that is the case, what are the criteria that say that increment is acceptable?

We are not at this stage asking for any decision

on these issues. We need to develop these issues further. Then we expect to come to the Commission for guidance on how to proceed on those issues.

Gary is going to cover many of these issues. I just wanted to say that the pilot studies are also progressing well. There is one pilot study that is not going as well as we had hoped, which is in-service inspection. It appears that that will be delayed. We can discuss that as we go forward.

In order to accelerate development of the regulatory guide and the standard review plan it was important to go back and re-look at the whole implementation plan. We have made certain adjustments in the implementation plan. Some of those adjustments have been delaying completion of some other activities. We will touch on those.

As Mr. Taylor noted, this is not just an NRR and Research activity. The standard review plan and reg guide are essentially Research and NRR activities, but the implementation plan has a whole range of activities that are identified, and both AEOD and NMSS have a significant part in terms of developing those activities further.

Gary is going to cover AEOD and NMSS activities also in terms of where we are on accident sequence precursor program, where we are on the data rule, and also in terms of

how PRA techniques are being used in addressing high-level waste and low-level waste issues.

I did want to note that there is a considerable international interest in this topic. The Committee of Nuclear Regulatory Authorities, CNRA, did have a number of countries participate in developing a report on regulatory approaches to PSA in OECD member countries. That report is complete. If you would like copies of this, we will make these available.

CHAIRMAN JACKSON: Why don't you do that.

MR. THADANI: It turns out that most of the Western European countries are applying these techniques to their decision-making process at some level.

It was also clear at the last CNRA meeting that no country really had any procedures and criteria for applying these techniques in regulatory decisions. They had used these techniques, but there were no procedures and criteria, which is the same thing that you asked that we do quickly, a regulatory guide and standard review plan. So there is a group now under CNRA working on the same activity.

We are participating in that, and our participation is sort of parallel to what we are doing in developing our own reg guides and standard review plans. I think during this participation we may learn some things we may want to incorporate in what we are doing.

With that as background, Gary will go through the plan itself.

MR. HOLAHAN: Slide number seven, please.

[Slide.]

MR. HOLAHAN: First I will discuss the revisions to the implementation plan, then some of the accomplishments to date and ongoing activities, and follow up and conclude with actions that we are planning to take in the next six months.

I would first like to mention that from the very beginning the implementation plan was meant to be a living document in the sense that we recognized that circumstances would change, that new issues would arise, and that priorities might change in such a way that revisions to the plan would be necessary and in fact healthy. We are at one of those stages now, but this is not a one-time change. I expect to see other additions and revisions in the future.

The biggest change to take place recently is focusing much of the attention on the development of regulatory guides and standard review plans in the reactor area. I will spend some time talking about those five activities in some detail.

One of the implications of that focus has been to put our pilot activities in the PRA area into a slightly different context where they are now directly supporting the

development of guidance activities, but it has also caused us to have to rearrange some priorities.

Where we had in the plan the consideration for developing a standard review plan for construction and design errors and some reevaluations of NUREG-1150, those things have been deleted as low priority items. In addition, an item has been deferred where we had planned to address PRA issues for non-power reactors. Because of the lower safety significance and also because of the state of the art the methodologies don't really exist currently for non-power reactors, we thought we would give that a lower priority. That will be probably picked up in a time frame after the development of the reg guides and the SRPs. That will be revisited.

In addition to some prioritization changes, a few new tasks have been added to the plan. I count approximately 120 identifiable tasks in the implementation plan at this stage.

The new ones are associated with some inspection activities where we think it is important to take PRA insights and get them into the inspection program, into the field offices so that our inspection activities are more risk focused. That is being done in part in preparation for the inspections of the maintenance rule, which will begin after the rule implementation in July of this year. And

also some new guidance on the inspection of design changes at reactors.

In addition to the other training activities that have taken place over the last few years, there is some activity now to develop PRA training focused on inspectors and what use inspectors can make of PRA and risk insights.

Slide number eight.

[Slide.]

MR. HOLAHAN: In terms of accomplishments to date, I think there has been substantial progress made on the regulatory guides and standard review plans. In each case the scope of activities has been set out in detailed outline of what those documents will be like.

There has been a considerable amount of discussion both within the staff and between the staff and industry on the role of the pilot applications and how those will be used in developing the regulatory guides and the SRPs.

I think it is worth mentioning at this stage that probably every time in the paper and virtually every time in the slides you will see regulatory guide and SRP mentioned together, because they are really not being treated separately.

The way those are being written and the way even the teams are being structured, one group of people is developing both the regulatory guide, which is really

guidance to the industry as to what the NRC expects, and the standard review plan, which is guidance to the staff as to how to review industry applications. Those are being done together by the same group of people.

There has been some progress on the PRA methods development. I will mention a few examples a little later.

In terms of the IPEs, the examination for severe accident vulnerability goes back to 1988. I think we have made substantial progress on that. Submittals have been made by all licensees. We are well along on the reviews. Forty-five of the 75 reviews have been completed, meaning safety evaluation reports that have been written by the staff back to the licensees. Any additional ones will be completed this summer.

I think we had originally planned on completing them by June. A number of those are being re-reviewed because of some difficulties. I think the main area the staff had problems with some of the IPEs had to do with the treatment of human reliability in the analysis. That is a very difficult area. We think some of the IPEs were not up to the standards that we expected. There is an additional review effort to get those completed.

In addition, I will mention the common cause failure database developed by AEOD, which I think is an important step forward. Common cause failures are a very

important element of PRAs. The most likely mechanism for losing redundant equipment is to have some hidden common cause failure. I think the study that has been done is an advancement to the state of the art and it will be folded into both the regulatory guide and the standard review plan.

There have also been recent studies on high pressure coolant injection on boiling water reactors and emergency diesel generators.

Slide number nine, please.

[Slide.]

MR. HOLAHAN: Since the last Commission briefing the 1984 accident sequence precursor report has been issued. Those analyses were completed.

CHAIRMAN JACKSON: You mean 1994. You said 1984.

MR. HOLAHAN: Excuse me. In fact, 1982 and 1983 were also completed, but I believe 1984 was done in about 1986.

There has also been publication of the proposed reliability data rule which would support the risk-informed regulation.

There have been a substantial number of improvements in the training programs and I think a substantial increase in the number of individuals taking those courses.

In the materials area performance assessment,

which I think I would describe as PRA-related methodology, there has been some progress in that area, particularly in some demonstration projects in the high-level waste area.

Slide number 10.

[Slide.]

MR. HOLAHAN: With respect to the standard review plans and the regulatory guides, I would like to give some details as to where the staff is in that arena.

First, we really have two types of activities going on. One is the development of a general regulatory guide and standard review plan which will establish general scope and quality guidance and expectations, which would really apply to all applications.

I think it is important to have that, because in addition to the application-specific regulatory guides, the four examples that we are dealing with now, we expect in the future there will be a fifth and a sixth and at some point there may be many others. When the general guidance is in place, that will be helpful in allowing us to make a fifth regulatory guide and a sixth, and I think it will establish the expectations for all future issues.

With respect to application-specific regulatory guides and standard review plans, we are working on four at the moment: in-service testing, in-service inspection, graded quality assurance, and technical specifications.

In each case there is a team in place. Each team has an action plan with schedules and milestones, and in each case they have at least a draft outline of the regulatory guide and standard review plan which really establishes the scope and organization of what is to be accomplished. In some of the cases we are even a little further along than that.

With respect to these issues, there have been numerous meetings with the ACRS and numerous meetings with the industry. Most of the industry meetings have been in the context of the pilot applications and how they fit into these activities.

One thing I think is worth mentioning -- Mr. Thadani mentioned it early -- is that the one item on this list that is not consistent with the schedule that we had originally laid out is the in-service inspection activity.

We still think it's possible to meet the final schedule for the regulatory guide and standard review plan at the end of 1997. The other case is to be done about a year ahead of time, that is, at the end of this year. That is not possible in this area because of some delays in the industry submittals.

I think that is not such a serious blow to the program. As Mr. Thadani mentioned, we are really developing guidance to cover three types of applications, screening

analysis, risk ranking, and detailed analyses. The in-service inspection activities is one of a number of examples of risk ranking type application. Even if the in-service inspection activity is delayed or in fact if it was not done on this schedule, I don't think it would have a major impact on our development of the general guidance activities, because in many ways it is a similar activity to the in-service testing. The methodologies involved will be tested pretty well in the in-service testing area and also in the graded QA area.

As I mentioned, we expect by the end of this year to be well along with the draft guidance and have the final ones in place at the end of 1997.

Slide number 11, please.

[Slide.]

MR. HOLAHAN: I think slide number 11 is pretty well covered except to say that in the graded QA area I think there has been a little more progress and there is actually a preliminary draft of a regulatory guide in addition to what I would call a detailed outline in most of the other cases.

Slide number 12.

[Slide.]

MR. HOLAHAN: With respect to the pilot applications, in the motor operated valve area, which is

related also to in-service testing since in-service testing covers pumps and valves, we also dealt with a specific piece of valve testing, which was really follow up to a testing program that the NRC put in place with Generic Letter 89-10, which was to address valve performance under in-service conditions. In other words, with the pressures and flows from actual accident conditions.

The Boiling Water Reactor Owners' Group had proposed a PRA-related technique for establishing priority among valve testing, which valves should be tested more often and which could be somewhat delayed. The staff reviewed that application and in fact issued a safety evaluation report agreeing with their approach in February of this year.

The in-service testing program is a much broader issue. We have two pilot plants at the moment, Palo Verde and Comanche Peak. I think those reviews are progressing well. There has been a request for additional information. There have been a number of meetings and site visits.

In addition, the industry documents in this area are under review and the staff has provided comments. I think what is happening is industry standards are being developed in parallel with the NRC guidance.

In several of these areas it is not entirely clear how the format of the regulatory guides will end up. In

some cases, where there is a well established and acceptable industry standard, the staff would reference that standard as in large part an acceptable way of addressing in-service testing. In other areas it may be that an industry guidance document would play a minor role or perhaps no role at all, or the staff might endorse an industry guidance document in part to be supplemented with some other considerations that the staff felt were important.

Exactly how the industry standards and the staff guidance fit together is part of this developmental process, but in each case I think there is substantial industry activity going on. Exactly how that ends up remains to be seen.

CHAIRMAN JACKSON: I am going to come back to that one.

MR. HOLAHAN: Slide number 13, please.

[Slide.]

MR. HOLAHAN: In the in-service inspection area there have been a number of meetings with the industry; there have been a number of discussions as to what were suitable pilot plants. Because the industry had been developing more than one ISI technique, we wanted to make sure that we were testing those approaches.

We also wanted to make sure that we were addressing both boiling water reactors and pressurized water

reactors. So we have come up with a collection of pilot plants, including ANO-2, which is a Combustion Engineering plant, Fitzpatrick, which is a boiling water reactor, and Surry, which is a Westinghouse designed plant. We are expecting some industry documents by June of this year. That really is a part of the critical path of getting the draft document done by early in 1997. We will be watching that schedule closely.

In the graded QA area, the staff has ongoing discussions with three utilities, South Texas, Palo Verde and Grand Gulf. There have been numerous site visits and discussions. I think that is progressing.

This is a risk ranking type application in the sense of deciding which equipment is more important than other equipment and therefore should be given more detailed attention. One is there has to be a strong approach for having confidence that you have really identified the important equipment when you are separating it from the less important equipment.

One of the features of a graded QA approach that the staff is enthusiastic about is that there may be important pieces of equipment in the plant which a risk analysis would identify which have not traditionally been treated as safety-related equipment in the sense that they are not design-basis accident mitigation equipment. It

could very well be that an additional standby pump or some other equipment might play an important role in risk even though it doesn't happen to fit into the deterministic design basis of the plant.

A graded QA approach which uses risk insights to identify that equipment and to give it additional attention that it wasn't getting before is an important advancement. One of the things that needs to be worked out is if there is what is called non-safety-related equipment which also turns out to be important, what do you do with that? What kind of QA is appropriate for that equipment? It doesn't fit into the traditional QA programs, and so whether it fits in the same category as other important safety-related equipment or whether we should give it some special focused attention is part of what needs to be worked out in this activity.

MR. THADANI: Gary, let me add to that. I think there are two issues. The first issue is exactly what Gary described. Appendix B applies to safety-related component systems and structures. We all know that there are so-called non-safety-related components that have a significant impact on risk.

If we go forward with the approach of risk ranking and we have two categories, let's say high safety significance and low safety significance, there is no doubt in my mind that some of the structures and components that

rise up to high safety significance would be non-safety-related components. If the industry has two different QA approaches, then those non-safety-related components clearly would have to get higher attention than they were getting before.

The more difficult issue, I think, is going to be things that fall into the low safety significance category. It is very clear that the criterion which the industry would prefer is, if there is failure, then we would take corrective action, that you don't need to do a lot more, because these components are not that significant.

Our view is that no matter what, for each failure one should be able to do a thorough root cause and corrective action plan. In order to do a thorough root cause and corrective action plan one needs to have a certain amount of information available on that component.

The second element we want to make sure of is, if a component fails, even if it is not safety significant in itself, there may be similar components within the plant and other systems that one needs to keep such information, know where these components are located, what systems, and so on. What that means is, even for the so-called non-safety significant component certain information has to be kept so that one can in fact achieve what I would call key analyses that could have a significant impact on risk.

As part of this review that is going on now that is part of the debate: where is the industry going and what do we think about that?

At this point, it seems to me for some applications we seem to be coming together, but we will wait and be sure what happens.

MR. TAYLOR: I'm not in the group doing this review, but I think even the industry through the years in terms of potential risk significance has recognized systems such as air systems where air in some parts of the plant is fairly mundane but used in operation of certain safety or very important valves and stuff in the plant.

That sort of recognition always gets to be important. It doesn't mean you have to procure that equipment or all of the requirements of Appendix B, but it raises the status of that equipment, particularly the ability to supply air and a continuing supply. We have seen this, of course, and then we have seen utilities look at air systems and say, gee, do I have sufficient capability? Because you are always having trouble with compressors; they are out of service, and so forth. I've seen some plants decide they will buy a backup diesel, sort of on a cart type diesel compressor for air service.

This is a sort of a fertile area where you use the risk potential to take a deeper look. It doesn't

necessarily mean rebuilding the system, but giving a lot more attention to it.

MR. HOLAHAN: In the area of the maintenance rule, there were nine pilot site visits done in order to determine that the implementation approach to the maintenance rule was viable and working well. That activity was completed and there was a workshop conducted last summer on the subject.

In addition, there is some inspection type training going on because there will be a baseline inspection basically covering all plants and their maintenance rule implementation.

In addition, the use of risk insights in the maintenance rule occurs in three different areas. One of them has to do with identifying more or less safety-significant equipment. As we go along, I think we are learning more about how to do that. We feel that it is important that the industry is learning along with us.

In the implementation of the maintenance rule, a key part of that implementation is done by an expert panel which takes both deterministic engineering insights and risk insights and combines those to come up with a list of more or less risk-significant, safety-significant systems for the maintenance rule. So the expert panel plays an important role in that.

One of the areas that we think may need additional

clarification is that it is probably an enhanced role of the expert panel in the sense that as we learn more about what a good quality PRA really means, those questions and those issues really ought to be on the minds of the expert panel as they are deciding what is an important system to be given specific treatment in the maintenance rule.

Slide number 14.

[Slide.]

CHAIRMAN JACKSON: I'm going to ask you to talk a little faster.

MR. HOLAHAN: Maybe I will say fewer things.

CHAIRMAN JACKSON: No. You can increase the speed, not decrease the volume.

MR. HOLAHAN: The last pilot application is the technical specifications. The CE Owners' Group has given us a request for extension of allowable outage time of equipment. We are also dealing with the South Texas project on two systems, on the service water system and on emergency diesel generators.

What we appear to be converging on is what we are now calling a 3-tiered approach, which is specific limitations on when a piece of equipment can be out of service based on risk insights, and also using risk insights to decide what other equipment would be particularly important during that outage period of time and putting

specific controls on that other equipment.

A simple example. If a plant has two diesel generators and one is out of service, you really need to make sure that the other diesel generator is given special attention in that period of time.

The third piece of this 3-tiered approached is also very important. If a piece of equipment is going to be out of service for some extended period of time -- we have seen applications for 14-day outages or 21-day outages -- other things can occur during that period of time, and sometimes they could either be driven by equipment failures that need to be dealt with or there may be just planned activities.

We are saying the third tier in this approach would be a risk management approach based on what the maintenance rule already calls upon for licensees to look at, the impact of taking equipment out of service, and give special attention to taking equipment out of service or finding equipment out of service while they are in an allowable outage time, because that may complicate a situation also.

We are working out that process.

Slide 15, please.

[Slide.]

MR. HOLAHAN: In the methods development area,

there have been two notable items in the reactor area, both related to developments for treating errors of commission. This is a difficult subject. Traditionally it has been much easier to put probabilities on reactor operators failing to take the proper action, but it is much more difficult to have a technique which says, in addition to that, what else could they do wrong? This has been an issue that has been recognized ever since the reactor safety study in the mid-1970s, and I think there is some significant progress being made in that area.

Number 16, please.

[Slide.]

MR. HOLAHAN: With respect to the individual plant examinations and the examinations for external events, I think there has been good progress. As I mentioned earlier, 45 safety evaluations have been written, with the rest to be completed by September.

There is also a preliminary insights report. I think that is important for looking at the overall industry and identifying what issues are important in addition to the IPE program, which was really intended to find any plant-specific vulnerabilities, But it is an excellent opportunity for learning broadly what areas are important.

In the IPEEE program, the NRC's request came afterwards. So we are still in the process of receiving

submittals from the industry. Five of our reviews are completed; an additional 20 are under review and will be completed within the next several months.

The staff is working on a plan to complete the additional 49 or 50 IPEEEs but to try to do it in a way that focuses on just the most important issues.

Because of resource considerations, although we spent a lot of resources on the first five and will do a pretty in-depth review on the initial submittals, we think we can learn from the first few submittals and focus our attention on those items that are most important to be more efficient in the remaining ones. There is a Commission paper due in the near future which will lay out our approach for accomplishing that.

MR. THADANI: There are a number of issues in the past that we have said we don't believe we need to take any action, that these issues would be addressed as part of IPEEE. So the review process we are going to go into is to take out all the areas where we have said we were going to rely on the IPEEE evaluations and lay out those issues, go back, take a look at the IPEEEs, review them so that we can make sure we can make decisions on those specific regulatory issues. So the review is going to be driven by decisions that we need to be making on those issues.

MR. HOLAHAN: Slide number 17, please.

[Slide.]

MR. HOLAHAN: The draft of the reliability data rule was published for comment. The comment period ends this summer.

A regulatory guide will be completed this month.

We expect as part of the rulemaking process for there to be a public workshop and comments, and we are targeting the end of this year for putting that rule in place.

Number 18, please.

[Slide.]

MR. HOLAHAN: The accident sequence precursor program is a program to look at actual operating events, actual reactor events, and to use probabilistic risk assessment techniques to identify the most significant of those events and also what about those events was really important. That program calculates a conditional probability of core damage given the event that did occur, how many more things, how much worse would it have had to be in order to have gone to core damage. In that sense, it is a measure of how much margin was left, how close we came to a core damaging event.

The report for the 1994 events was published in December.

In addition, the program, which has gone on for

many years, had a gap in it. It had not previously been funded to cover the years 1982 and 1983. There was a feeling that there was sort of incompleteness to the program, that there might be some insights in those years, and also it would be helpful in your ability to make any judgments about trending; it was important to fill in those gaps. Those analyses have been completed.

An accelerated program is in place now, so that rather than waiting for all of the events of the year and trying to deal with them all at once, they are being dealt with in AEOD on an event by event basis. So not only are the 1995 analyses being done on an event by event basis, but in fact some of the 1996 events are also being started. There will still be a compilation report. I guess in the AEOD annual report there will still be an annual compilation, but there would be more of an event by event analysis available to the staff and the industry to see what is important.

Slide number 19, please.

[Slide.]

MR. HOLAHAN: AEOD also has a number of other initiatives related to using risk techniques in reviewing operating experience.

There is a general plan to increase that activity. Common cause database is something that I mentioned earlier

and I think is an important advancement.

There are also a series of safety system performance studies which are basically equipment reliability studies that give good insights across a number of reactors and also across a period of time. That is dealing with high pressure cooling injection, emergency diesel generators, isolation condensers, a number of important safety systems on boiling water reactors and pressurized water reactors.

One important element of this program. Not only does it help identify important equipment or trends in equipment reliability, it can be used as a building block for inspection program, focusing inspection activities on equipment that has either been shown to be degrading or less reliable than other equipment, or in fact focusing on a particular plant or set of plants that might be out of line with its peers.

This is an important check where the staff and industry are doing PRAs and using them in regulatory applications. Here is an actual operating experience that can be compared with the assumptions in the PRA to give a good objective sanity check.

Number 20, please.

[Slide.]

MR. HOLAHAN: The PRA training activities are also

in the Office of AEOD. There have been revisions, improvements, I would say, to the curriculum in a number of areas.

There are also additional items which are being tested and are being planned to deal with configuration management and uncertainty. A number of important issues are being worked into the program.

One of the ones that I liked is the idea of having a course for technical managers, because if the implementation plan is to succeed, it is not for the few experts in the few expert branches. It has got to be a broadly understood and implemented program.

Chairman Jackson, this goes to one of your comments in your introduction, that if risk-informed regulation is going to be an agency approach, it needs to be worked into the infrastructure of the agency. Not only as programs, but as an understanding on the part of the staff.

The senior reactor analyst program is an important program that I would like us to spend a moment on. There are ten senior reactor analysts in training. They are in a two-year training program. They are predominantly senior level inspectors from the regional offices. After their training is done they will go back to the regional offices. They are receiving training in probabilistic risk assessment techniques. They are having rotational assignments in the

branches that are dealing with PRA activities.

They are developing expertise to be taken back to the regional offices. They are also developing a strong understanding of what tools are available here in headquarters, and maybe as important as anything else, they are making important contacts here with what will be, when they go back to the regions, their contacts back here so that they can form a communications link between the regional offices and headquarters. I think that is also an important part of what I will call risk-informed infrastructure of the agency.

MR. THADANI: These senior reactor analysts will become part of the baseline inspections that will be done in terms of follow-up to the maintenance rule implementation. They will participate in those inspections.

MR. HOLAHAN: Slide number 21, please.

[Slide.]

MR. HOLAHAN: In the waste management area, which parenthetically I might need some help on, the performance assessment techniques continue to be used in the high-level and low-level waste areas.

In the high-level waste area there is basically a three-phase program for implementing performance assessment. There was an initial demonstration phase, which was completed. Then back in October of 1995 there was

completion of the second phase, which was characterized as a completion of the demonstration. The third phase, which is really an application of the methodology, is an ongoing activity.

In the high-level waste area the key issues seem to be related to timing and a probabilistic treatment of timing issues such as the time frame of interest, the period for which it is appropriate to give credit for engineering barriers, and treatment of issues such as the evolution with time of site conditions. So performance assessment is a probabilistic way of dealing with those difficult issues.

In the low-level waste area there is also a performance assessment activity. There is a plan to publish a branch technical position this summer. That is about all I know on the subject, unless Carl would like to help some.

MR. PAPERIELLO: We are doing it for low-level waste performance. We have just begun to do it in SDMP performance assessment. What you do is you vary parameters and you find out what parameters change the outcome. So I kind of look on performance assessment compared to PRA as contradictory. It is more of a deterministic probability where you have bi-values for things and for the parameters that we have in performance assessment you have a distribution function. You look for which distributions affect the outcome and which ones the outcome is not very

sensitive to the change in the input. For high level waste it tells you should we worry about a particular phenomenon or is it not going to change the outcome very well.

Basically, that is how performance assessment is used in NMSS.

MR. HOLAHAN: Thank you, Carl.

Slide number 22, please.

[Slide.]

MR. HOLAHAN: The last two topics I would like to cover are emerging policy issues and then what activities we expect to be completing over the next six months.

The emerging policy issues are discussed in a Commission paper. We felt it was important to give the Commission early warning on potentially complex issues that are coming up. At this state we don't feel we need Commission guidance. We don't have a specific proposal for the Commission for dealing with these issues, but we thought it was important to identify them early on.

Mr. Thadani already mentioned the issue of use of the safety goals in decision criteria. I think this is an issue that the ACRS has raised with the staff. I think because risk-informed regulation will call for some decisions, it seems to me that in some sense the decision criteria that the staff has on individual issues needs to be in some way informed consistent with the safety goal, but

how that plays out is something to be developed. We understand that the Commission wants to be involved in such a decision.

With respect to performance-based regulation, the relationship between performance-based regulation and risk-informed regulation is not completely defined. There are some elements of performance-based regulation which are inherent in risk-informed regulation. For example, equipment reliability or living PRAs by definition are feeding back the performance of equipment into an ongoing assessment of risk insights.

But there is an additional element of performance-based regulation that we need to deal with, and this is very much related to industry initiatives to move towards performance measures as opposed to programmatic requirements.

To the extent that focusing on performance means focusing less attention or no attention on programmatic requirements, I think the staff wants to take a cautious approach to this activity to make sure that if in fact we are using a performance-based approach in a given area that there is measurable information, that that information will give good insight as to the safety significance of activities. For example, as in the maintenance rule, any failures or poor performance doesn't result in unacceptable

or intolerable conditions.

The maintenance rule is a good example of performance-based approach, because individual equipment failures can be counted, can be addressed. So long as there is something to measure and measuring failures is not unacceptable, that is a reasonable approach, but there are other areas for which programmatic requirements are probably very important.

The example perhaps is a little bit extreme, but I think it is a helpful example. In the seismic area you simply can't wait and count earthquakes and see how well the plants perform. It simply doesn't make any sense, a strong program and an inspection program where there is really nothing to measure; there is no output in the normal performance-based sense. Either we have to find other things to measure, other surrogates for real performance in a demanding situation, or else it is more appropriate to continue to focus on the strengths and the qualities of the program that gives you confidence that the diesel generator and the buildings are built to strong standards so that they are seismically capable.

That is an issue that we need to sort out, how much belongs with the PRA implementation plan and what is the right mix of performance-based and programmatic requirements.

MR. THADANI: I think that issue probably should be discussed a little bit further. Even under the maintenance rule the criteria that the industry is setting up are not probabilistic or numerical criteria in terms of performance of systems and components. For example, they might set up for pumps criteria like changes in flow, changes in vibration. That is, there would be some engineering-based criterion that would be set up and they would be monitoring that pump, let's say, to make sure that they don't get that condition. That condition is a precursor to potential failure so that problems can be detected in time before they lead to failure. That approach is going to be applied for all the components that are in high safety significance category.

In some rare cases, if the component performance is not acceptable, they would move those components into a category where they set up goals, go back and take a look at their programs, ask questions: why are we seeing poor performance from this component? Modify their program but put that component in a category where attention is given by management. That is called category A-1. At that point that is a goal, and that goal could be numerical, but by and large we don't expect numerical goals for components even under the maintenance rule.

MR. HOLAHAN: The third item is related to the

second, which is the staff needs to settle and presumably bring to the Commission its advice on how to treat increases in risk which may be allowed as part of the risk-informed regulation. It is certainly included in the current industry guidance.

The last item is really an implementation.

CHAIRMAN JACKSON: The last item you mentioned, the risk-informed in-service testing and inspection?

MR. HOLAHAN: Yes.

CHAIRMAN JACKSON: We are going to talk about that if we get a chance.

MR. HOLAHAN: I would propose to give you a chance by simply saying slide 23 and 24 are two pages of promises for the next six months. I will note that it is a long list of significant promises. I won't go into them in any detail. I won't even list them.

CHAIRMAN JACKSON: It sounds like you are tracked to fulfill them.

MR. HOLAHAN: Yes, ma'am.

CHAIRMAN JACKSON: Let's have a few questions. You talked about the emerging policy issue with respect to in-service testing and in-service inspection. It seems that there is this issue of the methodology for the review and approval of changes, perhaps what someone might want to call risk-informed changes to in-service inspection and testing

requirements.

I guess the question I have, and I think Commissioner Dicus has a similar concern, is, how do you make a finding under 10 CFR 50.55(a) based on the licensee submittal alone without having the benefit of information that you may have gotten from the pilots?

Put another way, is the pilot being used de facto or being judged de facto to be an acceptable alternative by definition which then is subject to change after the pilot?

MR. THADANI: If I may go back, 50.55(a) states that the utility should meet the ASME standards in terms of in-service testing.

CHAIRMAN JACKSON: Exactly.

MR. THADANI: The requirement may be that each safety-related pump has to be exercised quarterly. It may turn out that not all pumps are equally important; some pumps in the plant are more important than others.

The idea behind this approach is that the utilities take all those components and try to develop an understanding of the relative importance of those components. If some of the pumps have less safety significance, then they could assign lower testing frequency. The code calls for quarterly testing, for example. In this case they may go to six months, a year, or some longer time period before they test those components.

The staff has to review that. The code allows the staff to provide approval if there is an alternative approach that the licensees are using that is deemed of high quality and is in fact acceptable to the staff. At this point the staff is working with the utilities. For example, IST with Palo Verde and Comanche Peak, getting into the details of how did they decide what components are more important and less important, and what is the right frequency of testing.

If after the evaluation is complete the staff agrees with the licensee over some modifications, agrees that those changes are appropriate, that the licensee's assessment is still acceptable, at that point that licensee can go to the revised approach that has been reviewed and approved by the staff.

Our expectation is as follows. After these two pilots are done, once the staff says it is okay, they can go forward. However, our intention is to go back and revise the regulation to allow risk-informed thinking to be built in as part of the code. The code committees are also working on this issue so that they can modify the code itself and in the future reference to that code will meet appropriate requirements.

CHAIRMAN JACKSON: I guess an issue has to do with in the meantime the fact that essentially to implement the

alternative testing requirements the licensee needs to be granted relief from current requirements.

MR. THADANI: Not at this stage. After the staff is done with its review.

CHAIRMAN JACKSON: I am saying the staff is going to be doing a review.

MR. THADANI: Yes.

CHAIRMAN JACKSON: That would essentially grant relief from current testing requirements.

MR. THADANI: Correct.

CHAIRMAN JACKSON: You talked about evaluations, but the question is, what is going to be the basis for doing those evaluations for granting the relief?

MR. THADANI: The basis would be essentially negligible impact on risk. That is the thrust of this approach. If you go back and do the analyses with quarterly testing for pump X, it may not even appear in most of what I would call important accident scenarios. For that particular pump, changing the frequency from three months to six months or a year, I don't think one would even see it in the evaluation.

CHAIRMAN JACKSON: Maybe it is a message as much as a question. Even though the staff has the capability under 10 CFR 50.55(a), I think it would be helpful for the Commission to understand what the methodology is and what

bases you are using for making these judgment in the absence of the input from the pilots and in the absence of the development of the regulatory guidance, et cetera.

MR. THADANI: We would certainly come back.

One of the issues that I don't think we have total agreement on yet also looking at is, are the tests that are done in some cases giving us all the information that one would like to have, or should the test itself be revised? Not just the frequency issue, but are some of the testing procedures appropriate in catching the dominant contributors to failure of that pump? That issue is still under discussion. The ASME code people are looking at that also.

CHAIRMAN JACKSON: Let me ask you one last question about the pilots. Will the pilot studies tell us anything about the required scope and level of detail of modeling in a PRA?

MR. THADANI: I think so.

CHAIRMAN JACKSON: Are we approaching it with goals in mind that would allow us to get at this issue?

MR. HOLAHAN: Yes, absolutely. The reason that we are including pilot activities as part of the plans for the SRP and the reg guide is that it is very difficult to write review standards or general guidance in an abstract way. It is much better to have an actual example or numerous examples while you are trying to establish what kind of

scope is important, what kind of quality features am I looking for. I think it is very helpful to have those pilot applications in front of the staff. I think they form an integral part of developing guidance.

CHAIRMAN JACKSON: The last question for the moment. You mentioned your review of licensee submittals of IPEs. Can you say at this point whether the implementation of your proposed risk-informed and performance-based approaches will require licensees to upgrade their IPEs to full scope PRAs, level 3's?

MR. HOLAHAN: I don't think I can give you a clear-cut yes or no answer. I think it relates to what application is in mind.

CHAIRMAN JACKSON: The real answer is you have to work your way further through this implementation plan before you can give us an answer.

MR. HOLAHAN: I will give you a guess.

CHAIRMAN JACKSON: Okay.

MR. HOLAHAN: Mr. Thadani mentioned screening type applications, risk ranking and detailed applications. From what I have seen of most of the IPEs, I think they are suitable for screening type applications. My guess is that many of them are good enough for risk ranking but that some would require additional improvements. At this stage I wouldn't be confident in saying that many of them are good

enough for detailed applications. I would say maybe only a few.

MR. THADANI: Let me add to that. In terms of risk ranking, as we have indicated before, we are looking at clarification and guidance. It may be because of some of the variability in studies it is even more important to make sure that the importance measures that are used in getting a better understanding are carefully considered and the criteria that one uses in applying those importance measures become important.

I think we are trying to get a clearer understanding of what is the proper criterion. Is it five percent impact? 10 percent impact? I think what is clear is we need to look at these various measures and look at the hardware that shows up in appropriate category by using different approaches to get a better understanding of what these criteria are actually doing, that is, which components end up in high and low importance categories. There I think we need to do a bit more than we have done in the past.

CHAIRMAN JACKSON: There are going to be these pilot applications. It would strike me that in looking at what you hope to get out of them, which we have talked about before, that you need to think about all these things where you know you have these questions to see to what extent you can get what you need.

I am going to yield to Commissioner Rogers.

COMMISSIONER ROGERS: I am concerned about the same thing. We are talking now about applications of PRA that I think go way beyond what we had originally thought of a few years ago when using them for screening was clearly a very valuable thing to do and valuable insights that the licensee would get by doing the PRA. Now we are beginning to think, well, now we can use this very powerful tool for some other purposes. They are very interesting purposes, and I think it is important to look at them.

I guess my concern follows sort of along the lines of the Chairman's, and that is, what are the bases we use to judge that a PRA is a good PRA? It is all very well to say the risk is less or the risk analysis shows, but what is the basis on which we decide that that risk analysis itself was well done and sound?

It relates to questions about peer review of the PRA process itself, to what extent are we availing ourselves of peer reviews of PRA processes in what we are doing and what licensees are doing, and is there some codification possible of analyzing whether a PRA has been acceptably performed?

It is easy for us to look at the input data to know what the reliability database is that has been referenced in putting numbers into the PRA, but I am

thinking about the general structure, the fault tree and event tree structures of performing these and whether there is some basis for deciding, yes, this is a really sound job. Or do we have to ad hoc each one of these things? Is there some way that one can codify test criteria for looking at PRA that more or less meet standards of the scientific and technological community?

CHAIRMAN JACKSON: And will this be in the reg guide you are developing?

MR. HOLAHAN: It is more than in the reg guide; it is the reg guide.

MR. TAYLOR: One of the reasons we finished NUREG-1150 was that was the standard, presumably. Of course we spent a great deal of time. Not we the agency, but those that assisted us preparing such a study.

COMMISSIONER ROGERS: Yes, but it was just for those plants.

MR. TAYLOR: Right, but it set the standard. Having both a mix of BWRs and PWRs was an attempt to set a base standard.

Is that not correct, Dave?

MR. MORRISON: That's correct.

You have raised a good point. What we need to do is build on the experience and the insights that we have gained from the IPE process where we have a large number of

these and recognize that perhaps what we set then was not sufficient for people to be able to do what we now require as an acceptable PRA.

MR. TAYLOR: We are pushing even beyond the screen.

COMMISSIONER ROGERS: I wondered whether even the 1150 analyses would be good enough to make some of the decisions that we are thinking about making using PRAs now. They really sort of led us to see how the safety goals were being met or not met, but now we are talking about very detailed applications.

MR. THADANI: I don't think in my lifetime we will know how to do so-called perfect probabilistic risk assessment where I can really believe everything that comes out of that evaluation, because we will continue to have questions about cognitive errors, errors of commission, and things like that will always be around; there will always be some questions.

I think the policy statement lays out clearly the recognition that there are some places where one can apply these techniques, but you can't just depend on these techniques alone. We have this infrastructure. We have the knowledge and evaluation studies that have been done up to now through our deterministic process. One can't just replace that. Rather, the value of these techniques would

be in selected areas to see if we can do better: Have we gone too far? Has there been an area of perhaps what I would call overregulation or underregulation?

COMMISSIONER ROGERS: You don't have to take into account all of the human factors analyses perhaps for certain types of decisions.

Let's move on a little bit. This question about safety goals. That was a pioneering effort when a Commission put those in place. On the other hand, they really do relate in their initial form, if you want to use PRA, to a level 3 PRA. That means you have to know something about the location of the plant, the population distribution. You have to do that. Level 3 has been a big challenge for a number of licensees. I guess not very many have actually gone to level 3. There have been a few, but mostly it has been level 2 where they terminate.

When we start talking about safety goals for making some kind of regulatory decision that involves PRAs, are you going to have to move to subsidiary goals in order to do something meaningful here?

MR. THADANI: Exactly. I think that is it. Uncertainties just get worse as you go on all the way out to consequence calculations and health effects.

As the Commission has approved, the regulatory analysis group put together a document on subsidiary

objectives and core damage frequency and containment performance in terms of early or late containment failure. Those are criteria that we use in our generic approaches to safety issues, rulemaking activities, and so on. If we follow the path we are on, those will be the criteria we will propose.

COMMISSIONER ROGERS: Have we totally wrapped up what the acceptable subsidiary goals are?

MR. THADANI: Currently the Commission approved use of those criteria in any new rulemaking activities and generic activities. We have applied those in some of the recent regulations.

COMMISSIONER ROGERS: As we proceed to deal with the use of safety goals in regulatory decision-making, I think we ought to be brought up to date on what the status is of the surrogates for the level 3 statements of safety goals.

MR. THADANI: We did send up a Commission paper indicating how difficult it was to define a large early release.

COMMISSIONER ROGERS: I remember that. That's why I'm not sure how wrapped up this is.

MR. THADANI: So we went to containment performance instead, timing of containment failure as a reflection of significant releases.

COMMISSIONER ROGERS: I want to say one more thing and then we will give Commissioner Dicus a chance.

You mentioned these expert panels that are being used in the application of the maintenance rule. I take it those are licensee panels.

MR. THADANI: Yes.

COMMISSIONER ROGERS: Have you thought at all about trying to use what we have come to so far in studying the use of expert judgment in the high-level waste area as some useful guidance to provide to these expert panels for use in the maintenance rule? It is two different sides of the house now. Can you take something from one and usefully provide it to the other?

MR. HOLAHAN: I think we have not, but I think it is an interesting thought we can follow up on.

COMMISSIONER ROGERS: Thank you.

CHAIRMAN JACKSON: Commissioner Dicus.

COMMISSIONER DICUS: I am making it unanimous that we all have some general concerns here. I think it is clear that all three of us would like to hear a little bit more back from you, not necessarily today, but sometime in the hear future, on some of these issues, particularly these policy concerns that you have raised.

I would add one thing, and that is perhaps some sequencing in how these are resolved. It may be necessary

to have some resolution of the safety goals, this risk neutral versus increases in risk policy issues, and come to some points there even before you can come to some resolution of these applications that are coming in. That would be the only thing I would add.

CHAIRMAN JACKSON: Let me ask you two quick follow-up questions. I note that several guidance documents are being prepared by industry and reviewed by the staff, including the NEI PSA applications guide. Can you clarify again what the relationship is between these documents and the staff's review of them and the guidance documents being prepared by the staff?

MR. HOLAHAN: Yes. The PSA applications guide developed by EPRI for NEI, I consider that to be the same scope as what we have called the general SRP and regulatory guide. It is that type of document. As part of our development of the regulatory guide and SRP that team is reviewing that guidance document. If we found that to be a complete, thorough document, then we would propose to reference it as part of the regulatory guide.

In our review of the last draft of that guide we raised a number of issues. I think it was 12 or 15. Some of those issues have been dealt with by NEI in the revision to the guide, and I think some of them have not.

In its current form, I think there are a number of

open issues for which the staff wouldn't be satisfied with it as a reference document. Whether it is referenced at all or whether the staff develops independent thoughts on the same scope remains to be seen. It is part of the review process.

For example, in the maintenance rule area, the regulatory guide does reference the NEI 9301 document. There is basically an acceptance of that as an approach.

CHAIRMAN JACKSON: Are you saying that you are reviewing them with respect to their potential suitability for the staff to endorse them?

MR. HOLAHAN: Yes, to reference for endorsement.

CHAIRMAN JACKSON: In lieu of development of our own reg guides?

MR. HOLAHAN: In a practical sense, it's not in place of it. There will be a regulatory guide. I would say it is likely that if there is an endorsement it will be a partial endorsement with remaining issues to be dealt with.

CHAIRMAN JACKSON: In each case we would have our own reg guide and we would either incorporate in that a reference and/or an endorsement as appropriate.

MR. HOLAHAN: Yes.

MR. THADANI: At this stage there are some issues with the industry guide. We do have some concerns and those concerns have been identified. When we go forward, even on

these pilots, we will try to utilize our best views on the issues as well as try and see if one were to apply the PSA guide approach the industry put together how different the answers might be to get a little better understanding of what these differences might mean.

MR. HOLAHAN: There is some value to endorsing an industry guide if you are comfortable with the quality of it. It has had a lot of industry input; the utilities are more comfortable with a guide that they have tried out and that they were involved in the development of; and it probably is an easier and smoother implementation. Whether we can do that or not depends on whether we feel the issues are adequately addressed in those documents.

CHAIRMAN JACKSON: I note that you state that numerical criteria are espoused by the NEI PSA application guide and that some of these criteria will be tested in the ongoing industry initiated pilot applications. Can you give us an example?

MR. THADANI: Examples of the criteria?

CHAIRMAN JACKSON: Right, some criteria and how they would be tested.

MR. THADANI: If you go through some results from probabilistic safety studies, NEI guidance document would say that for a given change -- let's say there is a change that is to be made to the plant, a permanent change to the

plant. They would propose delta core damage frequency of some magnitude being acceptable. In addition to that, they would propose that certain importance measures be looked at.

The value of importance measures is it helps you a little bit in terms of the uncertainties that might exist in these studies. They have proposed some specific criteria for these importance measures to be used. We don't necessarily agree that those are the right values to be used. What we would try and do is to use these criteria and some other criteria to see how the results change, take a look at the output, and then use your best judgment: Does this seem a better breakdown, so to speak, of what is more important and what is less important? The devil is in the details.

CHAIRMAN JACKSON: You are building this into your review of the pilot applications and what you are going to be looking for?

MR. THADANI: Yes.

MR. HOLAHAN: Yes.

MR. THADANI: We have already indicated that there are some issues we are worried about in this guide. We have told NEI that.

CHAIRMAN JACKSON: You have your list of what your information needs are that you feel you need to get out of these pilots?

MR. THADANI: Yes.

CHAIRMAN JACKSON: Have you given any thought to how uncertainty will be dealt with in the performance-based side of the equation?

MR. THADANI: I don't have a clear answer to that. Uncertainty is one area that I am a little uncomfortable with. If you look at many of the studies done, they don't necessarily do a very good job of addressing uncertainties. In my view, when we get to performance-based approaches, as you have yourself said on many an occasion, our requirements should be clear and consistent.

I am not sure that one should have numerical criteria in terms of performance. I think we have got to stay back to something else that will tell us if one reaches that threshold, it's a sign of a problem, and deal with that. That is a non-numerical approach at that point. I think numerical approaches would be difficult.

Commissioner Rogers was here when we had this issue of how do you know what is the underlying reliability of diesel generators. If you have a rigorous statistical approach to that, then you almost cannot tolerate any failure at all even though the underlying reliability of the diesel may in fact be what one wants.

So you get into this very tough scenario. Diesel unreliability is on the order of 5 percent. Other component

reliability or unreliability is much lower. So the magnitude of this issue will just grow. That is an issue not identified in the implementation plan today, those kinds of difficulties. I think we need to address that issue as part of this activity.

CHAIRMAN JACKSON: Let me thank you very much for a comprehensive briefing on the PRA implementation plan. I do want to commend you for the progress you have made to date in this sometimes difficult area.

[Slide.]

CHAIRMAN JACKSON: You can put the credits up as I speak.

MR. HOLAHAN: In addition to just the credits, we have the actual people here.

CHAIRMAN JACKSON: Maybe those credits ought to stand. Why don't the team members stand up so we can see who you are.

Very good. Now that I see you, I can encourage you to continue to improve the PRA process and to provide appropriate review mechanisms to ensure that the PRA is used appropriately throughout the agency and consistently. I know it is widely used throughout the respective offices and so it has already become an important regulatory tool.

In striving to enhance the process and to ensure its consistent use, let me reiterate four points that I

think have come out of our meeting today.

With respect to the issue of referencing safety goals and decision criteria, I think the point that was made about the use of subsidiary goals, laying those out, clarifying where they are appropriately used is important.

Second, you raised yourself the issue of the performance-based approaches and where performance measures vice programmatic approaches are important. It seems to me that is an issue that you have to clarify, where systems or applications can be appropriately binned one way or another as opposed to necessarily trying to force everything within one pot.

Third, you have the IPE reviews that you are completing and you have the industry initiated pilots. It seems to me you have to put the two of them together to very carefully consider what your lessons are, and, either looking back or prospectively, how they will be used in developing the reg guides as well as the standard review plans.

Finally, as I think came out of the discussion on alternative approaches for reviewing ISI and IST changes, the message is that the staff should provide the Commission with the pros and cons of potential staff approaches and recommendations on all of the emerging policy issues prior to the staff taking a position.

With that, I will ask if my fellow commissioners have any further comments.

COMMISSIONER ROGERS: No, thank you.

COMMISSIONER DICUS: No.

CHAIRMAN JACKSON: We stand adjourned.

[Whereupon at 11:50 a.m. the meeting was adjourned.]

CERTIFICATE

This is to certify that the attached description of a meeting of the U.S. Nuclear Regulatory Commission entitled:

TITLE OF MEETING: BRIEFING ON PRA IMPLEMENTATION PLAN - PUBLIC MEETING

PLACE OF MEETING: Rockville, Maryland

DATE OF MEETING: Thursday, April 4, 1996

was held as herein appears, is a true and accurate record of the meeting, and that this is the original transcript thereof taken stenographically by me, thereafter reduced to typewriting by me or under the direction of the court reporting company

Transcriber: Michael Paulus

Reporter: Michael Paulus

STATUS UPDATE OF PROBABILISTIC RISK ASSESSMENT (PRA) IMPLEMENTATION PLAN

Ashok C. Thadani
Gary M. Holahan

April 4, 1996

OVERVIEW

- Background
- Revisions to the PRA Implementation Plan
- Accomplishments and Activities to Date
- Emerging Policy Issues
- Future Activities

BACKGROUND

- Previously briefed the Commission on April 5, 1995 on status update of the PRA Implementation Plan
- Final PRA Policy Statement published on August 16, 1995
- SECY-95-265, "Response to August 9, 1995, Staff Requirements Memorandum Request to Analyze the Generic Applicability of the Risk Determination Process Used in Implementing the Maintenance Rule" issued November 1, 1995
- SECY-95-280, "Framework for Applying Probabilistic Risk Analysis in Reactor Regulation" issued on November 27, 1995

BACKGROUND (CONTINUED)

- November 30, 1995, Chairman Jackson issued memorandum requesting staff plans to develop Regulatory Guides (RGs) and Standard Review Plans (SRPs) in 2 years

- January 3, 1996, staff submitted action plans for accelerating the development of RGs, SRPs and Inspection Procedures

- March 26, 1996, staff submitted memorandum to update the status of the PRA Implementation Plan

- Staff will provide quarterly written updates on the progress of the PRA Implementation Plan and brief the Commission semi-annually

KEY ELEMENTS OF THE PRA POLICY STATEMENT

- Increase PRA applications in all regulatory decisions
  - supported by methods and data
  - complements deterministic approach
  - supports defense-in-depth philosophy
- PRAs are not substitutes for meeting current rules, regulations and requirements. Current rules and regulations shall be complied with unless these rules and regulations are revised
- Safety Goals and subsidiary numerical objectives are to be used for generic requirements

PRA IMPLEMENTATION

- Inter-office activities underway
- High priority assigned to RG/SRP development
- Pilot studies progressing well
- Reprioritization of PRA Implementation Plan tasks
- Accident Sequence Precursor (ASP) Program and PRA training
- Use of performance assessment in environmental settings
- Participation in international PRA activities

REVISIONS TO PRA IMPLEMENTATION PLAN

- Accelerated effort to develop RGs and SRPs
- Better focused industry pilot applications
- New tasks to incorporate risk insights into inspection programs and procedures
- Risk assessment for non-power reactors and SRP for evolutionary reactors are deferred
- Several PRA methods development efforts and some ASP tasks were deleted due to higher priority activities

ACCOMPLISHMENTS TO DATE

- RGs and SRPs development underway
- Review of industry-initiated pilot applications
- PRA methods development
- Review of Individual Plant Examination (IPE) submittals
- Common Cause Failure (CCF) Database completed
- High pressure coolant injection (HPCI) and emergency diesel generator (EDG) system reliability studies completed

ACCOMPLISHMENTS TO DATE (CONTINUED)

- 1994 accident sequence precursor (ASP) report issued
- Published proposed Reliability Data Rule
- Training program and new courses for PRA
- Performance assessment for High-level waste and Low-level waste

RGs AND SRPs DEVELOPMENT

- Inter-office teams established to develop

  General RG and SRP

  Application-specific RGs and SRPs
  - Inservice testing (IST)
  - Inservice inspection (ISI)
  - Graded Quality Assurance (GQA)
  - Technical Specifications (TS)

- Draft RGs and SRPs for public comment by the end of 1996 (3/97 for ISI)

- Final RGs and SRPs to be completed by the end of 1997

RGs AND SRPs DEVELOPMENT (CONTINUED)

- General RG and SRP - annotated outlines developed, preliminary draft RG under staff review
- Application-specific RGs and SRPs - annotated outlines developed, preliminary draft RG for Graded QA under staff review

PILOT APPLICATIONS

- Motor operated valve (MOV) testing
  - Reviewed BWROG (Boiling Water Reactor Owners' Group) report on PRA application in MOV testing and issued Safety Evaluation on 2/27/96
- Inservice tesing (IST)
  - Reviewed Palo Verde and Comanche Peak applications, Request for Additional Information (RAI) issued
  - Reviewed draft IST guidance from industry and provided comments

PILOT APPLICATIONS (CONTINUED)

- Inservice inspection (ISI)
  - Met with industry to discuss technical approach and pilot applications
  - ANO-2, FitzPatrick, Surry submittals expected in 6/96
  - Draft ISI guidance from industry expected in 4/96
- Graded QA
  - Staff is evaluating graded QA programs from South Texas, Palo Verde and Grand Gulf
- Maintenance Rule
  - NUREG-1526 documented lessons learned from early implementation of the Maintenance Rule at nine nuclear power plants
  - Conducted public workshop

PILOT APPLICATIONS (CONTINUED)

- Technical Specifications
  - Reviewed Combustion Engineering Owners' Group (CEOG) request to extend allowed outage time (AOT)
  - Currently reviewing response to staff RAI
  - Currently reviewing South Texas 3-tiered approach to extending the AOTs

PRA METHODS DEVELOPMENT

- Completed initial development of methods for modeling human errors of commission in PRA
  - NUREG/CR-6265, "Multidisciplinary Framework for Human Reliability Analysis with an Application to Errors of Commission and Dependencies," August 1995
  - NUREG/CR-6350, "A Technique for Human Error Analysis (ATHEANA): Technical Basis and Methodology Description," expected June 1996
- Initiating demonstration phase

IPE/IPEEE REVIEWS AND INSIGHTS

- Completed preliminary review of all IPE submittals
- Issued 45 Evaluation Reports, remaining 30 to be completed by 9/96
- Issued SECY-96-051 on preliminary IPE insights
- Briefing regions on plant-specific IPE results and insights
- Completed 5 IPEEE reviews and 20 are under review
- Staff is reassessing the IPEEE review plan

RELIABILITY DATA RULE

- Draft rule has been published for comment
- Regulatory guide will be completed in early April 1996
- Public workshop to be held in May 1996
- Public comment period closes on June 11, 1996
- Target date for the final rule is December 1996

ACCIDENT SEQUENCE PRECURSOR PROGRAM

- 1994 ASP report was published in December 1995
- 1982-1983 precursor preliminary analyses have been finished and the results will be issued to the staff and licensees for information
- 1995 analyses are being completed and the results will be made available on an event basis
- ASP Technical Coordination Group meets monthly to assess progress on modeling, methods, and analyses

RISK-BASED ANALYSIS OF OPERATING EXPERIENCE

- Plan for "Risk-Based Analysis of Operating Experience" has been prepared and is being implemented
- Common Cause Failure (CCF) Database has been completed, CCF parameters estimated and forwarded to the staff for use, review, and comment
- Safety system performance studies are progressing on schedule. HPCI and EDG are complete. Additional studies are underway (IC, RCIC, HPCS, AFW)

PRA STAFF TRAINING

- The PRA training curriculum is revised and expanded
- A "configuration management module" was piloted in FY 1995 and is being added to selected courses
- An "uncertainty module" is being developed and will be added to selected courses
- "PRA for Technical Managers" course is being developed
- Senior Reactor Analysts are in training and rotational assignments
- Over 400 staff members have attended PRA training since the last update

PRA PROGRESS IN WASTE MANAGEMENT

- Performance assessment continues to be applied to high-level waste (HLW), low-level waste (LLW), and Site Decommissioning Management Plan (SDMP) sites
- High-level waste performance assessment (PA)
  - Iterative performance assessment (IPA) Phase 2 results published in NUREG-1464
  - Current IPA Phase 3 work focuses on risk-informed issue resolution
- Low-level waste performance assessment (PA)
  - Publish for comment Branch Technical Position (BTP) on LLW PA for LLW disposal facilities (to Commission June 30, 1996)
  - Document test case which demonstrates BTP approach

EMERGING POLICY ISSUES

- Role of "performance-based regulation" in the PRA Implementation Plan
- Referencing Safety Goals in decision criteria
- Risk neutral vs. Increases in risk
- Implementation of risk-informed IST and ISI requirements

FUTURE ACTIVITIES (NEXT 6 MONTHS)

- Working draft for general and application-specific RGs and SRPs
- Initiate inter-office review of RGs and SRPs (except ISI)
- Continue review of the pilot applications (complete IST and technical specification pilots)
- Complete inspection manual revisions and training material for inspectors
- Continue PRA model development efforts
- Complete IPE reviews
- Reevaluate scope of IPEEE review

FUTURE ACTIVITIES (NEXT 6 MONTHS) (CONTINUED)

- 1982-1983 ASP final report and additional system studies
- Reliability Data Rule public workshop
- Preliminary ASP analysis for 1995 and selected 1996 operational events
- Continue staff PRA training
- PRA Implementation Plan updates to the Commission in June and September 1996
- PRA Implementation Plan briefing for the Commission in October 1996
- ACRS full and subcommittee meetings

RESPONSIBLE STAFF/ORGANIZATION FOR RG/SRP AND PILOT APPLICATIONS

- Management oversight

  Responsible senior manager - A. Thadani

  Resolution of interoffice issues - Office Directors

  Overall coordination and technical guidance - PRA Coordination Committee

  E. Butcher (NRR), M. Cunningham (RES)
  P. Baranowsky (AEOD), J. Austin (NMSS)

  Daily coordination and supervision -

  M. Rubin (NRR)
  A. Ramey-Smith (RES)

RESPONSIBLE STAFF/ORGANIZATION FOR RG/SRP AND PILOT APPLICATIONS

- Inter-office, inter-disciplinary teams assembled for development of RG/SRP and integration of pilot plant experience

Broad-based, General RG and SRP

A. El-Bassioni (co-leader)	RES/PRAB
M. Caruso (co-leader)	NRR/SPSB
T. Hiltz	NRR/SPSB
M. Cheok	NRR/SPSB
S. Dinsmore	NRR/SPSB
R. Woods	RES/PRAB
B. Hardin	RES/PRAB
J. Guttmann	RES/PRAB
J. Schiffgens	NRR/SPSB

RESPONSIBLE STAFF/ORGANIZATION FOR RG/SRP AND PILOT APPLICATIONS (CONTINUED)

Risk-informed ISI inter-office team

J. Guttmann (co-leader)	RES/PRAB
S. Ali (co-leader)	NRR/ECGB
A. Hsia	NRR/SPSB
S. Dinsmore	NRR/SPSB
D. Jeng	NRR/ECGB
M. Caruso	NRR/SPSB
C. Hrabal	RES/EMMEB

RESPONSIBLE STAFF/ORGANIZATION FOR RG/SRP AND PILOT APPLICATIONS (CONTINUED)

Risk-informed IST inter-office team

D. Fischer (co-leader)	NRR/EMEB
B. Hardin (co-leader)	RES/PRAB
M. Cheok	NRR/SPSB
A. Hsia	NRR/SPSB
W. Gleaves	RES/EMMEB
M. Caruso	NRR/SPSB
J. Schiffgens	NRR/SPSB

RESPONSIBLE STAFF/ORGANIZATION FOR RG/SRP AND PILOT APPLICATIONS (CONTINUED)

Graded QA inter-office team

R. Gramm (co-leader)	NRR/HQMB
R. Woods (co-leader)	RES/PRAB
T. Hiltz	NRR/SPSB
R. Latta	NRR/HQMB
L. Campbell	NRR/HQMB
J. Peralta	NRR/HQMB
S. Dinsmore	NRR/SPSB
M. Caruso	NRR/SPSB
O. Gormley	RES/EMMEB

RESPONSIBLE STAFF/ORGANIZATION FOR RG/SRP AND PILOT APPLICATIONS (CONTINUED)

Risk-informed TS inter-office team

R. Woods (co-leader)	RES/PRAB
N. Gilles (co-leader)	NRR/TSB
M. Wohl	NRR/SPSB
A. Hsia	NRR/SPSB
M. Caruso	NRR/SPSB