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Vol. 1

Proceedings of the U.S. Nuclear Regulatory Commission

NRC Regulatory Information Conference

Held at the
Mayflower Hotel
Washington, DC
April 18–20, 1989

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U.S. Nuclear Regulatory Commission

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Conference Chairman:
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Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

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ABSTRACT

This volume of the report provides the proceedings from the Nuclear Regulatory Commission (NRC) Regulatory Information Conference that was held at the Mayflower Hotel, Washington, D.C., on April 18, 19, and 20, 1989. This conference was held by the NRC and chaired by Dr. Thomas E. Mosley, Director, Office of Nuclear Reactor Regulations (NRR) and coordinated by S. Singh Bajwa, Chief, Technical Assistance Management Section, NRR. There were approximately 550 participants from nine countries at the conference. The countries represented were Canada, England, Italy, Japan, Mexico, Spain, Taiwan, Yugoslavia, and the United States. The NRC staff discussed with nuclear industry its regulatory philosophy and approach and the bases on which they have been established. Furthermore, the NRC staff discussed several initiatives that have been implemented recently and their bases as well as NRC's expectations for new initiatives to further improve safety.

The figures contained in Appendix A to the volume correspond to the slides that were shown during the presentations. Volume 2 of this report contains the formal papers that were distributed at the beginning of the Regulatory Information Conference and other information about the conference.

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APPENDIX A

1 PLENARY SESSION:

INTRODUCTION AND IMPROVING OPERATIONAL SAFETY

Welcome

Dr. Thomas E. Murley:

Good morning ladies and gentlemen, distinguished visitors. My name is Tom Murley. It is my pleasure to welcome you to the first NRC Regulatory Information Conference.

This conference represents something new. The purpose of the conference is for the NRC's staff to explain our views, the rationale behind these views—on safety and regulatory issues—that we think are of most concern today. We further want to engage in a dialogue with you in the industry on these issues. We want to do it in an open forum, in an open atmosphere. For that reason, we have decided to have this conference.

We have allowed time for questions after each talk and for informal discussions at the end of each day; obviously, opportunities will arise for discussions in the halls and during breaks. We encourage questions. There are many people from my staff, from the Office of AEOD (Analysis and Evaluation of Operational Data); each of the Regional Administrators is here at the conference and regional staff as well as many others from the NRC headquarters staff. I am heartened to see so many utility representatives and other industry representatives.

If this conference proves mutually beneficial, we will consider holding similar conferences in future years. If there are suggestions for improvements in the format or the content, we will be pleased to hear those as well, at the end of the conference.

We have some announcements on housekeeping at the start of this morning's plenary session; I will defer those for the time being.

You will note a common theme running through much of this conference: that theme is an emphasis on improving operational safety. This morning's session is devoted, for example, entirely to four broad aspects of operational safety and the staff's views on these special broad subjects.

For the remainder of the conference, we have scheduled parallel sessions: one, emphasizing an aspect of operations, and the other parallel session on another regulatory topic of current interest.

For example, this morning, as I mentioned, is improving operational safety. This afternoon we have a session on operating experience and a parallel session on a topic that is of current high importance to us, that is, substandard material and equipment and what we are finding and where we are heading and where we think the industry should be heading.

Tomorrow morning we have a session on evaluation of plant performance and how we in the NRC go about evaluating such performance. There is a parallel issue, a parallel topic, on regulatory issues, for example, preparation for plant life-extension, license renewals.

Wednesday afternoon there is a session on NRC inspection experience and a parallel session that covers many topics of current technical concern. Finally, on Thursday morning, we have a session on human factors and operator licensing issues, which I know is a hot topic for many of you. Parallel to that, also an important topic, is a session on enforcement and investigation: what our policies are, where we are heading, and where the trends are. The final afternoon, on Thursday, we will have a severe accident plenary session and then a closing panel session.

Parallel to these we have a few breakout sessions that are on special, but somewhat narrower topics; these are outlined in your handouts.

We have a luncheon speaker today. Chairman Zech will be with us, and tomorrow Commissioner Rogers will come and be the luncheon speaker.

To open the conference, we have Victor Stello, Jr., the NRC Executive Director for Operations, who I am sure all of you know. He is the one who sets the tone for the NRC's staff emphasis on operational safety, and he provides strong leadership for the staff.

Introductory Remarks

Mr. Victor Stello, Jr.:

Thank you, Tom, and let me add for myself a very warm welcome. I am really pleased to see the turnout this morning. We at the NRC, in the last few years, have been trying new things. This is one of those new things we are trying, and I am completely confident this is going to be a success. I am confident we are going to be doing this every year. Why do I say that? Because I think this conference is in response to what a lot of you have told me, both publicly and privately, that we do not communicate very well together. Many of you have heard me say that there is a thread of a lack of trust and mutual respect for each other. We do not trust you; you do not trust us. We do not talk to each other very well.

Those are things we said in the past. They have changed. I think communication between the NRC and the industry has been improved substantially in the last few years. I think it is important that communication improve. Not that there has to be any coziness or any closeness to the industry. We certainly can regulate at arm's length, but if we cannot have good technical discussions where we both take our jackets off, roll up our sleeves, and sit down and hammer out a technical issue, we are not going to achieve the best solutions to problems. That is what is needed: a way in which we can talk to each other. This conference, hopefully, will be the forum to begin to show that we really have come a long way.

We in the United States, and I think it is recognized, have perhaps the most adversarial relationship between regulators and an industry. I do not believe that that is conducive to both what you are interested in and what we are interested in. We want the right answers, the best answers that are available. Your input is clearly important, significant, and required for us to come up with the correct answers. We respect your judgments and your opinions. We will not always agree; that is not important. What is important is that we have that opportunity to talk.

I am going to start this conference on a note that may surprise you. I want to start out by saying to all of you in the industry, you have my sincere thanks. What I have seen over the last several years is progress that has been a very, very pleasant surprise.

Let me talk for a moment about some of that progress, because I think it is very, very important to set not only the tone of this conference, but perhaps to let us look into the future and see what more we need to do. If you look at what you in this room have accomplished in your plants, and in your companies over the last several years, you will find first, improving safety. How do we know that that, in fact, is now the case? How can we say, as I do, with high confidence: plants today are safer? Why?

Well, if you look at the number of scrams per plant, they are down. If you look at the number of significant events per plant, they are down. The average exposure per plant is down. The number of precursors that we see across the industry, analyzed the same way over the years, is down. The number of pieces of equipment that are failing is down. Well, what does all of that mean? It means that people are operating the plant better. People are obviously better trained, more familiar with the equipment; and the equipment—to use a word—is actually being maintained better. I think we have data to show that.

When you put it all together, if you have fewer pieces of equipment failing, you have operators who are making fewer errors. The net result is that you have a plant that is operating more reliably with higher availability and capacity factors. If you look at those data, they show capacity and availability of plants; the average in the United States has increased substantially about seven percentage points over the last three or four years. If you take out those plants that have been shut down because of significant problems, the average availability of the plants in the United States approaches what we are seeing in Japan.

We are striving for the goal of excellence in operation. You are too; you are making progress, a lot of progress. I do not want you to get complacent and think it is over; it is not. A lot of progress has been made, and that kind of activity needs to continue in the future.

The industry groups that you have sponsored and set up have contributed to helping you do that. But it is you who operate the plants every day, who are in those plants every day, that make it happen. And for that, again, let me say, thank you very, very much; I think you are really making the kind of progress that will help our country and your industry go a along way in bringing the kind of credibility to this industry that I think it deserves. With continued hard work, I am sure we are going to get there.

I do not want to dwell a great deal on the future of this industry. We have some tough issues in front of us; we know we have plant life-extension. Many of you have already expressed a keen interest in looking at the plant life- extension issue. A lot of you are already asking for answers about what it is going to take to get a life-extension for a plant—is it in 10, 15, or 20 years? With a capital investment in our nuclear plants approaching somewhere in the order of a half a trillion dollars, I suspect that the capital investment itself will generate a great deal of interest. We are working on that problem. That problem, too, will require considerable discussion and debate—to look to the future on how we will deal with those issues.

As we look to the future—you are aware that the Commission approved a new Part 52 rule on how to handle plants in the future, standardized plants. I think a lot of progress has been made in terms of setting a framework for licensing plants in the future. I believe that we will have a regulatory environment and a licensing approach in the future significantly different than many of you may remember from the late sixties and the early seventies. But, again, that too will take a lot of hard work.

Let me move more directly now to the theme of the conference and the kinds of issues that we believe you are interested in. I think we, hopefully, have covered the waterfront so that if anyone has any particular issue that they want to bring up, there will be an opportunity to do so.

Again, some of the issues that we are touching on in this conference are not easy. They are tough issues. If I were to pick one, substandard materials would be on the top of my list. We continue to find problems with some new substandard element that has somehow gotten into the nuclear chain. Whether it is a bolt, a flange, a valve, a relay, or whatever, a very, very difficult and tough issue that we are wrestling with is how to know if we are on top of this problem of substandard materials. I think we have made progress, but there is an awfully long way to go to make sure that we, in fact, have dealt with this and dealt with it very, very well.

Operating experience. I am not going to be shy in telling you that at one point we had 10 percent of this industry shut down for one reason or another. Things were not going very well. I do not want to pick on any particular utility or any particular plant. But we did have one of them yesterday at a Commission meeting, and I am sure it received a lot of media coverage this morning—although I have not seen it, I am sure it is probably fairly wide-spread, especially in Pennsylvania since it is the Peach Bottom facility. They have had trouble in that company; I am sure all of you are aware of it. I am not proud of it; I know the company is not proud of it. When they got into difficulty and allowed the problem to develop, the result was that the plant was shut down for over two years. I do not think that serves our country very well. I am not proud that we as regulators did not find the problem earlier. I certainly am not proud of the fact that the company and INPO did not find a way to correct it. I call that kind of a problem one we do not want to see very often.

We are trying to deal with that type of problem today in terms of looking at the operating experience. I think it is worth a few words. All of you are aware that NRC senior managers get together at least twice a year to look at every plant in the country and try to make a judgment on how well things are going. What is paramount in those discussions is to try to identify early indications of problems and to try to find forceful ways to bring them to a company's attention so that those problems, in fact, can be corrected early.

During this conference, I hope there will be time to have some of you share your observations as to the effect of this process, how it is perceived, and how we can make it better. That is true with not just the issue of trying to understand the operating experience of a plant and what it means, but also with the rest of the agenda for the meeting. What do you think about enforcement? I know that that is a very difficult area, one where there has been considerable discussion with many of you. We think we heard you. We made a lot of changes in the way we handle enforcement, but maybe we have not made all the changes that are necessary. Perhaps there are other things that we ought to consider; we are going to talk about them.

If I go through the whole agenda, I am going to be saying more of the same thing. There are more topics, more issues that I think warrant and justify the meeting, of and by themselves. But, when you take them all together, there is a broader purpose for the meeting. Let us tell you what is driving us. This is the first time that you have ever had a forum to tell us where we are not on the mark, why we are not on the mark, and whatever other comments, suggestions you may have. You have a lot of experience out there and can have, I am sure, a great impact on the way we regulate. Remember, the way we regulate is important not only to you, it is important to the whole process and the industry itself. Keep the theme in mind of how I began this talk: How can we reduce the adversarial relationship so that we can communicate well with each other? Only then will we be able to do the best job that we can in overseeing the, now in excess of, 100 operating plants and in developing good requirements, rules, and regulations to improve day-to-day operation.

That is how I want to end my short talk this morning, emphasizing the responsibility that we all have to make sure that these 100-plus plants are operated safely. The minute any of you believe that you are through and you get complacent, you have failed. You have to be able to pay attention to detail all of the time, every day, and make all of the changes and improvements to keep up that plant on a day-to-day basis. Once you let safe operation slide, you are going to get into trouble. Your job, our job, for the success of this industry, is to keep those plants operating safely—and your job, your added responsibility, is to do so economically. You want to get high capacity, high availability, and I guarantee that if you have a really safe plant, the availability and the economics of the plant will follow.

With that thought hopefully kept in mind as we go through this conference, I am sure you will walk away with a better understanding of what we are doing, and we will gain a better understanding of what your concerns are about what we are doing. As a result, we can be better regulators and better serve the public. I sincerely hope that you will do your best to make this conference a success, pass on those comments I talked about. I wish all of you a very, very happy stay in Washington. I notice that the length of the conference is such that you may not get out to see Washington at this time of year, when Washington truly is beautiful. But I think your job here is more important. Again, let me urge you to do what you can to make this conference the best conference we have ever had in this industry.

Thank you very, very much for your attention this morning.

Dr. Murley:

Okay, thank you, Vic. We will move straight in to the morning's plenary session. If I could get the speakers to come up. Frank Gillespie and Singh Bajwa have a few announcements to make about housekeeping. So let us get those under way.

Mr. Frank P. Gillespie:

There is coffee available through the morning. We have provided microphones in the middle of the room to allow each session chairman to set the tone of his session and to take some time to answer questions immediately following each speaker's discussion. There is a pocket in the back of each handout book containing cards to write questions on. Identify the speaker and write the question. If you could pass those questions to the center at the end, or after each speaker, we will have someone who will go up the center aisle and collect them. We are going to make every effort to answer all questions at the end of the session.

We also want to get all the speakers to talk, so the session chairman, to keep things moving, may have to actually limit the amount of time after each speaker for questions from the microphones. Some speakers take more time than others in answering questions.

The rooms for the breakout sessions on the agenda are located on the second floor. The elevators are right across the hall. There is a suite of four rooms that are labeled for the breakout sessions.

We asked people to suggest topics for smaller panel discussions on the registration form, and we selected the topics from those. Most of the people who will be leading the discussions in the breakout sessions will have some of their staff with them so that they will be able to deal with fairly detailed questions and answers.

Mr. S. Singh Bajwa:

You have the books. I just want to give you some hints on how to work with them and what the content is.

First, you will find an organizational chart. We tried to identify all the speakers from an organizational point of view—where they stand in the NRC. Then you have the question and answer cards; use them as needed. A copy of the viewgraphs for all topics are in the second part of the book. So you have copies of all the slides that will be presented during the conference.

The first part of the three-ring binder has all the papers from the speakers. There is one paper missing, but copies of that are available outside.

Most important is the first portion of the conference program; all the topics are listed and the rooms, names of the rooms, and you will find a map at the back in case you have a problem finding the rooms.

If anybody wants to reach you during the conference, the hotel number is 347-3000. Instruct the caller to ask for the NRC conference. We will have a person taking your messages, and we will post all the messages outside the main ballroom on a message board.

We are going to have a reception this evening from 5:00 to 6:30 in the Colonial Room. All of you are invited to come.

Two of the round table sessions will be repeated. They are the same topics, same speakers, so they will be held twice: performance-based quality assurance and risk assessment application.

At lunch time please provide your tickets to the waiters so that you can be identified. Anybody who has dietary restrictions, please let the waiter know and he will substitute your meal.

A small detail: You may wonder why we have two-color badges. All the guests have the blue badges, and the NRC people have the yellow badges.

If we can be of any assistance during the Conference, please let me know. Thank you very much.

Improving Operational Safety

Mr. James H. Sniezek:

Good morning ladies and gentlemen. My name is Jim Sniezek. I am the Deputy Director of the Office of Nuclear Reactor Regulation, and I have the privilege of chairing our opening plenary session, improving operational safety.

First off, I want to thank Vic Stello and Tom Murley and Frank Gillespie and Singh Bajwa for giving me an additional four minutes for my session. Since one of my jobs is to make sure all the speakers finish on time, it is going to make my job a little bit easier.

In our opening session this morning, Tom Murley, Frank Miraglia, Jack Martin, and I hope to set the stage for the follow-on discussions that will occur during the remainder of the sessions.

I believe the theme of this session, improving operational safety, is the key for operation of nuclear power plants from the viewpoint of the nuclear industry and the regulator. The four major topics of this plenary session are closely coupled to achieving enhanced operational safety.

Our first speaker, Dr. Tom Murley, will be addressing the concept of developing a safety culture from both the perspective of a regional administrator, his previous position, and the Director of NRR, his present position. It gives me great pleasure to present Dr. Thomas Murley.

Developing a Safety Culture

Dr. Thomas E. Murley:

Thanks, Jim, again. I guess one of the prerogatives of organizing and sponsoring this first conference is being able to pick out my own topic and say what I want—say what is on my mind. I am going to do that.

What is on my mind most these days is how we can keep on improving the performance that Vic Stello mentioned, how we can keep that on the right track for all 110 plants licensed for full power. But more important, for us, I think, is how to bring the poor performing plants that are not doing so well up to the level of the best plants and how to detect declining operations early on and turn them around. I think it is a goal we all share. Nuclear energy is essential to the economy of the United States. We need several years of safe, quiet operation from our nuclear plants to make sure we preserve this energy option—and even expand the nuclear option.

The first question that comes to mind is how are we doing today? I think all the indicators show, as Vic Stello mentioned, that collectively plant performance in the United States is improving. We see fewer trips, fewer safety system actuations, fewer significant events, radiological exposures going down, and a number of other indicators.

In addition to this, a retrospective examination of operational data shows that several severe accident precursors have decreased substantially since the TMI accident. In fact, some analyses of these precursor data suggest that the average inferred frequency of core damage—that is, looking back over recent years and trying to judge how close we came to accidents using risk assessment techniques—the average inferred frequency of core damage has decreased by a factor of 20 in the past 10 years since Three Mile Island.

So it seems clear that the safety of U.S. nuclear plants is improving. Does this mean that NRC can back off? Well, to some extent, yes. We have in the past announced that we are reducing inspection coverage for some of the plants that have had a sustained record of excellent operations. I think we have announced that we are reducing inspection coverage at Kewaunee, Monticello, Prairie Island, and also Yankee Rowe.

Other plants, however, do not operate as well as these stalwarts. We continue to see examples of poor operations. Most troubling are cases of plants that once had good performance slipping backwards through complacency—or for whatever reason—to poor performance. I will talk about this later on: discuss some of the reasons we see for this backward slide and how we think we may be able to keep it from happening. As long as we have mixed operational performance that could affect safety, the NRC cannot reduce inspection coverage at all plants.

How do good operations or poor operations affect safety? Intuitively we know that good operations means good safety.

I have some charts and viewgraphs that show how we have tried to assess the affect of operational performance on safety.

This first chart *[Figure 1]* shows a plot of calculated core-melt frequency versus human-error rate for the Surry plant. Surry was one of the first plants at which a probabilistic risk assessment (PRA) was performed for the WASH-1400, the Reactor Safety Study.

Brookhaven National Laboratory used the Surry risk assessment several years ago for a research program. The researchers actually did a sensitivity study in which they varied the human-error rates from the baseline human-error rates that were assumed in the PRA. Wherever the models in the PRA assumed a human action, such as to turn off a pump or turn on a pump, or open a valve or something, the researchers assumed that the error rate was a factor of 10 higher than assumed, a factor of 20 higher, and so forth. Each time they increased the error rate, the researchers calculated the change in core-melt frequency, which, of course, increased. Similarly, as they decreased the human-error rate systematically by a factor of 10 and 20, they saw a reduction in the core-melt frequency.

Thus, one finds through this study—and I emphasize this study was done in the early 1980's, so these data are not new—that there is a substantial increase in risk or in core-melt frequency as the human-error rate increases.

As shown in the next chart *[Figure 2]*, we have expanded this study by looking at two other plants. We have taken the baseline human-error rates from the PRAs for the Oconee plant and the La Salle plant and found the trend is exactly the same. It is a little more marked for Oconee, but I think that was an artifact of the risk assessment model used for that plant.

These studies indicate a very high sensitivity of core-melt or core-damage frequency to human-error rates. Admittedly this is only an indicator; it does not show how operations affects the human-error rate. Although we all know intuitively that it does, we cannot quantify that aspect of it. Nonetheless, the message is clear: good operations is important to safety. One can take the same type of plant with identical hardware and if one plant is operated more poorly than the other, the risk factors increase by two, three, four, or five for the poorer-operated plant.

When we see declining trends in operational performance, we draw the inference that safety is declining. I think it is a good inference—I think it is a robust inference.

Unfortunately, we are fighting human nature. It is natural to want to relax, to become complacent, to say: "Well, we've got our plant capacity factor up on the world stage. We've been operating this plant for 20 years. The NRC can't tell us anything about how to operate a plant." To some extent that is true; but the moment we become complacent, I think that is where we start to head for trouble.

To prevent that from happening is one of the challenges for all of us. I believe it is necessary to establish a safety culture at each plant in order to prevent complacency.

This next chart *[Figure 3]* represents a lot of thought and study by our senior management at the NRC. I think international organizations are also coming to this sort of conclusion: one way to—probably the only way—to have a sustained good operation, a sustained safe operation, is to actually embed it in the culture of the organization that operates the plant.

Now, in order to know what we mean, we have to define it, and I must admit I cannot do that very well. It is like trying to define perfect beauty. You can nibble around the edges; you can give some examples of it; but it defies a sound description. Nonetheless, we can talk about some of the attributes of a safety culture.

First is a prevailing state of mind at the plant within the plant leaders so that all through the organization people are always looking for ways to improve safety. We never believe it is good enough. There must be a constant awareness of things that can go wrong. A nuclear plant has a lot of dangers associated with it, and we ought to recognize this—we ought not to minimize those dangers. We ought not be afraid to talk about them. We ought not be afraid to, amongst ourselves, admit that these are risky machines. We have to constantly be aware of things that can go wrong.

There has got to be a feeling of personal accountability, particularly among the managers, a feeling of pride in ownership in the plant. I can only give an example to illustrate what I mean: I once saw a plant manager, who was walking around on the tours with me, stop and pick up cigarette butts in the plant. Clearly, to me, that was one small indication, but significant, that this plant manager felt that this was his plant. He was proud of it; he did not want it messed up. He did not want it dirty. That kind of feeling and that kind of attitude permeates down through the organization.

A second attribute is a disciplined, crisp approach to operations. You have a trained staff, good team work; I think you know what that means, an insistence on a sound technical basis for actions. The procedures are up to date, the design basis is up to date, and the operations staff always stays within the design basis of the plant. You do not wing it; you do not move without a procedure. When you find yourself in a strange situation, you stop, take cognizance of the situation; if it is not clear, shut the plant down and figure it out.

Another attribute that comes to mind is the ability to do rigorous self-assessment: being open to problems, dealing with problems immediately, facing facts, facing bad news. I once had someone tell me that the indicator this person uses to assess management, at any organization, not just a nuclear plant, but almost any organization, is how they approach problems. Do managers let the message go out to their subordinates that they do not want a whole host of problems brought into their office: Keep the problem quiet; you guys deal with it. Or, do the managers really search for problems and let it be known that the way to avoid them is to be constantly on the lookout for them. I think this is the attribute that establishes the very best operations. It becomes almost second nature to be looking for problems.

I think it has become second nature to us at the NRC, quite frankly. I do not say that we have the best management system. But I do think, over the years, we have embedded in the staff this attitude of a safety culture in which we are always looking for problems. Of course, we do not operate the plants, so it is not up to us to make this come true at each plant, but we can function as somewhat of a conscience.

The next chart *[Figure 4]* illustrates the thought we have given to how one develops a safety culture, because it is not easy. I think the first clear description is that the policies have to come from the top; they have to be sincere. They have to be articulated forcefully by the top management, and I mean, probably, the chief executive officer; certainly the vice-president, nuclear, for the company.

Actions are needed, not just words. I cannot begin to tell you how many times I have been told, and have heard, from the top managers of companies that they were going to be the best in the country. I can almost tell whether those are sincere words or whether they are empty. Just saying it does not make it come true. Some of the plants that have gotten into the deepest trouble are those that have assured us time and again that they want to run a safe operation, and they want to be the best. But the fact is that their actions do not back up their words. Their actions say keep the plant running—always emphasizing production over safety.

No one is kidding the staff at the plant. Staff knows what management thinks is important. If the staff thinks that keeping the plant running at full-speed ahead is the message and the means to get a bonus, and if that is how awards get handed out at the top, then staff will keep the plant running. So there cannot be any hypocrisy in this.

You have to insist on competent managers. That goes almost without saying, but it is difficult to do. It is difficult to develop them. Not all companies have a good rotational system where they move managers from maintenance to operations to engineering, or to wherever, and get them a broad experience so that they can move on up to the very top organizations in the company.

Strict accountability, I took these words pretty much from something I read years ago from General Eisenhower. He said: "The essence of leadership is pick good people, give them clear instructions and authority, and hold them accountable." It is so simple, and I think it is clearly something that we can all follow.

Finally, we need a balance of strengths in the organization. A good plant manager can carry a plant to some extent; but the very best plants, the ones that operate well year after year, after year, have a balance of strengths within the plant manager, the engineering manager, and quality assurance manager. Jack Martin will talk about one aspect, the importance of engineering at this session.

Sometimes it helps to give an example; so I will do that. This is one of my favorite charts that we have developed over the last few years. We call it Plant A and Plant B *[Figure 5]*.

Plant A has a well-trained staff, with a plant-specific simulator. Staff follow procedures rigorously. The plant is fully staffed, so management does not have to use a lot of overtime. There is a good nuclear work ethic—people respect radiation, which is apparent when walking through the plant. There is a professional decorum in the control room; it is crisp. Scrams are extremely rare. The onsite review committee is diligent; they are sincere. The plant has a good preventive maintenance program: the plant is shut down when there are safety problems. There is a low-maintenance backlog; the plant is clean; and, typically, the plant has system engineers on the site who feel accountability and responsibility for their systems.

Plant B on the other hand is the antithesis of this. It has a poorly trained staff. They do not have a plant-specific simulator. The staff generally does not follow procedures because they "know" how the plant runs. In some cases they have been there since pre-operational testing. There are many management and staff vacancies that result in a routine use of excessive overtime. Instead of a nuclear culture, there is a fossil plant culture. The control room is noisy, undisciplined; there are many people trooping in and out, people who need not be in there; and there are frequent scrams. The plant's onsite review committee is pro forma; there seems to be a philosophy of "run the equipment until it breaks." For example, when there is a limiting condition for operation (LCO) action statement of some kind, staff will continue to run the plant until the end of the LCO action statement before they shut down. High maintenance backlog, many high radiation areas, and frequently no engineering presence at the site is common.

This is troubling to us because there are A and B plants and both types meet our regulations because we cannot regulate safety culture; all we can do is point it out. A Plant B-type of operation, with a poor safety culture, ultimately will have problems. When we see those problems, then we can take action and try to head off the problem. We have programs to try and spot these problems early on. Frank Miraglia is going to elaborate a bit on how we go about doing this later in this session.

I will run quickly through some charts of examples of what we have learned over the years, what constitutes a good operation—particularly a good safety culture.

First of all, the policies and tone are set by the very top management *[Figure 6]*. It helps, of course, if the Board of Directors has someone who has experience in nuclear activities so that the board, who has fiduciary responsibility for the company and for the plant, understands the risks involved with operating a nuclear plant. Senior management, by this I mean, in many cases, the CEO [chief executive officer] of the company, as well as, obviously, the vice-president of nuclear, is aware of, and involved in, what is going on in the plant.

Does the company have policies for rewarding good performance and disciplining poor performance? Frequently, we see that over the years utilities have developed a personnel policy of being easy on employees. I think this is understandable. In order to have loyalty, which is important if you are going to send your linemen out on a sleety, snowy night to repair some lines, the company has to have a family kind of atmosphere, a company policy that supports the employees.

On the other hand, a nuclear operation is a little different. It must be disciplined; there must be accountability. I think you simply must have policies for disciplining employees who exhibit poor performance.

Doing it right the first time, being self-critical: I think, these are pretty self-explanatory examples.

Sometimes even the very best organization *[Figure 7]*, even the very best people, cannot function well. I have seen cases like that, and it is sad. But through some Harvard Business School idea, or through some crazy notion, people experiment with organizations. We see cases where lines of authority get all botched up, and people do not know who is accountable, who is responsible. Therefore, even good people cannot make an organization work without the attributes of clear lines of authority, a depth of talent, and technical self-sufficiency. Although we try to point this out, we often find that people usually have to go through the experience of learning the hard way.

I think if I had to pick one person who is the very key to making the plant operate successfully it would be the senior person on site, usually the plant manager *[Figure 8]*. These days, however, it is increasingly common to have that person be a senior vice-president for nuclear operations. Whoever, that person is, that person sets the tone for the site. To some extent, a very strong site manager can compensate for other weaknesses in the organization. It is not the best thing, but it is another reason why it is so important to have that person be strong, to know what to do, and to set the right tone and the right attitude for the organization.

In this regard, I think it is important that companies develop their own internal plant manager programs so that there are always, in the pipeline, some people who can step in and run the plant, without the plant dropping back in performance. Unfortunately, I must say, we do see examples where drop-off happens just because that one person changes: usually he moves up; he gets promoted; he goes downtown; he puts on a three-piece suit; and then the plant starts to backslide. This is not always the case, but in cases where there has not been adequate planning and adequate development, to have someone step in and take that position, we see it happening.

In 1983, Admiral Rickover was asked to do a study for General Public Utilities on the readiness of the company to restart TMI-1 (Three Mile Island, Unit 1). He produced a report for them, which is a public document and retrievable. The Admiral listed seven criteria for management competency *[Figure 9]*. One is a rising standard of adequacy, which is where we are today. Maybe we are good, but we can always do better. Once you decide that you are good enough, you will sure enough start backsliding.

Another criterion that I found very significant was facing facts, facing bad news when you have to. This goes hand in hand with the concept of always looking for the problems, looking for the weaknesses. The Admiral mentioned that if people avoid problems, they will not get better by themselves. They never do. Problems sit and fester and get worse.

Let me move on to a couple of examples of some root causes of poor performance that we have seen *[Figure 10]*. These may be symptoms rather than true root causes—it is hard to say. For example, complacency, I do not know if that is a root cause or if it is a symptom of the next one: management overemphasis on production rather than safety.

The emphasis on production is real, and it troubles me a little bit these days. I know there is an industry-wide effort to reduce costs, reduce operation and maintenance costs, and so forth, and I have no problem with that. I think good discipline in management operation is important. However, if the message is to reduce costs and emphasize production, and if that translates to keeping the plant running even when things are questionable, I think you are sending exactly the wrong message to the troops in the plant. I would strongly urge that that not be done, because it is shortsighted. If the plant gets into trouble and has—God forbid—an accident, that could put the company at stake. Serious operational problems also could cause us to shut down the plant for six months, a year, two years, or even more, to straighten things out.

Another example is lack of accountability, as I mentioned, which can be the result of the wrong culture, excessive dependence on consultants and outsiders, or plant manager burnout. I believe burnout can happen because the stresses on a plant manager are so immense. It is possible that the enormity of the position would cause a person to burn out in a matter of a year, or two, or five. I do not know. Even though some can handle it, I think managers ought to be attentive to that possible effect.

There is one other issue that I wanted to bring up: the good-old-boy syndrome governing promotions. Let us say the plant manager gets promoted. When he puts on his three-piece suit, goes downtown, and reaps the rewards of all his hard work, a lot of times not much thought has been given to his replacement other than: "Well, Joe's been the OPS manager for 10 years, let's move him on up. He certainly knows the plant." That could be, but Joe may not be a leader and Joe may not have what it takes. There may be personal animosities; there may be all kinds of reasons why the organization starts to fall apart and people start to quibble and bicker amongst themselves. I would urge you as managers to really pay a lot of attention to this aspect of developing good managers and the right managers to run the plant; perhaps to run the company and to take your places some day.

Let me summarize and close. It is not going to be easy to change an ingrained culture. It certainly would have been better if we all had started out 30 years ago with a disciplined safety culture—a so-called Rickover culture or the nuclear Navy culture throughout the industry. Some plants of course, have had a safety culture from the very beginning of their operation.

I am reminded of the Yankee organization. When I was a graduate student in 1962, we were taken to visit the Yankee plant at Rowe, Massachusetts. There it was clear, even at that time, that there was a strict discipline in the plant amongst the operations staff. That has endured. In fact, that Yankee culture has been farmed out to many other plants, which I think, generally, has the same roots as a good safety culture.

However, that is not the case. We have many situations where a safety culture does not exist and we have to deal with it. I view this as a challenge. I think we should all view it as a challenge because it is not something that we in the NRC can bring about by regulation. Striving for excellence can bring about a safety culture over time, and that, in my judgment, is the only thing that is going to ensure that performance improving keeps on over time.

Thank you.

Jim tells me there is time for a question or two. We are going to have a question period at the end of the session; therefore, since I do not see any sign of questions, I will wait to see if there are any at that time.

NRC Interface With Industry Groups

Mr. James H. Sniezek:

Thank you, Tom.

I believe Tom has clearly described the principal aspects of a viable safety culture and provided some examples that we can all clearly understand.

As a follow-on to Tom's discussion on the development of a safety culture, I will be discussing the NRC interface with industry groups in our mutual quest to improve operational safety.

[Figure 1]

Improvement of operational safety, the theme of this conference, is the proper goal of both the regulator and the nuclear industry. Some may argue that when compared with other risks to the public, nuclear power plants are safe enough. Although there may be some validity to this argument, we, the regulator and the nuclear industry, will quickly backslide into an inadequate safety posture if we take refuge in this argument.

Thus, we must continue to look for ways in which we can improve operational safety. This improvement has to be cost effective. An important principle, and the one we should keep in mind, is real improvement in operational safety in a cost-effective manner.

[Figure 2]

In discussing the NRC interface with the nuclear industry in this quest to improve operational safety, there are two key points that we must keep in mind: First, the individual utility is totally responsible for the safe operation of the nuclear power plant. Second, the NRC as the regulator is responsible for ensuring that the utility carries out its safety responsibility.

The licensees' technical specifications and the NRC's regulations, licenses, regulatory guides, and policy statements can never be sufficiently detailed and comprehensive to provide for all aspects of nuclear power plant safety. Likewise, there is no way that the NRC reviews and inspections can guarantee the safety of nuclear power plants.

As Tom Murley mentioned in his talk, safety can be achieved and maintained only if there is a safety culture that permeates every aspect of the nuclear industry. This includes every facet of the licensee's organization as well as the industry groups that support the design, construction, and operation of the power plants.

The primary objective of these groups must be to assist the utility in carrying out its safety responsibilities in an effective and efficient manner. To achieve our safety mission, the NRC interacts directly with NUMARC, INPO, EPRI, nuclear steam systems suppliers, the owners groups, vendors and many organizations that set industry standards. These organizations must understand what the NRC expects from them and how the NRC will likely react when its expectations are not met.

[Figure 3]

As Vic Stello mentioned in his opening remarks, the most important attribute of the relationship between the industry and the regulator has to be trust. We, the regulator, have to know that when the industry indicates that specific action will be taken, we can count on it happening.

Similarly, when the industry implements its commitments to the NRC, the industry must be capable of predicting and able to predict the reaction of the regulator. The industry-regulator interface will be effective only if it is built on mutual trust.

With trust as the foundation of this interface, let me briefly discuss what the NRC expects from the various industry groups.

[Figure 4]

When the NRC finds a utility to be technically and managerially competent to safely operate its nuclear power plant, the NRC issues that utility an operating license. This is a significant finding and one which we, the regulator, must continually substantiate as we carry out our regulatory mission. As long as the utility remains competent to safely operate the plant, it should be able to do so with little if any interference from the regulator.

On the other hand, if the performance of the utility indicates that the licensing finding is no longer valid, the nuclear power plant should be shut down. As we are aware, this has happened more often than either the utilities or we, the regulator, would like.

Building on the spirit of mutual trust and keeping in mind the licensing finding, it appears appropriate that the NRC place more emphasis on clear communications of its expectations and rely on utility certification to the NRC that the stated expectations have been met. This means that there will be fewer preimplementation reviews by the NRC than there were in the past.

You have already seen this mode of regulatory operation in several of the more recent bulletins and generic letters that have been issued by the NRC. A good recent example is the generic letter on erosion/corrosion whereby we asked the utilities to certify to the NRC that they had implemented the NUMARC-endorsed inspection guidelines that were developed by EPRI.

Another recent example is the letter regarding the status of TMI action items, which we sent to the utilities last Friday. The NRC was asked the question of status by Congress and it appeared appropriate to us that the utility as the entity responsible for the safety of the nuclear power plant confirm the status as understood by the NRC.

Because the utility is responsible for the safe operation of the nuclear power plant, it is important that the NRC demand the utility perform adequate safety evaluations for those activities that require evaluations, such as changes to the plant as described in the safety analysis report.

Being mindful of its role as a regulator and not that of a consultant, the NRC must refrain from becoming involved in the utilities' safety evaluation process until the utility submits the results of its evaluation to the NRC for review and approval—if such submittal is, in fact, required.

This bond of trust, which is codified in 10 CFR 50.59, emphasizes the NRC's licensing finding that the utility is technically and managerially competent and is, in fact, the entity responsible for the safe operation of the facility. It also limits the NRC's regulatory role to that of ensuring that the utility carries out its safety responsibility and of taking the appropriate action if the utility has not met its safety responsibility.

The NRC views NUMARC as a focal point and spokesman for the nuclear industry on issues that are generic to all or most utilities. We do not view NUMARC as an organization that was established to thwart the NRC. To the contrary, NUMARC's charter to promote the enhancement of safety through coordinated industry efforts is in consonance with the NRC's safety improvement initiatives. NUMARC coordinates the industry's interface with the NRC to ensure that potential safety initiatives are in fact worthwhile from a safety standpoint and that these initiatives can be implemented in a cost-effective manner.

We believe that NUMARC has been effective in coordinating the industry interface with us and that this coordination has resulted in a marked improvement in the many proposed safety-enhancement programs. Examples of effective interface have included the industry response to the erosion/corrosion problems, work with the Edison Electric Institute on the fitness-for-duty guidelines, development of industry guidance for implementation of 10 CFR 50.59, and development of industry guidelines for responding to the fraudulent-components issue.

We are pleased with our improved relationship with the nuclear industry on generic issues and attribute this improvement to the efforts of NUMARC and to the support NUMARC has received from the utilities. We believe that NUMARC's coordination of the generic industry-regulator interface should be fully supported because of its important role in ensuring safe operation of the nuclear power plants in a cost-effective manner.

[Figure 5]

By performing the nuclear industry self-assessment function, INPO is implementing one of the most important lessons that came out of the Three Mile Island accident. The NRC views the role of INPO as complementary to, but quite different from, that of the role of the NRC. INPO has made a positive contribution to both plant safety and reliability by using the operational expertise of its staff to provide individual utilities with assistance in areas in which they are experiencing problems. In addition, the INPO independent assessment function has provided a peer perspective to operation of the individual nuclear power plant from the standpoint of both safety and availability.

By providing a peer review of the utility, INPO clearly transcends the functions of the NRC. Although we understand the INPO rationale for not making public its findings regarding plant-specific assessments, we believe that publicizing such findings would enhance the overall credibility of the nuclear industry in the long term. I believe the public will recognize the merits of a good industry self-assessment and corrective action program.

INPO and the nuclear industry can be proud of the major advance made in the area of training and accreditation of plant personnel, the enhanced safety resulting from evaluation programs during both the construction and operational phases, and lessons learned from events as exemplified in significant event reports and significant operating experience reports.

Likewise, the rapid exchange of significant information through "note pad" and information provided through the nuclear plant reliability data system has helped improve plant performance. Industry performance indicators substantiate the effectiveness of these programs and the industry efforts by clearly demonstrating improved plant safety and reliability from the national perspective. Unfortunately, not every nuclear power plant has demonstrated this performance.

As a result of the industry's self-improvement, the NRC decided that additional regulatory requirements and activities were not necessary in several areas. Examples were in the training area, and in the ALARA area. Continued self-improvement can be expected to result in similar NRC decisions in the future.

[Figure 6]

The owners groups are a unique and valuable resource for resolution of technical issues that are applicable to NSSS-vendor product line. The NRC believes that these groups bring both operational savvy and technical competence to the discussion of problems. Because the individuals in these groups have a good understanding of the design and operation of their specific plants, they quite often are able to develop a resolution that provides for both safe and efficient operation.

Examples of recent successes by the owners groups in their interface with the NRC include development of generic emergency operating procedures, the guidelines; development of the technical specification split documents; and development of a resolution for unresolved safety issue A-46 regarding seismic qualification. Regarding A-46, it is especially significant because the Seismic Qualification Utility Group transcended the normal reach of the individual owners groups.

Another significant issue to both the involved utilities and the NRC was the superior reassessment by the B&W Owners Group of a large portion of their plant design. All these efforts have had or will have a significant effect in promoting safe and efficient plant operation.

Although we are encouraged by the efforts of the owners groups, there is one area that needs additional attention. Individual owners groups do not appear to have the authority to commit their member utilities to the generic resolution arrived at by the group. This sometimes results in considerable duplication of effort on the part of the individual utilities and the NRC. In addition, the NRC has to examine the practicality of delaying regulatory action while an owners group is pursuing the generic issue of the problem if member utilities are not committed to accepting the generic resolution developed by the owners groups.

I would urge the owners groups and associated utilities to re-evaluate this policy.

[Figure 7]

Through 10 CFR Part 21, the NRC has a direct legal, as well as technical, relationship with vendors, nuclear steam systems suppliers, and others. Because vendors have an expert knowledge of the design of systems and components for which they are responsible, they have a special responsibility to ensure that their customers are aware of any potential problems with the components and services they supply.

The NRC also believes that vendors play a key role in the generic resolution of safety issues associated with plant operation. This is effectively accomplished through the topical report program. This program is strongly encouraged by the NRC. We believe this program conserves resources for both the NRC and the utilities. We have found it much more effective and efficient to review issues generically rather than grind through plant-by-plant submittals.

Recently, we have been giving priority attention to generic topical report reviews; and we intend to continue this policy. Good examples of success in generic reviews include the recent approval of extended allowed-outage times and changes in surveillance test intervals.

For both the NRC and the utilities to achieve maximum benefit from this program, it is important that the utilities adopt the technical resolution in the topical reports for their entities. However, we recognize that in a few instances, the plant design may dictate minor exceptions.

[Figure 8]

A few words about the Electric Power Research Institute. We view EPRI as basically the research arm of the nuclear industry. We believe that through its research efforts, EPRI can make a valuable contribution to safe and efficient plant operation. We see a large EPRI role in defining the industry perspective regarding those technical issues that need to be addressed for the extension of plant life.

In the day-to-day plant operations, EPRI has made 47 major safety contributions, such as the development of the industry guidelines in the area of erosion/corrosion and the development of techniques for nondestructive examination of piping and components. Thus we intend to continue our close working relationship with EPRI to determine appropriate technical courses of action in areas that require unique and difficult evaluations.

[Figure 9]

Organizations that set standards deserve special mention because a great portion of their effort is performed by volunteers. We believe the consensus approach to standard setting is a more technically viable approach to good standards than is the development of standards by the NRC. There is no way that we, the regulator, could bring the technical and operational expertise to standards development that is brought by those people with hands-on experience who serve on the numerous standard-setting committees.

Because of the positive contribution these organizations provide to safety and our desire to adopt industry standards rather than develop separate standards, the NRC intends to continue its active interface with these organizations. We believe it is important that the utilities continue to provide experienced operational and technical personnel to serve on the committees of these organizations.

We also urge the standard-setting organizations, in conjunction with the utilities, to take action to eliminate the major source of frustration that we experience with these organizations; that is, the length of time it takes to develop a standard once the need for the standard is identified.

[Figure 10]

Although not all the NRC interfaces with industry groups have resulted in mutually satisfactory experiences, for the most part we have found that direct, straightforward, and honest interaction has resulted in effective and efficient industry safety programs and has minimized the proliferation of unduly burdensome regulatory requirements.

For our part, we intend to place an even greater emphasis on our industry interface, especially communications up front of what we expect from the industry. We believe that we can count on the utilities and the industry groups to respond in kind.

I would now be able to entertain one or two questions if anyone has any questions regarding the presentation. If not, I would like to introduce our next speaker, Frank Miraglia, who is the Associate Director for Inspection and Technical Assessment in the Office of Nuclear Reactor Regulation. Frank will be discussing the NRC's operating performance evaluation with special emphasis on how the NRC determines whether or not operational safety is being improved on a plant-specific and nationwide basis.

I am pleased to present Frank Miraglia.

NRC's Operating Performance Evaluation

Mr. Frank J. Miraglia:

Thank you, Jim.

Coming as number three in the lineup is somewhat of a disadvantage. I think some of the things I am going to say and some of the points I am going to raise today have perhaps been said before. I will try to put a different spin on them.

Just a few weeks ago, we passed the tenth anniversary of the Three Mile Island accident. That event was met with a proclamation of some good news; the performance of the industry has been improving.

The next few figures *[Figures 1 through 3]* are NRC data that is a recognition of that improved performance. This is an average number of safety system actuations. The previous one was scrams, and this is radiation exposure.

The next two slides *[Figures 4 and 5]* are industry data that indicate the same type of performance improvement.

There is an element of bad news in this picture. It *[Figure 6]** indicates that the average equivalent availability factor for the plants has not met the industry-stated 1990 goal. Although it has been improving somewhat, the improvement has been hampered by the plants that have been shut down. In the past few years, as Mr. Stello indicated, as many as 10 percent of the nation's plants have been in a long-term shutdown as a result of regulatory concerns.

Thus, while it is clear that the performance trends are good, there is room for continued improvement. The record demonstrates that we need to continue to be diligent and vigilant in assuring the excellence of performance of the commercial nuclear power plants.

Performance evaluations performed by the NRC and the industry has been evolving in the past decade, particularly since the accident at Three Mile Island. I would like to go to a brief historical perspective of some events that have shaped our approach to assessing operational performance.

Based on Tom Murley's talk, it is clear that inadequate management, direction, control, and oversight of plant activities—such as plant operations, maintenance and engineering—and critical self-assessment have a negative impact on both the equipment and human reliability. Tom had data from the Brookhaven report that indicated how poor human performance coupled with perhaps poor equipment performance could lead and result in increasing likelihoods of potential severity of plant events.

During the late sixties and seventies, the focus of the NRC safety review was on the design and the construction and the quality of the materials and the equipment that was used in that construction. The general design criteria focused on the design and the quality of the systems, equipment, and components.

The Three Mile Island accident taught us that more attention needed to be paid to the human element: operator training, control room design, emergency procedures, and operating procedures. We are all well aware of the large number of requirements that flowed from that accident.

As I said, before that time, NRC's assessment of corporate and plant management, which Mr. Sniezek alluded to, was the basic judgment of the technical competence of the utility to receive the license. This was essentially based on a review of the organizational structure and the individual qualifications of the people that the utility was going to have fill those spots in the organizational structure against ANSI standards.

After Three Mile Island, it was determined that we needed a better and a more systematic approach for getting a measure of the licensee's performance and management effectiveness. NUREG-0660, the TMI action plan, established a systematic assessment of licensing performance, the SALP program. SALP was the first tool developed by the NRC to improve its ability to assess licensee performance and also to provide a basis for allocating our inspection resources. The SALP process has evolved in the last decade and continues to be an effective tool for communicating our assessment of plant performance to our licensees.

It provides a basis for dialogue between the NRC and licensing management with respect to our view of their performance. As currently structured, the SALP is an integrated agency effort. In the earlier days, embryonic times of SALP in the early 1980's, it was essentially a regional product. I think the SALP process has been changed considerably, there is more headquarters and regional interaction and a more integrated assessment of the licensee's performance.

*Figure 7 is not addressed, but it is included with Mr. Miraglia's figures.

At a session tomorrow at which I will be the session chairman, you will be hearing more about the SALP process in detail.

At the same time that the NRC was developing SALP, industry responded to the Three Mile Island accident with varying efforts regarding performance evaluation. Within days of the accident, EPRI set up the Nuclear Safety Analysis Center, which analyzed the event, what it meant, what kind of corrective action should be put in place from an industry perspective. The organizational entity NSAC evolved and provided the nucleus by which the formation of the Institute of Nuclear Power Operations, INPO, was formed in 1979.

The mission of INPO was to promote excellence in nuclear power plant operations. Over the past decade, as Mr. Sniezek has indicated, INPO has made solid contributions to training, events analysis, feedback of operating experience, and plant assessments. The INPO performance indicator program provides each of you and your utility management a specific measure of your performance.

[Figures 8 through 14]

During the period of 1980 through 1983, we focused on the followup to the many TMI action items, both the hardware items and the software items. The lessons learned from that event were many.

In February 1983, the Salem ATWS (anticipated transient without scram) event occurred. It shifted our focus, both yours and ours. The lessons learned from the Salem ATWS event indicated that root-cause analysis of plant trips and transients needed to be substantially upgraded. Maintenance activities and procedures needed increased management attention. Vendor interfaces for equipment needed to be developed and event followup continued to show need for improvement.

In 1983, NRC revised its event reporting requirements to focus on significant abnormal events. Specialized data bases were developed to improve our understanding of plant operating experiences. NRC established an incident investigation program to determine the root causes of reactor events. At the same time, both NRC and industry undertook major efforts to identify important operating problems and, as early as possible, develop solutions to prevent their recurrence.

Through the study of operating experiences, weaknesses in design, fabrication, and construction continued to be identified. That is true even today. These findings, coupled with the results of probabilistic risk assessments and other safety analyses, have led to a major improvement in reliability of overall plant safety.

During the same time frame, industry began developing its performance indicator program to provide a quantitative measure of performance in certain attributes. These indicators provide utility management with a mechanism to judge the progress it is making as an individual utility and also provides utility management with the basis for judging its performance relative to the rest of the industry.

The NRC performance indicator program was implemented in 1986. This program provides the NRC with a more objective way of assessing licensee performance. The current indicators are operations-focused. By that I mean they are focused on safety system actuations, scrams, and the like. Additional indicators are being developed and considered for use and these efforts will be discussed at tomorrow's session of the conference.

During that time frame, up through the mid-eighties, we have developed a number of tools by which we can assess licensee performance.

The significant number of operating events in 1985 —the Davis-Besse feedwater transient in June of that year, San Onofre check valve failures in November of that year, and the overcooling transient at Rancho Seco in December of that year—led to a redoubling of our efforts to improve our capabilities to assess operational performance. We had the SALP evaluation that indicated declining performance. Performance indicators were indicating things to us. We needed to assess how our ability to integrate this information could be improved and determine what actions we should take as an agency.

Those events in 1985 reemphasized the need for event followup including a detailed root-cause analysis; the importance of maintaining the balance-of-plant equipment to avoid complex transients that challenge the operators; and, again, the need for a more improved method for evaluating performance in a predictive way. Could we develop a technique that would allow us to identify declining performance early enough so that effective corrective actions could be taken? That was the goal.

Following the Davis-Besse loss of feedwater incident in 1985, the senior management meeting concept was established to focus senior management attention on plants of concern. Senior agency managers meet semiannually to assess and analyze the performance of plants of concern. Preparations for these meetings begin with a screening process.

This process consists of internal discussions between regional and headquarters management to identify those plants to be discussed at the next senior management meeting. Input for this process includes SALP (current and historical) plant operating experience, performance indicator data, inspection findings, licensing issues, and hardware issues. Candidate plants for discussion at the senior management meeting are generally based upon concerns of poor SALP ratings, negative trends in performance, adverse inspection findings, increased enforcement actions, and a lack of management attention in addressing concerns to address and prevent recurrence of problems.

The plants identified in this screening process are placed on the senior management meeting agenda. Each plant is discussed by senior managers using the information provided by the attendees and gathered by the regions, and the Office of Research, AEOD, and NRR. Again, it is an application of using the tools that we have, assimilating and integrating all of the information.

The senior management discussions center around individual utility strengths and weaknesses, the significant events, hardware issues, the actions that we have taken or plan to take, and the progress of licensee's corrective actions, if any.

Dr. Murley used this chart *[Figure 15]* in his discussion of Plant A and B. These are the attributes of a strong safety culture (Plant A), and this is a plant (Plant B) that has perhaps the opposite of that. These kinds of things are examined. Is there an involved management? Is the plant staff well trained? Is it disciplined? The kinds of things that Tom talked about in his speech.

All of those attributes that go into a safety culture are the kinds of issues that the senior management discusses at these meetings. This type of meeting provides a forum for the senior managers of the agency to integrate all of the information and form an assessment of the licensee's performance.

The tools that we have, performance indicators and the SALP process, validate those perceptions of performance. Based on that information and the integration of information discussed at the senior management meeting, our view of the performance and the assessment of the licensee's performance in the period and over the period of concern is formed.

The final outcome of these discussions is a better understanding by the NRC's senior management of the problems at the plants of concern and the best way to encourage corrective actions. Mr. Stello mentioned this in his opening remarks, that our concern is early identification and to encourage effective consideration of corrective actions early.

At these meetings, the primary agency goal is to answer certain questions. What are the issues of concern to us regarding this utility's performance? Have we adequately and clearly communicated these concerns to the utility? Does the utility understand these concerns? Is it taking effective corrective action?

Those are the kinds of questions that the senior managers of the agency try to get definitive answers to at this meeting. For some facilities, the agency cannot answer all of these questions clearly or unambiguously. These facilities become candidates for perhaps a diagnostic evaluation.

The diagnostic evaluation program is an inspection technique developed by AEOD, and you will be hearing some more about that during the conference—about the technique and how it has been utilized, perhaps even the results that it has shown to date. The diagnostic evaluation is an evaluation that is conducted on performance in a safety-oriented framework. It looks at and evaluates the actions and involvement of licensee management in the safe operation of its facility.

Similarly, NRR special team inspections are also used where there is a need to develop some in-depth information with respect to certain specific areas of concern. These inspections and techniques will also be discussed during the conference. Both of these inspection techniques provide an excellent information gathering tool and are another mechanism for providing input to the agency in making its assessment of operating performance.

As a result of the senior management meeting, the plants identified are critically assessed with respect to the utility's management's ability to develop and implement programs to improve and sustain operational performance. Does the utility understand the concerns and is there a corrective action program in place that, if implemented, will satisfy and address the concerns?

The results of the senior management meeting are discussed with the Commission in a public meeting and each licensee is informed of the agency's characterization of its overall performance.

Ten years ago, there were 120 plants under construction or a construction permit review and there were 70 plants that were licensed to operate. The situation is very different today. The NRC has been reorganized to better focus on the safe operation of the 100-plus commercial nuclear power reactors licensed to operate. I think the number is more like 112 or 113.

Inspection activities were consolidated into the Office of Nuclear Reactor Regulation. This put in a single office the responsibility for the inspection and licensing program for commercial nuclear power reactors. We believe that the approaches that we have outlined and that were discussed briefly by Mr. Sniezek indicate that the regulation today is more performance-based, our inspection program is more focused on our areas of concern, and our enforcement policy is aimed at providing the appropriate safety message.

We believe that these changes and the increased focus on operational safety has led and been a significant contributor to the improved performance that we have realized to date. But we did not do it alone, and we are just one element of the recipe for success.

This change in the NRC occurred in 1987 and, at about the same time, the industry was reorganizing itself. At that same time, an expanded umbrella organization, NUMARC, was established to provide a unified industry approach to regulatory issues, to enhance the communications with the regulator. Again, a point that was raised by Mr. Stello in his opening remarks.

This change was in response to an industry-sponsored report, the Sillen report. This report had few recommendations. It stated that in order to maintain the viability of nuclear power in the United States, the industry as a whole and collectively needed to improve the quality of its operations. We have seen some success to date in that regard.

Moreover, the report recognized that nuclear power, to have public acceptance in the United States, would require a strong and credible regulator. That is us. The industry could not go it alone and strong credible regulation was needed to gain public acceptance. To meet these goals, it recommended that the industry speak in a unified way with the regulator. As Vic Stello mentioned, we perhaps may not agree on all things at all times, but that communication, that dialogue, has to be clear and has to be open. As Mr. Sniezek indicated, it has to be based on mutual trust.

The report more simply recognized a truism that we have heard for a long time. In fact, we have heard it several different times in the talk so far. That the licensee, the utility, each of you is responsible for the safe operation of the facility. Another way of saying: The NRC does not design, construct, or operate nuclear power plants; it regulates them. And I think that the Sillen report recognized that both of those elements are an important part of the recipe for success. Thus, utility managements must be actively involved in the day-to-day operations of their facilities.

The recognition of this truism, about you being responsible, I think has also been a significant contributor the improved safety and performance in the industry. The utility involvement in understanding the design and operations of its facility has gone a long way in realizing those performance trends

The NRC has been assessing plant performance for many years. The process has been an evolutionary one and has been shaped by operational occurrences in the industry. Continued improvements to this process are being sought. As Mr. Stello indicated, if there are thoughts and ideas as to considerations that we should give as a staff to this process, we would like to hear from you.

The current semiannual senior management meeting has added stability to this process. The focusing of the senior agency management on plants of concern has in turn focused utility managements on those concerns. We have come a long distance in the past 10 years. Both the NRC and the industry have changed substantially.

While we have come far, there is still a great distance to go. Continued performance improvement raises the expectations of the NRC, the industry, and the public. With higher expectations, any faltering or backsliding will be met with a higher degree of disappointment by each of us. While our focus must remain on safe operation of these facilities, we must continue to strive for excellence in the regulatory process and the industry must demonstrate continued improvement of all phases of plant operations.

Thank you. Any questions? We have some time for some questions from the floor.

Voice:

There is one over there.

Mr. Miraglia:

Would you come to the microphone, sir?

Voice:

Dr. Murley said earlier that at each utility there was one executive, either the plant manager or at the vice presidential level, that set the tone for everything that happened at his utility. I was wondering if the NRC had talked about bringing in at your senior management meeting that top executive to participate in the evaluation process?

Mr. Miraglia:

No, I can honestly say that has not been discussed. It is an interesting concept, but I think with respect to the arm's length relationship that we have, we cannot do this. What happens is that we get together at subsequent meetings with the utility. The senior management meeting is aimed at developing the agency's perspective, which is shared with each of the utilities subsequent to that evaluation.

Voice:

Okay, thank you.

Mr. Miraglia:

Tom, would you like to add anything?

Dr. Murley:

No. We would do it afterwards.

Mr. Miraglia:

Afterwards. It is part of the process afterwards.

Are there any other questions?

Mr. Sniezek:

Frank, I want to thank you for a good description of the development of our assessment program and especially for making the safety tie between the cultural safety and our evaluation of plant safety.

Our final speaker during this session is Jack Martin, Regional Administrator of Region V. Jack will discuss the general topic of engineering support for plant operations. In this discussion, Jack will highlight the successes and failures he has observed from his vantage point as an NRC Regional Administrator.

I am pleased to present Jack Martin.

Engineering Support for Plant Operations

Mr. John Martin:

Thank you, Jim.

I guess there is a certain hazard being the last speaker right before lunch, so I will try to keep it moving.

I am going to pick up on a slide that Tom Murley put up that had the seven or so attributes of a good nuclear power plant, the second of which was technical self-sufficiency, which covers a variety of things, but boils down basically to excellence in doing engineering and technical work and having a basic technical orientation. I have found in recent years that we have been drawn more and more into this area, not so much because we have selected engineering and technical work as a good topic to look into, but primarily because of operating problems that when diagnosed have a very strong component of poor engineering work. Ill-thought-out, poorly done work that can be traced right back to the way the engineering work was done, or contracted for, at various utilities. So, rather than selecting it as a particular focus of our inspection program, we have been drawn into it.

It is interesting to note that looking at engineering work is not and never has been a strong explicit focus of the inspection program. It has been primarily an indirect thing and we have had to give it more and more attention in the last few years.

I would like to gather together a few observations I have made over the last four or five years, which are very heavily weighted towards utilities in my region, but I presume they are reasonably representative of the rest of the country. In general, I feel that utility management has had only limited success in finding a proper role for engineering in operation of these facilities.

Frequently, in fact in most cases, engineering is an organization that is remote, somewhere from the site, typically in the corporate office, and it is a fairly passive component of the organization. When people operating the plant decide something is not working right, they write a request for a design change and send it to the engineering department; then a few months later, they get something back.

I think this is a typical role for engineering in nuclear power plants—reactive; provide design changes and other technical resolutions when asked. I think many utilities are finding that this just is not the way to operate, that it is limiting their ability to improve. Most operating problems have a very strong technical component to them; and having engineering departments that are remote, uninvolved, and reactive is not a very cost-effective way to improve. On the other hand, those utilities that are at the top of the heap generally have much more involved and active engineering departments.

I would like to discuss three major categories or subjects in this technical area that I find are essential if a utility is to have a strong and involved engineering department. There are three elements of success to my way of thinking.

First of all, the engineering work is done by the utility, and by that, I mean broadly, either done by the utility's own engineers or under their supervision by contractors. It goes without saying that the on-going technical work must be first class in every respect. That is the first thing I would like to talk about.

The second item is that the engineering department must understand, control, and convey to the users the design bases for plant systems. This is the second topic I would like to get into to some degree.

And lastly, and probably the most illusive thing I would like to talk about—a third element of success—is that the engineering organization must have a proactive and indeed an intrusive role in day-to-day operations.

So I will examine each one of these three topics primarily from problems found and some suggestions I have for success.

Of course, the first priority of any engineering organization is to make sure that the work they are doing is correct and of high quality and directly contributes to enhancing plant operations. In the last few years, I have found with rather distressing regularity that when we get drawn into examining design packages that are either done by utility engineering departments or by their contractors—if I were to select a cross section of say ten design packages—it is with pretty much regularity that I can count on finding calculational errors, lack of proper technical rationale, incompleteness, incorrect assumptions and methods, and frequently a poor understanding of what was even asked for on the part of the engineer doing the design package. Frequently design work is put together to fix problems that are not fully understood. So I think this is an area that came as quite a surprise to me; that is, how many problems there are with the work being turned out.

Now, I find, compounding these problems, that the quality and management systems set up to deal with errors and that sort of thing in technical work are not very good. The checks and balances that are put together frequently do not work well, and some of the things that we find with regularity are that the reviewers and checkers do not really understand what they are supposed to do. People do review and check and sign off calculations and drawings and other output from the engineering group.

It is interesting, when you find the work is incorrect and you go and talk to the checker and ask him what he thinks his responsibility is when he checks this work, it is amazing some of the answers you get. Some are just sort of spot checking; others are not quite sure why they are signing off, other than they always have in the past; others are doing it for administrative and time-keeping purposes. So that is a key item, in that the people checking the work frequently do not have a good view of what they are supposed to be doing.

Frequently we find that approval and checking authority is delegated to subordinates that are not really qualified to check the work. One utility in our region, I know, has found that it has to budget up to half again as much engineering work to check the work as it did to do the work. In other words, if the utility had a package that took 100 hours or so of engineering work to complete, it was finding—to make sure that the work came out correctly—that it was budgeting on the order of another 50 hours or so for the checking process. Frequently, that was not done.

We find another typical case is one in which supervisors are not sufficiently involved in the details of the work to be capable of checking it, so that the management and quality factors frequently are not effective in finding errors in the technical work that has been done.

I have also found a number of situations where the basic way in which the engineering work is organized and managed contributes to its lack of quality. At some utilities, we have found up to 25 or 30 engineers assigned to one supervisor. There is just no way in the world that a supervisor can monitor what 25 or 30 engineers are doing. In other cases, we have found that complicated design packages are handled in a matrix fashion in which all the inputs are given to a project engineer somewhere who assembles them. In reality, there is really nobody that has overall understanding of the whole package. It sounds hard to believe, but that seems to be more prevalent than not.

I think that is something that you need to take a good hard look at; that is, whether there is anyone thoroughly conversant with the whole package once it is produced. We found other cases in which technical work is contracted out to the point that the utility really does not understand the details of the work when it comes back. They have no sense of ownership for it. We have found other cases in which technical work is contracted out in such a piecemeal fashion that the contractors never are able to develop any long-term familiarity with, or competence in, the operation of the facility.

I think one of the other interesting things that we have found is that many of the engineers are frequently the same ones who are involved in new construction projects where work is frequently released for construction before the design is completely finished, and then it is completed in an iterative fashion. Frequently that style of doing business did not change when the utility went operational. Thus, the mind set of the engineering department is that they see nothing wrong with issuing design changes that have to come back and be redone several times before they are finally complete. This is another example—more of a mind-set-type issue—that is just not suitable for an operating nuclear plant where things ought to be done right the first time

Now, these problems that were found that I have given you are sort of a composite of typical kinds of things that one finds in an inspection of engineering work. Frequently utilities are managed by people with engineering backgrounds, and I have found almost universally that when these findings are presented to the utility management, they are just astonished that this could go on at their utility.

I think, in general, there is an attitude—perhaps because managers are engineers—that engineers do not require supervision and checking. There is an all too prevalent attitude that, since engineers are professionals, they do not need the same degree of supervision or checking that would typically be given to pipefitters and welders.

I think this has proved to be unsound; the same types of quality assurance arrangements required for other work are equally applicable to engineering work. However, this is something that is frequently just not done. The quality assurance department is generally a stranger in the engineering and technical work spaces and is not really competent to do any kind of a critical assessment of technical work.

So much for problems found. I have the following suggestions that will help you understand the extent of the problem at your utility and I would recommend three things that would, if done, put you in a pretty good position to judge where you stand.

One thing that can be done is to commission an independent audit by some outside engineering firm of say a dozen completed design-change packages; picked with some variety—some electrical, some mechanical—say for an upcoming outage. Have these packages shaken down completely by a competent, independent, dispassionate engineering firm.

Another thing that can be done that is pretty revealing, is to take a dozen or so completed design-change packages after an outage and find out how many changes had to be made to them. I recently encountered a design change that had 163 field changes made to it before it was finally completed. That is very revealing as to how well the work was thought out and completed before the design change was issued.

The last thing that can be done is to provide your quality assurance organization with personnel who are competent to scrutinize engineering and technical work. I would challenge you to do those three things; I think you would be surprised at the results.

The second major category that I think needs to be understood is just what is it that you have. The engineering department, I think, is the repository for understanding, controlling, and conveying to others the design bases of the plant. But what are the design bases; what do we mean by that? That has sort of become a buzz word in the last couple of years. Others will talk more about that later in the program in more detail. In very general, simple terms, what I mean by design bases are a description of the specific functions of a plant system and the parameters within which it is to operate. What is the system supposed to do and within what limits? A second part of the design bases are the engineering analyses, test data, and reports that demonstrate that these performance requirements have been met. Such design bases information is a necessary point of departure for any kind of design changes. For the operations department to put together test programs, surveillance tests, that sort of thing, it has to be able to trace back to what is the system and what is it supposed to do.

I think, in our inspections the last two years, the thing that has been the most surprising to me is that the design bases for plant systems gets awfully murky. In many cases, utilities never bought this information from the reactor vendor or the architect engineer. In some cases, it has been lost. In almost all cases, the information has not been retained in some readily retrievable fashion. I would emphasize "readily." In most cases, it can be reconstructed, but frequently with difficulty.

Many of you are probably thinking, well, that applies to those old plants where they did not keep a lot of records and that sort of thing. Not true. I have found that it is equally applicable to plants that are only a couple of years old. Frequently, it is a much bigger problem because the newer plants are much more complex than the older ones. It is a much more difficult task to reconstruct just what the systems are designed to do and where all the calculations and test data and that sort of thing are to demonstrate the systems meet the design bases.

The failure of the engineering organization to maintain this type of information and to disseminate it and convey it to others, in practice, has frequently resulted in operating or testing systems outside their design envelopes. Now, I will come back to the fact we did not get into this by thinking it would be a good idea to go see if people could reproduce the design bases of the systems. We got into it from the operational end where we found cases of systems clearly being operated improperly and outside the envelopes of what they are supposed to do, and then we traced back and found it was extremely difficult to find out just exactly what the systems were designed to do.

The types of things that we found, and I will just tick off a few of them because it gets to be a little monotonous after you have looked at several plants. It is almost predictable that you are going to find some of these problems. For example, electrical systems and batteries, in particular, have been overloaded as a result of uncontrolled addition of loads over the years. In one case we found a few months ago, electrical systems were overloaded because a larger pump impeller was installed on a motor to get the head flow curve up. However, the effects on the power supply were not considered and the breaker settings and that sort of thing were not kept consistent, and a major problem on a safety system developed.

We found numerous cases of insufficient air capacity for emergency diesels or critical valves because the required information on how many starts the system was designed to accomplish were not maintained, or were lost. We found cases of substantial water intrusion into the instrument air system even though the operating people had just drained 100 gallons or so, without having any appreciation of what that meant, what compromise that constituted to the system.

Several cases have been found in which relief valve settings were inconsistent with the design pressures of the systems. Another case I can recall involved overspeed trips on turbine-driven pumps that were set inconsistently with their design bases so that when the turbine reached its overspeed trip, the attached discharge piping was overstressed, or other attached equipment like motors were beyond their rotational limit. Things that are not very subtle, but that require that consistency be maintained throughout the system.

I would recommend that each utility examine its posture in this area, and I think the following items should be addressed. First of all, the design bases for each system should be readily available in usable form, and I emphasize "readily." My own personal opinion is there is no really good standard formula for what a design basis is other than it is readily available and it tells you clearly what the system is to do, and the documents demonstrating conformance are available.

The second thing to be done, once you are convinced that you have all the technical information available, is to check the plant and see if it matches the design bases. Frequently it does not. Frequently, there have been uncontrolled changes made so that the plant being operated and tested is not in conformance with the design.

A third key thing, once the design bases are straightened out, is to control future design changes so that design basis documents are reviewed and updated where necessary every time changes are made. This is a living process and one that I expect each utility will have to work out on its own. I cannot think of a good standard way for doing this, but I believe it is a real challenge to have some sort of living process so that at any point in time, not only the engineering people, but the operations people too, know what the design bases of the plant are and are confident these are being maintained.

Lastly, there should be some on-going effort to train design engineers, system engineers, and operations people in the design bases information so that they can appreciate the significance of things that pop up in operations. It is distressing when the maintenance department of a utility can drain 100 gallons or so of water out of the instrument air system and have no appreciation at all of the safety significance of it, or what it might mean to the attached and related-safety systems.

Most utilities have started doing something in this area. I think many have decided to start with a system or two to get their feet wet and see what they are up against. Most of the utilities in my region have found that this is a much bigger job than they thought when they got started, and most found it is something that they really have to do themselves. There is a limited role for contractors in this area because the utility in essence is trying to create a technical self-sufficiency that by its nature has to come from within. I presume most utilities around the country and certainly in our region are well along in this process and are sort of feeling their way.

One thing that has happened that I want to acknowledge is that there is a regular meeting of the engineering managers in our region to discuss engineering questions, an approach to doing engineering work. In particular, they have completed a guide for this somewhat murky design bases area that I think is a pretty good general statement of objectives in this area. So there is a lot of thought going on, and I think this is something that will get increasing emphasis. Again, it has to come from the industry, and I think you will be surprised, once you start getting into it, how little you know about your plant.

Certainly looking ahead at this whole life-extension question, I find it hard to understand how one can extend the life of something unless one really knows what it is. I think the design bases will become absolutely critical for that. It is a very time-sensitive question. As time drags on, it is amazing how complex this whole design configuration of the plant can get, particularly if there were a lot of contractors involved in constructing the plant in the first place.

The third element I would like to discuss is probably the most illusive and the one that is the most difficult. It is, I think, the analogue of the safety culture that Tom talked about. Perhaps one could call it an engineering culture. As you know, nuclear reactors are complex technical enterprises; they are engineering enterprises.

The engineering components of the organization should have a real sense of ownership toward the plants. They are not ancillary organizations. They are certainly one of the key components, right along with operations, and should be co-equal in responsibility. Certainly, if I were the owner of a nuclear power plant, I would make sure that the engineering manager was every bit as responsible for the way that plant runs as the operations manager. In a way, he could understand the relationship between bonuses, for example, and how well the plant runs. Having a passive organization waiting to be tasked to do something just does not make sense for something as complicated as a modern plant.

What do we mean by active participation? I will give you a few examples. I would expect an engineering department to maintain a thoroughly continuous presence at the plant and seek out opportunities where technical solutions can improve or deal with operational problems. I would expect to see self-initiated evaluations of systems, particularly those that have problems. Rather than waiting to be asked, initiate some reviews.

Certainly there should be active participation by engineering people on design changes. It just seems to me to be mandatory that the engineering people involved, walk down the system and understand what it is that is being requested in a design change. It is astonishing to me that this is not done in many cases. Certainly an active organization would meet with the persons or organization requesting the design changes and go look at what was to be changed to assess the quality of the request. Frequently, the requests are incomplete because the requester is not entirely clear about what he wants—it is just something that is not working right.

Similarly, after the design change is completed, I would expect the engineering department to walk down the change to make sure that it accomplished what it was intended to. I would expect to see engineering participation in things like the plant managers' periodic meetings, frequent presence at the plant, participation in post-trip reviews, event reviews and similar major evolutions at the plant.

In contrasting this active role I have just described, I will share with you a recent example that was observed at a nuclear power facility in which the engineering department was denied entry to the plant; the engineers had their badges pulled. Sounds unbelievable. In trying to understand why this was the case, the best I can tell, it was more a case that the plant manager felt that the engineers were disruptive and raised more questions than they solved and that they should wait until they were told that they were needed.

You know, sometimes it takes an extreme example like this to bring it to the surface, but I think there are elements of this thinking. There is a natural tension between the operations people and the technical people; certainly operations people feel very proprietary about their ownership of the plant. But I think the engineering people need to be placed in that arena and feel equally proprietary to get a more constructive tension.

I hope some of these comments will prompt some degree of thought and assessment on your part. Giving this speech reminds me a little bit of when I went to a presentation at our local high school a month or so ago. This gathering concerned all of the kids that are going into drivers' training. They have a requirement now that the parents come to an orientation session where the local police and others put on a little presentation about drunk driving. During the presentation, the chief of police in our town made the comment that 85 percent of high school kids either drink with some regularity or at least participate at some time or another. Of course, as I sort of looked around at the people sitting around me, I am sure that they were all thinking that their kid was part of the 15 percent that did not do this. So I think many of you are probably thinking that I am talking about somebody else in giving these examples. Do not believe it; please do not believe it.

That is the extent of my talk and I hope it has been useful to you. Thank you.

General Questions/Answers

Mr. Sniezek:

Jack, we thank you for your insights on the attributes of an effective engineering support program for operating nuclear power plants.

At this time, I am going to remind you that we welcome challenges to what we have said, what will be said in future sessions. We also welcome your questions because we have made some statements regarding expectations for utilities, expectations regarding other industry groups, and how we want them to react in the regulatory process. We have talked about what we thought established a good safety culture. We looked at our bases for evaluating the operational safety performance of plants and our engineering support expectations. So we have covered quite a broad waterfront.

We have about 15 or 20 minutes before we have to break for lunch. We will attempt to address some of the questions that we have received on cards. When we are finished going through the cards, I would urge anyone who has not submitted a card to feel free to step up to the microphone and ask a question.

Frank and Jack and Tom, I think, we will each address one of the questions that we have received thus far and feel free to chime in to amplify any answers we may give. We may not have some of the answers to some of these questions you have asked, so we have put ourselves on the spot.

I would like to have Tom address the first question.

Dr. Murley:

I will read the question; these are good questions. I think it is useful to read it because other speakers can address some of these same questions later on in the session.

> *QUESTION:* Industry data shows significant operating events are increasingly caused by human error not related to procedural or design deficiencies. Do you have any thoughts related to optimizing human performance? What in addition to training do you consider effective in reducing human error?

ANSWER: This is an excellent question. I do not have an answer other than the need to place more emphasis on motivating our workers in the plants. Although I did not get to it on my last chart, it is included in the viewgraphs that I prepared: "Areas for future emphasis in developing a safety culture." One of the items I had was "how to keep plant workers highly motivated and attentive to the details of their tasks."

That is the sense of what I took the question to be: that it is not necessarily procedural errors or design deficiencies, but workers doing just inexplicably stupid things when they should know better. You can go back and review an event and you cannot explain it. We see more and more of that. I think Chernobyl was the apotheosis of that problem: how to keep operators alert during quiet monotonous times, particularly in the wee hours of the morning.

I do not have answers for that. I know it is something we all have to pay attention to. Perhaps in the session on human factors later on we can go into that. It is a good question, and I think it needs a lot of attention.

Mr. Sniezek:

I will try to address this second question. I am not surprised that it came up.

> *QUESTION:* Why was the safety issue management system, the SIMS data base, not judged to be sufficient to respond to inquiries on the status of TMI action items?

ANSWER: In the future, the safety issue management system will be the basis that we will use to respond on the status of TMI action item implementation, and we will not have to come to the facilities.

However, let me relate to you an experience I went through within the last two or three weeks. Before the Commission meeting on one of the NTOLs [near-term operating licenses] we recently approved for full power, I met with the staff and I said, we are likely to get the question from the Commission: What is the status of TMI action item implementation? We examined it and we concluded that the utility had adequately implemented all TMI action items.

Now, when I say "adequately implemented," what do I mean? I mean that the NRC is satisfied that the utility has met the requirements of NUREG-0737 and its Supplement 1 to the extent that the NRC would not take any enforcement action or issue an order to compel the utility to take any additional action if no further action was taken on the part of the utility. That is our definition.

I told the Commission at the briefing that all TMI items had been implemented. Right after the meeting, a reporter came over and said: "Mr. Sniezek, you told the Commission that? The utility is saying they still have not completed implementation of the SPDS." I then gave the reporter the definition I used: "Because you are putting enhancements on something, does not mean the item is not complete from the regulatory standpoint." I think that is important to understand.

So in establishing our base line, we have gone out to the utilities and said, here is where we believe, from a regulatory standpoint, you stand on implementation of TMI items. We are asking you as the organization responsible for the safety of the operation of the facility to confirm our judgment, simple as that. In the future, we would expect that to be the basis for our answers.

Mr. Miraglia:

I have a question regarding the performance indicator data. Let me read it. It is some commentary as well as a question. I will read the whole thing.

> *QUESTION:* In discussions with AEOD [Office for Analysis and Evaluation of Operational

Data], the performance indicators used in evaluating licensees are subjective to some degree, especially for systems safety failures—I will let representatives of AEOD to try to put that comment into context. Unless utilities closely review the quarterly report distributed by AEOD, an inaccurate perception is created. What feedback mechanism exists to ensure the correct perception is established? My concern is that utilities may not be aware of how the evaluation process works and may also be unaware of the need to provide feedback to AEOD. The AEOD engineers and management are obviously doing the best they can with the information provided to them. Feedback appears to be essential to ensure a correct picture is taken for public viewing.

ANSWER: I think, with respect to the specific question about the feedback, if there are concerns about the data that is being presented for your facility, I think that you should feel free to discuss those concerns with AEOD to understand the basis of those concerns.

In the broader perspective of what does it mean to me as a senior manager when I look at the performance indicator data, we look at the data not only for the quarter that just passed, we look at the trends behind that data. We have an explanation of what all those data points are. It is just one tool that we use. As I indicated, we have SALP [systematic assessment of licensee performance], we have research insights, we have licensing issues that are before us, and we have inspection findings.

I do not believe one inaccurate data point for a quarter's worth of data is perhaps going to be that important to sufficiently tip the judgment of the senior managers relative to an assessment of the overall performance. But I think it is clear that if you feel that the data that is being used by us has some inaccuracies in it, or if you were going to have an understanding of that data, you should feel free to communicate with AEOD.

Mr. Sniezek:

I would like to just amplify something that Frank said, which is that this afternoon's session, one of the sessions on operating experience, evaluation of operating experience, is one of the topics with Jack Heltemes, the Deputy Director of AEOD. It might be a good topic to raise there.

Also, tomorrow morning in the session where Frank is the Chairman, Tom Novak, a division director in AEOD, is giving a presentation on performance indicators. I think it might be a good session to discuss this issue in a little more depth.

Jack, did you have any cards?

Mr. Martin:

I must have been clearer than these other guys because I do not have any.

Mr. Sniezek:

They just did not have time to get the cards to you, but they are going to have the chance to get you with the mikes.

Dr. Murley:

I have a question I would like to pass off to you, Jack. Let me read it.

QUESTION: Relative to the balance of strengths in the utility, where does independent nuclear safety review—that is, both on site and off site independent safety review—fit in relative to QA [quality assurance]?

ANSWER: I will give a brief answer from my perspective. However, I think Jack can probably do a better job.

I view QA as a function that is supposed to help management—not only the top management but the plant management—and not as a reporting function or one that is needed just to satisfy NRC regulations. The QA function ought to include looking at everything that goes on in the plant in a non adversarial way. My understanding is that the independent reviews are called on just for special topics and not necessarily to help management look at the whole organization like QA is.

Jack, perhaps you can amplify that.

Mr. Martin:

Yes. Well, I think the way we tend to look at this in the region is that there is basically a category of organizations that I like to call the "problem finding arms" of the organization. QA, of course, is the obvious one, but there are a bunch of others. For example, the plant safety committee—it is called various things, but every plant has one, there is an offsite safety committee or corporate safety committee—most everybody has one of those—as well as an independent safety evaluation group.

I think those four typically make up the problem-finding and review portions of the organization. And, to a large degree, these organizations reflect the temperament of the utility they service. As Tom mentioned in his safety culture session, if management wants to know about problems and to find problems, then its problem-finding groups will be effective. If the utility's management does not want to hear about problems, then these groups do not tend to be too effective.

You know where these groups fit in the particular structure of your organization. I think they fit in that problem-finding organization and that they typically reflect the attitude of the person they work for. While doing our SALP reports and what not, if we find that these problem-finding groups are ineffective, I do not blame the groups; I blame the vice president they report to. He is the person that sets the tone.

So that might clarify a little bit.

Mr. Sniezek:

Let me hit the next question; I have two for one here.

> *QUESTION:* How do you rationalize NRC's implementation of a degree-on-shift rule and a maintenance rule over strong industry objection, which supports self-improvement, and how does this square with your mutual trust assertion?
>
> A similar question is:
>
> *QUESTION:* In light of improvements being made by industry on its own initiative, do you have any comments on why a maintenance rule is considered necessary?

ANSWER: Well, the jury is still out on both these rules. Let me address, from my perspective, the degree-on-shift rule. There is a lot of debate within the staff and the Commission on the need for such a rule. I personally believe that what is truly needed, not only for safety but for the economic viability of the utility with that multi-billion-dollar investment, is a senior manager on shift. For the life of me, I do not understand why the utility does not have one.

It is a concept that Vic Stello discussed with many industry representatives two or three years ago and it is a recommendation that he personally made to the Commission during a meeting. The Commission will make the ultimate agency decision on what, if any, type of rule we will have.

Regarding the maintenance rule question, there have been very strong industry objections to a maintenance rule and assertions that the industry is doing better. If you look at the overall operating performance of the industry, the overall safety performance, they are doing better. Obviously some of that is tied to improvements in maintenance.

The NRC was challenged by industry that we did not even have authority in that area: we had no authority over the balance of plant if it was not safety-related.

We basically found that assertion to be absurd. So, if there is really an industry belief that we do not have the authority, that almost in itself speaks for a need of a rule that goes beyond the term of art "safety-related."

AEOD did do a study on maintenance in the industry. They focused, if my recollection is correct, on boiling-water reactors and they found, overall, that the state of the industry in maintenance had improved. But one-quarter of the plants that were examined were going downhill and not improving. According to the boiling-water reactor study, if you believe any of the maintenance indicators that are being tried and being looked at, these plants were declining in performance—not staying steady and not improving. Therefore, although the overall trend of the industry is up, there are quite a few utilities that are still just staying where they were or going downhill.

Now, what is the maintenance rule? You have seen the draft rule; you have seen the policy statement that the staff had developed at one time. It is not a prescriptive rule—it is stated very generally. This is the first time the agency has talked about maintenance and what our expectations are in that area. The rule does not even say, submit a description of your program to the NRC. The rule says, here is what we expect; you just tell us you are doing it. How you do it and how you make your judgment is your call.

I think that is trust. We trust that once you know and understand what is expected, you are going to go out and do it. We do not have to do reviews in advance to make sure that you are doing what we think is necessary.

Mr. Miraglia:

I have a question regarding the discussion about NRC utility interfaces.

> *QUESTION:* There was no discussion about the 25 percent of the industry represented by the non-operating owner, and I would like some discussion of that.

ANSWER: It would appear to me that the context of the question is that when we license a nuclear power plant, there is a principal operator named in the license, and that there may be a larger number of owners in the financial kind of sense. While we look and interact principally with the operator, the licensee, I do not believe that we have any exclusion of the other owners participating in those meetings. To my knowledge, they have in the past, in some instances, done so.

I do not think that when we are talking about the operator, whatever the agreements are between the operator and the owners, I do not think we have any objection to interfacing with those people in the technical discussions regarding the operations of the facility.

Mr. Martin:

I would just add to that one, Frank, that although it is important that we keep the lines of accountability clear, we are going after the operating utility because it is responsible for operating the plant. We recognize that there may be other owners that own more of the plant, but the company that is named on the license as the operator is the one that we hold accountable, and there is no confusing that responsibility.

I have another question that deals with keeping costs down.

> *QUESTION:* In view of NRC's concern with the pressure to reduce costs, has NRC formally expressed our concern to state agencies, public utility commissions, about tying availability to rates?

ANSWER: The answer is, yes and no. Yes, we have done it in some very special cases. One that comes to mind is a dialogue we had a couple of years ago with the New York State Public Service Commission [PSC] where they were proposing a rule that would have tied financial awards and financial penalties to our SALP scores. We reacted quite strongly to that; in fact, we communicated with the PSC and told them we did not think it was a good idea because it would have, I think, grossly distorted the SALP process.

Likewise, in a case just recently, the Commission made it clear to SMUD [Sacramento Municipal Utility District] that the Commission did not think it was a good idea to put ... Actually, there was a drastic proposal that if the capacity factor of the plant falls below a certain level for a certain number of months, then the plant will be shut down unless the board votes otherwise. That is a drastic way to approach things and the Commission made it quite clear to the full board just a couple of weeks ago that they did not think such a proposal was a good idea.

There have been some other special instances over the years where the NRC has communicated—I think actually my predecessor, Harold Denton, communicated with some state authorities. However, we have not spoken as an agency and we have not spoken across the board. I think there is a reason for that, that is, we are not sure we know exactly the connection between availability and safety performance. It could very well be that general exhortations to run the plant so that availability is tied to safety may not be out of bounds. However, I think it is clear to us for at least those plants that have a sharp cut off, a drastic cut off, tying availability and finances is probably not a good idea. We are studying it, we are collecting data from all the states to find out what the trends are, and it is something we will keep our eye on.

Mr. Sniezek:

I will try the next one here.

> *QUESTION:* Why does the NRC continue to use a least-common-denominator approach, that is, require a licensee to adopt a generic document in its entirety when it is recognized there are so many plant-specific designs that are licensed to operate? Why not either request the necessary staff resources to review the plant's application of the generic document, or stop issuing rules, topical report SERs, et cetera, on the basis of the one-size-fits-all approach? That approach entails the inevitable round of questions and answers after the requirement is issued.

ANSWER: I think there are a couple of related questions in there. Our desire is to have topicals that can be adopted in their entirety; but we recognize that, based on the true hardware differences, not differences in preferences but true hardware differences, it is not possible to use a generic approach in all cases.

However, I think what we have asked for is that the industry as a whole, in adopting many of the generic solutions, take a look at what would fit most of the utilities and the configurations out there. That is where the owners groups and NUMARC come in.

I would hope that we would not see a lot of questions and answers. If we say, we are satisfied with this approach, and if the utility says, we intend to implement this approach, I would envision in most cases we would not ask you to even submit the description of what you intend to do, but merely that you would say, we will be implementing the approved topical report as adopted by the staff's SER. We do not want a lot of questions and answers going back and forth.

In fact, we have looked at our licensing backlog recently, and one of the things we have to do in the NRC is bring more discipline to our process. What does that mean? We basically have two types of license amendments in house. We have those in house that the utility wants. They are important to you, and that means, get them out quickly. That means, when we ask a question—I hope it is a valid question—we expect a prompt response back. I envision the staff, if it does not get a prompt response back, will say, when it goes back with a question, here is the question, please respond in 30 days. If we do not get the answer, we are going to terminate our review and ship it back.

The second type of license amendment in house, a good many of the licensing actions, are things that the NRC staff wants. Many of them have been on the books for years and there are rounds and rounds of questions. We had hoped to wear you down so that you would capitulate and see it our way.

I think the time has come for us to make a decision: Is it important enough from a safety standpoint that we really need it? If it is, let us order it; otherwise, drop it. That is the way we see ourselves going in the future—not just haggling about the same issues back and forth for years on end.

As far as the resources to do plant-specific reviews of generic requirements, I do not think that really enhances safety. I do not think we need more resources to do that. I do not think that is the way to do business. If we were to do that, we would be asking for probably several hundred more resources. If the utilities are so inclined, the industry is so inclined, we would welcome any support you can give us down at Congress to get those resources, but we have not seen you come forward and say, please give our regulator additional resources. We just have not seen it, even though we have asked for additional resources.

Tom, I think the next one is yours.

Dr. Murley:

I could not have asked for a better question to sum up my thoughts about this session.

QUESTION: NRC and industry say we must always improve, strive for higher and higher goals. When is enough, enough? Do we wait until we price ourselves out of the business? I hear it also more and more that NRC is killing the nuclear industry. There must be some ultimate acceptable goal. If not, our goal will be shutting down all of the plants. When is enough, enough?

ANSWER: Well, I thought I made it clear. I do not think enough is enough. I think we are always going to have to be pushing for better and better, and that is that. As Walter Cronkite says, "that's the way it is." I think those who cannot accept this ought to really find another line of work, ought not to be in the nuclear business, because it is so demanding and we are always going to have to continue to be better. It is like being in a submarine or being in another high technology—let me say it—high risk endeavors. If you do not like it, maybe you should try farming, because I would say, this is the way it is going to be.

Mr. Sniezek:

Tom meant no dispersions regarding farming either when he said that.

I have one last question up here. It is a housekeeping, administrative matter.

QUESTION: Whether it is possible to make arrangements to mail the briefing materials to your business address.

ANSWER: I think you can see from the size of the crowd here, we would be overwhelmed by the logistics, but we will ask the question, and if it is possible, we will let you know before the close of the conference.

Are there any questions that someone from the audience would like to raise at this time?

QUESTION: I hope you can hear me because we do not have microphones as you can see. The question really relates to Tom's last point and it relates to the NRC's role in accidents. I think we have had discussions with Jim Sniezek and the other staff regarding the NRC's role with regard to that subject. I think we found some common understanding that the NRC's role is to set the proper climate for excellence so the industry can survive to achieve it. And yet, in comment and paper, you indicate that the NRC's role is to point out standards of excellence and to evaluate licensee performance against them.

To follow up on your comment, it seems that, one, I would like you to clarify what you believe the NRC's role is in this, and then—while I agree with your last point that we need to keep working and striving for continued enhancements in performance—I guess I question whether that is the responsibility of the industry, the licensees, or the responsibility of the regulators.

Dr. Murley:

ANSWER: Yes. The question gets down to the respective roles, let us say, of the NRC, which basically sets standards and then regulates to see that those standards are met, and then NUMARC or INPO, which wants to go beyond those standards and really push for excellence.

I understand that difference: There is a kind of difference in ultimate approach, but there is no difference in the goal. We have concluded, at least I have, and I have heard the Chairman say it quite clearly, Chairman Zech, that merely meeting our regulations is not enough because that is a kind of a minimal compliance that is going to lead to an attitude that sets in at a plant, which is going to ultimately lead toward problems. We have seen it time and again. Being satisfied with merely meeting our regulations down the road is going to lead to problems, so we are going to continue to push for excellence.

Now, we know the difference between excellence and perfection. You may not think so if you get a civil penalty or are on the end of our enforcement actions, but we know there is a difference. What I am trying to say is that by pushing for excellence, we know that we are going to ensure the kind of the average safety across the industry that we like.

At the same time, we encourage INPO to go well beyond our standards and set their own standards and even evaluate plants against their own standards. I guess I do not quite see the distinction that there need be a distinction in this regard.

Mr. Sniezek:

I would like to amplify on something that Tom said. In fact, the NRC staff does have a speed limit put on it. It is called the backfit rule. It very clearly says how far we can go. We can push on anything that can cause a substantial improvement to the public health and safety as long as the cost is commensurate with the improvement. That is our speed limit.

Whereas the industry, NUMARC and INPO, do not have that speed limit imposed upon them. So I personally see that as a dividing line.

Any other questions from the floor at this time?

QUESTION: Does that constitute official NRC policy that we should release those or any other self-assessment of our plants to the public?

Mr. Sniezek:

ANSWER: For the people who could not hear, the basic question is that I made the comment in my presentation that we thought it would be good if the INPO evaluations were made available to the public.

I believe that most of the senior managers that I have talked to in the agency believe that would be good. That is not an official agency position. And, as I stated in my remarks, I believe in the long term it would be beneficial to the nuclear power industry because I believe in the long term that the public can understand a good, thorough self-assessment process such as the industry has established through INPO. But that is not an official agency position or policy that they should be released.

Questioner:

Might I suggest in a nice way that the releasing of self-assessments should be management policy and a management decision on the part of the industry and that we might appreciate that kind of help not being made because we get pressure from other people who do not understand the standards of excellence versus compliance that you do.

Mr. Sniezek:

I understand what you are saying, Pat, and I think we are really in a pay me now or pay me later situation.

Dr. Murley:

Jim, we should make clear that there is no move afoot inside the NRC that I am aware of to require making the INPO reports public. It is just a belief on our part, Jim's and mine and many others, that it would be good for public acceptance for you to do it on your own.

Mr. Sniezek:

That is where our remarks went beyond the official regulatory posture.

Questioner:

You will not mind if we do not agree with you?

Mr. Sniezek:

We welcome that, and it will not be the first time, and I am sure it will not be the last.

Anything else?

QUESTION: I have a question. There is a difference between policy statements and rulemaking, and there have been different positions relative to when to apply each of those techniques. In the interest of trust and development of the relationship where industry and the regulator can support each other, where does the NRC staff stand on when it is appropriate to apply a policy statement and when it is appropriate to apply the rule?

Mr. Sniezek:

Should I take a cut at that, Tom, or do you want?

Questioner:

I would just like to add one clarifying remark. It is my perception the the policy statement generally establishes expectations and rulemaking establishes requirements.

Mr. Sniezek:

The question is, when is it appropriate to apply a policy statement versus when is it appropriate to apply a rule? *ANSWER:* I was glad that you asked for the NRC staff's viewpoint and not the Commission's viewpoint.

The commenter went on to state a fact that a policy statement establishes expectations whereas a rule establishes requirements. And that is a statement of fact.

My belief is a policy statement is an exhortation on the part of the Commission for the industry to do good in an area. It is my belief, it has no legal stature, my personal belief. You may get a different argument from various members of the Commission.

Whereas a rule, on the other hand—If we want to very clearly establish an NRC position, something that we are willing to enforce if necessary if it is not implemented by the industry, that is the right time to issue a rule.

If we have any of our lawyers in the house who...

Voices:

No, no. No.

Mr. Sniezek:

I pushed a big button.

Dr. Murley:

Lawyers, I am fighting a losing battle, but my view is that lawyers do not make policy, they advise policymakers.

My view on this is that a policy statement is largely instructions to the staff whereas a rule is clearly a requirement laid on the industry that they must meet.

I will give you one example of that: The Severe Accident Policy Statement that has been out since 1985, essentially said that severe accidents pose no unique risks to this class of plants, that there need be no special requirements laid on, other than the need to do an individual examination of each plant. It also said that severe accident issues should not be brought up in any individual hearings.

Now, there has been a case where an aspect of that policy statement has been challenged in the Limerick case and the appeals court has essentially said that the Severe Accident Policy Statement has no standing and that we have to go back and reopen the hearing and consider severe accidents under the NEPA [National Environmental Policy Act].

The Commission has filed with the court to take another look at that issue, and we are going to appeal it. But that gives you an idea of at least what one court felt about the status of policy statements, which is essentially that they have no legal status.

Mr. Sniezek:

Since they have already started serving lunch and no one is there to partake in it, I am going to close off the session. If there are other questions, I would ask you to put them on the cards and give them to the young ladies and they will be picked up during the closing session.

Thank you very much.

LUNCHEON SPEAKER

Remarks by
Chairman Lando W. Zech, Jr.
U.S. Nuclear Regulatory Commission
at
NRC Regulatory Information Conference
April 18, 1989

QUALITY PEOPLE – THE MOST IMPORTANT FACTOR

I appreciate this opportunity to address you today at the Nuclear Regulatory Commission's 1989 Regulatory Information Conference. As I look around this room, I see many individuals whom I have had the pleasure of meeting and talking with during my many plant visits. I am glad to see so many of you taking an interest and the time to attend our conference this year. Your attendance is another demonstration of the nuclear power industry's growing commitment to the continued safe operation of nuclear power plants throughout our country.

As many of you are aware, I have had the privilege of serving on the Commission since July of 1984, and I am currently completing my last months as Chairman. Today I plan to highlight what I believe has been the single most important factor to increased operational safety and what is necessary to improve nuclear power's operational safety record in the coming decade.

I want to begin by restating our common goal—to safely provide the United States with the energy benefits of commercial nuclear power. I see the NRC and the nuclear industry as sharing this common goal, but having separate, complementary roles to achieve that goal. Together, in an atmosphere of mutual respect and trust, the NRC and the industry have accomplished a great deal and we can be justifiably proud of our service to our fellow citizens.

As we continue to develop and use nuclear power, we must remember that there will always be room for improvement. Nuclear energy is a very demanding technology, one that requires our respect and a great sense of personal responsibility. Therefore, this industry and those who work in it must never become complacent. Safe nuclear energy is not magic. It takes hard work and attention to detail, with emphasis on quality—quality work and quality people.

As a result of my experience with the Commission, I truly believe that people are the key to safe plants. People are the critical element to achieving the operational excellence that you desire and that nuclear power requires.

Experience at Three Mile Island Unit 2 in 1979 and at Chernobyl Unit 4 in 1986 demonstrated that *competent, knowledgeable, dedicated* people are crucial to the nuclear safety equation. As recently as 1987, over half of the events described in licensee events reports have been attributed to some type of human error. Clearly, the impact of plant personnel on safe operations is significant.

As far as operational safety is concerned, no one is more important than the nuclear power plant operators. The operators of commercial nuclear power plants are the people who are entrusted with the responsibility to safely operate these large and complex facilities. They must be technically competent and dedicated to safety. When an event occurs that could potentially compromise safe operations, the plant operators are the ones who must properly analyze the event and take corrective actions to maintain plant safety. The industry and the NRC must ensure that these operators are best prepared to do their job. Therefore, training for operators is essential.

As such, the NRC has focused a great deal of attention on the training and qualifications of reactor operators. As most of you are aware, the NRC licenses all personnel authorized to operate the controls of a nuclear reactor. Recently, the NRC has given significant emphasis to a program to verify the continued proficiency of licensed reactor operators. We hope that this revised program will make our requalification examinations more content valid, operationally oriented, and focused on integrated plant understanding. A great deal of credit for the specifics of this program belongs to the utilities and experienced plant operators who have contributed significantly to this effort.

I believe that in recent years the commitment to operator training has increased throughout the industry. During my visits to plants throughout the country I have seen excellent training facilities and many plant-specific simulators. These facilities represent a significant investment by the utilities, and in my opinion it is one of the best investments that can be made to maintain and promote safe operations.

Although plant operators are central to operational safety, it is very important to recognize that quality people involves more than the operators. The NRC emphasizes the need for personal dedication and individual accountability for all individuals engaged in any activity that has a bearing on the safety of nuclear power facilities. I believe it is important to emphasize that *people design, people construct*, and *people maintain* these plants. These people also are just as accountable as the operator for safety of nuclear power operations.

The Commission has called on management to provide the leadership that nurtures and perpetuates a "safety culture" in each nuclear power facility. A "safety culture" means a professional atmosphere of competency where an honest, deepseated commitment to safe operations and a willingness to be self-critical and to be held accountable is clearly present.

My experience has convinced me that a crucial factor in assuring operational safety is leadership involvement of senior level management. Leadership involvement means that all levels of management know what is going on in their plant and are committed to doing things right the first time. If this commitment is instilled in everyone in the organization, this will often times set the tone for the important activities related to the safe plant operation.

During the past four and one-half years of my tenure on the Nuclear Regulatory Commission, I have visited all 112 licensed nuclear power plants in the United States, plus several plants that are still under construction, and about 40 plants in foreign countries. I did this because I believe that effective management, whether NRC or industry, requires that senior managers see first-hand the relevant plant conditions and get to know the people at each site.

My visits have been extremely valuable to me in that they have given me the opportunity to learn and to observe—first-hand—a great deal about commercial nuclear power plant operations. During my trips, I have received valuable information by talking with plant personnel. I encourage all senior managers to visit your plants frequently and discuss plant status with your operators, plant managers, maintenance personnel and others, in order to thoroughly know your facilities, your people, and their challenges and problems. I sincerely believe that your visits will benefit you, your employees, and the organization.

My plant visits have shown me that nuclear power plants in this country are being operated by competent, knowledgeable, dedicated individuals with a safety first attitude. I believe that the nuclear utilities and the nuclear industry are overall serving our country very well. In 1988 nuclear power *safely* supplied almost 20 percent of our nation's electricity.

I stress *safely* because from 1984, when we first began our trend analysis, until now, there has been a clear and significant improvement in the key parameters we watch that concern operational safety. In particular, per operating reactor, the number of significant operating events has continued to decrease each year, the unplanned automatic plant shutdown or scram rate has shown steady improvement, the number of safety system actuations has clearly decreased, the average radiation exposure to plant workers has continued to decrease, and the number of precursor events has shown a steady decline. And a personal observation—since I first began visiting our commercial nuclear power plants in 1984—is the very significant improvement in plant cleanliness. This, in my view, is an important element in improved professionalism. To me, a clean plant indicates pride in your facility. A clean plant is a mark of a quality facility. A clean plant shows that you understand the importance of maintaining contamination and radiation levels at the as low as reasonably achievable level. A clean plant is a safe plant.

However, I believe that there is considerable room for overall improvement in some plants and at least some room for improvement in all nuclear power plants. Despite the improvements I have mentioned, there are still too many operating events, equipment and component failures, and human performance errors. For nuclear power to continue to serve this country in the future, this industry must be encouraged but never completely satisfied with its operational safety record.

One particular area that I believe the NRC and the industry will need to address in the future is the issue of plant maintenance. In my opinion, the importance that licensees place on maintenance will determine to a large extent, the safety, availability, and reliability of plant operations. I personally believe that proper maintenance programs that are vigorously executed make a substantial contribution to safety and can contribute significantly to plant life extension. Skimping on maintenance is extremely shortsighted. Well maintained plants are safer, more reliable, and therefore more economical.

Both the NRC and the industry have done much in the area of improving operational safety. These include improving the staffing and qualifications of personnel, training of personnel, licensing of operators, and the management of the plant. Licensee and NRC management attention should continue to focus on each of these areas in the future. Deficiencies cannot be tolerated.

We at the NRC remain encouraged and optimistic that the safety trends that we observe in nuclear power operations are moving in the desired direction. Through leadership by industry management, vigilance in maintaining progress in the interest of safety, and perpetuation of a safety culture at the plants, continued improvement in safety is achievable. The next few years will be pivotal for the nuclear industry in this country and will set the stage for the turn of the century and beyond. I strongly believe that working together with a commitment to safe operations and an emphasis on quality people and quality facilities while recognizing our separate, complementary roles, we can continue to meet our common goal.

Nuclear energy requires the very best of each of us so that we can continue to achieve our common goal of safely bringing the benefits of nuclear energy to the American people.

The citizens of our country are receiving the benefits of safe nuclear energy now.

Let us renew our pledge to do our very best to continue to supply safe nuclear energy to our fellow citizens and thereby contribute to the energy security of our country.

Thank you.

2 SESSION 1: OPERATING EXPERIENCE

Mr. Charles E. Rossi:

I would like to welcome you all to Session 1 of the NRC Regulatory Information Conference. I am Ernie Rossi, Director of the Division of Operational Events Assessment in the Office of Nuclear Reactor Regulation, and I will be the chairman for this session this afternoon. This session is entitled "Operating Experience" and contains papers on five subjects. Mr. Bernero is going to cover his subject, which really is kind of two separate subjects in two papers, so we are going to actually have six separate papers.

The first four papers are closely related, and the order of presentation has been based on this fact. Mr. Lanning's, Mr Heltemes', and Mr. Berlinger's papers will give a description of the agency's overall program for reviewing operating events and experience and disseminating the information from the review of operating events and experience to the industry.

Mr. Heltemes is also going to briefly discuss some problems that we in the NRC have seen with the reporting of operating events. Mr. Ernst's paper will cover a subject that is important to a utility's evaluation of each of its own operating events, and Mr. Bernero will cover two issues that are of current interest to most of you.

We will do as was done this morning with the questions. At the end of the presentation of each paper, we will try to take two or three questions as time permits. During the remaining presentations of all of the papers, you can write further questions on the cards that presumably have been handed to you, and they will be picked up and we will answer as many of those questions as time permits after the presentations of all of the papers.

We will begin with the first paper for this session entitled "NRC Review of Operating Events." This paper will be given by Wayne Lanning, who is the Chief of the Events Assessment Branch in the Office of Nuclear Reactor Regulation.

NRC Review of Operating Events

Mr. Wayne D. Lanning:

Thank you, Mr. Chairman. Good afternoon, ladies and gentlemen.

The purpose of my presentation is to outline the NRC's review and response to operating events with special emphasis on the activities that take place at headquarters. I feel that you already have an understanding of the regional responsibilities with regard to the operating events, so I hope to give you a headquarters perspective.

I will also provide an introduction or establish a road map for subsequent presentations in this session and also for the conference. The program for the prompt evaluation of operating events includes several parts. We receive the reports and then there is a prompt assessment of the safety significance of those reports. We determine what the agency response should be to those events. We evaluate the adequacy of the corrective actions. This is done primarily by the regions. And those first two parts are done at the time that the event is reported, essentially.

The next day we look at the adequacy of the corrective action in more detail and try to assess and determine the generic safety implications of the event. The plant-specific safety implications are evaluated by the regions. Then we try to feed back lessons learned to ensure reactor safety when appropriate.

There are a number of NRC organizations in headquarters that deal with the assessment of operating events. My discussion really is limited to the assessment of events occurring in reactors; it excludes safeguards events; so this is really dealing with operating events

Essentially the division of responsibility at headquarters for operating events can be simply divided between prompt evaluation and long return followup evaluation. On the right-hand side of this chart *[Figure 1]* are the regions that have the responsibility for the immediate response and evaluation of the corrective actions before restart.

On the left-hand side is the Office for Analysis and Evaluation of Operational Data (AEOD), which has two divisions. Essentially AEOD has responsibility for the long-term evaluation of operating experience, the trends and pattern analysis, and performance indicator program.

I want to focus on the specific part of the NRR organization [Office of Nuclear Reactor Regulation] and essentially what the Events Assessment Branch does *[Figure 2]*. First, what I want to do, is just quickly outline some of the regulatory reporting requirements

[Figure 3]. The reports required by Part 50.72 [of Title 10 of the *Code of Federal Regulations*]. These are the telephone notifications. These are provided to the operations center, which I will talk about in more detail, within 1 to 4 hours after the event. These reports provide the primary basis for our assessment at headquarters.

Following that is the LERs [licensee event reports] required by 10 CFR 50.73. These are reviewed by AEOD, and I think that Jack will talk more about the use of those reports. The LERs are probably included in more data bases and in more applications than any other reports of operating experience.

There are also the 10 CFR Part 21 reports. These are the reports related to defects of safety-related components of services. The focal point for the review of these reports is the Generic Communications Branch, and Carl Berlinger will talk more about that during his presentation. In the 10 CFR 50.55(e) reports are construction deficiencies, and there are also reports required by the technical specifications.

There is a large source of other operational experience and there are multiple applications of those reports. I think that Jack will get into some of those applications.

Now I want to briefly go through the process for NRC response to events at headquarters *[Figure 4]*. The notifications are really the 10 CFR 50.72 reports. These are telephoned to the operations center. We have an individual on duty 24 hours a day. He is a professional, he is highly trained, he is qualified, he understands plant operations, and he does the initial screening of the reports. His primary function is to determine whether or not there is an ongoing safety concern. If the answer to that question is yes, he has procedures that he implements to notify NRC senior management of the event. He is on duty for the primary purpose of increasing the agency's position to respond, its readiness to respond.

The purpose of staffing the operations center is really threefold: to monitor these actions, these mitigating actions to the event; to provide support to the licensee during the emergency; and to serve as the focal point for communicating and coordinating other Federal agencies' responses.

There are five modes of operation for the operations center *[Figure 5]*. What is important is that the modes to which we activate the operations center are largely dependent upon the classification of the event or the emergency action level [EAL] that is specified by your emergency plan.

Consequently, the EAL is of great importance to us, because it influences the actions that we take and the government agencies that we notify. What we have seen recently has been some nonuniformity in the classification of events, particularly the loss-of-offsite-power events. We have instigated some discussions with NUMARC and industry representatives on trying to improve the consistency of the EALs, and we expect some changes in this area in the near future.

If it is not an ongoing emergency, we really get into the mode on the next day of the daily review of operating events *[Figure 6]*. In addition to the 10 CFR 50.72 report, the other primary source of information that we use is something called the morning report. The morning report is provided by each of the regions each day.

These are reports that are not normally required by the reporting requirements of the licensees. In other words, they provide information concerning operating events or operating situations that are not reported, or they provide additional information concerning events that were reported. Thus, we use those two sources of information to do our prompt assessment of operating events.

At 8:15 each morning, we brief the division directors in NRR on the significant events that have occurred over the past 24 hours. This includes reactor trips, significant events, or significant personnel changes, for example, at a licensed facility.

One of our important jobs is not only providing feedback to the industry, but also keeping NRC's staff informed of operating events and operating experience that affects its regulatory activities and responsibilities.

It is at that time that there are a number of actions that we can take in response to a safety concern. These include dispatch of an inspection team or an incident investigation team. Jack will talk more about the incident investigation program in his presentation. It results in generic communications, for example, an information notice or a bulletin, or it can result in the planning of special inspections of various sorts, or it can result in the justification for continued operation or the basis for restarting the unit.

After that, at about 8:45 each morning, we hold a conference telephone call that brings to bear expertise from throughout various headquarters organizations to assess the safety significance and determine the generic implications of operating events. We have a conference telephone call that includes Projects, the Generic Communications Branch, the Vendor Inspection Branch, the DEDRO [Deputy Executive Director for Nuclear Reactor Regulation, Regional Operations of Research] staff, and the AEOD staff, where we collegially review the events and determine what is safety significant and what the appropriate followup action should be.

We also look at reporting requirements and determine whether or not these events were reported under the right criteria, reported timely, or for the right reasons.

As part of this collegial evaluation of operating events, we essentially screen the events into four categories. It is either a significant event, a potentially significant event, or the event is just not understood well enough for us to classify, or it is too insignificant to warrant followup activity *[Figures 7, 8, and 9]*.

Those categories are discussed in the paper. Let me show you quickly the characteristics that would result in an event being classified as significant. This is the same significant event that is provided in the performance indicator program. Thus, we are the ones who provide the input for significant events into the performance indicator program, and that is going to be discussed in more detail tomorrow morning.

Let me go back to the events analysis process where we have screened the event and are at the point of deciding what followup actions to take in response to the event [*Figure 6*]. We in the Events Assessment Branch can follow up the event ourselves, or we can assign them to other organizations for followup. For example, if it is a vendor problem or a component problem, we could ask the Vendor Inspection Branch to follow it up. That is just illustrative of a number of organizations that have specific responsibilities in NRR that can be assigned the followup.

The top right-hand part of the chart more or less shows the process. It is important to point out that we work through the project managers and through the regional offices to obtain additional information. I know that many of you have been involved in discussions that have involved headquarters staff—we try to understand the event and determine the generic safety implications.

After we screen the event, we have a tracking system and we keep track of reported events and how we classify them over a period of time; we have various uses for those data bases in the evaluation of licensee performance.

Each week we hold a briefing for senior managers at headquarters offices of NRR, AEOD, and Research, and we include the regions by telephone. We have traditionally briefed two or three events that have significant aspects, or unique characteristics, or that reflect ongoing policymaking decisions, and we try to brief those managers and talk about the corrective actions. Again, we will probably get a collegial evaluation of the safety significance of the event, whether or not it is a generic problem, and what additional actions we should take.

We also have a weekly telephone discussion with INPO [Institute of Nuclear Power Operations] to discuss the events that we think are significant that have occurred during the week. We exchange ideas on what has been reported or what has been communicated previously concerning this type of event in order to eliminate duplicative material. Carl Berlinger will talk more about that process.

Lessons are learned through the evaluation of operating experience that can lead to regulatory actions to improve safety in specific areas. For example, we have had two recent events involving leaking check valves and personnel errors that had the potential for bypassing containment resulting in an Event V type event. As you know, the Event V scenario is called a risk-significant event in the *Reactor Safety Study* [WASH-1400]. But because of these events, and primarily because of potential failure modes, the human errors involved change the frequency of these events, causing increased emphasis within the staff.

This chart *[Figure 10]* shows the two events and the process that took place. Both of these events are feeding into an action plan to discuss or to study intersystem LOCAs [loss-of-coolant accidents]. A special presentation tomorrow will cover intersystem LOCAs. But this just shows you how operating experience can change the focus of regulatory emphasis at headquarters.

The end product of this activity will probably be new calculations and new evaluations of the PRA [probabilistic risk assessment] analysis, and probably some inspections to look at design adequacy of existing plants to preclude intersystem LOCAs.

In summary, the NRC places great emphasis on the review of operating events at reactor plants. We have the capability to support a licensee during an emergency. We have the capability to assess the generic safety implications and feed back the lessons learned both to NRC and to the licensees.

However, this is really the easy part. The real challenge and the key to ensuring reactor safety and improving operational performance is to act on the lessons learned and implement changes. Lessons are not learned without significant costs, but there is a higher cost if we do not act on the lessons that operating experience teaches us. Thank you.

The chairman says that I have five minutes for questions.

Voice:

As we talk about reporting requirements and the relationships, there appears to be a vast discrepancy from the industry as to the level, numbers of LERs submitted, and those incidents that are found to be reportable.

I am wondering if you could comment on that, and whether you believe that the industry in general is doing a good job in making the report, and the adequacy in identifying and reporting all reportable events.

[No response.]

Evaluation of Operating Experience

Mr. Clemens J. Heltemes, Jr:

I represent the Office for Analysis and Evaluation of Operational Data, known as AEOD. As you may know, AEOD was established in 1979 as a direct response to the TMI-2 accident. We have the primary responsibility for the review of operating experience from all NRC-licensed activities independent of any enforcement, licensing, or inspection responsibilities. AEOD also has responsibility for the NRC operations center, the technical training center, the diagnostic evaluation program, and the performance indicator program.

Today I want to cover four items—four different areas. First, to discuss the reporting of operating experience. Second, to talk about the AEOD analysis and evaluation program. Third, to run through very quickly the incident investigation program of the NRC. And, finally, to give you some thoughts on the operational experience review program that you conduct.

I will be using a number of charts today that will not be in your handout, but there are copies available on the table. I hope that you will be able to read the charts although they are not very bold.

[Figure 1]

There are many sources of operational experience available to the NRC. This is a listing of some of them. We have already covered the first two: the operations center telephone calls per 10 CFR 50.72 and the regional office daily reports. The next several are the ones that we in AEOD focus on primarily: the inspection reports, the LERs, and the NPRDS [nuclear plant reliability data system] reports. The NPRDS, as you know, is the component failure reporting system operated by INPO. It also has engineering data, basically nameplate-type information for a number of the major components in the plant.

We also get a number of foreign reports. The NRC participates in the Nuclear Energy Agency's incident reporting system, or IRS, and in the International Atomic Energy Agency's IRS. We also have bilateral agreements with every country operating a light-water reactor. We share information, therefore, with all other operators of commercial nuclear power stations. In addition, we receive a number of special reports, including 10 CFR Part 21 requests, monthly operating reports, and special team inspection reports.

[Figure 2]

A major revision was made to the NRC reporting requirements in 1984, that is, when we established the LER reporting requirements by rule. Previously the LER reporting requirements were in the plant technical specifications and were not uniform.

In the early 1980's, we decided to start a trends and patterns program, and later the performance indicator program. When you perform these types of efforts, you have to have consistent and uniform reporting from all plants. Therefore, we tried to achieve consistency through a rule, 10 CFR 50.73. At the same time, we changed our immediate notification requirements to the operations center for those contained in 10 CFR 50.72 to assure consistency with 10 CFR 50.73 on LERs. Our intent was that oral reports would normally be followed up by a written LER

The LER is probably the most detailed and comprehensive report on operating events. It certainly is the most important and widely used. The LER reporting requirements of 10 CFR 50.73 encompass basically two different parts. The first part says *when* you have to report, and I have listed some of the principal criteria on the chart. The second part specifies *if* you have to report. The objective of the LER rule was to get a complete and comprehensive technical story on what happened and why it happened so that we can review it, and feed back the lessons.

[Figure 3]

In 1988, we received about 2600 LERs. This chart represents the distribution of those LERs per the LER reporting criteria. About 40 percent of all of the LERs received address the reactor protection system, that is scrams or emergency safeguard features actuations. Another 40 percent were shutdowns that were mandated by the technical specifications or conditions prohibited by the technical specifications. About 8 percent address real or a potential loss of a safety system.

The next category addresses unanalyzed conditions and major degradation of the principal safety barriers, such as leak of the containment in excess of authorized limits, a condition that is not covered by procedures, or a condition that was outside of the design envelope of the plant. Failures of multiple systems normally mean a system interaction and that accounted for 3 percent or so of the LERs. Such reportable events as external threats such as tornadoes, internal threats such as fires, for example, or airborne or liquid releases are very, very low in terms of percentage of LERs—essentially zero.

As I noted previously, we received about 2600 LERs in 1988. The average per unit is about 25, giving us an LER, on the average, from every unit every 2 weeks. We get LERS at the rate of 10 to 15 per working day. So we believe that our reporting system is working, and that we understand the operational experience of the U.S. industry. At the same time, we are aware that there are some problems, and some nonuniformity and inconsistencies in reporting.

[Figure 4]

We are starting to pay more and more attention to these problems because many of our systems depend upon consistent reporting. Further, we are aware that on occasion we do not get a report or we get an incomplete report, and this is a matter of real concern to us. The responsibilities of the NRC are to respond promptly and properly to operating events that are significant, and to do so, we must know about and understand events that are potentially significant.

Further, one of our responsibilities is to feed back to you the industry safety concerns that have generic applicability, and for that we have to receive complete reports. I can assure you that the Congress, the public, and the states believe that the regulatory officials in the NRC should understand what is happening in the plants and be able to comment on the safety significance in real time. To do that, we have to have timely reports.

In some cases, reports are clearly required, in our minds at least, through the regulations, 10 CFR 50.72 and 50.73. In other cases, the reports may not be so clearly required. Judgment can be exercised; but we would ask you to report if in doubt. If there is uncertainty, let us know. We think that it is in everybody's best interest for us to know and for there to be a free flow of communication.

Let me just note a couple of the problems that we have observed in reporting. The LER rule and 10 CFR 50.72 clearly exclude random independent component failures; but the equipment failures indicating a potential generic problem or a possible common-mode or common-cause failure are reportable. Yet we did not receive a report when a plant found many damaged cables in multiple systems including safety systems. The cables were degraded and over-temperatured; this is probably an unanalyzed condition and it certainly has potential common-cause and generic implications. We feel that it should have been reported, so that we can assess it and feed back to other plants that may have the same type of problem.

We are aware that another plant had a scram solenoid problem, and under tests a rod did not insert. Under further tests, 3 rods did not insert and 11 others had some hesitation. This was not reported to us; yet, in our minds, it was clearly a common-cause mode of failure that had generic implications.

In terms of incomplete reporting, we cannot properly assess the safety significance of an event if there are key aspects having safety relevance omitted from the reports. The trained engineer at the operations center has to assess the safety significance of what he is hearing, and then the agency responds as appropriate. However, the engineer can be misled if the report is incomplete. For example, we received a report on a scram on one occasion from a plant, but many hours later we learned that six rods failed to insert. On another occasion, the operations center was monitoring a steam generator tube rupture. The initial report said that the leakage was in the range of 100 to 150 gallons per minute. It was only after seven hours, and after a number of interim reports, when we learned that there were two charging pumps in operation and the leakage was about 540 gpm. It was several hours after that that we found out that the safety injection was blocked.

The regulation, 10 CFR 50.72, clearly says that if you notify the state and local government, or issue a press release, then you are to notify the NRC, so that we are able to handle press inquiries. I think that Wayne mentioned that there was an occasion in which there was a leak outside of containment; in this particular case, through mispositioned valves, the RCIC [reactor core isolation cooling] suction piping was overpressurized and a relief valve opened. Five people were contaminated and water accumulated in the RCIC room. The state and local governments were notified, but the NRC was not.

On another occasion, a plant had a loop seal that failed; as a result, a precautionary evacuation was made of the reactor building. It received local media coverage, and there was a chance for national coverage, and again the NRC was not notified.

We believe that complete reporting is in all of our best interests. If we do not have good reports, the program that Wayne, and I, and others are talking about, that is the collection, assessment, and feedback of operating information, is really defeated. So we ask, if in doubt, report.

This next chart *[Figure 5]* is a graphic attempt to give you a quick overview of the AEOD analysis and evaluation program. In terms of operational events, you can think of those as the LER. In going across on the top, each LER is reviewed by a senior engineer in AEOD. That engineer makes several judgments. One judgment is the significance; that is, does this event warrant an individual examination in depth by AEOD or others? Also we make a determination whether it is an abnormal occurrence, which I will cover a little later, and whether it should be reported to other countries since it may have safety significance for their reactors. We also try to determine if it has generic applicability and, thus, should be fed back to the industry either through power reactor events prepared by AEOD or through a bulletin or information notice, which Carl will cover.

If the event has particular significance, we do an engineering evaluation, which is a rather prompt study of the event to determine its significance and to determine if there is any aspect of the event that is of particular concern, or we do a case study, which is an in-depth review. A case study takes perhaps a year or so and will result in recommendations to the NRC for corrective action because of a safety concern. In the nine years plus of AEOD's existence, we have issued about 35 case studies.

Each LER is also entered into a computerized data bank called sequence coding and search system, SCSS. This particular system allows us to do computer searching, that is, to link and draw the perspective of past experience to bear on current study efforts, such as engineering evaluations and case studies. This system also supports our statistical analysis activities, which we know as the trends and patterns (T and P) analysis program. We have done a number of T and P studies, including scram analysis, engineering safeguard feature actuations, loss of safety system, technical specification deviations, and the performance of new plants. We have a number of reports generated from SCSS. We have both ad hoc reports and routine reports.

This chart *[Figure 6]* gives you some of the criteria that our engineers use when they review an LER. The primary attention is placed on unexpected events, sequences which have not been previously analyzed; any system interactions; any common-cause or common-mode component failures; any unexpected system or component performance; any multiple failures or errors particularly of safety systems or component failures of non-safety equipment that affected the performance of a safety system or cause a challenge to a safety system.

[Figure 7]

When we find an event that meets one or more of these criteria, we generally study it further. When we study it, we ask ourselves several questions: what happened, why did it happen, should it have happened, has it happened before, what could have happened, and what corrective actions are needed? We try to answer these questions when we prepare our reports.

[Figure 8]

AEOD produces a number of products from our analysis and evaluation program. We have produced about 500 reports to date including the 35 case studies that I mentioned before. Each of these reports is identified in our annual report that we publish as NUREG-1272. Each of these reports is in the PDR [Public Document Room]. And if you have trouble getting any of the studies, just let me know and we will get you a copy.

AEOD also publishes quarterly reports called abnormal occurrences reports, that are sent to the Congress. An abnormal occurrence is an event in which there was a major degradation of protection of public health and safety. Typically, about 3 to 10 such reactor events per year are reported to the Congress.

We also publish *Power Reactor Events*, a bimonthly publication. We send it to all training coordinators at all plants, and it goes to a number of individuals in the United States and worldwide. It is our means to feed back the lessons of experience.

We also publish a monthly compilation of the LERs received during each month. There are special indexes so that you can look at the LERs by system or by type of failure.

We send about 70 reports per year to the various international incident reporting systems that link experiences of plants worldwide. We also produce an annual report, and have a number of outputs from our data banks that feed into performance indicators and other activities.

[Figure 9]

Now let me swing over and discuss for a few minutes the incident investigation program. This program was established by the Commission in 1985 as a result of a special study requested by Congress. The study was done by Brookhaven National Laboratory, and it indicated that the NRC could make a number of improvements in the way that it investigated significant events.

Basically, the objectives are to determine what happened, and most importantly to evaluate the root cause of why it happened and determine the plant-specific implications and any generic implications.

[Figure 10]

The program has two initiatives. One is to look at particularly significant events with teams known as incident investigation teams or IITs. These are interoffice, interdisciplinary teams. Events with lesser significance are investigated by an augmented inspection team or AIT.

The next chart *[Figure 11]* shows the difference between the two teams. AITs are normally activated by the regional administrator. The leader of that team is selected from the regional staff. There are no specifications on team size. The composition and size would depend on the event to be investigated. There were 14 events investigated by AITs in 1987, 10 in 1988, and I believe 6 so far in 1989.

IITs are established by the EDO, and the team reports to the EDO. There have been three events investigated by IITs to date, all in 1985. The team leader would normally be a senior NRC manager. The team would have an independence from the event and from the project and region, so that the team's report will be independent of any direct licensing or inspection activities. The team would normally be from four to eight people.

This next chart *[Figure 12]* illustrates operational experience review programs. I am sure that these points are generally well recognized and already appreciated by all of you. However, because of the importance placed on effective operational experience review programs, I thought that it would be worthwhile just to briefly focus on some of the principles of these programs.

First and foremost is the emphasis on root-cause analysis. By root cause I mean the specific item or items that you have to correct in order to prevent reoccurrence of the error or failure. You have to have an effective root-cause analysis to determine the proper and total corrective actions needed to prevent reoccurrence.

Further you need to determine the generic implications. You have to determine the systems or the locations that are susceptible to the same type of failure, and these also have to be corrected both in the unit where the failure occurred and in other units. You need to feed back operational experience to the operators and technicians, so that they can learn from experience, although this has to be done carefully so that the information does not become overwhelming. It also has to be done with particular insight into what do they need to know in order to perform their duties and responsibilities more effectively.

Finally we feel that you need to share the lessons and experiences through feed-back to others through INPO's and the NRC's assessment, collection, and feedback programs, and that is why it is so disturbing to us when reports having generic implications escape this system.

Finally let me leave you with a thought that was expressed by Chairman Zech in September of 1987. "There is no secret to much of this nuclear business, except for hard work, discipline, attention to duty, competent performance, following procedures, and a real honest to God commitment to safety."

In the nine plus years of the existence of AEOD and looking at 30,000 LERs over this period of time, we have come to appreciate and heartily endorse the simple truth of this statement.

Thank you for your attention, and we wish you well in your endeavors.

Mr. Heltemes:

Are there any questions?

Voice:

How many of the events are significant, and regarding your request that if in doubt, report, can these reports be misused?

Mr. Heltemes:

Let me first address the first half of your question about how many of these events are significant. Basically, in the 3000 events, I can tell you in construction of the OER [operating event report] rule, it was our attempt, our objective, to assure that no significant event escaped reporting. That is what we were attempting to do. In order to assure that, we set the threshold reasonably low.

In our own studies and our own results of the screening process, we find about 6 percent of the 3000 or so warrant some individual attention and, so, we would not conclude that the 3000 are individually significant.

I should also mention that when we published and when the Commission approved the OER rule of 1984, we raised the threshold of reporting. In 1983 we received about 5000 LERs. In 1984, after publication of the OER rule, that number went down to 2500. That was intended. We had a tradeoff between raising the threshold and getting fewer reports and getting better reports so that we all could learn better from the experience.

With regard to the second part of your question about my request that if in doubt, report, how these reports could be misused, I do not think they can be misused or, hopefully, they will not be misused. The objective for all of us is to identify the safety concerns in one facility and assure that those safety concerns are addressed wherever they may exist. It is just too important an objective to have selective reporting or to have inconsistent or nonuniform reporting.

One of the principles of AEOD is that we believe that you should never count LERs. Our request is that you submit voluntary reports and that these would be a plus to you and that somehow you would get credit for this and that in no way would this come back to cause you any harm, if you will, in the regulatory process. This voluntary report, this sharing of information that will be of use to others, we think is just too important an objective. It just needs to take place: the free and open communication is in all of our best interests.

Voice:

You might want to read this one.

Mr. Heltemes:

QUESTION: How do you reconcile your request to submit reports when in doubt about reportability when the total number of LERs is used to indicate poor plant performance or 10 CFR Part 21 reports can cause permanent harm to a vendor?

ANSWER: I think I attempted to answer that just a moment ago. We think that the identification of safety concerns and the sharing of the information on safety concerns is just too important. We have to have the information ourselves to judge its significance and generic implications and then feed it back to you. Selective reporting causes that process to be harmed. Part 21 reports, by their very nature, indicate a serious problem that should be addressed, should be known, and fed back.

I want to also point out that in large measure, the LERs are fed back to the industry and read by many in the nuclear industry worldwide. It is the most complete and most important report. If there are significant events or events having generic implications escaping the LER system, I think our system tends to break down and we cannot perform our function and you might be harmed in the operation of your own facility.

Mr. Slider:

Mr. Heltemes, my name is Jim Slider. I have question for you about this point. In your presentation, you emphasized the importance of sharing events that may have potential generic implications.

QUESTION: Could you clarify what you mean as far as the individual utility's responsibility for looking at the industry-wide generic implications of events at their stations and in particular with this example of the cable deterioration. From your tone, it sounded like it was very clear to you that there were industry-wide implications to that but, apparently, not to the utility involved.

Mr. Heltemes:

Well, the way I would respond to that is: If you think that you see a safety concern or a safety problem then report it, and the NRC will do what it can to determine the generic implications.

The plants, themselves, need not determine that. That would be one of the functions that we—one of the areas that we look at. In the particular cable incident, as I understand it, it does have generic implications and that is why I probably said what I did. I understand it does, and I was relating back that it did. However, we do not expect each utility to do the necessary studies to determine what those implications may be. We are asking that if you see a safety problem, if you see a safety concern, if you have some evidence that action is needed at your station, it may be needed at other stations, so report it via an LER, report it via 50.72. The natural system process will take over from there. 10 CFR 50.72 reports are shared with INPO, LERs go directly to INPO in all cases. That information will enter the INPO assessment process, and NRR's, and through that assessment process, we have high hopes, expectations, that it will be fed back to all stations so that they can take the necessary action.

Mr. Slider:

Thank you.

Mr. Heltemes:

Yes, sir?

Mr. Sniezek:

Jack, Jim Sniezek, NRR. I would like to amplify the answer to the question about whether the number of LERs will be held against the utility. Absolutely not.

Let me give you an example. In the senior management meeting that Frank discussed this morning, one of the things we do look at is the number of LERs. However, even if there are a relatively large number compared to the average facility, one of the things we always hear or frequently hear from the Regional Administrator and others is: "But this utility is very conservative." They end up getting positive credit for that conservative reporting.

On the other hand, if there is a low number and we say, "hey, this utility has got a low number," there is enough knowledge in the staff for someone to point out: "But they are not doing a good job on reporting what they are supposed to be reporting."

So, truth in reporting is the important thing. It is not the exact numbers that are reported.

Mr. Heltemes:

Thank you, Jim. I hope you all heard that last statement. It is not the number; it is that the event is causing reportability. But do not try to decrease the number of LERs; try to decrease the number of reportable events.

Mr. Rossi:

We are going to try to answer some more of your questions at the completion of the presentation of all of the papers. I am getting a number of written questions up here and I will try to sort through these and eliminate the duplicate ones as much as possible. Then after all of the papers are presented, we will try to answer as many of these questions as time permits.

In the meantime, we will go on with the next presentation. The next one is NRC Generic Communications and this paper will be presented by Carl Berlinger. Carl Berlinger is the Chief of the Generic Communications Branch in the Office of Nuclear Reactor Regulation.

NRC Generic Communications

Mr. Carl H. Berlinger:

Thank you, Ernie.

Good afternoon. This is probably one of the toughest times to speak: about an hour after lunch, after a big lunch. I will remind you that if you feel a little drowsy, I believe there are refreshments and you can take a break during my presentation. I will not be offended; but if you fall off your chair, then I will be offended.

This paper is intended to complement the other two previous papers regarding review of operating events and the evaluation of operating experience. I will provide a description of NRC's generic communications program. This program is intended to inform industry of potentially generic and safety significant issues through the issuance of generic communications.

The intent of the program, the generic communications program, is to identify potential generic safety issues and to inform the industry regarding these issues or events and to ensure that actions are taken out in the field by licensees to prevent recurrence of these issues.

[Figure 1]

The major topics that I will be discussing include the process of screening and reviewing operational safety data. Much of this, with regard to the NRC's program for screening operational data and reviewing operational data, has been touched upon in more detail by previous speakers. I will not belabor and repeat that information.

I will be discussing 10 CFR Part 21 and 50.55(e) reports and how we handle both receipt and the process for review and tracking and closeout of items associated with AEOD efforts and the resulting recommendations and suggestions that are included in their published reports.

I will describe to you the actions taken by the NRC after it is determined that an issue is generically applicable. I will also describe the process used to determine whether there is a need to issue a generic communication.

Furthermore, we will go into a brief description of the different types and the purposes served by these various generic communications. I will then cite several examples of generic communications that have been issued within the last two years, which will give you an idea of the different types and purposes of these generic communications as they apply through our experience.

The program for review of operational safety data is implemented jointly and concurrently by NRR, AEOD, and regional offices and resident inspectors. However, each of these offices has a different purpose in the reviewing of generally the same data. For instance, NRR may review a series of events to determine the generic applicability, whereas the regions may look at plant-specific responses in implementing solutions to prevent recurrence of events out in the field; these are more specific or plant specific.

The types of operational data that are reported or for which we have notifications from the industry are listed on this slide *[Figure 2]*. I will go through these very quickly because others have touched upon them. Included are Part 21 and 50.55(e) reports, 10 CFR 50.72

and 50.73 reports, and these are reports and notifications required by specific regulations.

There are the daily reports submitted by regional offices and, again, these are reviewed in the Division of Operating Events Assessment in the Events Assessment Branch by Wayne Lanning and his people.

My branch, the Generic Communications Branch, also participates in the discussions and on a daily basis after notification through participation in the morning call. We also do followup when asked to provide assistance.

Case studies, special reports, engineering evaluations prepared by AEOD and the suggestions and recommendations that they may put forth as a result of their reviews, and these are in-depth reviews, have already been touched by Jack Heltemes in his presentation.

There are inspection reports that are prepared by NRC staff, both as a result of regional hands-on inspections, whether they be AIT's following an event or IIT's or routine inspections that are done by regional resident inspectors.

In addition, we are involved in data, which we classify as potentially generic safety questions, that are identified by regional staff. Based on their hands-on, onsite inspections, they identify problems within a region that they may feel are generically applicable or potentially could be generically applicable throughout the different regions and across the industry and they provide these identified questions to my branch for our further review, evaluation, and followup.

In addition, we do utilize nuclear industry reports such as INPO SERs, SOERs [significant operating event reports], and O&MRs [operation and maintenance reports]. These are received upon publication. They receive limited distribution within NRC. These reports are tracked by my branch in a data base, which we maintain. We use the data base to be able to review the subject matter after the event or in the future when similar events may occur. We try to find out what the industry has already done by reviewing the INPO reports that we have in our data system. In addition, AEOD does provide us with reported events, from International Programs, that have occurred at foreign reactors.

Most of these data or data systems are tracked within my branch using computer data bases. We have a proposal in the process right now to develop an electronic mail system or a local area network that would provide us with the capability of providing copies of information notices and other generic communications to the industry on a prompt basis and would provide access to this type of generic historical data, which the industry could access remotely through the computers. This is an ongoing evaluation and pilot program that we are just trying to get under way.

Recently, we did make one additional change, internal to NRC, in which the document control system (DCS) was automatically provided with a text file of all generic communications that are being issued. The DCS for newly issued or generic communications to be issued in the future will be provided electronic data transmission, which will be available to DCS users.

[Figure 3]

The screening and review of operational safety data—really the lead responsibility for the prompt review and followup of events—lies within the Division of Operating Events Assessment (DOEA). We serve as a focal point and provide a coordinating function and a function for consistency and thoroughness of review.

The Generic Communications Branch has the primary lead responsibility for all Part 21 notification reviews and those 50.55(e) reports that are identified as potentially generic are sent to my staff at headquarters for a more thorough followup evaluation. 50.55(e) reports are routinely reviewed within the regions.

When additional or specialized review of a particular event or an engineering issue is required, that particular followup depends very heavily on the availability of technical expertise throughout the agency. As coordinator, it is our responsibility to identify those events and issues that require followup or more detailed technical review and to assign that responsibility through to different offices or within NRR to the different branches where that expertise lies. That is one of our main functions.

In addition, the regional and resident inspection staffs support the review of operational data by providing us with information and ensuring that the information that we do receive is accurate, is provided in a timely fashion, and is complete. If subsequent information is identified as needed, we work with the regional people to obtain that information.

In particular, events or issues which may in fact not be reportable under the regulations, are identified by the region and brought to our attention—initially by telephone call and, generally as followup, by memorandum requesting a more detailed headquarters review.

Once we have identified a potentially safety-significant and/or generic issue, there are several actions that we will take *[Figure 4]*—well, a choice of one or more actions that we can take.

One of these actions is to contact industry organizations or vendors, INPO, NUMARC, owners groups. These interactions take place between the DOEA staff and these industry groups in order to determine what actions may have already been taken by the industry and the adequacy of those actions.

We may issue an information notice, a bulletin, or a generic letter; on some issues, we may issue an information notice, a bulletin, and a generic letter, not necessarily in that order and not simultaneously.

We provide information and feedback not only to the industry, but we also provide information and feedback and coordinate our activities with AEOD and with the Office of Nuclear Regulatory Research. When a need for a change in a regulation is identified or the development of a change in a regulatory guide, we would make recommendations to Research, which has that prime responsibility, and they would carry forth that activity.

During a review of operational data we may identify a new issue, a new generic issue, and it may be sent to Research for incorporation into the generic issues program. Occasionally, issues are reviewed within DOEA that in fact are not broadly applicable; they are plant specific. We interface regularly with project management to identify the potential need for individual licensing actions. In addition, we may prepare temporary instructions with regard to need for special inspections to be conducted as followup to these generic communications.

[Figure 5]

The primary objective of the generic communications program is to ensure that all utilities that may be affected by a generic safety issue are notified and that appropriate actions are taken by the industry to prevent recurrence.

The type of communication that is issued depends on the safety significance of the issue, the generic applicability, the urgency or need for immediate action, and the actions already taken by industry to address the same issue or similar issues.

[Figure 6]

Information notices are used to notify licensees and construction permit holders of problems that could affect their plants and facilities, and generally describe one or more related events. In fact, information notices frequently report what corrective actions have been taken by licensees, but in no way are those actions endorsed by the NRC nor do we prescribe any specific actions for addressees to take. It is provided to the industry as a means of feeding back information.

We do have an expectation, however, that addressees will review the information notice and determine the applicability of the issue at their facility and, if applicable, determine what correction actions are needed. Corrective actions should indeed be taken by the utility to remedy the problem at its facility.

[Figure 7]

Bulletins, on the other hand, require response and occasionally request actions to be taken by licensees. All bulletins must be approved by the Committee to Review Generic Requirements, the CRGR. This is, as Jim Sniezek said this morning, one of the bases under which a speed limit is set on the NRC staff.

Information submitted by licensees on occasion is thoroughly reviewed and approved by the staff. On other occasions, information is requested to be submitted that is not intended to be thoroughly reviewed and approved, or information may be requested to confirm that the actions that are requested to be performed by licensees have in fact been completed and implemented. These confirmatory response letters that are requested by bulletins and, in some cases, by generic letters *[Figure 8]*, are intended not to just minimize the amount of resources to be expended by utilities and this regulatory body, but also to make sure that resources are spent in areas in which they are really needed where it will get the most bang for the buck.

The following examples *[Figure 9]*, I intended to go over a couple of these to give you an idea as to the types of communications we have issued, but session chairman Rossi has taken a gun out of his pocket and reminded me that I am talking too long.

I will only touch on a few of the items. Information Notice 87-28 on air system problems, this was issued in June of 1987. The main purpose of this information notice was to announce the completion of an AEOD case study that was an in-depth, systematic review of problems identified regarding air systems at nuclear power plants. Air systems are not safety-grade systems in most plants, and some of the problems that had been identified were related to how air systems could affect the operability of safety-related systems.

A supplement was issued several months later that actually attached a full-text copy of the AEOD NUREG report. This was to provide wide dissemination of the actual report. Information notices may go to as many as 125 to 150 addressees. However, the mailing list for information notices approaches 3000. We issue approximately 100 to 125 information notices a year. We do try to limit the number of information notices only to those that are really required. In this particular case, as a result of further review by the NRC staff with regard to instrument air problems, we developed guidance and provided that guidance through the issuance of Generic Letter 88-14. That was issued in August of 1988. It requested that very specific actions be conducted by utilities.

As a result of the review conducted by licensees in response to Generic Letter 88-14, several if not many instrument air system safety-related equipment problems were identified. As a result, we issued Information Notice 89-26 last month, in March. The main purpose was to provide feedback to the industry as to some of the most recent results that had been reported or findings that had been reported as a result of the generic letter responses.

In conclusion *[Figure 10]*, I will say that the NRC program for systematically reviewing operational safety data and for informing the nuclear industry of significant issues definitely provides reasonable assurance that the industry will be kept informed, and is being kept informed, of these issues, not only by the NRC, but by other organizations such as INPO. Steps are being taken through implementation and review by individual licensees to prevent the recurrence of these events at their facilities.

In addition, the NRC generic communications program has proven to be an effective feedback mechanism, which does keep the industry informed of significant issues and has in fact enhanced the level of safety at nuclear power plants. Thank you for your attention.

Mr. Rossi:

There is one question that came up, written down, that I think Carl Berlinger can answer now. The question is: Is there an effort under way to eliminate the duplication of effort between NRC and INPO? It indicates that sometimes licensees get SERs, SOERs, and bulletins and notices on the same kind of events. So, Carl, maybe you can address that now.

Mr. Berlinger:

Yes. As Wayne Lanning had mentioned, we do conduct a biweekly telephone call with INPO to discuss current events, so to speak. Every two weeks, I issue a listing of all of the potential generic communications that are being considered within the NRC, that is, both at headquarters and out in the region. INPO, on a weekly basis, provides us with a listing of those reports that it is also working on.

We have as part of our program a specific action: that is, to review past actions recommended or reports issued by INPO and the industry in general. We make a specific effort to minimize duplication, but on occasions the perspective that an INPO report may take and the perspective that an action like an information notice to be issued by NRC may take are different. Sometimes these are operational problems as compared to a regulatory or licensing problem. In both cases, we discuss safety problems, but from slightly different perspectives.

If we feel that INPO has taken adequate steps to notify the industry and has done it in such a way that we are satisfied that it is sufficient, we do not issue a generic communication.

Any other questions?

Voice:

My question concerns generic letters, vis-a-vis bulletins. Generic letters lately have become fairly frequent and detailed. Why do you send a generic letter in lieu of a bulletin?

Mr. Berlinger:

I can answer that by briefly differentiating between bulletins and generic letters. Bulletins are issued to address an issue for which we have sufficient information to develop specific actions that we want licensees or addressees to respond to. On the other hand, generic letters are slightly different in that we may, in fact, not give specific action guidance. We may not request a specific action, but rather will provide a guidance in which a program can be developed by individual licensees to address the issue. So, a generic letter would get, let us say, a description of a program developed by a licensee.

Voice:

But the recent ones have involved a lot of resources and work. Do they all go through the CRGR?

Mr. Berlinger:

Yes. Both generic letters and bulletins are reviewed by CRGR and cannot be issued without their approval.

Voice:

All right. One more question. We got a little letter, a lot of us, last Friday night, which most of us had to have people work on over the weekend. It had a nice little disclaimer at the bottom saying that if it requires more than 8 hours of work, you write to so-and-so about the burden.

This is a rather annoying type letter because it came after business hours for most of us and we had to call in people over the weekend and it was,a lot more than 80 or 40 hours for all of us because basically you asked us to certify the status, which means to all of us that we have to gather all the root documents and verification.

Is that really required and it does impact our cost and our attitude and morale. Can you help us a little on that?

Mr. Rossi:

Well, I think this was an unusual situation with that particular letter. I am sure Carl cannot answer your question nor can I. I do not know whether there are any other NRC people here that would want to address that. That is the letter, presumably, on the SIMS system.

Voice:

Yes, Three Mile Island information.

Mr. Rossi:

Yes. I think that was to some extent addressed this morning. That question was asked.

Voice:

In terms it was addressed, but the communication category, it did not fall into any of these.

Mr. Rossi:

Yes, it was an unusual situation that prompted the issuance of that letter.

Voice:

Well, now, let us get sticky a little bit about economics. Here, we are requested to provide information over a weekend that requires a lot more hours than were identified with it and we would like to think that you guys stand between us and the Congress on some of these and will give us the chance to do business in a more normal manner. Can you defend that a little bit, please?

Mr. Rossi:

Well, I cannot—I do not think it is appropriate for me to defend it. I do understand your concern. That is about all I can say—we understand your concern. But it was, I think, an unusual situation. I do not think any of us up here can really address it because we were not involved in the details of that particular letter.

Voice:

I did want to have at least one of us speak out against our concern over the letter of the past week.

Mr. Rossi:

Again, I think it was brought up this morning also.

Voice:

Thank ›

Mr. Rossi:

Okay, let us go on to the next paper. The next paper is entitled, "Root Cause Analysis of Operating Problems." This paper will be given by Mal Ernst from Region 2. Mal Ernst is the Deputy Regional Administrator of NRC Region 2.

Root-Cause Analysis of Operating Problems

Mr. Malcolm L. Ernst:

It is indeed a pleasure to be here this afternoon. The first three talks had to do basically with reporting events, NRC assessment of events, and issuance of correspondence from NRC which required some action or at least a look-see by the utilities with regard to that assessment.

While this process does affect utilities at the front end, namely, collecting and reporting information, and sometimes from the back end in assessing the event to see if it is applicable to the particular site, it could give the impression that event analysis and root-cause analysis are a reactive process for the utilities; but, obviously, as all of us know, that is far from the fact.

It is a proactive process for the utilities. We do inspect the utility's performance from the standpoint of assessment of operating events, utility experience, and the taking of appropriate actions. So, I am going to basically cover that in my discussion of root-cause analysis.

Simplistically, root-cause assessment, in my mind, is what I would call an inquisitive logic process that is conducted by knowledgeable people. These are rather simple bottom-line kinds of terms. I do not intend in this talk to get into the methodological aspects of root-cause analysis.

What I want to do is try to emphasize the importance of this kind of analysis. Root-cause analysis is a matter of significant regulatory concern. What we look for is aggressive self-assessment of problems that occur on the site by the utility.

We do recognize there is substantial effort under way by INPO in trying to develop guidance on root-cause analysis. Also, I understand there is going to be a session on root-cause analysis in the summer operational experience meeting and, clearly, all this is necessary to try and set the standards and the guidance for adequate root-cause analysis.

The problem, as we see it, is if there is a safety-significant issue or occurrence at the site, and if that problem should have been evident to the licensee, then that issue should not lie around for a long period of time, either as to its identification or assessment or final corrective action.

So, I look at the whole issue of root-cause analysis as basically two parts. One is the identification of safety-important—what I call off-normal—failures. By that I am not talking about normal wear of equipment or what one might term as a pure operator error, but I am looking more at the assessment of things that are off-normal or operator errors in which perhaps the operator was set up for the error and not just a standard kind of an error.

With regard to identification, I am not going to talk about the details because I think it would identify the site and that is not my purpose. One case is brought to mind in which the event itself was assessed improperly by the operating crew as to basically what happened, what the scenario was. Even though, in retrospect, there was enough information available that a reasonably logical assessment would have led to a different conclusion and a different and safety-important operating scenario.

Because of this hurried, what I would call misassessment, subsequent evolutions at that particular site were done in a manner that in our view was not sufficiently safe—as safe as it should have been. This caused us to initiate a rather in-depth inspection of the event. In fact, because of what we thought were some of the obvious things that should have been picked up, we actually investigated to see whether or not there was some coverup, or something like that, of the event.

So, these are some of the ramifications of not doing a reasonable job of event analysis to at least identify the scenario. Once you identify safety-important events that need to be followed up, then the second part involves aggressive assessment of the root cause.

Some people have asked, and I think this question came up this morning: "How do you differentiate between a SALP 1 and a SALP 2 plant?" In some respects, a number of things were identified this morning that we can use as a measure of what we call excellent performance. This could be the degree to which teamwork and communications are achieved, attention to detail, ownership and accountability, setting goals and standards for the staff, professionalism, solid engineering support, good procedures, good maintenance, competent well-trained operators. All of these things are certainly measures of performance.

The answer is not simple as to what is the difference between SALP Category 1 and SALP Category 2 rating. Clearly, it indicates a fair amount of subjectivity in this kind of an assessment because, basically, for both SALP 1 and SALP 2, the basic regulations are being adhered to.

I guess one simple measure might be the management energy devoted to problem recognition, root-cause analysis, corrective action, and followup to see whether or not that corrective action is solving the problem. One might say that is the bottom line assessment of whether or not you are an excellent performer or a SALP 2 performer.

Enough introduction, let me get to the first chart *[Figure 1]*. As regulators, fundamentally we do need to find a regulatory basis for things that we do. There is a regulatory basis for root-cause analysis, and this is in Appendix B, Criterion XVI to 10 CFR Part 50. That is: "Measures shall be established to assure that conditions adverse to quality such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition...."

This means that it is each licensee's responsibility to be proactive and to adequately evaluate occurrences that could lead to unsafe plant operation. The NRC role in this respect is to determine that licensees indeed are doing that and, if not, to take appropriate enforcement action; to evaluate events on our own to see if we come up with different kinds of conclusions; and, as has been talked about already, prepare generic correspondence if indeed the agency thinks that the industry should do more.

A basic definition *[Figure 2]*, I have added a word to what I find in the literature as a standard definition: Root-cause analysis is the method by which the most basic cause of an event is determined in order to best prevent recurrence. I put the word *best* in there because that really says two things, which I have as criteria for root-cause analysis: The first is that upon removal of the cause, repeated events either do not occur or would occur with substantially less frequency. Thus, if indeed you have a root cause, then the problem, for all intents and purposes, should go away.

The second reason I put the word *best* in there is because the cause must be within management's control to correct. There may be some optimum solutions, but they may not be the best solution if it is not really within your ability to solve the problem.

A good root-cause program is important from a number of aspects *[Figure 3]*. Clearly, from the standpoint of safety, if you do a good root-cause analysis, you will: Number 1, potentially reduce the occurrence of initiators that could challenge safety systems. Number 2, given a safety system challenge, you could well improve the reliability of that safety system so that it can do its job more reliably. Number 3 is a more subjective area. A good root-cause analysis program indicates that the licensee is being proactive and is a thorough and objective self-evaluator. This is one of the more critical things we look for in our inspection program when we try and come up with a synthesis of inspection information and go off on these every-six-month management retreats to assess the plants. One of the fundamental questions is whether or not the licensee is a good self-evaluator.

Of course, a good root-cause analysis program has some economic benefits. Even though economics is not in the NRC's domain, a good root-cause program is clearly a plus for the utilities because it certainly can reduce unnecessary outage time and improve efficiency.

A third general area of the importance of a good root-cause program is that the rest of the industry can profit by a site's root-cause analysis. If a good job is done in LERs and other mechanisms for reporting information to the rest of the industry, then that can be helpful to the rest of the industry.

Now, I do recognize that root-cause analysis does have its limitations. In an ideal world, you could establish reliability values for everything that functions in a plant and monitor the performance and determine when values are out of bounds and perform a good root-cause analysis of all the failure mechanisms that would cause equipment to go out of bounds, et cetera, et cetera. However, that would be more costly than the safety benefit—it is a resource-intensive kind of a process—and you must establish priorities both for monitoring the performance of safety equipment and other plant equipment and for the expenditures in performing the root-cause analysis itself. That is one of the challenges that management has in any good root-cause program.

I did some thinking with regard to examples of root-cause analyses, which I discussed in my paper. The four examples are basically summarized here *[Figure 4]*. I will talk about examples 2 and 4 in more detail *[Figures 5 and 6]*, but just mention briefly in passing examples 1 and 3. The first three are examples that illustrate poor root-cause analyses and the last one is an example of a good root-cause analysis.

In example 1, without talking about the details of the problem, the lessons learned from example 1 were that there were repeated failures of these silicon bronze bolts and the utility did not focus on the issue. The scope of the problem was not identified and the cause initially was inappropriately attributed, which caused the problem to run on for a considerable length of time. Through communications at the site, the utility finally discovered that the scope was larger than it first thought. At that time a good root-cause analysis was performed and the solution found.

With regard to example 3, we had pretty much the same kind of problems. Again, there were repeated failures during testing. Again, the wrong cause was initially identified and, again, there was delay in a good root-cause analysis and corrective actions.

Example 2 involved numerous failures of HPCI [high-pressure coolant injection]. The situation in this case was that there had been numerous operability problems with HPCI and these problems involved a number of different causes: undersized motors, valve actuator problems, EQ [environmental qualification] problems, problems with regard to improper set points; and these problems led to numerous fixes over a several-year period.

After the utility fixed a number of these problems, it identified a situation where it looked like there was an HPCI failure as a result of HPCI turbine trip. There was a special test run that confirmed that indeed on starting the HPCI pump, there was a low suction pressure during this startup period and a built-in trip in the system caused the HPCI to trip out. This led to the conclusion that there likely never had been a fully operational HPCI system at this particular plant.

Looking at this particular example, one can say that the lesson learned is that the numerous issues related to the HPCI system clouded the real root cause.

Also, the licensee had conducted an SSFI [safety system functional inspection] on the HPCI system and, as part of the SSFI, had recommended that the low-pressure trip on the HPCI should be removed, not necessarily because it would clearly trip out the system if the system were called upon, but because this trip was to protect the pump under certain circumstances and the analysis indicated that that trip really was not necessary. However, no action was taken on it.

The other lesson learned is that if you have a major problem with an important safety system, you need to really comprehensively assess the problem with a team approach. In this case, there was a significant safety question that should have been looked at. That might have cut through some of the other peripheral issues or problems and enabled the licensee to sort out the big problem.

Example 4 involved failure of redundant containment isolation valves. There were four valves, two of them in the dry-well equipment drain system and two in the dry-well floor drain. The failure resulted in no automatic valve closure; two valves subsequently could be closed on manual actuation and two others responded slowly upon manual actuation.

In this case, the licensee immediately formed an investigation team. The vendor was contacted to perform an investigation. This investigation included operability tests of all components, disassembly and inspection, relay inspections, retrieval of repair history and failure analysis by a metallurgic group.

The root cause in this case—although the team did find one relay problem—the root cause basically was that the solenoid valves were sticking, the lower disk to the lower seat. The sticking was basically caused by oxidation that took place between the EPDM seat and the copper disk. Corrective actions were to cycle these valves routinely until final repairs could be made and, in long term, to replace the EPDM seats with Vitcom.

This was a good root-cause analysis with a very aggressive action to investigate the problem and with good solutions to resolve the problem.

There are a number of root-cause traps *[Figure 7]*, and we have already covered a couple of them. You can jump to conclusions very easily with root-cause analysis. In the cases I have just been talking about, that was a syndrome, I guess, that ran through most of them.

You can blame the problem on personnel errors; and, too frequently, that can happen. It is easy to do. But many, many times, if there was a personnel error involved, the person was led to that error either by design or by configuration or procedure or something like that and it was really not basically the operator's fault. He was set up, and the trap was going to spring at some time. It just happened to spring on that particular operator.

You can procrastinate and delay the assessment to some convenient outage. Typically, what can happen then is you can get caught up in the outage pressures and do not give the problem the kind of analysis that you could have done ahead of time—or you get low maintenance prioritization. Maybe the system did not come up real high in safety significance on your list because you did not look at some of the ramifications; therefore, it winds up with a low priority.

Good root-cause analysis has the characteristics of mobilizing resources quickly. A team approach with qualified people, preservation of the incident scene and the associated records, detailed personnel interviews, objective evaluations, thorough and broad scope, and realistic recommendations—something that you have control over and that should solve the problem.

The bottom line as I alluded to in my opening remarks is management involvement *[Figure 8]*. You have to have management that assures that proper attention is placed on the safety-important equipment and systems. You have to have management that assures that proper emphasis is placed on learning from past experience and not just turn it over to the NRC, let the NRC assess it, and wait for a generic letter or something.

You have to assure the feedback of the root-cause determination is factored into all potentially affected aspects of plant operations. Then you have to measure whether or not the basic root causes have indeed been found and appropriately corrected. It does take management attention.

That is about it.

Mr. Ernst:

Are there any questions?

Mr. Rossi:

Bob Bernero is now going to talk about two topics, handling of low-level waste and dry-cask storage. Bob Bernero is the Director of the Office of Nuclear Material Safety and Safeguards.

Handling of Low-Level Waste and Dry-Cask Storage

Mr. Robert M. Bernero:

Thank you, Ernie.

If you too are looking for a logical bridge as to why these two topics are here, you might just look at it this way: If you are successful and do operate, you must generate nuclear waste. I will close your fuel cycle for you.

I would like to talk about two topics on handling of low-level waste at sites *[Figure 1]* and the handling of high-level waste, that is, storage of spent fuel. I think that both of them have some related regulatory information that can be of distinct use to you.

Not long ago, not many years ago in fact, the new regulation was put out, 10 CFR Part 61, which was the regulation for the handling and disposal of low-level waste. In addition, Part 20 requires that waste generators generate or form their waste into forms compatible with the requirements of Part 61. You may recall that this is where we developed the Class A and Class B and Class C waste, progressively increasing in radioactive concentration and half-life of nuclides involved.

As you go into Class B and Class C, there are stability requirements so that the form of the waste is specified, so that it will not be compressible or unduly degradable. This all involves the method of disposal at the low-level site, so that one has a very long-term stability and does not have trench collapse and many other things that are possibilities with shallow land burial.

Now if you look at structural stability—and bear with me for the Italian spelling of stable on the slide *[Figure 2]*, basically what you are looking for in Class B and Class C waste, the higher forms, the higher activity forms, are either that the waste itself is inherently stable so that it is going to maintain a compressive resistance, or that you process it to a stable form.

Now many, many years ago, we started doing that in nuclear operations. People have used cement mixed with resins, and they have used asphalt or bitumen. I remember years and years ago when people got all excited that phenol formaldehyde resin, Bakelite, was going to do it. You know, we are going to stir in some phenol-formaldehyde resin and make ashtrays out of it. All of these things were developed ad hoc, and they were put into different processes in different plants; many processes are still in use today that were started twenty years ago.

A third kind of structural stability that we began to see more recently is the high-integrity container. This is basically a rather expensive barrel, some of them rather large, into which you can put the waste. What you are really doing is saying, "I am not going to try to manipulate this waste into a predictable stable form, but what I am going to do is put it into a good, tough can and use the can as the structural form."

Last, but far from least, you can have the structure itself; that is, that you can build a vault at the burial ground. Many of the states—and all of you must be keenly aware of the low-level waste disposal in the various states through the compact process—many of the states are talking about having additional protection by way of concrete vaults or structures. However, the waste criteria in Part 61 say that the waste itself is supposed to have it, and you would have to have a package deal if you are going to rely on the burial ground vault or burial ground structure.

In this area we had a grandfather situation: We had waste being generated, and waste being packaged, and waste being sent to now three operating burial grounds. Therefore, we encouraged vendors or handlers of processes for making solidified waste or containers for waste to submit topical reports so that we could review them and we could bring some sort of review approval and certification discipline to this whole process *[Figure 3]*.

Thirty topical reports were submitted on waste forms and high-integrity containers a few years back, and we have been working at this for these years now. We have approved some of them. I list here three high-integrity container designs and three solidification-media processes that we have approved. I would remind you that when we approve the process, that is not merely that you solidify with gypsum cement. It is the process by which you use it and the concentration as well. Because some people think that if you take a cubic foot of ion-exchange resin that is depleted and put in a pinch of cement, that might be enough; what you are really going to get is a bucket of plastic beads with cement in the interstices and it just will not have stability. There are concentration limits and test data needed in order to have a reliable compression resistance in that form.

We have a lot of other actions. I list them here, and there is no need to enumerate them to you. We have disapproved some things. It was a matter of some controversy quite recently with the high-density polyethylene high-integrity container and what sort of reliance that we could place on it. But, in a nutshell, what we found is a catalogue of a very large number of topical report actions and perhaps even a confusing status as to which are reviewed and which are approved. Therefore, we put out an information notice, and I would invite your attention to it: Information Notice 89-27, published earlier this year, in which we deliberately put together the status and sent it to you so that you would know what has been approved, what is not approved, and where we stand on the topical report review. As we proceed to some new more substantial degree of progress, we will inform you of that, so that you do not fall back and not know what has happened.

There is one other event that I would like to have you look to and especially those of you who have plants that are using waste solidification processes that are one-of-a-kind, or a few-of-a-kind, old processes that have been used for years.

We are conducting a workshop on cement solidification of low-level waste at the NIST, that is the new name for the National Bureau of Standards here in Gaithersburg, Maryland, at the end of May. Remember that we are working to get a grandfather process disciplined: A lot of waste has gone into the ground already that does not have the right form, does not have the right package, and does not have one thing or another. We are trying to bring discipline to this process, so that as we go into the next few years, we will have legitimate proper-form waste going to the burial grounds, and we will not have the attendant problems of having the older forms that are already in the ground to a very great extent, and frankly, in many cases, are still growing.

We are not in the process, yet, of going out to your plant and pressing down on you and asking if that is an approved cement. We are not yet in that process and would rather not be. We would rather see the process evolve out of that. Right now, the regulatory mechanism for checking the product is a mechanism that you know works, and that is the burial grounds—the receiving agents for the waste will react to the quality of the waste as they see fit. If these agents believe that the waste is not meeting the specifications, they will address the nonconformance. As you know, they certainly do react when there is leakage or anything similar. There have been many instances of waste access denial.

So let me leave you with this urging, especially if you are using cement solidification of a one-of-a-kind older process, please participate at the workshop we are going to hold at the Bureau of Standards at the end of May. At the same time, look at that information notice. I think you will find useful information for the approved, and perhaps soon to be approved, processes for solidifying or containing low-level waste.

Let me turn now to high-level waste and to the spent fuel. If you go back to the 1970's when we were all enchanted with the prospect of fuel reprocessing, we expected that very quickly the spent fuel would leave the spent fuel pools and go through a reprocessing plant to be cut up and dissolved; no one thought of extended storage of spent fuel at the reactors.

Then things began to slow down: the reprocessing plants did not come along; presidential policy raised questions about whether to reprocess; and the first thing you know, we began to talk about the need for densifying or modifying the racks to store the spent fuel to cope with it, and more and more built up. The older plants started to rerack or put in more dense packing, if this were still possible for the racks. By now I think that some plants have reracked three times and maybe even four times.

It became evident that long-term storage of spent fuel was a reality in the United States and might even endure right on to the waste disposal itself. It would be a direct fuel cycle, and there would be no reprocessing. So back in the 1970's, the NRC took a very hard look at spent fuel storage technology, and the Department of Energy had a major program to develop dry storage technology.

Fortunately, I think, we now have technology at hand for the dry storage of spent fuel that is quite mature and well established. We have a situation where we can cope with this dry storage in some fairly practical ways.

We put out a generic environmental impact statement in 1979. It was not really a dry storage rule, but it was a spent fuel storage rule, 10 CFR Part 72, which covers the storage of spent fuel, dry or wet, at some place other than the reactor pool.

The rule of thumb when we wrote that rule was: "If it goes into a cask to get out of the pool, then it is going to a Part 72 license." We put that out. You may remember at the same time Congress was looking at nuclear waste and ultimately passed the Nuclear Waste Policy Act of 1982. Congress recognized the need to do something and put a mandate on the government, namely the DOE and the NRC to an extent, to develop technology and to develop regulatory mechanisms for the handling of spent fuel. At the same time, Congress recognized that the utilities had the obligation for interim storage of spent fuel.

As a result, the DOE performed some engineering studies and then assisted in two licensed demonstrations of dry storage technology, which the NRC reviewed and licensed. At the same time, we looked for ways to do this in an effective regulatory manner and not to get into ultra-complex amendments for reactor operating licenses.

I want to show you a few photographs [not included] in case you have never seen this process before. This is the first of the two licensed demonstrations at the Surry plant in Virginia, the Virginia Power Company. Those white cylindrical casks are castor casks on a simple ground transporter, basically it is just dry storage. It is a great big fuel cask that has openings in it so that you can put the spent fuel assemblies in and close it up and just simply put it on a pad.

This gives you a better perspective. You can see that it is just a simple concrete pad at the site, and these casks have an extremely simple interface, they just sit there.

The noteworthy thing that comes up later in the new rulemaking that we have is what is the interface between the casks and the site—and it is trivial. They are just sitting on the ground, a simple concrete pad. It will not sink into the swamp: that is about the only specification that you have, which is a very valuable point because basically the approach to dry storage is passive, minimum maintenance and minimum surveillance. Basically, find a place on the site where you can set the dry waste down within some kind of a reasonable security boundary—a little bit of surveillance and an occasional check for birds nests and things like that and you get off the hook. You do not have any complexity and you do not have any active systems or such. We look toward extending, without significant modification, the use of existing security systems, surveillance systems, reporting systems, and the like.

Another demonstration was at the Carolina Power & Light's H.B. Robinson site. The purpose of this photograph is to show the peculiar factor that drove the design of this one. That is a General Electric IF-300 fuel cask halfway down onto the platform, and Carolina Power & Light already owned one for transhipment between sites. Using that cask as an envelope, they made a contract with a developer who developed a fuel cartridge, a spent fuel can, a NUHOMS-7, that would slide right into the cask, sort of like an insert. This spent fuel cartridge—notice the number, NUHOMS-7—is geared to the packing density and shielding design of that cask, which is one of the old casks that were designed for the fuel reprocessing era where thermal loads would constrain you and so forth.

When you transport the cask to the bunker—short of showing you a whole bunch of photographs, I think that it is rather simple just to show this one. The cask is on its side; it is up against the concrete bunker, which has a series of horizontal tube shaped holes in it. The cask is moved right up against one of the openings and the end of the cask is lifted out of the way so that the fuel canister is now exposed to the opening. A draw bar comes out from the opening and pulls the fuel canister in, setting it right inside the concrete bunker and then the door is closed. Voila, the cask can now be used again to get another canister.

Thus, this design has been developed and applied. The utility has loaded a couple of canisters at H.B. Robinson. We expect them to apply an essentially identical system to the Brunswick plant using the same equipment in the near future.

These two demonstrations, which are in place, demonstrate the technology that is available; that is, a cask with essentially no interface with the site and a module [bunker], which is built on the site but has a very simple passive characteristic—you just slide the spent fuel into it.

We recognized at the very beginning of this process that there was a distinct regulatory value to minimizing the licensing hassle—do not have one-at-a-time license applications. There are topical reports on essentially every type of this design that is available and we have encouraged the vendors, or proposed vendors, of these things to submit topical reports. We review these topical reports and approve them so that any reactor licensee can much more directly do its licensing by referencing the topical report and telling us where it is storing the waste and that is that.

There are two tables in the paper that has been distributed with your material handouts. One of the tables gives the reviewed and approved designs—feel free to look at that at your leisure—and the other one gives a list of prospective license applications as well as the ones that have already been received. We see that we have had a topical report for a dry storage vault—a very large vault that looks like a dry pool—and we have had variations on this theme, the NUHOMS theme. Oconee is under review right now with 24 fuel assemblies in the module, and it is not using a leftover cask but a special transporter to move the waste. Of course, we have many variations of the individual cask.

There is going to be a big increase in the need for dry storage. If you believe the recent DOE final version of the dry-cask storage study that was just published, 35 to 45 sites in the United States are going to use or need something like this in the year 2000. We are looking for a systematic way to enable safe storage of that fuel with a minimum of hassle. We have one, the topical report review process, and it is working well. I think it is working well with those applicants who are using it, and the licensing procedure is continually available.

In addition, we have new rulemaking that is going through the Commission process right now, and we hope to have it complete by early next year. Taking advantage of the cask—the discrete cask separation—is to say that there is nothing site specific about a cask, there are only conditions about its use. Therefore, we can write a rule that would enable a user, who is a qualified current power reactor licensee—in other words you have to have a Part 50 licensee with a site, an emergency plan, a security plan, fences, guards, et cetera. Given that you qualify, here are the conditions under which you can merely register to use a precertified cask. You register under a general license. There is a way to do that, a legal way. We have a rulemaking that would enable the licensee to do a 10 CFR 50.59 review to make sure that it has a place to store the waste. It does not unduly change the security plan or anything like that and it does not interfere with reactor operation. You do not even have a separate specific licensing action.

We see the need for the dry storage of spent fuel, which is getting close to you right now if it is not already in your lap, and we see that we have a technology in hand, a technical basis in hand, and we have the topical report review process that enables you to get a fairly straightforward plant-specific license. In the near future we may even have a more flexible process through this generic license or general license approach that we have in rulemaking now.

That is all that I have to say on these two subjects. Thank you.

Mr. Bernero:

I have got a couple of questions here.

QUESTION: Is the NRC encouraging or advocating supporting vendors and facilities that are planning or building radioactive waste incinerators and vitrification facilities?

ANSWER: I am not sure that I should say that we are encouraging it. We are willing to look at such processes. Frankly, the experience that I have seen to date on the incinerators is a reluctance to go into them because of the difficulty in the PR [public relations]. They are very difficult facilities to sell, and the incineration of the very low level waste is about the only thing that we would foresee there.

QUESTION: What criteria are imposed by State authorities to accept low-level waste at their facilities, and have these criteria been reviewed and approved by NRC?

ANSWER: Well, in general, the 10 CFR Part 61 criteria are available. Those are the criteria that the State is to use for the receipt of waste and those include packaging leakage and things like that. We do corroborate with the States and review those criteria. However, the vigor, the spirit, and attitude by which they implement those criteria is somewhat variable. Because all three operating burial grounds are in Agreement States—and Agreement States actually do the licensing and direct regulation by formal agreement with us—our control is a little more indirect. Whenever you are dealing with Agreement State licensing, you do get variability.

QUESTION: Are we also looking at transportation implications so that dry casks can be used to ship fuel to the waste repository?

ANSWER: Yes, indeed we are. This is a program question that has been addressed a number of times. The dry casks that you saw at Surry are not authorized or certified for shipment. People had been encouraged to submit them for dual-purpose use, and we think that in the next year we will review the first true dual-purpose application which applies to both the storage and the shipment. We are willing to entertain special shipment conditions for those casks.

Remember that an ordinary spent fuel shipping cask is designed to ship 12 months out of the year—winter, summer, any weather, and so forth. Something like this would probably only be used once or twice in its life for actual over-the-road shipment. Therefore you could entertain special weather, special conditions, or special overpacks, or something like that. But a great deal of attention is being given to dual-purpose use in particular.

General Questions/Answers

Mr. Rossi:

I have been told that we have to be out of this room by 4:30. There are a number of written questions that have come up to us, and I am going to cycle through the people one at a time and let them answer one question each time. I would like you to keep your answers as short as you can. I suggest that you pick the questions that are likely to be of most interest to the audience to answer first. I am going to start with Jack Heltemes.

Mr. Heltemes:

There are two questions here that might be of general interest.

QUESTION: Will there be any additions to NUREG-1022 to provide more examples on what is reportable versus what is not reportable?

QUESTION: 10 CFR 50.72 and 50.73 require reporting of engineered safeguard actuations without exception, and this is being rigidly interpreted. Many of these are filtered ventilation systems, startup and cleanup isolations, et cetera, which rely on one-on-two logic as originally designed. Why must such trivial items be reported?

ANSWER: I wanted to comment on this because we now have about five years—a little in excess of five years experience with 50.72 and 50.73—and we can see its strengths and weaknesses. We have an activity under strong consideration to modify those two rules, to take into account what we now know in terms of reportable events that we are interested in and reportable events that we are not interested in.

I would agree with the person asking the question that many of the engineered safeguard feature actuations are trivial events. We ourselves, if you read the AEOD [analysis and evaluation of operational data], the trend and patterns analysis study on engineered safeguard actuations, make the conclusion that most of these events have no particular safety relevance.

Further, I would use the example—my favorite is—that the rule requires reporting of RPS [reactor protection system] actuations, and sometimes we get RPS actuations without rod movement, that is to say, the rods are all the way in. We are not interested in those types of events, and they have no particular safety significance whatsoever. So we are very much considering changing the rule in order to focus on events such as I talked about today, common-cause and potential generic-implication-type of events to assure that they get fully reported and evaluated and to drop some of the other events that have no particular safety significance. Our attempt would be to alter the resources and not to increase the burden on reporting.

Mr. Berlinger:

I have two very short questions.

QUESTION: Why is the NRC reluctant to publish the 10 CFR Part 50.109 value impact assessments for bulletins and generic letters?

ANSWER: In this particular case, in preparation of a bulletin or generic letter, a value impact or cost benefit analysis is included as part of the CRGR package. That is pre-decisional information, and, at that point in time, it is not put in the PDR [Public Document Room]. However, once the issue has been reviewed and approved and, in fact, the generic letter or bulletin is issued, I believe that the CRGR minutes would reflect that fact and would be placed in the PDR; the value impact assessment would be part of that PDR package. I may not be absolutely correct in that answer, but I think to the best of my ability that that is the answer.

QUESTION: The other one is a quickie. It says that there seems to be some confusion regarding Part 21 reports that are also covered in an LER, are they required?

ANSWER: I think that the best way to answer is that Part 21 is being modified. I believe that one of the changes to Part 21 would preclude a filing of a report if, in fact, the event had been previously reported under separate regulation, which would include 10 CFR 50.73.

Mr. Lanning:

Thank you. I would like to try to respond to the question asked about 10 CFR 50.9.

QUESTION: I think that the question was, how do we reconcile the differences between 50.9 reports and other reporting requirements?

ANSWER: After having read 50.9 for the first time, I am ready to answer the question.

The 50.9 rule had two paragraphs, and I think that the second paragraph really addresses the question. It is really a reporting requirement that says that if an applicant or a licensee has information that has significant implications for public health and safety or the common defense and security, he has to notify the Regional Administrator within two days of making that determination.

The last sentence in 50.9 says that "this requirement is not applicable to information which is already required to be provided to the Commission by other reporting or updating requirements." I have not seen a 50.9 report. I do not know whether any of the regional administrators have seen one or not. So I think that it would be handled in exactly the same way as any other operating experience for the 50.9 report.

Mr. Ernst:

QUESTION: Can you have more than one root cause in a complex event?

ANSWER: The answer is yes. I think you want to strive for the root cause if you possibly can, but if your logic path tells you that there are a couple of root causes then there are a couple of root causes.

QUESTION: There were a couple of questions basically asking how the PRA-IPE [independent plant examination] approach fits with root-cause analysis. My feeling is that it is not really a fit. The PRA, or whatever you do for the IPE, will establish vulnerabilities perhaps, and those vulnerabilities need to be looked at. If the vulnerability indicates that your plant really is performing as designed, but the risk is a little too high, then maybe some redesign is necessary.

The IPE might say that "gee, it looks like the design is about the same as everybody else, but my site-specific performance is not the same as everybody else," like the HPCI case that I talked about, in which case you may need to do a root-cause analysis and find out what the real problem is. But I do not see any direct relationship between root-cause analysis and the IPE.

Mr. Bernero:

I have a question.

QUESTION: What does NRC consider an adequate security system for independent spent fuel storage?

ANSWER: I think that the best illustration can be found in the picture that I showed of Surry, which is basically the concrete pad with a chain-link fence around it. That structure, by the way, is somewhat separate from the reactor site itself, if you ever get down to that site. It is a distance away, on the plant property, but in a separate security area.

The Surry docket includes a description of it. It is little more than protected custody. The casks are too robust to hurt and too big to steal. So you are basically keeping public access away from it, and also providing the necessary surveillance so that atmospheric conditions, debris and so forth, snowfall or whatever, will not clutter it up.

We will have, in that proposed general license rulemaking, a cask certificate with a set of conditions for a security system, among other things, and that should be available for public access in just a couple of months.

Mr. Rossi:

Let's go back to Jack Heltemes.

Mr. Heltemes:

I have two that I can respond to rather quickly.

QUESTION: One question is: Does Congress receive abnormal occurrence reports from other segments of the U.S. industry, such as oil, gas, chemical, and fossil fuel, in order to not unfavorably bias members of Congress?

ANSWER: The answer is, not to my knowledge. The requirement for abnormal occurrence reports to Congress is tracked back to the Atomic Energy Act, specifically Section 2.206, and that is the reason that we provide those reports to Congress.

QUESTION: Another one that goes quickly: Do you see any redundancy between your power reactor events and INPO notices and INPO SERs and SOERs; if so, do you have plans on better coordination with INPO to minimize this repetitiveness?

ANSWER: The answer is yes, we see a great deal of overlap between these documents. In fact, we saw so much overlap that we questioned the need for power reactor events. We put in a notice that we intended to suspend publication, to terminate publication, of that particular document unless we received a strong response. We did receive a strong response from some of the people that now get the document.

As a result of that response, we reconsidered and continued to publish the document, but we still are trying to figure out what the long-term objective should be; how do we minimize the overlap in these documents, and whether or not indeed power reactor events have continued to be justified and whether we should terminate publication. We have not made a final decision in that regard.

Mr. Rossi:

Bob, I know you have some more.

Mr. Bernero:

QUESTION: Has the stabilization of low-level waste been reviewed for its applicability to stabilization of mixed waste?

ANSWER: Well, the succinct answer is no, it has not. But it would indeed be applicable when the time comes. For the new applications for burial grounds in states, the acceptance of mixed waste will be considered, and that will involve a joint NRC/EPA sort of regulation. Presumably the waste stability requirements that would carry through if you did have Type B or Type C mixed waste would be applicable. But right now, it has not been applied in any way to mixed waste.

Mr. Rossi:

Let me go back to Jack Heltemes.

Mr. Heltemes:

Let me cover two questions. I will first give you the questions and then try to respond.

QUESTION: Have comparisons been made between LERs and PRAs to confirm or check the validity of PRAs to predict the probability of event occurrences?

The second is: When the NRC performs significant reviews of operating events, are PRA probabilistic models used to determine relevant importance of an event with respect to reactor safety; if not, what criteria defines the threshold for increased NRC attention?

ANSWER: Let me just note here that PRA analysis and risk perspective is certainly the universal language or index to safety significance. Within AEOD, we have a procedure that says that when we do a case study, we are to look at the PRA models and try to develop a risk perspective with regard to operational experience against the results being predicted by PRA studies. So we very much try to reflect a risk perspective in our reports.

Secondly, we plan to put a lot more priority—in the coming future and in the days ahead—to do a lot more studies on PRA analysis overlapping with operational experience. In fact, to rephrase that, to cast operating experience in terms of PRA analysis.

One of the current topics of high interest in the NRC, for example, is motor-operated valves and their frequency of failure. We continue to do a considerable amount of studies in this regard, and we are contrasting the results of those studies to that failure rate predicted by PRA analysis.

We have a generic PRA study at Oak Ridge, and we do a lot of screening with that study. It is known as the ASP program, the Accident Precursor Sequencing modeling. We try to identify accident sequence precursors by use of PRA techniques, looking for new sequences; looking for new ways, if you will, that we could get a serious core-damage-type accident. So there is a coupling, and that coupling is getting tighter and tighter between PRA studies and operational experience.

Mr. Rossi:

I understand that we have to be out of the room very near to 4:30, and I think that it is a little bit after 4:30 as a matter of fact. I would like to thank you all for coming to this session and for your questions and attention. I would also like to remind everybody of two things: One is to check for any telephone messages that you might have; and the second is that there will be a reception beginning at 5:00 this afternoon in the Colonial Room on the lower level, and you use the main elevators to reach the lower level. So thank you very much.

3 SESSION 2: SUBSTANDARD MATERIAL AND EQUIPMENT

Mr. Brian K. Grimes:

I would like to get started this afternoon with the session on substandard material and equipment.

Just a couple of administrative things. We are going to try and go through all the presentations before we have most of the questions. If you have a clarification question, feel free, but for the most part we will try to fill out cards during the session. We have some extra cards here if you do not have cards and did not bring your material along. If you will pass your questions up during the session, then the speakers will get a little chance to consider their answers and we will try to go through all the questions at the end.

This is an opportunity, I think, for us to reach a common understanding, or baseline, on what our concerns are, what our initiatives are, and to hear back from you about what your thoughts are in this area of substandard and fraudulent materials and equipment.

As Tom Murley said this morning, the conference chairman has the prerogative to say what is on his mind. As session chairman, I will limit myself to the subject of the session for what is on my mind, but I would like to generally say I have been very pleased at the industry response to the areas that have been identified with regard to substandard materials and equipment. However, there are a couple of warning signs, related to particular areas, that I think we should discuss during the session.

Our first scanning indicates the responses to Bulletin 88-10 have not been totally satisfactory—that is, the circuit breakers. I think the industry aggressiveness in identifying other material that is now in their plants that may be substandard is lacking somewhat. But in terms of—particularly the NUMARC effort, which is forward looking and trying to prevent occurrences in the future—I think the industry is performing in an outstanding manner.

Just to give a little background before we go through each of the speakers; as you all know, the issues of fraud and counterfeiting are of increasing concern and have been for about the last year and a half. These are somewhat related to a concern for quality in general. I think this is because the systems that we put into place for making sure that all equipment in the plant is good have not entirely served us well—not as much the systems themselves, but many times in the use of those systems for assuring quality.

For the first paper, Bill Brach is going to discuss some general concerns with dedication of equipment that is not manufactured under an Appendix B process [10 CFR Part 50] and relate that to the fraud and counterfeiting concern.

I want to make sure we understand at the outset that the NRC believes that the basic responsibility for ensuring quality in power plants is the licensees. Also the bulk of the expertise needed to cure the problem resides with the industry.

With respect to current requirements, as you know, all plants are required to meet Appendix B for replacement of safety-related materials and components. For the rest of the plant, we expect good engineering practice to be followed and quality attention to be given to balance of plant equipment in proportion to its significance to safety.

Where there was a specific licensing basis, a specific code and standard agreed on at the time of plant licensing, we do recognize that as the technical specifications for replacement components. However, the assurance that you are getting what you ordered in terms of that specification is to be done to Appendix B standards. Whether or not you have the initial design documentation and design rationale, all the critical aspects of that replacement must be ensured.

Preferably, in our view, this is done by ordering a component which is manufactured under an Appendix B process or to an ASME Code process. However, we recognize that, as some of the other speakers will discuss, there is a shrinking number of vendors that produce parts to Appendix B manufacturing standards. In those cases, we expect critical characterisitics to be specified by the designer. That is you, not by the vendor but by the designer. You must reliably establish that these characteristics have been met on receipt of the component.

The principal weaknesses and vulnerabilities I see that we have in our current system of procurement relate to an over-reliance on paperwork, lack of engineering involvement in the process, and a lack of ongoing relationships with manufacturers, as commonly reflected in use of local suppliers, for example. Lack of systematic and technically sophisticated dedication processes and the lack of industry standards for the critical characteristics of the various components have also contributed to this problem.

There are some approaches that I think would be appropriate to better attain assurance in this area, and during the question-and-answer session I would be pleased to have some further discussion on these. We will mention a few of them as we go through the papers also. But the first, in the short term, is aggressive action to identify additional specific classes of components that are vulnerable to fraud.

I recognize no utility wants to be the one that causes another industry problem and NRC bulletin, but I think it is extremely important that everybody take a critical look at their own procurement practices, determine where they think the vulnerabilities are, and share that with the rest of the industry and the NRC. Based on what the NRC has stumbled across, I am confident that there are additional examples of things out there that are waiting to bite us. By "us" I mean both you and the NRC. I am not looking forward to the day that we have a serious operational event that we find has been contributed to by a substandard or fraudulently marketed component. I think that would be a very serious situation for you and for us.

Second, in the short term, of course, following identification of components, we need to take aggressive action to look into the actual technical significance of the component and do the appropriate safety thing to correct the problem on an appropriate time scale.

For the NRC in the short term, I think we need to be continuously conscious to adjust our initiatives to the industry initiatives. That is where I think our keeping track of what NUMARC is doing on the forward looking process is very important, and I think the plan of action so far has impressed me. If the products are commensurate with that plan of action, I think the NRC will be able to take a much less active role in correcting the whole situation.

We are also looking, as you will hear in the last paper of this session, at where regulations should be modified. That is not just to put more teeth into the inspectors' hands—or rather mouth—so that he or she can go out and aggressively go after your program, it is to also give both the utility industry, and the NRC, the tools to find out where the problems are. Do we need to modify Part 21 so it somehow covers more than just safety-related vendors? Does the NRC need more ability to issue a civil subpoena to get records from a non-safety-related supplier?

I want you to think in terms of both those aspects as we talk about where we need to modify regulations.

In the longer term, I would like to think about it in terms of modifying your own internal environment and then trying to influence the environment in which your vendors work. Those two aspects both have a lot of opportunities for improvement.

I think internally each utility has to look at its own accountability within the line management for all quality processes including procurement. I am a strong believer that QA [quality assurance] should be an overcheck on all processes and that line management needs to take responsibility for the adequacy of the procurement process also.

The allocation of resources is also important internally. I think you have to look at what needs to be put into quality achievement, what needs to be put into your self-evaluations, and then your QA over-checks. What is the split of resources there? It takes the top management of the company to make that determination.

Influencing the external environment—the people that you deal with over whom you do not have direct control. There are things like establishing long-term relationships with vendors, which has not been done in many cases; improved vendor audits by the licensees; improved dedication programs and receipt inspection and testing; sharing of information and combining to do joint audits or joint procurements, which can increase the quality of those at a smaller staffing cost.

The last thing I want to mention, very important, is a new concept, at least in my mind. I believe we need to look at traceability of all the commercial-grade components that we are buying. In other words, we need to know where those are coming from. We need to know that we can go back to the manufacturer and know that a component is what it is represented to be.

Those are ideas for the longer term improvement. Many of those are addressed by the NUMARC initiatives.

With that, let us go through each of the papers. As I said, we will collect questions on cards during those presentations and we will answer at the end. If you have a clarification question, however, feel free.

First I want to introduce Bill Brach who is Chief of the Vendor Inspection Branch in my division. And I guess I did not introduce myself properly either: I am Brian Grimes. I am Chief of the Division of Reactor Inspection and Safeguards at headquarters. I see so many familiar faces that I forgot to introduce myself to those of you I do not know.

Bill has been spearheading our effort since early last summer and has become deeply enmeshed in this business, which is a mix between worrying about quality and worrying about fraud. I think the whole vendor area, which was previously focused on looking at the root cause of defects that occurred in components in operating nuclear power plants, has really in the last year turned almost exclusively to worrying about substandard materials resulting from fraud.

So we will let Bill share a few thoughts in the dedication process and then we will go on.

Dedication and Procurement

Mr. E. William Brach:

I just want to clarify one point: when Brian said I am deeply enmeshed in the issue, I am not deeply enmeshed in counterfeit and fraud, I am following up on trying to identify the nature of substandard vendor products.

As Brian mentioned, we will be presenting four papers this afternoon. Each will be on the general topic of the quality of vendor products. A common theme to each of these papers will be on the general issue of counterfeit and fraud as it relates to the quality of vendor products procured and installed in nuclear power plants.

While I will be discussing, more specifically, issues involving procurement and dedication, I thought it would be worthwhile to provide an overview, or introduction, into some of the issues that NRC and the nuclear industry have been facing over the past year or year and a half. Of course, this will be from the NRC perspective.

First, I will start with the general question of what is the problem or issue that is raising its head, that has the interest of the NRC, the nuclear industry, many other Federal agencies, and many other non-nuclear industries. We heard Vic Stello, Jim Sniezek, and Tom Murley earlier this morning make reference to the substandard vendor product issue and the issues involving counterfeit and fraud.

If we look at the first bullet on the viewgraph *[Figure 1]*, we note that recently we have identified a number of instances of apparent counterfeit and fraud involving vendor products procured at nuclear power plants. Examples include fasteners such as nuts, bolts, and screws; piping material such as fittings and flanges, which I am sure many people here are familiar with from Bulletin 88-05 from last summer; issues involving valves and pumps; and replacement parts such as valve replacement parts; electrical equipment, and as Brian alluded to before, Bulletin 88-10 and the issues involving molded-case circuit breakers.

Ed Baker and Paul Gill will be going into much more detail on the specifics involved in some of those pieces and types of equipment.

The instances of counterfeit and fraud have heightened our concern with regard to the overall adequacy of licensee's procurement and dedication programs. Some recent discoveries in the past year, or year and a half, have demonstrated to us some inadequacies in those programs for ensuring that a licensee's procurement and dedication programs are, in fact, assuring that all substandard products are not making their way through the process. Also Max will be addressing, in the fourth paper, some initiatives that the NRC has under way to identify and to attempt to address some of those deficiencies that we have identified.

A point I would like to stress as well is that the problems we have identified have been both in procurement for safety-related as well as for commercial-grade procurements and in the dedication of commercial-grade procurements for safety-related application.

I want to mention in my discussion, and I am sure in the following discussions as well, that oftentimes we will be making reference to a licensee's procurement or a licensee's dedication program. Generally you can interchange the form licensee with vendor for procurement and dedication because many of the issues we are identifying are equally applicable to licensee as well as vendor activities.

Kind of an obvious question to ask is. Why is it that in the last year or year and a half the nuclear industry has been detecting so many more cases of misrepresented vendor products than in the past? Assuredly, counterfeit and fraud is not a new revelation.

I have listed four *[Figure 2]* contributing causes to why we are seeing more instances of substandard vendor products, many involving counterfeit and fraud, than perhaps in the past.

The first item references to the shrinking nuclear market. Brian mentioned earlier that there are fewer Appendix B vendors, that is, vendors who maintain a quality assurance program consistent with the quality requirements of Appendix B to 10 CFR Part 50 for manufacturing and providing safety-related equipment than say 10 or 12 years ago. This has resulted in a demand on the part of the licensees to search out new vendors. In many cases, or some cases, it is possible that the new vendors may not appreciate or understand or recognize the need for strict adherence to all the nuclear standards that are invoked, or strict adherence to the industry standards that are invoked in the various procurement documentations.

The second item listed, you could say, has been a result of the first item in that, in many cases, we see more instances of intermediate suppliers moving in to be the supplier of safety-related equipment. Inherently there is nothing wrong with having an intermediate supplier dedicate or subject equipment to dedication activities for safety-related use. The concern raised is about the knowledge that an intermediate supplier has about the items and products that they are dedicating for safety-related application.

For example, with regard to many types of equipment, it is very important for the vendor or the licensee who is doing the upgrading of the equipment to ensure that they have the current design specifications and material specifications for the item, to ensure the consistency and conformancy of critical characteristics for the intended application. In mentioning that, I am sure many of you picked up right away that in many cases original equipment manufacturers claim proprietary restrictions on the release of certain design and material specifications as well as identification of design changes that have been made over the years.

These issues tend to make it a little bit more difficult for a licensee or vendor to ensure complete and objective review of all the critical characteristics necessary for an adequate dedication program.

Also, with regard to aspects of dedication of safety-related equipment, certain issues such as environmental qualification or seismic conditions come into play as well. Many dedication programs rely on a previous qualification report as a basis for continued qualification of items that are being dedicated presently. Keeping in mind the issues I just mentioned with regard to continuity of knowledge about design and material specifications and subsequent changes from when the initial qualification report may have been generated, again causes potential for difficulty in adequate dedication. Brian mentioned as well another significant issue that comes up in dedication and that is the traceability of equipment. This has been especially true as we have been reviewing the molded-case circuit breaker issues during the past roughly nine months going on a year now, with regard to the various transactions between the point of original equipment manufacturer and the purchase by the utility for either eventual dedication or eventual use in the nuclear power plant. In many cases equipment may have been used, may have been refurbished, may have been, of course, counterfeit or fraudulently marketed, and the traceability question is a difficult one to address, especially dealing with commodity type, commercial-grade items that are being procured either by licensees or vendors for subsequent dedication.

To draw kind of a bottom line to this part of the discussion, would be to say that there is a concern, in many cases, that the critical characteristics that are identified during the procurement and dedication process are difficult to verify or to confirm, especially by nondestructive-type tests.

The third point concerns economic incentives; that is also a rather obvious potential contributing cause because the difference often between nuclear-grade quality items and commercial-grade items is significant. As we were talking at lunch at the table I was at, oftentimes the price differences can provide an incentive to those that might be less scrupulous than others to misrepresent, counterfeit, or introduce fraud into the product.

The fourth item maybe is not really a cause but more an observation. Over the past one to two years, we have become more and more attuned to the existence of counterfeit and fraud with regard to products that are purchased by the nuclear industry. We may be today more attuned to ask the question—once we have identified that a product is substandard—to ask ourselves or to pursue with the vendor the authenticity, the correct representation, or misrepresentation of the product. So it may be well that we are more attuned and looking for such instances.

For this slide *[Figure 3]*, you might be asking an obvious question: Where is the punch line? The point I wanted to stress is that in procurements of items for safety-related application at nuclear power plants there are of course two options. One is to buy safety-related equipment from a vendor who has an approved quality assurance program; two is to buy commercial-grade and subject it to dedication by the licensee. The problems we have seen have covered the waterfront. Both procurements are from vendors who have approved quality assurance programs or who are approved vendors for providing safety-related equipment to commercial-grade items and procurement for subsequent dedication.

There are a number of examples of both types. I will mention just a few, involving safety-related procurements. Examples that I have personally seen in the last six to nine months are of instances where some utilities have procured safety-related equipment from unapproved vendors. If you stop and think, that puts the licensee in kind of a catch-up game. They have placed an order with a vendor who is not authorized or approved by the utility to provide such an item under an approved quality assurance program. The licensee is then in a mode of trying to determine the quality under which the item was manufactured, the reliance it can place on any certificate of conformance or compliance or CMTRs [certified material test reports], that maybe were provided, and the basis on which it can rely on that documentation. The licensee is already in kind of a catch-up mode at that point.

Also there have been cases in the recent past where utilities have accepted certificates of compliance, conformance, or CMTRs from vendors who were not authorized to provide such documentation. About two months ago we put an information notice out with regard to such a case.

Another point—and this will be the last one that I will mention about safety-related procurements—that is, we have noted on many many inspections, not just on one or two occasions but a number of occasions, where licensees have failed to invoke Part 21 in their safety-related procurements. The point I want to stress here is that we are not trying to be picky; we are not trying to see if someone initialed a document as opposed to signing his name; but Part 21, from our perspective, is a very important regulation. It lays the framework for the industry and for each licensee to ensure that in procuring items under 10 CFR Part 50, Appendix B, a safety-related-type item, the framework is laid. If the vendor were to identify a defect in the manufacturing process, in the materials or in the design, the mechanism is in existence contractually between the licensee and the vendor to ensure that the licensee is made aware of such defect so it can initiate appropriate deviation evaluation and potential defect reporting.

With regard to commercial-grade procurements, I have touched on the issues of traceability and testing requirements. However, there is one aspect I did not mention with regard to dedication. Many programs rely on a sampling program to represent the conformity of a batch or a lot of items to specified critical characteristics. In the past year, we have noted that in some instances, for large procurements of say 450 items or 200 items, that sampling is quite often applied to determine the acceptability of the entire lot or batch. On many occasions these individual procurements or these batch procurements came from many suppliers, many vendors throughout the countryside. When you stop and think about the introduction of counterfeit and fraud considerations into the overall dedication process and you are relying on a sampling program, I think it is readily evident that homogeneity questions with regard to the sample and the representativeness of the lot are raised.

On this slide *[Figure 4]*, I just want to list a few examples of procurement issues that we have seen. Let me stress that when I am using the word "procurement," I am using it in a very broad sense or using a general definition to include all aspects of licensee and utility activities that are necessary to, in essence, identify the item to be procured and tested to assure its acceptability for use. So this includes both the audit of the vendors, the specifications in the procurement documents, and the receipt inspection that should be taking place to ensure that the attributes that are specified in the procurement document are, in fact, achieved when the item is received.

For example, with regard to incomplete procurement packages, I have seen some packages recently in which necessary specifications were omitted or left out of procurement documents—such as EQ [environmental qualification] or seismic specifications that were not included or specific design criteria that should have been included and were not included. This is oftentimes an occasion where a like-for-like type of procurement has been placed without the involvement, which I will get into shortly, of engineering to ensure that a like-for-like will meet the necessary critical characteristics for replacement. Other examples I have mentioned beforehand as well, such as the inclusion of Part 21 in some safety-related procurements.

Item C on the slide addresses the lack of engineering involvement. The point I would like to stress here is that on occasion, a number of occasions, we have seen procurements that have been basically handled by the procurement office and we have not seen the involvement of engineering in specifying the characteristics of the item to be procured or the necessary critical characteristics to be verified, to be specified in the specification and to be verified upon receipt. The procurement office, minus engineering involvement, has been the predominant player in the role. I will discuss this more with the next slide.

The third item, hopefully, is very clear to all of us here, and that is that reliance on certification from an unapproved vendor is leading you down a path of problems and difficulties. I guess I would like to use an example of a certificate I saw about six months ago. It was a utility procurement to a local supply company and the certificate of conformance that was provided by the local supply company identified that the item being provided met all the specifications of the original equipment manufacturer, met all the specifications of Underwriter's Laboratory, and met all Federal specifications, and was signed by the supply company.

Having not seen the item, but just by reading the certificate of compliance that was provided, it makes you start to wonder how a supply company, a local supply company that was not involved in any activity with regard to the assurance of the quality of the item, was not the OEM [original equipment manufacturer], could be in such a position to make such statements. My point in stressing that or identifying that is just to be sure that those of you in the audience from utilities are cognizant that—not only in reviewing and approving vendors in the programs and reviewing the types of certifications that they can provide—you are assuring that in cases where you are relying on certifications provided by those vendors that the certifications being provided are representative of the activities within the power of that supplier or that manufacturer to certify to.

With regard to inadequate audit of vendors, last summer we issued Information Notice 88-35. It listed a number of instances, or examples, of cases in which the NRC is of the opinion that audits of suppliers, as carried out by the utilities, by the industry, could be improved or enhanced in the areas of depth, coverage, scope, and sample of the audits. Brian Grimes mentioned this a little bit earlier on some of the activities that NUMARC has under way. NRC encourages industry support in working with NUMARC and looking at their audit programs to the extent that joint audits might be an option to pursue, to help obtain a more comprehensive, broader scoped, and deeper technical type of audit.

I would stress as well that the purpose of an audit, when you are auditing your vendors, is not a pro forma approval of a vendor but it is an approval of a quality vendor to provide a quality product.

The next item pertains to receipt inspection programs, and I will be tying that into engineering involvement. As I mentioned before, it is very important when you are specifying procurement documentation that you include the characteristics that are critical for the item being procured and that you establish a receipt inspection program that will ensure upon [illegible]pt that you are getting what you want, what you o[illegible]ed, what you are paying for.

While talking about dedication programs, I have touched on a few aspects with regard to traceability, to sampling, to the knowledge of design—engineering design, material specification, design changes that have occurred since either original purchase or original qualification. Dedication programs that we have reviewed in the past couple of years have kind of run the gamut. We have seen some that have been fairly thorough and comprehensive, others at the other end of the spectrum that relied almost solely, or principally on a like-for-like model-type replacement. Coupled with that, some just had cleanliness type inspections upon receipt as well as a check for physical damage of the item during transit.

I mention this as a point to keep in mind as we talk more about dedication because the purpose of the dedication program should be to ensure that the critical characteristics for the item being identified are identified before procurement. These characteristics should be identified in the specifications on the procurement documentation and should be interwoven into your receipt inspection and dedication programs to ensure that the critical characteristics are, in fact, being conformed with. Again the key item of dedication is the traceability aspects, principally dealing with the commercial-grade-type items.

The last item on this slide, secondary market procurements, is a difficult one to deal with. We issued an Information Notice 88-97 in December of last year that dealt with the issue of valve replacement parts. The point I would like to stress here, again, relates to the dedication questions that are raised when a secondary market manufacturer is providing parts for your replacement or use in applications. Licensees need to ensure that the secondary market vendor has all the appropriate engineering designs—current and correct engineering designs and material specifications—so that the item you are procuring will be in conformance with your specifications. For many secondary market manufacturers that can very well be a problem.

I would like to look now to a little more positive area and discuss what it is, during NRC inspections of licensees and vendors, that we have identified as being effective aspects of programs [Figure 5]. Those of you that have had a chance to receive and read Generic Letter 89-02, which was issued about the middle of March, may recognize this slide because the characteristics follow in some regard the contents of the generic letter. The generic letter, while identifying attributes of effective programs that we have identified during inspection, also includes NRC conditional endorsement of EPRI's document NG16-07 on commercial dedication programs.

During our review we have found that a key to successful program performance in the area of dedication—procurement in general and dedication specifically—has been the comprehensive involvement of engineering in the process. If you will contrast the four sub-bullets that are listed on this slide with some of the issues we have been discussing just previously, it is very important in procurement to include engineering in review of original design documentation. This is necessary to ensure, in specifying the procurement item or the item to be procured, that the original design specifications for that item are included. Quite often we have found, our licensees have found, that, in going back and reviewing the original design basis as part of the development of procurement specifications, the reliance on like-for-like model replacement number has oftentimes not been enough.

The second item on critical characteristics also is tied in to engineering involvement. In going through and identifying basically what it is you need to buy and what is critical in the procurement of that item, is the need to identify those critical characteristics that are important for the installation and use in the given application.

I would like to digress for just a second with regard to identification of critical characteristics. I have had some telephone calls recently and I am aware of some confusion that some of you have about the role of the utilities or vendors in identifying critical characteristics. I was made aware by a vendor of a case in which a licensee was declaring that all aspects, or every aspect, of the item to be procured was a critical characteristic. I guess, on the one hand, that points out to me that perhaps there is a lack of involvement of engineering in the procurement and perhaps also it may be a lack of understanding on the utility's part as to what the critical characteristic represents with regard to its given application.

A second example, which is a little bit of a twist of the first, is that I was made aware of a case where a licensee asked the vendor to identify what the critical characteristics are of the item. Again, it points out to me a concern with regard to the depth or extent of engineering involvement on the part of the utility in the procurement.

The responsibility for identifying critical characteristics rests with the licensee. It is the licensee's design; it is the licensee's application and use of that piece of equipment at the licensee's site, at the power plant. Thus, it is the licensee's responsibility to identify what the critical characteristics are for that application of that piece of equipment.

The third item on the list, the involvement of engineering in inspections and tests, goes back to my earlier comment about structuring your program so that you know what you are ordering, what you are purchasing, and what you are buying. Further, you are confirming that through an effective receipt inspection, and if it is a commercial-grade item, through a subsequent dedication program.

The fourth item follows from the standpoint of involving engineering. You have involved engineering in the identification of the item to be procured, what is unique or peculiar about that procurement, and you have involved engineering in the identification of critical characteristics for inspection and testing. Engineering should be involved in the evaluation of the test results. Not everything is as clean as we all might like to think with regard to test results. Sometimes there is a little gray area in trying to determine if the item passed the receipt inspection test or the dedication test or not. Let me stress that engineering needs to be involved in the review and evaluation of the test results that are obtained during the receipt inspection and dedication activities.

I would like to further stress, as kind of a side point, that often we have seen an emphasis during procurement to ensure that the new items being bought or procured are equivalent to or better than the item being replaced. Inherently there is nothing wrong with that concept, but we have seen instances where it has forced utilities to, in essence, survey the countryside to try to locate, for example, 1970 or 1974 vintage equipment. Perhaps the best engineering solution to the issue may include a redesign of the system or that aspect of the system to bring it up to date, 15 or 20 years later, with current state-of-the-art technology.

I mention this because, as we are discussing more about counterfeit and fraud, the more you are scouring the countryside and going to various suppliers, the greater the potential for procuring items for which traceability is difficult, if not perhaps impossible, to establish. You may be procuring items that are used and maybe are noted as used, but you do not know under what conditions they have been used or abused. Of course, with regard to the counterfeit or fraud, the potential exists that the vendor providing this item on a demand-type basis might be tempted to, for the reasons we were discussing earlier, misrepresent the product in providing it to you.

I wanted to just mention, as a side issue, that maybe a very possible outcome of your engineering involvement in some of the procurement items will be a recommended redesign of the system or configuration.

An effective product-acceptance program follows along the lines I have just been mentioning with regard to the expenditure of engineering resources in your procurement. You basically want go be sure that after having expended this level of effort and resources, you are getting what you want, what you have ordered, what you have purchased. Simply, this is achieved through effective product-acceptance programs.

I mentioned before the emphasis on the audits of vendors from the standpoint of knowing these vendors you are doing business with, what they can provide to you and what they, in essence, cannot certify to you.

The second two items really go together with regard to the source receipt inspections and the special tests. That is basically the program that you would be establishing to ensure the item is in conformance with critical characteristics and other items specified in the procurement document, to ensure that you have conformance of the item to the specifications initially identified.

The last point is both a summarization and culmination of the issues I have been talking about in the past few minutes with you with regard to the involvement of engineering and procurement, inspection tests, dedication, and subsequent authorization for use.

Kind of wrapped up in this, and not stated on this slide, are the issues involving your knowledge of the vendors you are dealing with and your ability to rely on those vendors; the issue of traceability as it relates to specifications and procurement documents; and the reliance on certification that your vendors may be providing for those complex items for which dedication test and receipt inspection are oftentimes difficult to obtain. I mentioned previously that there are some, perhaps critical, characteristics of certain items that you cannot verify through receipt inspection or dedication. Maybe they have to be obtained through destructive-type testing that can only be done on a lot or sampling basis and that is maybe best performed by the original equipment manufacturer. Of course, in this wrap up, I stress again the role of engineering in the entire process.

Kind of simply stated, a dedication process includes the two items listed on the slide: The technical evaluation to determine critical characteristics; and then your programs in place, or your product-acceptance program, to ensure that those critical characteristics have been tested and verified and confirmed for suitability for use in your given application.

In summary let me just note that the purpose of my presentation was to give you an overview of the issues that we have been dealing with within the NRC and the nuclear industry, as well as with regard to issues involving procurement and dedication programs, and how those issues have been compounded or at least complicated by the identification of the counterfeit and fraudulent activities that have been carried out in the many different areas.

As Brian mentioned beforehand, while the listing I went through at the very outset was a fairly broad listing, I guess there is no reason for any of us to think that is a complete list. The concern, of course, is what is the next item that is going to appear to be the result of a vendor's less than straightforward representation of the quality of the products.

I have tried to end on a little bit more of an upbeat with regard to the areas of concern or areas of improvement. With regard to the involvement of effective engineering in your procurement and dedication programs, you must establish effective product-acceptance programs to basically ensure that you are getting what you want, what you ordered, what you paid for, and through your dedication programs, you must remain sensitive to the need to identify critical characteristics at the outset of a procurement and to include those critical characteristics in the receipt inspection and dedication programs to ensure the overall quality of the products.

As Brian had mentioned, I guess we will entertain questions for clarification at this point; other questions will be held to the end. Any questions should be with regard to clarification of any items I have discussed.

Voice:

I wanted to ask you for a few more comments on critical characteristics. In the sense of a participant design, critical characteristics on something like check valves, the ability to shut and hold water or what have you, the flow of pressure. There are characteristics that are a part of the manufacturing process, which are very critical to the function of the valve, and yet the critical characteristics are something that are fairly difficult for a utility to determine—the utility who is not in the business of designing and manufacturing valves. Would you address that issue?

Mr. Brach:

I agree with what you are saying. The point I was trying to stress as well is that it is very important, for either the licensee or an intermediate supplier that is in the process of translating a commercial-grade quality item to a safety-related application, to have available all the requisite design engineering specifications and documents to identify the attributes that would be critical to the operability of that valve in whatever application it might be put to, as well as the ability to demonstrate the existence of the critical characteristics in the item procured.

I mentioned beforehand that in some cases that may be accomplished only through destructive testing. Maybe in the case of a check valve, there may be attributes that you have to take the valve apart to confirm the existence or conformance of that critical characteristic and that may be self defeating in the procurement or may be very difficult to obtain.

Voice:

All you said is true. But if you are trying to get a replacement for a valve, one of the sources of expertise on any given component that is pretty highly engineered is going to the manufacturer. Ask him what the critical parts of that valve are. You seem to infer that the utilities should be able to do that by themselves, and unless you do do R&D [research and development] and destructive testing and all that, it does not seem practical to me.

Mr. Brach:

Let me clarify the point. My earlier example was a case where the licensee—given the indication that I had from the vendor that called—the licensee was not attempting to—I will call it in the spirit of cooperation with the original equipment manufacturer—identify both what the licensee saw to be the critical characteristics of the valve given its actual or intended application in conjunction with the original equipment manufacturer's knowledge of the inherent design characteristics of the valve. It was a case in which the licensee, in essence, had opted to wash its hands of the need, on its part, to identify critical characteristics, pass that off to the vendor and say: "Mr. Vendor, you tell me what is important about the item and then I will not back-door it, but that is what I will consider to be the critical characteristics."

My point was that it is the licensee's responsibility. On many pieces of equipment, especially more complex items, such as valves and pumps and other pieces of equipment, there may very well be a need for the licensee in conjunction with the original design equipment manufacturer to work in concert with the vendor. It is a two-way street. The example I was trying to stress beforehand was a need for the licensee to be, from an engineering perspective, very much involved in the process and not of passing it off to the vendor.

Voice:

But I think my real question is, I do not believe there is such a thing as a clearly defined set of characteristics for almost any given engineered piece of equipment. There is not a definition of those. I think that is part of the problem in discussing this, the lack of such definition.

Mr. Brach:

That is true. Had the EPRI document—had there been such a list or if we had such a list—we would be passing it out or having it otherwise made available. There is not a generic list.

Mr. Grimes:

The next speaker is going to be Ed Baker. We have copies of his viewgraphs that can be passed out now. Ed's material did not make the book so you will get copies of his viewgraphs shortly.

Ed will speak to the area of substandard materials in particular.

I guess I would just add to what Bill said earlier, by emphasizing, in my view, the importance of each utility having a very substantial engineering presence both in its plant design and its component procurement. I think unless—my own view—unless a utility is doing about a third of its engineering work, it may not have enough engineering capability to know whether it is purchasing the right kinds of things or specifying the right characteristics of the things they do buy.

Ed, I will turn it over to you for the materials area.

Substandard and Falsified Materials

Mr. Edward T. Baker:

Thank you, Brian. Good afternoon.

The talk I am going to give today is to kind of give everybody an update, to the extent that I can, as to the status of items that have previously been identified to utilities and the rest of the nuclear industry as questionable. I will start out by the definition that will be applied, at least in this presentation, to what are counterfeit items. What I will refer to as a counterfeit item is something that has been misrepresented intentionally, and this will be by a marking, either a manufacturer has represented it as being manufactured by another manufacturer or the item is being represented as, for example, a material that it is not. In other words, one is the mismarking by manufacturer, the other is mismarking by specification. The other issue I will be talking about is substandard, meaning that it was nonconforming with the specification it was ordered to; however, it was not misrepresented in any fashion.

So I want to make perfectly clear that I will be covering both cases. The examples I come up with are not all to be considered counterfeits, and I will try to differentiate when I get to those items.

As both Brian and Bill have discussed, the Vendor Branch, at this point, is almost totally engulfed in the issue of trying to determine when we have a counterfeit situation. We are now much more closely following product failures or nonconformances in trying to determine whether it is a result of something intentional or a manufacturing error. What we have found is that it takes a lot more time to make that determination than it has in the past.

The items that we have identified to date include fasteners, fittings, flanges, valves, valve parts, and pump parts *[Figure 1]*. I will be talking about each of those cases and trying to give you an update as to where we stand on these issues, at least to the extent that I can discuss them. All of them have been previously identified, and to some extent I will be able to elaborate a little bit. In those cases where the information is not public but of an investigatory nature, you will not hear anything new on those issues. The first issue that I will talk about is fasteners *[Figure 2]*. The first time I would say that the industry got involved with a large effort was probably about 1984. That involved substandard fasteners and Cardinal Industries. Again I will say, substandard not counterfeit. But a few utilities had to go through some rather expensive reviews to determine whether or not they had quality fasteners or not good quality fasteners.

What started the whole counterfeit ball rolling in the fastener area was a notice put out on May 2, 1986, by the Industrial Fasteners Institute. They discussed a problem with Grade 8 versus Grade 8.2 fasteners and an intentional misrepresentation of SAE Grade 8.2 fasteners as SAE Grade 8.

Subsequently, the NRC issued Bulletin 87-02, mainly in response, to determine if counterfeiting was an issue for the nuclear industry. We had talked to people in the Defense Department and discovered they had a considerable concern in this area so we decided we needed to find out if counterfeiting was an issue. That was the principal reason for Bulletin 87-02.

The results of Bulletin 87-02 are complete. The industry ended up testing—actually I should say between the industry and the NRC—we ended up testing 2218 safety-related fasteners. We had a nonconformance rate of 8 percent, meaning 8 percent of that number of fasteners failed to meet specification in some manner. That could have been a very slight amount out of specification or it may have been a larger amount.

We did determine initially that about 1 percent, or slightly less than 1 percent, of the fasteners were significantly out of specification. In the non-safety area, we tested a smaller number; I think largely because of the fasteners that the NRC had tested in the safety-related area. In that testing, we found a 12 percent nonconforming rate. So you see a slightly larger rate where you have less of a quality program, fewer checks on those fasteners.

As an update as to where we are today, I have been talking to people about this issue. We have been working on a NUREG that will contain the results of that bulletin. Those results were submitted to the NRC and we are in the final stages of getting that information back out to the utilities. The testing breaks that information down by specification, by manufacturer, by supplier, and by licensee. So you will be able to tell from the results of the testing which manufacturers and suppliers had, for example, the largest failure rate, which specifications had the largest problem, and those sorts of questions will be answered.

Along that line, the NRC is also issuing a temporary instruction to the regions as a followup on that effort. This is in addition to the temporary instruction that was issued previously.

Also of interest is that there were congressional hearings held on April 5th on two bills that they are considering to address this issue. I think the abbreviation HR stands for House Rule—House Rule 336 and House Rule 777. Congress is discussing legislature that would in fact impose some sort of testing on fasteners in addition to what ASTM or the other standards impose.

In the fastener area, as Bill had discussed, we did issue an information notice recently, 89-22. We saw some of the same problems we saw back in 1984 with Cardinal Industries. Things like improper upgrading of material for ASME use, excessive hardness as reported on the CMTR [certified material test report]. It turns out that those CMTRs were used as a basis for receipt at the utility and probably were installed since they were back in the 1981-1982 time frame. Also a failure to perform impact testing was addressed.

The impact testing was an interesting case from the standpoint that the utility did not provide any temperatures for doing the charpy impact testing; yet the ASME Code of that time frame very strongly said you had to have charpy impact testing.

Here we had a failure of a licensee to provide all the necessary information. The vendor took that to mean, "I do not have to do it because you did not give me the information." There was probably also some ignorance on the vendor's part in terms of all the Code requirements. So we are still seeing the same problems we saw in 1984. We have to concentrate on those problems.

The next slide *[Figure 3]* addresses fittings and flanges. The NRC issued Bulletin 88-05, which involved material supplied by Piping Supplies Incorporated and West Jersey Manufacturing, namely fittings and flanges. The material fit three different categories from the testing results that we got from NUMARC. We had substandard material, meaning that it did not meet the specification and most of the material was SA105 and it was found not to be counterfeit. In other words, it had been purchased as SA105 and it was sold as SA105; it just did not happen to meet the specification.

We had material that was counterfeit and not substandard, meaning that the material was misrepresented as to who supplied it, but it still met specification.

The last case was counterfeit and substandard, meaning it was misrepresented as to who it came from and it was also substandard. I just had a discussion last week at an ASME meeting with a representative from San Onofre. I have had people tell me it was never an issue, it was not a safety concern.

San Onofre discovered one heat of material, or one heat number, that had three separate chemistries in that heat number, radically different chemistries. They had welded these flanges to a carbon steel piping system. One heat was actually carbon steel, one of the chemistries under this heat number was actually carbon steel. Two of the heat numbers had very high hardnesses in the range of 248 to 260 brinnel, and also the wrong chemistry. I do not remember the particular element, but it was either, I think he said it was either a quarter chrome or a quarter moly material, which is vastly different from what SA105 is supposed to be. So what we are seeing is, in fact, that there was material that was definitely misrepresented.

Where are we going on this issue? NUMARC has been keeping the industry informed of what it is doing and the positions that have been taken. In a February 15th letter to NUMARC, we outlined what we thought was an acceptable method of using material that is currently in the warehouse. That acceptance included hardness testing of whatever material you had on a 100-percent basis to establish homogeneity of the heat. In other words, before you could depend on any results within that heat, you had to establish you had the same material throughout the heat. The results from San Onofre show you that that is not always true, which is why we asked for the test. Once you establish homogeneity of the heat, then you are required to do a sample tensile strength and a sample chemistry. That reverifies that after you have shown you have the same material throughout the heat, it meets specification. Based on those tests, you can use what you currently have in the warehouse.

In terms of what is installed, there has been a combined effort with NUMARC where the utilities did hardness testing and NUMARC's laboratory did tensile strength and chemistry. NUMARC also has agreed to do some analysis using the generic method it established with three plants to show that, in fact, they had not exceeded any stress limits. In a March 20th letter to the NRC, NUMARC committed that it would have that analysis done in about 10 weeks. At that point the NRC will review the information and make a final determination on the acceptability of installed material. At this point we have no reason to believe that it will not be an acceptable result, but we are waiting to get that information. That will close out Bulletin 88-05, hopefully.

The next issue I will talk about are valve and pump parts *[Figure 4]*. Both Brian and Bill have talked about this subject a little bit. The NRC issued Information Notice 88-48 concerning a company called CMA International. This was an instance of Diablo Canyon identifying what it considered to be some counterfeit Vogt valves. This is an instance where a utility placed an order through a distributor and what it thought, or expected to get, were Vogt valves. However, after the utility had the valves installed, it discovered some leakage conditions and called in a Vogt representative to establish what the problem was. It was determined that the valves were not Vogt valves. The key feature was that the valves had square flanges and Vogt does not make any valves with square flanges.

I should emphasize that they were purchased for non-safety-related application. However, you already heard Brian say that the Commission is interested in all applications that involve counterfeit and fraud because the utility does have the ability to dedicate and take a component that it bought for a non-safety application and upgrade it. With the current concerns we have on dedication programs, we need to know about any instance of counterfeit and fraud.

Other instances involving valve parts were addressed by two information notices that we put out. One was Information Notice 88-95 concerning valve parts purchased by San Onofre. The other was Information Notice 88-97 concerning Masoneilan valve parts purchased by Palisades, I believe. In both cases we are talking about non-pressure-boundary valve parts. In the case with San Onofre, it was valve stem guide bushing assemblies. In the case of Masoneilan, there were valve trim parts, valve seats, stems, and valve plugs.

In the case of the Crosby valve assemblies, San Onofre had ordered the parts as safety-related parts. What the utility later found out was because these valves were not related to the pressure boundary and because they had been ordered to ASME Section III, Crosby was not treating non-pressure-boundary parts as safety-related parts. It treated them as non-safety-related parts and supplied a commercial-grade part. The utility found cracks in these assemblies when they were shelved in the warehouse.

Since then San Onofre has changed its practice. My advice is for each of you to review your practice in the same manner. Look at how you are purchasing safety-related non-pressure-boundary parts because you may be getting commercial-grade parts. San Onofre has changed their practice. It now orders non-pressure-boundary parts for safety-related applications under an Appendix B program, and it audits the vendors to ensure that they in fact are manufactured that way.

In the case of Masoneilan, the utility was purchasing parts, not pressure-boundary parts, in a commercial-grade mode through a supplier. The supplier was then going to a secondary source, someone other than the OEM, to buy those parts. It turned out that it received nonconforming parts in both a dimensional and possibly a metallurgical characteristic, or critical characteristic.

One of the biggest concerns we have with secondary manufacturers when you buy things from them is: Where did they get the design input for doing this? How do they know what the dimensions and tolerances should be? You may say, they can reverse engineer. What did they use as a basis? Was it a good part they used for a basis? Which range of the tolerance band was it on? How did they re-apply those tolerances? If you are on the extreme edge of a tolerance band and you re-apply those tolerances, you might end up with a nonconforming part. In this particular case, this is what happened.

Since the case of Masoneilan, we have also been told by Cooper Industries, for diesels, that it has an issue with secondary manufacturers. This is not something we verified, it is something their representatives presented during a talk. They have some concerns as well.

We also have some concerns in the area of replacement pump parts. Again, the primary thing you have to consider is where did the design input come from when it is not the original equipment manufacturer and it does not have accessibility to those requirements.

Something else I was told at this last ASME Section XI meeting I went to was that owners are fabricating parts. I have the same concern there as with a secondary source. If you do not have the detailed drawings, where did you get your design input to manufacture a part, particularly an active part?

The last issue deals with substandard or misapplied parts, and this kind of goes back to the pump part instance. The information we have from the licensee is that it knowingly and willingly went out and bought this part that it knew was not from the original equipment manufacturer. The vendor clearly told them, "look, here are the differences in the part," and the utility bought the part anyway. The utility later agreed that it may not have had sufficient engineering input in the decision on the tolerances of these parts. The utility misapplied a part and, in that particular case, ended up with a situation in which it had an inoperable piece of equipment.

Those are the instances that we have identified to date and the different types of concerns that we have in that area.

The last slide *[Figure 5]* lists the concerns we have under the topic of counterfeit and substandard parts. Of course, the major concern with the Commission right now, and by that I do not mean just the staff, I also mean the five Commissioners, is counterfeit products.

The reason you saw the reaction you did from the NRC regarding Bulletin 88-05 is that when you identify a counterfeit part, you cannot tell how bad it is going to get. The first test result we had with regard to the flanges was from Sharon Harris; it indicated a part that had 70 percent of the ultimate tensile strength that it was supposed to have. When you know there is counterfeiting involved, where do you put that? Is that the best piece they sold; is that the middle; or is that the worst piece they sold? That is why you saw the testing that you did—because we did not know. It could have been the best part they sold. It turns out it was the worst part they sold. Everybody was real fortunate. Nobody at this point has had to replace anything; there was enough design margin in there so that that did not happen. But, that is why you see the concern with counterfeit parts.

The only thing I will say about counterfeit products is, even though people have talked about audits and auditing commercial-grade suppliers, if somebody is going to lie, cheat, and steal, it is going to be very hard to detect during an audit. If they are going to misrepresent a product, probably the only way that you are going to detect it, for the most part, is by some sort of end-item testing. This is Ed Baker, this is not an NRC position. It is a personal feeling I have from being involved in vendor products for four years with the Defense Department and five years with the NRC and from doing this type of work.

How do we address some of these concerns? You heard both Bill and Brian talk about inadequate dedication programs. We see a lot of this counterfeit and fraud in the area of commercial-grade products, more so than in safety-related, although we did see the safety-related. An adequate dedication program should prevent most of those products from getting in the plant. If you have to verify critical characteristics, you should be able to catch these.

The next issue is the secondary market sources and I just covered those. Primarily our biggest concern is where did the design input come from? How do you know they made the right part?

Second to that is the manufacturing process: Even though the manufacturer had the right design input and made the part in accordance with the drawing, how well did the manufacturer control that process?

Inadequate procurement quality requirements, I discussed in relation to San Onofre. There was another example in that same information notice about Anchor Darling snubbers and the fact that when you order

Section III snubbers, if it was not part of the load path, they considered it a commercial-grade item and that is what you got. One of the things we were looking at is what they did classify within the load path and what they did not.

Inadequate vendor audits, in the case of West Jersey Manufacturing preservice inspection on the flanges, we felt after having gone in and looked at their records, that had someone done an adequate vendor audit—I should not say adequate because that has a regulatory context—an effective vendor audit, they would have picked it up.

The reason I say that is, if you looked at the paperwork associated with the flanges, it met ASME Code. They had the paperwork they were supposed to have. If you looked behind that Code-required piece of paper and what was the basis of that Code-required piece of paper, that is where you discovered some discrepancies. All of a sudden you noticed commercial-grade, domestic and foreign material, suddenly appearing as ASME material, and there were no upgrade test reports.

That goes back to things you heard this morning from Jim Sniezek talking about meeting the regulatory requirements and going beyond the regulatory requirements—an adequate vendor audit under the regulatory requirements and an effective vendor audit. There are some differences there, and you have to go a little bit further than just doing the audit, looking at the program.

Inadequate receipt inspection and testing, again, it is the same differentiation between what did you commit to in ANSI 45.2—whatever the next numeral is—for receipt testing? Are you checking for shipping damage, count, and part number, or are you going a little bit further than that? Insufficient engineering involvement in procurement, which I have already talked about in terms of the pump parts that a procurement person decided to buy without checking with someone who is more knowledgeable about tolerances, can have an effect on the operability of the piece of equipment. Those are the concerns.

My personal opinion is that adequate dedication programs would address a lot of those concerns. I think we could detect the large majority of the counterfeit parts, if we got parts from secondary markets we would identify either that we did not have the design input or, in fact, we did have the right part. The procurement quality requirements are more on the safety-related side. I think that is just something we are going to have to pay more attention to.

That ends the presentation on where we stand on the issues we have identified to date. I hope this has been beneficial.

Mr. Grimes:

Again, we will collect questions on cards to be addressed at the end of the session.

The next speaker is Paul Gill of the Electrical Systems Branch. He will discuss electrical equipment and, in particular, the molded-case circuit breaker problems.

Substandard and Falsified Equipment

Mr. Paul Gill:

Good afternoon. For those of you who have been sitting for over an hour, if you will just stand up and stretch and sit down, that would be great.

I have been asked to address the circuit breaker issue, dealing with substandard and falsified equipment, but particularly the refurbished circuit breakers. Let me clarify what we mean by substandard and falsified or refurbished equipment.

What we mean by refurbished equipment is that either it is used equipment or equipment that has been opened and altered. You will find in the electrical arena that we have devices, such as circuit breakers, that are basically sealed so they should not be tampered with in the field. If they are opened and altered to any degree, then they are considered to be refurbished, which violates whatever standards or criteria they were manufactured and controlled under—falsified information.

We are looking at not only equipment that may have been altered in the field, but also used equipment that may or may not meet the standards or perhaps may have been adversely degraded in service. We are also looking at equipment that may have been stored for years and then may be considered as commercial grade (or meeting the commercial-grade standards) and upgraded to safety grade through either some sort of dedication process, which may or may not verify all of the operating characteristics of that device.

So what we are trying to address here covers the whole pedigree of these types of categories. The reason I bring this up is because of the interaction I had with the utilities regarding Bulletin 88-10 in terms of the questions being asked. Most of the licensees that asked questions were only interested in those breakers that they thought were altered or refurbished. I think it covers a broader category, including used equipment that has been sold. During NRC inspections of suspected vendors, it was found that these vendors had bought used equipment either from salvage houses or from places where there was a surplus of this equipment. These vendors in turn were selling it to the utilities for whatever applications they had bought it for.

What I am trying to get across is the broadest sense of this issue.

[Figure 1]

Again, looking at this issue, which was brought to the attention of the NRC back in April by a Pacific Gas and Electric Company report that indicated about 30 circuit breakers were sold as new to Diablo Canyon plant and then it was discovered that they were not actually new. So that issue came to our attention and from then on we took certain actions.

Basically, what are our concerns? The concern I just mentioned to you is refurbished CBs [circuit breakers] or CBs that are used and being sold as new and that do not meet industry or manufacturer standards, such as NEMA [National Electric Manufacturers Association], UL [Underwriters Laboratories, Inc.], IEEE [Institute of Electrical and Electronics Engineers], and ANSI [American National Standards Institute]. Most of the equipment you find is governed by some of these standards, and manufacturers' specifications—or even to the extent the utilities may have a specific requirement that they may want included in these type of devices.

This was one of our concerns because these standards or specifications basically establish the benchmark of commercial grade, not only the nuclear industry, but in the commercial side of the business as well, such as fossil plants or commercial buildings, which have to comply with IEEE, UL, and the National Electrical Code. So these are the specifications that assure there is some minimum quality to these products. One of the concerns that the NRC really has is that if these devices have been altered without authorization, they may violate the industry standards or may not conform to these standards. So that was one of the issues we were concerned about.

As Ed Baker mentioned, some of this commercial-grade equipment is being upgraded to safety grade or safety applications. One of the concerns is that such equipment does not meet the minimum commercial-grade standards; therefore, you are starting from a different benchmark to upgrade these devices to safety grade.

During the inspections we made, we noted that dedication programs among the utilities vary. These programs may consist of comparing a catalog number to perhaps doing some further testing to verify the operability of the devices. There really is no benchmark to say what performance tests are being performed to upgrade these devices. This is another concern that the NRC has in terms of whether we are achieving a quality product that is going into our safety-grade-type of applications.

Again, the basic question is what is the safety significance of these devices that are installed or are going to be installed? The safety significance is basically the impact that a breaker is going to have on safety either during operations or during an accident condition. Certainly during operations you may have an unsafe or unanalyzed condition or a reactor trip, thus challenging the safety systems. When we have an accident condition, there again the impact may be an increase or change in the core melt frequency. So these are some of the concerns that the NRC has regarding this issue.

If you look into the regulatory aspect of this issue, that is the general design criteria (GDC), Appendix A to 10 CFR Part 50, and the quality assurance criteria of Appendix B, you will find certain regulatory requirements that have to be met. The first one is GDC 1, Appendix A. It requires that equipment important to safety shall be designed and tested to quality standards. To get quality, one has to refer to those industry standards I mentioned, which establish a minimum benchmark in terms of commercial-grade applications. Certainly the quality assurance criteria, number IV, says that measures shall be established to ensure that applicable and other requirements, which are necessary to ensure adequate quality, are included in the procurement documents. Then criteria VII says measures shall be established to ensure that purchased equipment and service conform to the procurement documents; that is, inspection upon receipt of the procured equipment to make sure it meets the specifications. Certainly, if procurement documents did not specify specific requirements, it would be very difficult to verify these requirements.

I refer to the question the gentleman asked earlier in terms of how do you identify or specify what are the critical operating characteristics of any equipment? I beg to differ a little bit on the response to that question. I think for certain equipment, at least in the electrical area, engineering should know what the critical parameters of the equipment are. For example, in a circuit breaker, we know pretty much the functional operating characteristics of that device. It is not necessary to duplicate every test that was done on that breaker during manufacturing, or even tests that were done during the production run, but certainly when you apply that breaker in the field we know what tests should be performed. As a matter of fact, NEMA had a standard, NEMA AB-2, which for one reason or another they rescinded recently, that specified what test to perform to ensure the operability of a circuit breaker.

Therefore, I do not think you can make a general statement that we do not know the operating characteristics of equipment. Certainly, if you go to your engineering—again, in the morning sessions and even here, reference is being made to engineering involvement, and I think this is where the engineering comes in. The engineering has to establish some benchmarks that establish the operating characteristics or performance characteristics that should be identified during procurement. Certainly, if you do not do that during your procurement, then it is difficult to verify the operability of that device.

The conclusion that NRC reached was that the refurbished CBs or non-conforming CBs do not meet the commercial-grade standards; therefore, they are not suitable for upgrading to safety-related applications. NRC took some actions to address this issue. The first item was to issue Information Notice 88-46 back in July of 1988, which basically described this issue and also provided a list of the five or six companies that were identified as providing these refurbished circuit breakers as well as a number of utilities, plants, that received certain shipments. To follow up on the information notice, there were two supplements that were issued: one was in July 1988 and the other in December 1988. These supplements provided additional information on the listing of shipments to the various plants and utilities.

Between July and November, we worked on a bulletin with extensive involvement from NUMARC. Mr. Marion of NUMARC is here, and I think he can attest to that. Also, we involved NEMA and UL to get their opinion on this very complex issue. This issue was very difficult in terms of what would be the best resolution, or best answer, so we sought the best advice and interaction. Based on the input and our evaluation of it, we finally issued Bulletin 88-10, which asked licensees to take certain actions.

Judging from the questions we have received from the licensees on this bulletin, it was apparent that licensees were not clear on what we meant by certain actions in the bulletin. Responses to Bulletin 88-10, to some degree, still indicate there is some confusion. Hopefully, at least for this group, I am going to try to go over these action items so that we can all have a common understanding of what they mean.

[Figure 2]

Basically there are seven action items in this bulletin and I will briefly go over them and perhaps take questions from you later on. We asked the utilities to review their purchase records for stored spares for safety-related applications, for traceability to the CBM, that is, the circuit breaker manufacturer.

Safety-related applications include two categories: either those breakers that have been bought as safety grade or those breakers that are stored as commercial grade but are later to be upgraded to safety grade. It basically captures all the breakers in stores in those two categories per site.

So, given that, the question might be asked, why stored spares? Well, as I mentioned, it took several months to formalize this bulletin because we went through a lot of gyrations, or what I call really painstaking evaluations of what was the best measure to go out with. What we attempted to do was to get a snapshot of what might be installed in the plant. The best way we could accomplish this with all the advice that we had, was to look at what was stored as spaces in stores so that we could get some idea, some picture, in terms of what percentage of these devices might be installed actually in the plant.

We asked that the sample include at least a minimum of 50 circuit breakers. Now for those sites that did not have 50, we asked that the licensees or utilities go into the plant for the last 5 years and include breakers that were either replaced or used in modifications to make up a minimum sample of 50.

Judging from the responses, most plants did meet the minimum of 50 circuit breakers with some exceptions. The action item also asked that, if you did find some installed CBs in the plant that you could not trace, you then prepare a JCO [justification for controlled operation] within 30 days from the time you identified that you had installed equipment with no traceability.

Now, given that the traceability of the stored spares is less than 80 percent, we thought it prudent to go into the plant for the last 5 years to assess traceability of circuit breakers that were installed as replacements or modifications to determine, to the extent possible, the number of refurbished circuit breakers that were installed. I think one of the reasons for selecting a 5-year window was, as Bill Brach mentioned, because of the nuclear suppliers going out of business and unavailability of Class 1E equipment as a result of the shrinking nuclear market. Our justification, or reasoning, was that most of these type of devices would have been installed within the 5-year period, so then, if we determined in this 5-year window how many devices had been installed, we would then be able to determine the need for further action. That is the rationale for looking at the 5-year window to see in terms of traceability of the CBs that have been installed as replacements or modifications in the last 5 years.

If the traceability of the stored spare was greater than 80 percent, then the bulletin requests that you perform tests on those CBs that you have not been able to trace. That is, to look in terms of how well they perform. Certainly if the licensee chooses not to test, then you can consider them failed. I think this iteration came as a result of questions and answers with licensees who did not want to test CBs, and NUMARC, I believe, issued a clarification on that to the utilities.

Depending on whether you chose to test and whether you had a failure rate of 10 percent or greater than 10 percent, then you would also be requested through the bulletin to go into the plant for the 5-year period to look at the installed breakers as replacements or as modifications. So, going either route, you would end up going into the plant 5-year period for verifying the traceability of the installed CBs. The rationale, again, would be that, if you had high traceability and a low failure rate, we felt you did not have a procurement problem or the equipment you procured was reasonably in good shape; that was the rationale behind those numbers.

Certainly in the bulletin we have a very comprehensive test requirement, Attachment 1. I have had a lot of discussions on that with either the utilities or with their agents who are performing these tests. Basically the criteria in Attachment 1 was based on industry standards, again, basically National Electrical Manufacturing Association Standards AB-1 and AB-2. The rationale for these tests was that if you had a breaker that was traceable you were not required to test, but the breakers you were not able to trace conceivably were considered to be substandard or falsified or refurbished; therefore, we wanted a rigorous test to make sure that those breakers would be able to operate or perform according to their operating characteristics.

This test requirement had a criteria that went beyond the AB-2, which is a standard for field testing of commercial-grade breakers and not refurbished or substandard breakers. So that is the difference between the Attachment 1 test and the NEMA AB-2 test.

Also, the bulletin requested, as of August 1, 1988, that utilities install breakers in safety-related applications to meet certain given criteria. These criteria basically said that either you have these CBs procured from, or manufactured by and procured from, a circuit breaker manufacturer under the 10 CFR 50, Appendix B, program—that is, the Class 1E equipment or safety-grade equipment—or you could procure from others, such as circuit breaker manufacturers or third-party suppliers who are not under an Appendix B program. However, in the latter case, you would need verifiable traceability to ensure that these breakers that you buy meet the minimum commercial-grade criteria to be upgraded to safety-grade applications.

Those of you who are electrical types realize that molded-case circuit breakers are manufactured under NEMA standards and inspected and tested under UL Standard 489 to ensure a quality product. This practice is basically applied throughout this country in the commercial world as well as in your non-safety plant applications. I realize that utilities do not have to comply with the code, but a lot of FSARs that I have looked at will reference the National Electrical code, which means you have made a commitment to meet that standard, and if you review the National Electrical code it basically says you shall install devices that have a UL label or certification.

As a matter of fact, in the commercial world, the National Electric code becomes a regulatory criteria because most local jurisdictions adopt the National Electrical code as a legal standard. OSHA [The Occupational and Safety Health Act] also requires that commercial facilities meet the National Electrical code.

Therefore, what we are trying to say is that at least one criterion should ensure that devices that you are going to upgrade from commercial grade to safety grade should meet the commercial-grade standard, and one way to ensure that is to make sure that they meet the UL and the NEMA standards.

There are two avenues by which you can get the safety-grade equipment: either buy it directly from the Appendix-B-type program or buy commercial grade and then verify its traceability and perform some appropriate dedication. Dedication is an area I think we still need to work on because, as of today, I do not believe we have a standardized dedication program.

Certain licensees have taken the Attachment 1 testing program and asked us if we would accept that as a dedication program—sure, I would. But you may not want to follow everything that is in Attachment 1, provided we can assure that what you are going to upgrade meets the minimum commercial grade standard.

[Figure 3]

Also there were certain reporting requirements in the bulletin. The first requirement was that licensees send us a report by April 1, 1989, to confirm that CBs that are installed after August 1, 1988, meet the criteria of Action Item 7, which addresses the option that you will either procure from the Appendix B program type of vendor or you will take commercial-grade equipment with verifiable traceability and upgrade it.

Also there was a reporting requirement to provide a summary of the total number, make, model, and procurement chain of those circuit breakers that could not be traced, to give us an idea of the extent of the problem that exists out there. Basically, it is trying to get our arms around how big an issue is this. A further requirement asked that you basically implement the actions that were requested in the bulletin, items 1 through 6.

This report was due on April 1. Also, the reporting requirements asked that, if you perform tests, you submit to the NRC the test results within 30 days of the completion of these tests. The completion was based on the number of breakers and the next refueling outage. In other words, if you had a large number, we asked you to do a minimum of 75 by the first refueling outage and the remaining by the second refueling outage, beginning after March 1, 1989.

For construction permits, submit the same report 30 days after fuel loading.

[Figure 4]

Now let me say a few words on the licensee responses to the bulletin. As of close of business yesterday, I was still counting how many responses I had received. When I was preparing this slide, I thought I would go ahead and put 50 because I thought at least I would have 50. Well, I received 49. I had 39 the day before, so about 10 of the 49 came in yesterday. So we have approximately 50 responses. The others I hope are on the way. If not, you will be getting a call from our project managers.

As far as responses go, they vary in size and quality. What do I mean by that? I have a response that is one page. It is either asking a scheduler change or it says we have done everything you asked us. Well and good. Some are over 100 pages long. Some basically are responses that do not even address what we asked for; they have taken an altogether different course.

It is very interesting. In other words, it is going to require staff resources to go through these reports. I again would like to remind you of Mr. Sniezek's comment this morning: It is the licensee's responsibility to make sure that it has a safe operating plant.

What I want to say here, is that from what we have seen in these responses, the alternatives at this point do not appear to be acceptable to the NRC unless we make a detailed evaluation. The whole idea of the bulletin was to look at the stored spares, to get a snapshot of what is in the plant. If you circumvent what we asked you to do, we have no way of getting that snapshot of the plant to determine what is installed in the plant. Stored spares is not a safety issue; the safety issue is what is installed in the plant.

We could second guess ourselves and say, why did we not check the installed CBs? But the point is that we were going to look at stored spaces to get a snapshot as to what is the extent of this problem in terms of installed circuit breakers that do not meet the commercial-grade and, further, the safety-grade criteria. Looking at those responses, which do not directly address what was asked in the bulletin, it is going to be very difficult to make an assessment as to what is installed in the plant. I guess, at this point, all we can say is that without further evaluation of those responses it is going to be hard to say they are acceptable.

Our position as far as I understand it, and I could be corrected on that—Brian, feel free to jump in if I say something that is not so. We are not, at this point, leaning towards making detailed reviews. We are going to certainly scan through the responses to determine what is in those responses.

However, again, as was mentioned this morning by Mr. Sniezek, we feel that it is the licensee's responsibility to ensure that the plant is safe, that there are no substandard, falsified, or refurbished pieces of equipment installed in the plant. Further, we want to be sure that no substandard, falsified, or refurbished pieces of equipment are stored because someday you are going to take that equipment and upgrade it to a safety application. We have a concern there. It is the utility's responsibility to make sure that it has met all the requirements for a safe operation.

However, as we go down the road, we are going to review the Bulletin 88-10 responses during our inspections of the plants to make sure and ensure ourselves that the licensees have satisfied the requirements of Bulletin 88-10.

[Figure 5]

Our basic concern with regard to this bulletin is the lack of 10 CFR Part 50, Appendix B, quality controls in procurement for equipment that is installed for safety-related applications and also in the balance of plant. I think NUMARC has an initiative that is addressing the balance-of-plant circuit breaker issue.

Let me address the safety significance of refurbished CBs installed in the plant. At this point, we do not have an exact answer from the bulletin responses unless we do a safety evaluation of the circuit breakers in terms of a PRA [probabilistic risk assessment] to the extent that they can be included in the various cut sets to determine their impact on safety. Our sense is that it is going to increase the core melt frequency. The question is how much. I do not have an answer to that, but certainly we are concerned about the safety significance. We are also concerned about the dedication programs for the commercial-grade equipment that is going to be used in safety-grade applications.

Now, after having addressed the safety concerns, what is the rationale for allowing plants to continue to operate? Certainly we looked at this issue, rationalized in our minds in terms of how big a safety issue this might be. We looked at the rationale and considered it prudent to allow the plants to continue to operate while we evaluated this concern. As you can see on this slide, there are redundancies provided for accident mitigation capability. Also, installed CBs are tested periodically in accordance with the licensees' technical specifications. Perhaps not all, but many of those CBs are tested on a rotating basis. So we will verify the operability of the CBs by those tests.

Few refurbished CBs are expected to be installed in the original equipment, that is, during the initial installation. Our concern is really with circuit breakers being installed as replacements or modifications. Operating experience does not indicate a high CB failure rate. Perhaps this is because we do not have sufficient data. Nonetheless, the data we have available does not indicate a high failure rate.

Lastly, the normal function of a circuit breaker in service is to carry current; therefore, if it is a marginal circuit breaker, it will end up as a failure and its operability will have been demonstrated. The concern, however, remains with those circuit breakers that are called upon to close and then spuriously trip. Those are the ones that we do not have adequate knowledge about in terms of their operability.

This summarizes my comments on the refurbished circuit breaker issue and the bulletin description. Thank you.

Mr. Grimes:

Thank you, Paul.

The last paper will be presented by Max Clausen. He will address the initiatives related primarily to the advanced notice of proposed rulemaking, which has been published and which you are all encouraged to comment on during the public comment period.

Contemplated Changes to the Regulatory Approach

Mr. Max J. Clausen:

Thank you Brian.

I think I have just figured out what the Academy Awards are about. At this point in the program everyone is saying hurry up, hurry up, we are going to run out of time and the TV is going to be turned off.

Good afternoon.

As my first viewgraph *[Figure 1]* shows, we are talking about four kinds of issues here. I will focus mostly on the advance notice of proposed rulemaking. I should make some mention of the fact that we have a long list of bulletins, information notices, and a couple of generic letters that relate to this subject. I will focus on one of those, Generic Letter 89-02, for a moment or two. I will also mention some industry initiatives in this area.

The NRC published an advanced notice of proposed rulemaking [ANPR] on March 6th. The title is officially, "Acceptance of Products Purchased for Use in Nuclear Power Plant Systems, Structures, and Components," and I am going to call it the ANPR.

[Figure 2]

The purpose of this ANPR is to give notice about an issue of concern to the NRC. The gentlemen that preceded, Mr. Brach, Mr. Baker, Mr. Gill, Mr. Grimes, Mr. Sniezek this morning, and Dr. Murley, have all touched on the quality of products in nuclear power plants. I can venture to say that Bill Brach and Brian Grimes are intimately familiar on an every-other-week basis with the EDO's [Executive Director for Operations, Mr. Victor Stello] personal interest in this subject of product acceptability. They get together and try to explain to the EDO why we should not shut down all the plants if all this bad stuff is out there. That is basically the background and the reason why there is an ANPR—because the concern is real. The EDO keeps asking, "Tell me it is not a safety issue or we will shut it down."

The ANPR goes on to request a lot of information. It asks about 100 questions. It reflects the fact that we do not believe we have the answers and we hope the questions will stimulate some constructive ideas. As I mentioned, Mr. Brach, Mr. Baker, and Mr. Gill talked about some specifics. The ANPR recognizes that Appendix B to 10 CFR Part 50 articulates the quality assurance criteria for design, procurement, receipt, and testing and so on and so forth to ensure the quality of products that are used in all the activities at nuclear power plants. Appendix B was put in place with the idea that such criteria would allow licensees to detect products that were substandard. However, it was not the intent of Appendix B to detect counterfeit or fraudulently marketed products.

Recent experience, as expressed in the generic letters and the list in the appendix to the ANPR, shows that Appendix B does not work—in fact, because it was not designed for that purpose—to detect fraudulently marketed or counterfeit products. In fact, Appendix B is probably doing what it is supposed to do, which is to help people figure out how to detect substandard materials, but not to detect when people lie, cheat, and steal.

Therefore, the NRC is considering additional requirements, regulations, specifications to provide confidence that the plant systems and structures and components will perform as required to protect public health and safety. It is a data-gathering device.

We are looking to the industry, the utility industry—people who procure the products, engineers who are involved in specifying components, people who do testing, people who do receipt inspection—to help us put together a mechanism to solve the problem. We are currently fighting fires: We are worrying about refurbished circuit breakers that were not supposed to be refurbished and substandard materials being used in flanges. In each case, when we identify a problem, NUMARC, the NRC, and the individual licensee jump in and do what they can to cope with the individual issue.

The purpose of the ANPR is to try and figure out if there is not a way to approach this issue proactively, before it becomes a problem. We are looking for the technical and programmatic issues that will provide us with a higher degree of assurance that quality products will be installed in nuclear power plants. However, keep in mind that the ANPR is not a proposed rule: There are no answers proposed in the ANPR; it just asks for information.

The reason that we are asking questions in the ANPR is because we believe that the industry has the expertise that is necessary to solve this problem and we would like to work with you to do that.

In a closely related effort, as shown by the next viewgraph *[Figure 3]*, we have issued Generic Letter 89-02, "Actions to Improve the Detection of Counterfeit and Fraudulently Marketed Products." It was issued in March. I have a few copies if you just cannot stand to go away without one today. It has been mentioned: Mr. Brach talked about some of the elements that are in the generic letter.

What we basically have in that document are a number of elements that seem, from our experience, to be working. The facilities that we have inspected that have strong engineering involvement in the whole process seem to be more successful. That goes from the guy who decides that we need some widget to defining what that widget is and what it is to do. This answers part of Pat McDonald's question on how do we get to the critical characteristics. Well, somebody has to decide you need the widget, and from there all the way through the process you really need to have engineering involvement; even to the point of evaluating the results of installation and testing at the end in order to ensure that what you have is what you need.

When we find strong engineering involvement, we find programs that seem to be more successful at detecting even fraudulently marketed items. Again, effective as opposed to adequate inspection and testing. You need to be checking the critical characteristics in order to ensure that the item you bought is going to do what you need it to do.

We have had some discussion about audits of vendors and sources. The depth of the audit, the audit team composition, and the focus of the audit are all points that need to be considered before specifying the procurement. If you do not ask, you may not have access to the vendors and/or their contractors to determine whether or not they are doing the things that need to be done in order to ensure the quality of the product.

I would like to go over a point that Mr. Baker made, adequate versus effective. Adequate meets our requirements. Adequate says that you probably will not be cited for a violation. Adequate is what is being done most everywhere. But effective is the difference between the possibility of having something installed in the plant that may not function some day as opposed to working beyond Appendix B, which was not intended to detect fraudulently marketed material.

Generic Letter 89-02 is important for one more significant item that is not on the viewgraph. If I were asked to recommend a regulation that would go forward, the elements that are written in 89-02 are what Max Clausen would recommend to management and the agency as the elements that belong in a change in the regulation. Absent new information and given that I have this job when the rule comes out, that is the sort of thing you are going to see in the rule. I do not believe that is necessarily the best answer to the problem, but it is the only answer I have today.

In the fourth viewgraph *[Figure 4]*, there are a number of industry initiatives that I specifically want to recognize because industry is working hard. NUMARC is doing some good things. They have participated in helping us address the flange problem. When we have gone to them with a problem, they have been responsive. Additionally, EPRI is working with NUMARC to develop a number of guidelines that will help the industry in dealing with these issues.

In the generic letter, we endorsed some of the methods in the guideline from EPRI on the utilization of commercial-grade items in nuclear safety-related applications. Mr. Brach mentioned that. The guideline provides methods that we agree will work in the dedication process. I do not know of any other document that we have endorsed, that actually says, if you use this you are probably going to be able to get through the dedication process without any flack from us.

In addition, EPRI has a working group to develop a guide for the technical evaluation of replacement items. This is of interest to us for the same sort of reason: If there is a way to go about doing the technical evaluation that we can endorse, then we would like to get that on the street so everybody can use it.

A third effort is related to the development of a guideline addressing audit methods and receipt inspection activities. Again, this is the sort of thing we believe will strengthen existing programs.

NUMARC has been supporting these activities through working group efforts as well as through workshops that it is conducting to spread the word on this. All of these activities are a very positive thrust from our perspective.

My closing comment is that the nature of further rulemaking will depend on the NRC's analysis of the responses to the questions asked in the ANPR and on the effectiveness of industry initiatives to improve assurance that substandard, counterfeit, and fraudulently marketed products are not used in nuclear power plants.

We are concerned. We believe there is an opportunity for us to find a way to protect against fraudulently marketed material. We have not made a decision on a rule. The generic letter states that there are some good things you can do. However, if things do not get better, I am confident that the NRC will publish a rule of some nature.

That concludes my talk. Thank you.

I think Brian has a question or two.

General Questions/Answers

Mr. Grimes:

If I could have the panel come up and join me on the platform, we will go through the questions we received. Uldis Potapous, if you would come up also. Uldis is another section chief in the Vendor Branch. I am going to stand so we have enough chairs.

I will start out the questions and answers with one that I probably should have set the stage for before.

QUESTION: Is the NRC considering civil and/or criminal actions against known vendors operating fraudulently for profit to discourage future fraudulent activities?

ANSWER: I would like to take a minute to explain the process. When we get information that something may involve criminal wrongdoing, we involve our Office of Investigations, which has trained investigators. We work on two tracks: we work a technical track, and they work the criminal track. The one rule we have across the board is that safety always prevails. Therefore, even though a release of certain information in generic communications such as bulletins or information notices may decrease the eventual ability of the Justice Department to prosecute, we still go forward with what we need to do to ensure that the safety of the nuclear power plants is preserved.

Once we assure safety, we try to maintain the integrity of the investigation process. For example, we may not release related inspection reports until the investigation is completed. When the investigation is completed, the case is referred to the Justice Department for their consideration. They may choose to prosecute.

We just had a case, we issued an information notice within the last couple of months that cited a couple of convictions in this area. One of them started in 1985. Sometimes it takes a few years to get through the court process, and although we do not get really fast action in these cases, we do get some successfully prosecuted.

We will take one question each. We will start with Bill Brach.

Mr. Brach:

I will read the question I have on the top of the stack.

QUESTION: Are all refurbished parts and components that include such parts by definition substandard?

ANSWER: The short answer to the question is no.

Some equipment is designed to be refurbished during routine maintenance in the power plant activity. There are a couple of questions that evolve around the refurbished aspect. One, is it equipment that was originally designed to be periodically refurbished? If it is not, then it would be an inappropriate type of refurbishment.

The second question with regard to refurbishment:

QUESTION: Is the buyer, the licensee, and the utility aware that in buying this item, piece of equipment, that it has been refurbished?

ANSWER: There are a couple of different aspects to that question. You could be buying an item that was designed to be refurbished, but the utility, the buyer, needs to be aware if it has in fact been refurbished since original manufacture. Secondly, if it has been refurbished, you need to be sure that it was refurbished with quality parts and with a commensurate quality program.

Mr. Baker:

This question has to do with the fasteners.

QUESTION: The sample size of both safety-related and non-safety-related fasteners was too small to be statistically significant with high competence for individual plants. Will statistically significant samples be required for individual plants? What follow-on action for fasteners is contemplated?

ANSWER: During the talk I said that the principal reason for issuing the bulletin was to determine whether or not we had a counterfeit problem with fasteners within the nuclear power industry. It was not intended to be a statistically significant sample. We were not trying to show that all fasteners are good, or even provide a basis by sampling that they are good.

In my paper, I did not say it during the talk, but in the paper on the bottom of page two, I gave some numbers on—call it counterfeit fasteners—in particular, SAE Grade 8 and Grade 8.2 fasteners. We did determine that there were counterfeit Grade 8.2 fasteners that had been marked as Grade 8 and 5.2 fasteners marked that had been marked as Grade 5 within the nuclear industry. However, it was determined that this was not an issue for the nuclear industry because those differences are not significant until you hit temperatures of between 550 and 600 degrees Fahrenheit. Therefore, we did not consider this a significant problem for the nuclear industry.

Mr. Grimes:

I guess, in general, we have decided, as far as fasteners are concerned, we do not have a major counterfeiting problem. However, we do expect that when you found a fastener that was significantly out of specification, you followed up and determined for yourselves whether that was a result of fraud or not. Our inspectors will follow through on the relatively small number of cases in which we believe fasteners were significantly out of specification to see how good a job you did in that area. However, we do not intend to require more samples of fasteners at this point.

I do think more receipt testing is one of the possible solutions to assuring fastener quality. Therefore, in the long term, we will be looking for initiatives that encompass a better assurance of quality for the fasteners in general.

Mr. Gill:

I have a remark from Alex Marion of NUMARC. It says, "I believe it appropriate to note that NUMARC, NEMA, and UL did not fully concur with Bulletin 88-10." That is true, Alex. I was just trying to save time.

The fact is that Alex is correct. We had a lot of interaction. NUMARC came in and said we should do and not do certain things, and NEMA and UL said we were all wet behind the ears for providing this testing program to verify the function and performance of these breakers. In fact, I read a press report that said, "NRC turns deaf ear to UL and NEMA."

Given the extent of comments that varied from UL and NUMARC and NEMA about what the objectives were, I believe the NRC took all the comments in good faith and made the best evaluation. We evaluated the safety significance of the issue and used our best judgment to come up with what we thought was the most appropriate action that we needed to take as regulators.

Certainly we were open to reason: we listened, we exchanged ideas, and we exchanged rationale back and forth. However, that does not mean that we had to agree to everything that NUMARC or NEMA or UL had to say. I think, as regulators, we are responsible for making the best decision we can with the information available. Nonetheless, I would like to correct myself and note that we did not have full concurrence or agreement with these groups.

Mr. Clausen:

QUESTION: When referring to engineering involvement, are you referring to design engineers or does this include procurement engineers, quality assurance engineers, and so forth?

ANSWER: You really need the engineering expertise that is appropriate for the job that is being done. If it involves design in the front end, the design engineer has to be involved in identifying those technical characteristics that will help ensure that the device will perform the necessary function. If the expertise you need is later in the program to ensure that you have the right audit team going to visit a vendor's facility, it is probably a quality assurance engineer.

So again, that is a matter of applying the appropriate resource at the appropriate time. The one person I believe who does need to be involved from beginning to end is the engineer responsible for the performance of the component, who understands what is going on all the way through. He has to be able to review the test results. He ought to be able to review the material certifications and any material testing that is done.

Mr. Baker:

One other comment I would make with regard to procurement engineers, because I have been asked before, is that in some cases utilities employ people who do not have an engineering degree and do not really have a lot of experience in the engineering world, but the utility will call them procurement engineers. Basically they process procurement orders. That is not what we mean when we say engineering involvement. We are talking about someone who has a technical background in, as Max explained, the area involved.

Mr. Potapovs:

QUESTION: What is the current status of dedication with regard to electronic component piece parts such as resisters, capacitors, transistors, et cetera? Do such piece parts used in the repair of safety-related components have to be dedicated?

ANSWER: The answer would be yes. I think the proper dedication process, or an effective dedication process, for any commercial item that will wind up in safety-related service would need to consider the critical characteristics of those parts.

Without getting into a lot of detail on what one should consider critical characteristics of such electronic components, you could certainly assess the need to do such things as verify by markings or identification as well as determine the need to perform certain electrical tests on these parts. Specifically, when these types of parts are used to repair components that may have been dedicated as a unit, wherein the dedication of the unit itself, or the safety-related procurement of the unit, may have included some burn-in tests or some functional tests before accepting that unit as a safety-related component, I would think tests would be required.

So the answer would be yes, the critical characteristics ought to be defined and they ought to be included in the dedication process.

Mr. Grimes:

Let me take another one myself.

QUESTION: Has the NRC audited the various utility dedication programs? If not, what are the plans for the near future? If yes, is there a good example program?

ANSWER: The answer is yes. About once a quarter the Vendor Branch inspectors go to a utility's facility and look at both the interface for technical information between the utility and its vendors and also the utility's procurement program. We have identified a number of deficiencies in dedication programs during that process and have identified specific examples of components that could not perform or not be shown to perform their intended function.

I would say that we have seen a spectrum of programs. Most of the better programs are of very recent vintage, however. In consonance with my theory that it is not the program, but mostly the inplementation of it that is critical, I guess I do not want to point to anybody as being the star in this area, but I think if you talk among yourselves you will find out what various people are doing in this area.

Also we intentionally do not go very often to good performers. Once in awhile to try to get ourselves calibrated. But for the most part, we go to those plants at which there might be problems. So we deliberately tend to run into the lower side of the dedication process spectrum.

Mr. Brach:

QUESTION: Have problems or concerns of the NRC resulted from procurement of safety-grade products from cancelled plants?

ANSWER: The answer is, not as a class of its own. As you may recall, the earlier discussion with regard to traceability of equipment is a key issue to the concern about utilities buying material from a cancelled facility. But as a class by itself, the answer is no.

Mr. Baker:

QUESTION: Can you provide a few examples of operationally safety-significant problems occurring as a result of improper dedication of commercial-grade equipment for safety-related use?

ANSWER: I can provide a couple. Some others I really cannot discuss in detail. One that we can discuss is a known instance that took place a couple of years ago with regard to some solenoid valves that were supplied to a BWR [boiling-water reactor] by the NSSS [nuclear steam system supplier]. Those valves were purchased commercial grade and turned around and sold as nuclear grade. When those valves were called upon to operate, we had a slow insertion of five control rods. So that is one instance where, in fact, the dedication was nothing. They were in a sealed box; they came to the NSSS in a sealed box; they went out in a sealed box.

There was also an instance recently of some failures in a plant with regard to the molded-case circuit breakers: one in a bench test and one in operation. The example I gave earlier Masoneilan valve parts was a failure in service. There were also some additional nonconformances found when the items in the warehouse were reviewed.

One caution I will make is that all of these examples came about as a result of normal operation. That does not tell you what would happen in the event of off-normal operation. It does not tell you what would happen to equipment in an earthquake or in a harsh environment that is not there normally. The question does not address the real issue which is: Sure, you can do a functional test and maybe the part operates during normal operation, but what about the ends of the design parameter, just at the border of the envelope? What is going to happen then? The results we see in terms of testing do not address that. We talk about failures during normal operation.

Mr. Gill:

The question I have deals with commercial breakers and fuses.

QUESTION: Whereas UL and CSA provide valuable independent verification of very-difficult-to-demonstrate capabilities, such as interrupting capability, what about non-UL listed or recognized electrical components?

ANSWER: I guess the question really is, can we use non-recognized or non-UL listed components in the plant? My sense of this is that, if in the FSAR the licensee has made a commitment to use UL-listed or NEC [National Electric Code] requirements, then by virtue of those commitments you have no choice but to meet those commitments. If you have not made those commitments, then I would refer you back to the acceptance verification of such devices and leave it up to the licensee in terms of how effective a verification program that it wants to perform. We do not have something on the books that requires the licensee to install equipment that is UL listed other than GDC 1 that I mentioned in my presentation. To us, quality means industry standards and we consider UL, IEEE, and NEMA to be industry standards.

Now, void of that, I suppose one could rationalize and go a step further and evaluate this non-recognized, non-listed component that you have procured, or are thinking of procuring. You need to evaluate what kind of quality assurance program to have in place. Then evaluate it to the extent that you can and compare it to the existing industry standards. If it does meet the standards, then one could provide the justification for installing something that is non-listed.

I hope I have answered that question.

Mr. Grimes:

I would just add that we always expect you to do a rational engineering job. Just because you get a recommendation from a vendor to do something does not mean you should do it until you have decided through an engineering evaluation that it does apply to your facility and it is the right thing to do. The same applies in a lot of other areas.

Something you said, Paul, reminded me that I wanted to clarify one item with regard to balance of plant. We are concerned with balance of plant not just because you may use a component in a safety-related process after you have dedicated it, but also because use of that component, if it affects the balance of plant, could either challenge safety systems or complicate greatly the response to an accident if that non-safety-related system did not work. So we expect good engineering throughout the plant, and we expect you to pursue all areas on that basis.

Mr. Brach:

I have a two-part question, which is another way of saying there are two questions on one card.

QUESTION: What would the NRC suggest a utility do to determine original design requirements when the vendor claims that that information is proprietary?

ANSWER: The point I would like to stress is that utilities should presently be in possession of their original design specifications. If this is a situation where the architect engineer is not allowing a utility access to the original design specifications, I think that is an issue of its own. However, the utility should be in possession of sufficient original design basis engineering information to identify what was identified by the architect engineer maybe 10 years ago, 15 years ago, as the engineering design specifications relevant to the item or the component or subcomponent for which procurement is now being planned.

> *QUESTION:* What if a utility could determine that material is a critical characteristic, but could not provide specific information to allow verification during receipt?

ANSWER: If you recall my earlier discussion with regard to establishing receipt inspection dedication testing to confirm the acceptability as well as the presence of those aspects that have been identified to be critical characteristics, I said this could be difficult. If, in fact, that cannot be done during receipt inspection or dedication testing by the utility, a question would be raised with regard to the capability of an intermediate supplier to do that testing. This, I think, takes you back to the original equipment manufacturer, which is an area of concern because of the traceability factor when you need to address those aspects that subsequent receipt inspection or testing cannot confirm through nondestructive-type tests on the component.

So the answer to the question, I believe, is that if you cannot, through testing during receipt and dedication, confirm the acceptability of those aspects that are identified as critical characteristics, then you are probably in the mode of going back to the original equipment manufacturer to establish a mechanism by which those material characteristics can be established and verified and qualified.

Mr. Baker:

This question is related to the last question I had.

> *QUESTION:* What can be done to limit the impact on utilities of the massive and expensive testing programs that NRC has required in response to the discovery of small amounts of counterfeit substandard material, especially in light of the minimal actual safety impact that has been found?

ANSWER: I will address the last part first. We were not able to determine that the effect was minimal until after the testing was done—that is, first of all. My comment during the presentation is that when you know that counterfeit and fraud is involved, you do not know where you stand on those first initial results. So I think we need to start with that preface: you do not know and you have to find out.

Secondly, I do not know if there is anything the NRC can do to minimize your cost. In terms of what the industry can do, there are a lot of things that are being considered under the NUMARC program and I think the NRC is supporting those efforts. There is nothing that prohibits joint procurement, for example, which would give you leverage with the manufacturers and reduce individual costs.

During procurement inspections, I have seen utilities go out and buy three bolts. It cost more to cut the purchase order than it did to buy the material.

In addition, there are several joint audit programs going on. There are at least two people that have come up and talked to me about setting up joint testing laboratories—five, six, seven, or so utilities getting together on a regional basis to set up testing laboratories.

In terms of material, meaning the two out of the three major bulletins that have gone out recently on counterfeit and fraud, my position is that on the fasteners and the flanges some sort of sample testing on receipt would have given you enough information to know up front that you had a problem.

So I think you are not going to see solutions out of the NRC on that side because we are not in the cost business. However, I think there are a number of industry initiatives that are set up and are in progress to address that issue. I think the industry is going to have to address that themselves.

Mr. Grimes:

I guess I would add that when we do identify a specific technical item, we are amenable to aggressive industry proposals to deal with it. I thought the flange issue was well handled by NUMARC. It avoided everybody going in and testing, and taking out all flanges. It tested a fairly good sized sample that provided a technical basis for the next actions in terms of determining safety significance. I think if that kind of a response is put together by the industry, the NRC will not have to specify extensive actions itself.

Mr. Gill:

> *QUESTION:* If the licensee is having the OEM, that is, GE or Westinghouse, refurbish an obsolete CB and that CB was originally provided as commercial grade, that is, 15 or 20 years old, how can the OEM verify that it has the correct drawings, engineering data, critical changes, et cetera? Also, how can the licensee verify any of this

if the position of proprietary information is used by the OEM?

ANSWER: First of all, let me answer this indirectly. We looked into the refurbishment programs in the industry. There is no such program that exists that is sanctioned by NEMA or UL that allows refurbishing of these breakers.

Mr. Grimes:

We are talking about molded-case circuit breakers.

Mr. Gill:

I am not talking about the . . . power circuit breakers, which can normally be refurbished. That is, you can replace parts on those under the manufacturer's specifications.

The molded-case circuit breakers that are sealed cannot be refurbished. There is no authorized program.

If you do send a breaker, a sealed molded-case circuit breaker, back to the manufacturer for refurbishment, it is my understanding that the manufacturer has to make it as a whole new breaker, just as a breaker in the production run would be made. In other words, the manufacturer has to go through the same process of controlled inspection by UL, by his own quality assurance, and so on.

So given that you have found a manufacturer that is willing to refurbish, I think the cost might be prohibitive. It might be cheaper to buy a new one than refurbishing an old one. Notwithstanding that, if you did find somebody to refurbish the circuit breaker, he would essentially have to make that breaker as a whole new breaker. So I think the cost incentive is not there. If the manufacturer did not have the correct drawings or engineering data, then certainly the breaker could not be made as new to the original specifications. So the answer to that is you would just have to discard that breaker and go to something else.

Mr. Grimes:

Certainly, looking at the outside of a breaker does not determine whether it has been used before.

Mr. Gill:

Again, how can a licensee verify any of this without the proprietary information? As far as the circuit breaker is concerned, there is sufficient information in terms of testing the functional characteristics or performance characteristics of a breaker so that the licensee does not need any proprietary information. There are enough tests, for example, in attachment one to the bulletin that you could perform to verify operability.

Mr. Grimes:

Do you remember when I spoke about the rationale that the NRC used in arriving at the testing requirements in Bulletin 88-10? We basically looked at a safety significance, we looked at the capability, the interrupting capability for example. Although the interrupting capability is important for circuit breakers from a fire point of view, we felt, given the redundancy of the system we have, that perhaps it was not the most critical operating characteristic that we needed to verify. The only way you can verify the interrupting capability is by destructive testing and we did not feel the need to do that.

I think you can develop a rationale and not need to go to proprietary information. There is enough information in the public domain that exists so that you can make certain judgments on electrical equipment.

Mr. Potapovs:

QUESTION: If a supplier has a policy or procedure for defect evaluation and client notification, and this program has been evaluated for compliance to Part 21, is it permissible to invoke the policy and procedure in the procurement document in lieu of regulations of Part 21?

ANSWER: The answer, in general, would be no. Part 21 is fairly specific in defining the commercial-grade procurement. If a procurement does not meet that definition, then Part 21 would be applicable for a basic component as defined in the regulation.

Typically, if you deviate from a catalog description in your procurement of the item and invoke specific requirements, that would suggest a nuclear application at a licensed facility and Part 21 would have to be invoked by the licensee. It would also be self-invoked by the vendor accepting the order.

Mr. Baker:

QUESTION: In your opinion, what is the best way of implementing the engineering involvement in the procurement process? For example, should there be a separate procurement engineering group as part of the design engineering organization, or should it be an engineering staff "matrixed" under the procurement organization? In your opinion what has or will work best?

ANSWER: Actually, there is no right way. We have mentioned or discussed some aspects where engineering has not been involved in the process. I think the way the question is written indicates that the author is thinking along the lines of there being different types of organizations. You can have, for example, line organizations that work and others that do not. You can have examples of "matrixed" organizations where they work in some cases and in other cases not.

Again, by the thrust of the question, the point is that engineering needs to be involved in the procurement process. It is germane to the individual utility as far as how that organization best works with line responsibilities and accountability or, in the matrix sense, if various staff can be assigned from one organization to another.

Mr. Gill:

I wondered if I would get this question. Most of the telephone calls that we received with regard to Bulletin 88-10 included this question.

QUESTION: What is the NRC's definition of verifiable traceability to the CBM?

ANSWER: Bulletin 88-10, Attachment 2, provides a definition. Perhaps the person asking the question did not see that attachment; let me read it.

It says: "Verifiable traceability. Documented evidence such as certificate of compliance that establishes traceability of purchased equipment to the CBM [circuit breaker manufacturer]. If the certificate of compliance is provided by any party other than the CBM, the validity of such certificate must be verified by the licensee or permit holder through an audit or other appropriate means." I am happy to say that we have a traceability expert here sitting among us in the right-hand corner, and I will defer all questions to him. He is our expert, Uldis.

Mr. Potapovs:

I think that was a proper definition. I have seen several different amplifications on this definition, probably the most common being that the utility has contacted their intermediary supplier and the supplier has provided assurance to the utility that it only buys breakers from the original equipment manufacturer. The utility then would consider this a satisfactory response. However, that would not be a satisfactory response to the traceability criteria that was just read.

Mr. Grimes:

I am going to take two more questions and answers, and then we will call the formal part of the session to a close and let the reporter go, but we will stay here and keep answering questions as long as the individuals who have the questions that have not been answered want to hear them.

Mr. Brach:

QUESTION: You mentioned going back to the original design basis to provide the item specifications. For vendor audits, is it prudent to question the original engineering associated with that basis, or should it be accepted at face value?

ANSWER: There are two answers to the question. One, whether involved in procurement or any other ongoing utility activity, if there is reason to question the correctness of the original engineering, the obvious answer is definitely that you should take a look at that engineering basis to determine if it is valid. That holds true whether involved in procurement or other activities.

Putting that aside, with regard to the procurement, the point we were mentioning earlier is going back to the original design basis to obtain the identification and specifications for that item, component, subcomponent as it may be germane to the procurement specification.

Mr. Baker:

QUESTION: Is it acceptable to accept material from an ASME certificate holder who has been approved on the basis of an ASME certificate only? That is, approved by the customer, no audit by the purchaser was performed, and the customer is accepting it on the basis of a receipt inspection that looks at the visual, dimensional, and documentation aspects only—documentation being the certified material test report.

ANSWER: The person asking the question referenced Information Notice 86-21.

The answer is no, it is not acceptable to do that. Information Notice 86-21 states that the ASME accreditation program was approved for, or accepted for, qualification and placing someone on the approved vendor's list only. An implementation audit is still required if you are going to use the CMTRs [certified material test reports] or CMCs issued by that ASME certificate holder. So you still have to do an implementation audit.

Mr. Grimes:

Let me make two administrative announcements and then wrap up the formal part of the program.

There is a reception at 5:00 tonight in the Colonial Room. You are to use the main elevators to reach the lower level for that reception. You are all invited

Second, if you would please check your telephone messages on the wall as you go out.

With that, I thank you very much, and anybody that wants to stick around and get an answer to their particular questions are welcome to do so.

4 SESSION 3: EVALUATION OF PLANT PERFORMANCE

Mr. Frank J. Miraglia:

Good morning ladies and gentlemen. I would like to welcome you to Session 3 of the Regulatory Information Conference. My name is Frank Miraglia. I am Associate Director for Inspection and Technology Assessment in the Office of Nuclear Reactor Regulation. I have to read that, which is one of the reasons I do not have a business card—my wallet is not big enough.

Before we start this session, Dr. Murley would like to address a question that was asked at last evening's reception. Before we get started, I would like to introduce Dr. Murley and give him an opportunity to make some comments.

NRC's Crash Effort To Update the TMI Action Plan

Dr. Thomas E. Murley:

Thank you, Frank

One question that came up yesterday in the plenary session, came up in the afternoon, and also came up in some of the hallway discussions and conversations appears to need a little more explanation and discussion.

> *QUESTION:* Why did the NRC find it necessary to go out to the utilities on a crash basis and ask for an update of the TMI action items and why was it necessary to require this information on such a hurried basis that people had to work over the weekend?

ANSWER: I will explain it.

It is not the most glorious chapter in NRC's history, but nonetheless I believe in facing up to facts and explaining them.

It came about as part of the 10-year celebration of the TMI accident, so to speak. The NRC had put out a report that summarized the results of what we had done since TMI, particularly our response to the Kemeny Commission recommendations. That report was thought of at the last minute; the staff had only about a week or so to put it all together and it was typically a crash effort.

At the same time, or soon thereafter, Congress sent us a request for an updated evaluation of the TMI action items, particularly a printout of the SIMS results. The SIMS is the safety information management system, which is a computerized system that we have for keeping track of all the actions.

Now just to put it in perspective, the amount of effort, the post-TMI actions amounted to over 10,500 different actions, integrated over all the plants in the country. That gives you an idea of the scope.

In addition to those 10,500, there have been another some 6,500 generic actions that stem from the Salem ATWS [anticipated transients without scram] and from closing out generic issues. Thus, there are some 17,000 generic issues that we have to track for: the status, whether they have been implemented, whether they have been verified, whether they have been inspected against, and so forth.

In addition, there are the vast number of technical specification amendments that we get that are plant specific. So it is quite a large burden that we have to keep track of.

We sent the printout over to Congress thinking that that would be the end of it. But, of course, as you might expect, some congressional staffers went through line by line apparently, and they noticed a discrepancy between what we had sent in the SIMS listing and what we had put in the report on the response to the TMI accident. Subsequently, another letter was sent to the Chairman asking why there was a discrepancy between the reports. The NRC staff put together another run of SIMS, which showed yet another set of data. Although I was not in the Chairman's office when the reply went up for his signature, I can imagine his consternation when it appeared that we had not provided the correct information to the President or the correct information to Congress and we still did not have correct information.

The Chairman says, "I want it fixed. I want an all-hands effort, and I want it verified by the industry that this is right."

So that was the genesis for the effort that resulted at the end of last week in my sending a letter to each of the utilities asking for verification of our understanding of the status of the TMI actions. It is fundamentally an NRC problem; I admit that.

Does it involve some of the same things that I put on my charts yesterday? Yes, it does. We have gone through our preliminary root-cause analysis, and I can tell you that there are a couple of problems that have popped up. One is we did not have a good QA program on the data that was in SIMS.

I had thought it was up to date. It turns out it was not. It turns out that we did not have a good system for controlling what went into SIMS and for making sure that the periodic updates of SIMS are frozen, let us say from month to month, and for comparing one version of SIMS data to the next version. We are going to fix that.

There is also an element of accountability. When I looked at our organization, I did not have a single person in charge of keeping the data up to date. We are going fix that too.

It occurred to me that you probably did not get a detailed explanation as to what happened. Of course, we have data and the information we give to Congress is accurate. That basically is the reason we did what we did.

I apologize for the inconvenience and the effort it is causing you. I think we are going to use the information that we get now as the baseline set of data. Any further changes will be recorded so that we have a clear paper trail from now on.

Thank you.

I guess if there are any questions now I can take a couple. There is one in the back.

Voice:

Tom, I wanted to ask you that question yesterday, and I would like to thank you for the explanation. I speak for our company, and we are all ready to stand behind you.

Dr. Murley: Thank you, Pat.

Voice:

I would add one consideration and that is that we obviously had to do that. On the other hand, I think it probably cost somewhere between two, two and a half, or three million dollars to do that. And that is what we have to spend, and if you work with us, to make a big point of it to make us feel like we are managing our business in a most cost-effective way, we would all appreciate it very much.

Dr. Murley:

Okay, thank you. I appreciate that comment.

Mr. Miraglia:

Thank you, Tom.

Session 3 of the Regulatory Information Conference deals with performance evaluation. Yesterday I made some remarks, broad remarks, about performance evaluation and indicated that there were a number of tools in our toolbox with respect to evaluating licensee performance. We are going to hear about some of those things in this morning's session. SALP [systematic assessment of licensee performance] trends will be discussed by Mr. Bert Davis. New initiatives in developing performance indicators will be discussed by Tom Novak. Maintenance inspection is a form of a special team inspection that gives us the ability to focus on certain areas of concerns, and Tony Gody from NRR will be talking about the maintenance inspections that have been conducted to date.

The last item should read equipment operability. Although tying equipment operability to the theme of this session, perhaps, is a little stretched in the day-to-day operations of the facility, facility management has to make determinations about the operability of the equipment. They have to determine what that means in relationship to the technical specifications and the licensing basis of the facility. We have had a number of issues and concerns come up in this area with relation, in part, to the safety culture of the facility, mindfulness of equipment operability, and consideration of what degradation of equipment means to the safe operation of the facility. These issues will be discussed by Gary Holahan.

As I indicated, Bert Davis will talk about the SALP trends. He will talk a little bit about the SALP process and the evolution of that process since its inception shortly after Three Mile Island.

Bert Davis, as most of you probably know, is the Regional Administrator, Region III, and it gives me pleasure to introduce to you Bert Davis who will discuss SALP trends.

SALP Trends

Mr. A. Bert Davis:

Good morning, ladies and gentlemen. My topic today is SALP trends for operating reactors. I plan to discuss four areas. These are: First, the purpose of SALP; second, SALP history the emphasis that we are currently putting into the SALP evaluations; third, the process used to arrive at SALP category ratings; fourth, I am going to share some data with you. Seven figures: The first three are industry-wide trends of category ratings for various functional areas and the last four are SALP ratings versus time, SALP ratings versus availability, SALP ratings versus NRC performance indicators, and finally, a histogram of SALP ratings versus the number of units.

I expect that most of what I say today will be in the form of a review to you. In fact, as I prepared the talk, I wondered how I was going to cover anything that all of you would not already know.

Some people have told me that is not the case, but I happened to be talking to one of the Region III licensees this morning and he indicated to me that he had read the talk. He had also gone over the SALP procedure in detail several times with the resident inspector and essentially was well aware of what was in the SALP. It pleased me to hear that. So I am hoping that what I have to say today will be primarily a review for all of you.

The SALP program, of course, is an integrated agency effort to collect agency insights, data, and other information to assess and better understand the reasons for a licensee's performance.

Now, note what I said, insights, data, and other information. This means that SALP is not a totally objective tool. There is a lot of subjectivity in it. It is a combination of subjective and objective evaluations and information.

The product of the SALP report is used by the NRC to improve and manage our own program; and we hope that it is used by licensees to focus attention on their strengths and weaknesses for the purpose of improving performance.

Let me pass on now to the purpose of SALP. We have four major purposes. The first is to improve the NRC regulatory program and provide a mechanism for focusing NRC management attention on areas of concern.

The second purpose is to assist us to properly allocate our resources, and I will talk a little bit more about that later.

A third purpose is to improve licensee performance by establishing a basis for dialogue between the NRC management and license management so that we can talk about and hopefully agree on where weaknesses and strengths exist.

A final purpose, the fourth, is to provide a mechanism to focus your attention on both strengths and weaknesses.

I hope after a SALP meeting, even if there is disagreement in what is in the original SALP report, that after a free interchange in a SALP meeting, we reach agreement on where the strengths and weaknesses are.

Let me pass now to SALP history and what we are currently emphasizing in our SALP evaluations.

The SALP process began in 1980. After the accident at Three Mile Island the President's commission on that accident recommended that a program be established for the systematic evaluation of operating performance.

In addition, and as a result of the NRC staff reviews at that time, we also concluded as a result of that accident that more intense oversight of operational safety was needed. It was apparent that we had given too much reliance on the design of redundant systems to protect the reactor and the public health and safety. The confidence in these safety systems and this redundancy, in my opinion, led to inappropriate complacency on the part of the NRC and the industry.

As a result, we concluded that additional and strengthened oversight of the quality of operations and operational support, as well as design and design changes, was needed. SALP is one of the oversight tools that we use.

We use many methods in the NRC to oversee operational safety. These include the licensing; inspection and enforcement program; the evaluation of the events—you heard some talks on that yesterday—the performance indicator program, which you will hear more about today; the SALP program, of course; and periodic management meetings to discuss licensee performance. I might elaborate on that.

I feel that one of the major tools that we use in Region III is the management meeting. We sit down with some of the licensees' managers on a monthly basis, others on a quarterly basis, and some on an annual basis, to review the performance of the plants. Most of the licensees' managers attending these meetings have their own monthly performance indicator books, which we basically use as a basis to discuss performance.

As a result of those meetings, I believe that the licensees and the region are pretty much in agreement on where the weaknesses are and where some management attention should be focused. I think this is a major tool that we are using, and I think it is paying off with results.

There are other methods to oversee operational safety, which I think are effective. I believe that the visits to the plants by the Commissioner and NRC management have had an effect. I typically visit a plant a couple of weeks before the Commissioner's visit, and I have seen problems. However, a couple weeks later, when the Commissioner visited the plant, a lot of those problems were fixed. So I think the Commissioner's visits have had an effect.

I think the NRC semiannual senior management meeting that Mr. Stello referred to yesterday is an effective method for us to oversee operational safety. And, of course, the SALP program is a key element of the multifaceted approach to monitor and hopefully bring about an improvement in operational safety.

Since the SALP was begun in 1980, it has evolved and improved. In thinking about this paper and preparing it, I went back and reviewed a couple of the first SALP reports that were issued in Region III. I found that we covered 17 functional areas. In my judgment, after looking at the report, we did not cover them very well in the first SALPs. I think we are getting better as the years go on.

In June 1988 the number of functional areas was reduced, although the activities evaluated in the remaining functional areas have broadened considerably. The current functional areas are: plant operations; radiological controls; maintenance and surveillance, combined into one area; emergency preparedness; security; and engineering and technical support, combined into one area; and safety assessment and quality verification, combined into one area. We then have the flexibility to add other functional areas, if we see a need.

Although the original 17 functional areas are mostly captured in the 7 functional areas that we have now, the emphasis has changed. I would like to talk about two of the functional areas, just to indicate how the emphasis has changed. I will talk about engineering and technical support and quality verification and safety assessment.

Engineering and technical support has replaced and expanded the previous assessment of design changes and modifications. We still evaluate the quality of design changes and modifications, but, in addition, we focus on the involvement of engineering to enhance operational safety. For example, we assess such important functions as engineering support to operations when a request to solve operating problems has been made. We also evaluate engineering monitoring of operating problems for needed design enhancements. By that I mean, engineering looking at the operation of the plant and determining what needs to be changed to improve that operation regardless of whether a request has come from operations.

We look at engineering involvement in procurement of quality parts, in overview and participation in root-cause analysis, and event followup and safety evaluations. We also look at their support to other functions such as maintenance and radiological controls.

So, we have expanded what we expect of the engineering departments in the plants, and we have focused on engineering efforts devoted and oriented toward improving operational safety and supporting operations.

Another example is the broadening of our assessment in what used to be a couple of different functional areas: quality assurance, quality control, and committee activities, and the adequacy of licensing submittals. These have been put into the new functional area of safety assessment and quality verification. Previously, quality assurance, quality control, and committee activities were pretty much evaluated as individual segments or areas. Now the evaluation emphasizes safety assessments done by various committees and organizations and how the assessments are reflected into the operation and design of the plant. It also assesses how management and each department imparts quality into their individual effort, thus, reflecting that quality is everybody's responsibility and not just the responsibility of the quality control and quality assurance organizations.

The assessment includes all licensee activities associated with monitoring and improving overall performance of the plant. Many licensee activities are considered, including licensing activities, resolution of regulatory initiatives, resolution of safety issues, safety committee results, and self-assessment activities such as the analysis of industry operating experience and root- cause analysis—its effectiveness in identifying and correcting performance weaknesses and in identifying the precursor. As you can see, there are a wide spectrum of things that we consider in the functional area of quality verification and assessment when we evaluate and write the SALP report.

Let me move on to the SALP process. When SALP began it was predominantly a regional effort and product. As you heard one of the speakers say yesterday, this has changed. There used to be some input from program offices in Washington, and I think the project manager has always participated in the SALP meeting. Today it is different than that. The SALP process and report are truly an NRC product. The write-ups for each of the SALP functional areas are generally prepared by one individual, but there are reviews by many.

The SALP process varies somewhat from region to region, but it basically is similar. We are trying to eliminate as much as we can of the variation from one region to another. Several things are helping us in this regard. One is the NRC headquarters involvement in the SALP processes of the regions. Another is that the SALP procedure encourages us to have an observer from one region periodically attend the SALP process in another region. We recently had a deputy division director from Region I come to Region III and sit in on the SALP Board meeting; subsequently he attended the SALP meeting with the licensee. Those are some of the efforts we are using to achieve uniformity.

The first step in the SALP process is to prepare a write-up for each functional area for consideration. This is based on inputs from both the regional inspectors and from the appropriate headquarters offices. The write-ups are primarily prepared by the person who is most knowledgeable in the area. In our region the resident inspector prepares a number of write-ups, but also the specialist inspectors prepare some for those areas in which they are assigned.

These write-ups are then reviewed by a SALP Board, which is composed of regional and headquarters managers, the senior resident inspector, and the NRR project manager.

A category rating of 1, 2, or 3 is assigned to each functional area. There is also a provision for assigning an improving trend or a declining trend to each of the functional areas, if we choose to use it. I will talk more about that later.

The SALP Board is also responsible for assessing any commonalities among the functional areas to identify common underlying reasons for the licensee's performance. I will not speak for the other regions, but I feel that in my region this is one of our weak areas and we are going to be paying more attention to that next year to attempt to write a more meaningful portion of the report dealing with commonalities among the functional areas.

After the SALP Board review, the report is reviewed by the Regional Administrator; he may either accept the report or change it. After that the report is sent to the licensee and a meeting is held to discuss that report. The meeting is a public meeting.

After we send the report to the licensee in my region, we allow two or three days for the report to reach the licensee and then we publicly release the report. I understand that the SALP procedure is now being changed to make that a uniform process, if it is not already uniform throughout the regions.

There is a provision for changing the SALP reports after the meeting with the licensee and after we receive comments. I urge all of you not to accept the report if you do not agree with what is in it. I have heard a number of licensees say, "I am a little bit concerned about raising questions or arguing about contents of the report because I will get the inspectors down on me and I will get a bad rating the next time." I wish you would not do that. I can understand why that temptation would be there, but that defeats the SALP process and I do not think any of the management in the regions or in headquarters would permit, if they knew about it, anybody downgrading your SALP rating because of arguments or honest discussions that you had during the SALP meeting. In fact, I really believe that if you have that kind of concern, the concern might not be proper. If you sat in on one of our SALP Board meetings and observed the give and take and the arguments and the discussions that go on among the SALP Board members, I think you would realize that it would be pretty hard for one person to overly influence or dominate the SALP evaluation. There are just too many people who are on the Board and are aware of what is going on in the plant to allow one person to really have a major impact on causing an incorrect rating to result.

After the SALP evaluation is completed, we use the SALP results in helping us decide where we should put our resources. That is a moving target as the year goes on, but that is a starting point, and I think it is an important starting point. The inspection program is modified as the SALP period goes along depending upon inspection findings, events, and those types of things.

Now, let me talk about the category ratings. The Category 1 rating indicates performance that substantially exceeds regulatory requirements, and it may result in reduced NRC attention.

If any of you are knowledgeable of our inspection program, the program for operating reactors has a number of components in it. One of those components is called the "core inspection program." That is the minimum inspection program that can be performed and it is for the licensee that has a majority of Category 1 ratings. It is less, certainly, than if we were to add to it the other components of the NRC Manual Chapter 2515 inspection program.

A Category 2 rating indicates a level of performance that is above that needed to meet regulatory requirements, and normal NRC attention would be expected.

A Category 3 rating indicates that performance does not significantly exceed minimal regulatory requirements, and increased NRC attention may be needed.

As you can tell from these definitions, SALP takes us beyond just looking at your compliance with the regulations. It looks at the quality of your operation.

There are many times in the region when we will see problems at a plant and we will talk about whether or not there is any enforcement action that should be taken as a result of those problems. In many instances we will decide, no. One of the statements that I make often, and I think a lot of my managers do, is file that away for the next SALP, it needs to be discussed then. So SALP is not just a scheme to enforce regulatory requirements; it goes beyond that.

I said I would talk about trends, which is very simple. An improving trend indicates performance was improving at the end of the assessment period. A declining trend indicates performance was declining and the licensee was not taking adequate steps, in our view, to reverse the declining trend.

Let me pass now to a discussion of some of the data that I put together for this talk.

May I have the first figure *[Figure 1]* please.

What I did here was to look at the average SALP ratings for all functional areas versus the time from 1980 through 1988. This one surprised me. You can see that from 1980 to 1982 there was an improving trend, but from 1982 to 1988 the trend curve became relatively flat. That is the part that surprised me. I was stating to my people that the way SALP ratings are going up, pretty soon everybody is going to be a Category 1 and the SALP will be rather meaningless. It does not appear to be the case.

Let me have the next viewgraph *[Figure 2]*.

This next one is the same type of a plot, but this time we only looked at four functional areas: plant operations, radiation controls, maintenance, and surveillance. It shows about the same thing.

Next one *[Figure 3]* please.

We looked at this one just for operations. The result is about the same, although there might be an indication that the operations rating has a small positive trend.

Now this is interesting because you have heard a couple of speakers say yesterday that we generally believe the plants are improving. They gave a number of performance indicators that would attest to that. Also, if you look at the INPO performance indicators, they also would show that. So, you ask yourself, if that is the case, why are the SALP ratings not improving? I do not know the answer. It might be that we are getting a little tougher in our SALP evaluations. I just do not know.

Let me go on to the next viewgraph *[Figure 4]*.

This is a nice one. It is kind of meaningless, you would think, and it might be. Average SALP ratings versus plant availability. Inside NRC put a report out in 1988 that showed that there appeared to be a correlation between plant capacity factors and SALP ratings and between cost to generate a kilowatt of electricity and SALP ratings. I wondered if I could show a correlation between plant availability and the SALP rating. Well, I am not so sure based on this viewgraph.

But let me go to the next viewgraph *[Figure 5]*.

This is another way of looking at that data. I had one of my guys who knows how to do linear regression analyses to do that type of an analysis on the data that you saw on the previous viewgraph. It does show that there is a weak correlation between the SALP rating and the plant availability. The correlation coefficient was about 0.5, and they tell me that you need a coefficient of about 0.8 to have a strong correlation. Nonetheless, it does show a weak correlation. My people tell me that if we had done a nonlinear regression analysis on that data it also would have shown a correlation, but a weak correlation.

Let me go on to the next viewgraph *[Figure 6]*.

This is another one that has a lot of scatter. This attempts to determine whether or not there is a correlation between SALP ratings and performance indicator deviation. If you have looked at the NRC performance indicators that are put out quarterly, you know that we have trends in there to show if a performance indicator is improving or declining. This is depicted on the horizontal bar chart. This figure is an algebraic summation of the improving and declining trends for 1988 plotted against SALP ratings for 1988. We could have done a regression analysis on this one too; we did not because it seemed to me that just by eyeballing it, you could see that for the lower SALP ratings it is pretty well scattered and I do not think it would have shown much. However, as you get up into the higher SALP ratings, it looks to me, from that data, as though there is a correlation between SALP ratings and performance indicator deviations. I would hope that there would be.

The final viewgraph *[Figure 7]* please.

This is merely a histogram of the number of units versus the average SALP ratings for the last SALP evaluation that was done for the units. You can see that they are somewhat skewed above the average of two, which would indicate that if our SALP process is valid, the plant performance exceeds regulatory requirements; and that is, of course, where it should be. I would like to see it even skewed further to the right as the years go on, and I think, based on the performance improvements that I see, it is likely to do that, unless we start getting tougher in our SALP evaluations.

In closing, it is my view, and I hope this is shared by you in the industry, that the SALP process is one of the more important initiatives that has been taken by the NRC to assess licensee performance.

I believe this process has contributed to plant improvement along with a lot of other things, including other NRC initiatives, certainly industry initiatives and the industry organization initiatives, because it is really you who bring about the improvements in the plant.

The SALP process continues to evolve and we seek constantly to improve our capability to assess the performance and to use this information to preclude future problems.

We welcome your feedback on this process as we seek the common goal of improved plant safety.

Is there any time for questions, Frank?

Any questions?

> *QUESTION:* How do you guard against increasing the tougher standard other than implying a decline in performance?

Mr. Davis:

I do not know that I have an answer to that. I have made a recommendation to Washington to increase the number of SALP categories to more clearly distinguish between the performance of the different plants.

Right now Category 2 is very, very broad. Category 1, I think, is very narrow.

There is a natural tendency though, I think, for us to become more demanding. As we become more demanding, I do not think the SALP ratings will go down because of that: I just do not think they will go up as fast.

Maybe that is the real answer to your question. I see in the SALP Boards in Region III that generally the people will say, "well, hey, these guys are better this year than they were last year so we ought to reward them, the rating ought to go up." I rarely hear people say, "they are better than they were last year, we ought to decrease their rating or keep it constant."

I am kind of the one that will say, "well, hey, we should read the definitions of SALP and we should make sure that the ratings meet those definitions." They are pretty good definitions before they increase.

In the past the members of the SALP Board had not been in the plant during the SALP period and clearly had little or no involvement with the facility in any way—meaning no firsthand knowledge. Yet, these people discussed and voted on the proposed ratings. How has this been changed, if at all?

It has been changed a little bit in my region, not as much as I would like. We have set a regional procedure that requires every one of us, including me, to get out to the plants at a certain prescribed frequency. I think that helps in achieving or making sure that people understand a little bit more about the plant before they participate in the SALP Board.

I looked recently at requiring everybody on the SALP Board to go to each plant a month before the SALP. I really would like to do that. I found out I cannot. The reason I cannot is because I am required to have a certain cadre of managers in the regional office at all times to handle an emergency. With the number of plants we have, we just could not get all the people out there. It sounds strange, but my people convinced me whenever they showed it to me on paper.

There is another aspect; it is not only the direct observations at the plants that go into the SALP ratings; we consider a lot of different things: the significance of the licensee event reports that we see and the evaluations that come from AEOD, for example, on significant events that have occurred. In our SALP process we have, for example, a radiation protection person who prepares the radiation protection functional area and that person makes a presentation on that. There are others as well: the section chief, the resident inspectors, they have been to the plant and have a feeling on all these things.

So basically, when you consider the number of plant visits that we are making and all of the other things in addition to direct observations in the plant that we consider in arriving at a SALP rating, I think it is pretty good. It would be better if we could all get out there, but we are doing about as well as we can I think.

Mr. Miraglia:

Mr. Davis has received a lot of questions on the cards, and I encourage you to fill out the cards for the other speakers as well.

In view of the number of questions it appears that we are going to be getting, I think I may forego a break. I was considering a break in the session because we had approximately two and a half hours. However, I think I will just play it by ear and get the next speaker up—get through the presentations and leave as much time for questions as possible.

The purpose of this conference is for you to hear from us and for us to have a dialogue and I encourage you to raise the questions.

The next presentation will be by Tom Novak. Tom is a Division Director in the Office of Analysis and

Evaluation of Operational Data. Tom Novak's division has the responsibility for the performance indicator program, the ongoing one and looking at new indicators. Tom is going to talk about those activities now.

Performance Indicators

Mr. Thomas Novak:

Thank you, Frank.

Frank said there will not be a break, but if somebody wants a cup of coffee, I am not going to be embarrassed if you get up to get one. I will the assume that is the reason you got up and not because you are tired of hearing what I have to say.

Certainly it is a pleasure to be here this morning and talk about performance indicators.

I had not seen Bert Davis' slides until they were shown on the screen. Bert said that we use all kinds of data. I mean, we are garbage collectors when it comes to data. Just pass it on and we can do something with it.

Statisticians have ways of simplifying it, refining it, and it is surprising what you can see.

The papers that are in your folder contain good information. I plan on giving you the most current efforts that we have in the development of performance indicators.

You are all aware of the ones that are traditionally reported trips, safety system failures, significant events, forced outage rates, equipment forced outages, and radiation exposure. Through INPO we get about four of these that are common to what you typically report and whenever possible we will just use that information in our reporting.

Most recently, though, we have compared the 1988 annuals, INPOs and ours, and there are differences and we are trying to understand the reason for this. Some of it is the averaging process—what plants go into it and what plants do not. But it is interesting to look at.

Another thing I think is worth mentioning very early is, the performance indicators were not developed as a substitute for SALP. So when you see a relationship that is not very strong, that is good in a sense because we have always said that performance indicators are a tool to understanding a certain kind of information. To put that information into a program that lets you understand it and look at it very effectively.

In fact, surprisingly, when we do develop new indicators people are concerned about just how much more information they have to look at very quickly.

As part of the senior management meetings, we do a compilation of the 100 or so plants that are operating so everyone has a chance to look at it and take it with them, wherever they are going. So we try to condense the information and make it easy to look at and useful as an ongoing tool.

Another point is that it is public information. About two weeks after we put together a quarterly report we put that report in the PDR [public document room]. While we have not done this across the board, I do know that some directorates in NRR would routinely send the PI [performance indicator] data for a specific plant to that plant so that plant personnel could see the information.

I think it is useful to look at the PI data for your own plant and to look at the data of other people that have plants very similar to yours to see just how things are going. It is there. It is public information. And I would suggest you use it.

May I have the slide now *[Figure 1]*.

What I would like to talk about now are the current efforts that we have under way to develop new performance indicators. Actually, the staff has been working on programs to develop new indicators for several years. We have been looking at maintenance for several years. We looked at training. I will get into the maintenance one in just a moment.

Cause codes—coding the cause and corrective information really is just looking at the causes of events that are reported in licensee event reports.

Safety system function trend is just another term for safety system performance indicator. It is very close to what you typically now report to INPO. It is really looking at train unavailability, and I will talk a little bit about that.

Let me have the next slide *[Figure 2]*.

Now, clearly our focus over the last several months has been to develop a maintenance indicator. Originally our concept was to develop some leading indicator of maintenance, and that was a very challenging approach because we had a lot of difficulty in picking out something we thought was a leading indicator of maintenance.

We chatted with a number of people and they said they had looked and it was very difficult. So I do not worry too much about whether I have a leading indicator of maintenance. I think you will see that we are trying to come up with an indicator on the effectiveness of maintenance in today's time.

The Commission asked us to accelerate our efforts to develop a maintenance indicator in support of the proposed maintenance rule. Last summer we decided to put together a set of candidate indicators on maintenance; they are included in my paper.

We put together teams of people to go out to specific utilities and collect the data that we could evaluate to see if, in fact, an indicator could be validated from operational data.

What this slide is intended to show you are some of the results. Clearly, some of the candidate indicators were the same kinds of maintenance information that you report to INPO. You can see them as process indicators, corrective maintenance backlog, the ratio of preventive to total PM [preventive maintenance] overdue.

We went out to the plants and gathered three years of data and brought it back to evaluate.

We also developed some indicators that are based on component failures. We developed indicators; we looked at rework, which had merit in terms of the quality of maintenance, because you could develop an indicator that would give you a measure of how much rework had to be done. We looked at the length of time a component was out of service because that had a quantitative measure of the quality of maintenance. We even looked at failures per thousand components; we picked a set of components to find out how often they were failing.

After these site visits, we looked at the information and did an engineering review of all the data that we had gathered. We looked at the information from an engineering standpoint to understand the trends that this information was telling us about plant performance. We looked at outage times. We looked through this information and said, does it make sense?

We also did a statistical comparison to see if we could correlate that kind of information to other measures that we felt were indicative of the quality of maintenance—measures such as forced outage rates, availability, capacity factor, critical hours. We were trying to see if, in fact, some of the information would be leading indicators of those kinds of measures of maintenance. That is, from information on corrective maintenance backlog, could we get an indication of what we might predict to be the forced outage rate of a unit.

Our results were not really that good. There was a large spread. The consistency between utilities was one of our problems. People will report information; they will do it consistently, but it is not across the board. You could take the corrective maintenance backlog and say, "all right, across 20 plants how does it look compared to the forced outage rate?" However, people treat corrective maintenance backlog specific to their own purposes, and when you sit down and talk to people you quickly get an appreciation that that kind of information is very difficult to work with across the board—to develop a model.

One thing we did learn from these site visits, there seemed to be consistency in the kind of failure information that was reported to NPRDS [nuclear plant reliability data system]. On a number of occasions when we wanted specific kinds of failure information, the people we would talk to would just go to the NPRDS files and pick it up from there. This gave us a little bit of a warm feeling because it may be that there is more consistency in component failures reported by utilities from NPRDS.

The process indicators, we felt were good, but we looked at them many times; they are a management tool for doing maintenance. You need to know how your resources are being expended. However, you really do not get a quantitative measure of the quality of your maintenance. How good is it? So we felt that we ought to continue to look very hard at component failures. The reason that I stayed with this process is simply because you, the audience, are the people we need to convince that this is an indicator. It is very clear when you talk to people at the plants that they will track something if they believe it is useful. If you ask them to provide information on something that they really do not think is beneficial, they will do it, but their heart is not in it.

So it was very clear to us, from talking with the people collecting information on maintenance, that if the kind of information we were collecting had a ring to it, if it was some measure of the quality of maintenance, we would be more successful than not. That is why I stayed with this idea a little longer.

At the end of this process, we found ourselves concentrating on NPRDS. We tried to understand what we learned from these site visits. Even within NPRDS there is a variability on reporting. For five years now we have been looking at timeliness and completeness and so forth. We do see variations of how quickly information goes in and what kinds of information are reported.

However, through our talks with people at your plants, we learned that people report, more or less, the important failures. We then decided to look at those failures that most likely cause forced outages because we felt across the board utilities are reporting them. Our goal was to develop a set of data, to find a set of components that led to forced outages.

I will now talk about the first effort we completed on the boiling-water reactors *[Figure 3]*.We are doing the same thing currently on pressurized-water reactors.

We used the Stoller report, which was done for EPRI several years ago and identified components most likely to lead to forced outages. The North American Electrical Reliability Council also came up with very similar kinds of components in its efforts. From that set of components, we looked for those that are required to be reported to the NPRDS. What you see here is typical of the five systems that we looked at. These are three of those systems: the control rod drive, feedwater, and neutron monitoring. We then checked the NPRDS to look at the components that are reported as failed in any of five systems.

You will have to bear with me because what we were trying to do is see if we could see a pattern in terms of maintenance and then we were trying to measure that as kind of an indicator to some of these more overall indicators of maintenance.

May I have the next slide *[Figure 4]* please.

Again, what we wanted to do was maintain this consistency across plants. In other words, if we were going to develop anything it had to work for more plants than not. We selected only the failures that you have to report. Immediate and degraded failures were what we looked at. Incipient failures are voluntary, so we wanted to remove them from our data base.

Again, the specific components and specific systems that generally caused forced outages and that have to be reported to NPRDS became our data base.

All right, let me have the next slide *[Figure 5]* please.

Now, I apologize to you people in the back of the room, even if you were sitting in the first row you would not be able to read this. I will walk you through it.

Our indicator was basically to look for clusters of failures in specific systems and say, "if you see a rate of increase of failures that may be indicative of something."

I will give you my end point: We are looking for something like that to be a leading indicator of a forced outage rate. The idea then was to look for clusters of failures. As you go across the X-axis, you are just looking at time. For a given system, you look at each system individually and tally up the number of component failures that are identified from the set of NPRDS that have to be reported and you look for a rate of change in the failure rate. The choice of slope is arbitrary. We picked a number. You can pick a different number. We looked at 28 plants. We looked at a lot of data and we chose a number that gave us a reasonable amount of indicators. If your slope is too great, you do not have any indications; if it is too flat, you will have too many indications. So you have to find something in between.

Our indicator concept was that we will raise a flag if the rate of failure of a given set of components within the system exceeds a certain mark—that was the mechanics of calculation. It was done over a 5-month period. You compare the latest 2-month average with the previous 3 months. It is all in the paper. I do not want to waste time now on the mechanics, but that was our idea: to go ahead and see what we could learn. This was the model we came up with.

And remember, it has to be tallied on a monthly basis.

Let me see the next slide *[Figure 6]* please.

Now this is a real-life example of a BWR, although I do not remember which one. We looked at the five systems that we were watching in the NPRDS [reactor recirculation system, main steam system, feedwater system, neutron monitoring system, and control rod drive system] and each of those large marks is an indicator. As the model shows, you can now sum up over five systems and look at the number of indications you will come up with as a measure of the change in the quality of maintenance at your plant. I have more data that I will show you a little later in the presentation, but that is the way we were looking at this.

You also may sum up the indicators as a function of time, which, in this case, would show what I would call an "improving trend in maintenance." Certainly, in the first several months, there were a number of clustered failures; but as you look towards the right-hand side of the slide, you can see that clearly there were less and less failures occurring. This just runs straight through calendar time.

One of the problems we have is that we do not distinguish between refueling outages and operation. This is just continuous. It is something we would like to do better. We thought about it and we said, "look, for a first order screening tool let us just run through an outage." So our data does not recognize whether the plant is shut down or operating. Although you will see certain peculiarities, overall we do not think they discredit the indicator.

May I have the next slide *[Figure 7]*.

Why do I like this indicator? These are some of the attributes. It is normalized to a specific plant reporting practice, which provides a consistency. We like it because it looks at a system.

One of the things that we recognized in maintenance is that if you broaden it too much, you lose the sensitivity. Looking at specific systems and providing a monthly tally, at least as far as we were concerned, seemed to be the proper approach.

Again, the systems and the components, the emphasis on NPRDS, provides consistency. The validation process appeared to work and we did not see any reason why this could not be expanded to other systems. Again, this was a trial program and we spent quite a bit of time on it, but it certainly was not limited to that.

May I have the next slide *[Figure 8]* please.

Once we developed the maintenance indicator, we had to validate it. The Commission, before they will adopt any indicator, really puts us through the wringer in terms of validation. I think you would want the same thing—before you decide something is useful, you would like to understand it and have some confidence in it.

All right, we looked at it in three different ways: root-cause analysis, correlation with other data, and plant analysis. For the root-cause analysis, we went back and read over 500 failure records that are in your NPRDS files for about 40 of these indications, just to understand the causes of the failure. We talked about some correlation with other data, which I will show you in a moment, and then we did some plant analysis, which I will talk about in a minute.

May I have the next slide *[Figure 9]*.

This is the root-cause analysis. Basically, we read the 500 descriptions of the causes of failure and summed them up; almost 80 percent of them clearly could be read as a maintenance problem. The others are on the slide and you can read them.

Now, to me, that was important because I am able to see that maintenance problems cause most of the component failures. When we showed this slide to the Commission, we had some comments that wearout could be construed as a maintenance problem, which would mean that 77 percent could be more than 90 percent, if one chooses.

An interesting point: We sent our report to INPO, not so much for a peer review, but just to show their people how we had used the NPRDS. However, when we talked with some of their people, they noted that when they look at component failures, probably 50 percent of them are unknown. I think that this indicated that the failures that we were looking at were better described. Actually, I felt good about that. When we discussed this further with INPO people, I think they also agreed that there might be some logic to our point.

The definition of maintenance failures is given below on the slide. [Failures experienced while conducting, or as a consequence of, maintenance, upkeep, repair, surveillance, testing, and calibration of plant equipment. Examples include personnel errors of omission and commission by maintenance staff, procedure problems resulting in inadequate/improper maintenance, problems traceable to maintenance program administrative control, and equipment failures due to improper previous repair.]

May I see the next slide *[Figure 10]*.

All right, correlation with other data. We have been looking at the NPRDS for several years. Over the last two years we looked carefully at a couple of systems and components. We looked at main feedwater flow control valves and flow control bypass valves—we looked at all the failures reported in the NPRDS for those components. We were trying to understand it.

We compared these failures to see if the manufactured differences in the design of the valves were the problem, or was something else. The bottom line of those studies showed that plant-specific maintenance practices were the dominant cause of component failures. So again, it added to our belief that the kinds of things we were looking at are truly a measure of the quality of maintenance.

The next thing we looked at was our licensing event data base to see if there was a correlation between our description of the quality of maintenance at a plant, via the NPRDS model that we developed, versus that indicated by the licensing event reports. We compared it in terms of maintenance.

May I have the next slide *[Figure 11]* please.

This is the comparison; let me walk you through this. You can do this either way, but I will choose the way it is shown.

We indicated the plants across the X-axis. We took 23 commercial boiling-water reactors, those that had been commercial from 1985 to 1988, and developed a 3-year maintenance data base, which provided consistency.

We just summed the number of indicators that we received over the 3 years of operation. Lo and behold, as you can see, there is a plant way on the left-hand bottom corner of the slide that had one indicator for those systems over the 3-year period. As you move across, there is a plant on the other side that had something, maybe on the order of 25 indicators, over that 3-year period. We then went into our LER data base for each plant and for the same period of time we took all the LERs and looked for all of the LERs where maintenance was one of the causes of the event, and we summed the maintenance events per month. The slide shows you that the plant on the left had about the same number of LERs per month that were reported.

It gets a little busy now; time to find a statistician. But, clearly, from two separate sets of data, really, there is a correlation. Those two lines really show a .6 correlation and, if you talk to your statisticians, they are saying, "that is not the luck of the draw, you have something there."

In a sense, this shows that the way we tried to distribute plants by the NPRDS would have been supported, generally, by the LER data base, which was very supportive of our model. Again, because we found another set of data and went ahead and correlated it, it was statistically significant.

May I have the next slide *[Figure 12]*.

Now I will talk about the plant analysis. Our position was, if you are looking at the number of components that caused forced outages and if they are increasing, the chances are that the plant will eventually run into a forced outage. So the idea was to see if, in fact, this would be a leading indicator.

We looked at the complete operating history and all the forced outages for the same BWRs. We went to the grey book and got them all, and for these plants, over this 3-year period, there were more than 200 forced outages reported. We have over 3,000 equipment failures to look at. That was our data base.

We found a weak correlation, but we did find 10 plants, at least one time, where our indicator did in fact lead a forced outage rate by 2 to 6 months. So, there was that kind of correlation.

Now remember, what caused the forced outage may not have been the particular component that we were tracking; it could be something else. There is that variability. Nevertheless, a correlation was there. I think, with time and more refinement, we could come up with a stronger correlation. I feel very positive about the plant analysis because it suggested some measure of validity.

May I have the next slide *[Figure 13]* please.

We have shown this slide to the Commission as part of our maintenance development. This is another way to look at what people are saying. We tallied the indications for those same plants as a function of time across the X-axis. The total number of indications for all the boiling water reactors are plotted on the Y-axis. As a function of time this shows, in our judgment, that the maintenance was improving for this class of plants. The slope of the line indicates the rate at which we see the maintenance improving. We did show that, and clearly, we think it supports the general hypotheses that maintenance is improving.

May I see the next slide *[Figure 14]* please.

These were our conclusions. I am not going to go through them all, you can read them. Clearly, we thought that this kind of an indicator was useful. We thought it would be appropriate to identify as an example indicator in the regulatory guide in support of the maintenance rule.

We think that utilities would go into more depth—they could do more—but the NPRDS was a common data base that we thought the utilities would find beneficial because you can look at your own information and your neighbor's. You both are using generally the same data base, and there is a sharing of knowledge.

I showed this information to the BWR Owner's Group recently. In some discussions the thought was expressed that you can see if changes that some people make in some of their systems are reflective in one way or another, which would help you decide on changes or maintenance practice differences. You can look at somebody else's work to judge how effective it was.

May I have the next slide *[Figure 15]* please.

I would like to talk for a few minutes about cause codes and then finally about safety system function trends.

Cause coding is, in effect, a different way of cutting licensee event reports because you have trips, you have safety system failures, you have a number of things, and you count each of them one way. When we looked at cause codes, we said, "let's look at the causes of these events."

Because the Commission was concerned that these causes would have a certain amount of subjectivity, we were directed to not use your causes for the event in the trial program. Instead, we were to read the event reports and reach our own judgment to see if we could identify the causes and provide the lessons learned. We went through a validation process afterwards.

We asked people at Oak Ridge to help us read LERs and code them into our sequence coding and search system, which is our general data base for all licensee event reports. We asked them to perform this review for us.

We picked a 6-month period. We decided we would read all the LERs from January 1 through June 30 of 1988 for the purposes of identifying our own definition of the causes of the event. They were not single causes. If the event had a certain amount of information that indicated there were multiple causes, we would put them down. We were not limited to one cause for each LER. It was whatever we thought contributed.

As part of the cause code effort, we also looked at corrective action. So you had the front end and the back end. We took your—whatever you said would be your corrective action—and identified that.

The problem was that 6 months of data was not very much to understand whether or not there was any trend. We had our friends at Oak Ridge develop an analog; that is, they read those LERs and did a key word search, using the information that is currently in our sequence coding and search system. If we went to the computer and used key words, how well would we have predicted the causes based on our algorithm? Surprisingly they did very well. We came up with the same cause 85 percent of the time that we had by reading it independently.

We then went back in time and expanded our data base to 3 years to trend causes of licensee event reports for a 3-year period. We thought that was very helpful.

We only had a 6-month data base because we never coded in your corrective actions; but we are going to be doing more about that.

May I have the next slide *[Figure 16]* please.

I would like to pass on this information. For that 6-month period, if you looked at all of the licensing event reports, you would see the distribution of causes. You can read in our reports. We broke maintenance into two areas: maintenance-1, clearly maintenance, and maintenance-2, we were not quite sure, so that was our maintenance subcategory. Administrative control, random errors, and so forth—you can read them for yourself. That was just a distribution of what you see in terms of reasons for licensee events.

May I have the next slide *[Figure 17]* please.

Corrective actions, again, here is what you tell us. This is kind of the industry average for 6 months in terms of what you see as corrective actions: procedure changes, training, equipment repair, and so forth. These are the percentages of contribution.

By itself it really does not do much. Let me move on to the next slide *[Figure 18]* and then you will see how we were trying to use this.

This is just illustrative of one idea; I stayed away from maintenance on this one. Suppose for a minute that you wanted to look at licensed operator errors, you would go back to your causes and see how, on the average, you responded in terms of corrective action for that population of events, causes that were due to licensed operator error. You can see that 27 percent of the time you responded with procedural changes, 37 percent with training, and so forth.

We think this is a useful tool because you can begin to trend. In other words, how does one utility respond to certain events as opposed to others. Oak Ridge did some sensitivity studies. It was interesting because, in looking at corrective actions versus a given cause, they took out the population of recently licensed plants and, true enough, this caused a difference. The corrective actions made by newly licensed plants had a different distribution than that for the mature plant with the same kind of event. This did not surprise me because I think you do things differently with regard to corrective actions as you get the plant up and shake it down.

I thought this was constructive in terms of the kinds of information that we can gather.

May I have the next slide *[Figure 19]* please.

Again, let me remind you that this validation process was to convince the Commission that there would not be subjectivity if we applied the causes from LERS.

We did some comparisons. For all of our AIT [augmented inspection team] reports, we looked at the events and compared what we found to be the causes of the event to what was reported in the LER as a comparison. We looked at enforcement history and reporting; we looked at our SALP reports; and we looked at what we had been doing as LER quality reviews. Generally it was good. In other words, we believe that the information is usable—it will not be manipulated and it does give you a sense of what the causes and corrective actions might be.

May I see the next slide *[Figure 20]* please.

We think the cause-code indicators will provide additional performance information. This information will be in the public document room for you to look at. This is not something we are just generating. The cause code indicator has been approved by the Commission for implementation. We are in the process of trying to come up with display methods, which is a challenge in itself. We feel that it will be a useful diagnostic tool. I think you will be able to use the indicator and understand what your trends have been over the last several years through this kind of information. It is simply taking your data and putting it back again for you to look at in perhaps a more convenient way.

May I have the next slide *[Figure 21]* please.

I do not know what my time is, but let me just take a minute now and. . .shorten it? Okay, very quickly. Safety system function trends are very similar to what you are doing when you report to INPO on safety system performance. It is intended to be an indicator of safety train availability for specific safety systems to ensure system availability. We think this is an indicator with certain specific merit. It had a risk base connotation to it, and we think it could be useful.

Again, when you develop a model you want to validate it, which can be a problem. We have gone back to a number of plants trying to validate the model. Trying to go back several years to obtain information that may be kept for a different reason, to understand whether specific components did take a train out of service or not is very suspect.

It has been difficult to get good solid data on train unavailability at specific plants over the last three or four years.

May I see the next slide *[Figure 22]* please.

I think I have talked about retrospective data enough. It was a mixed bag, clearly; we found some good information; we found some information we did not understand. We are continuing to look.

May I see the last slide *[Figure 23]* please.

Let me make a pitch here for volunteer units. We are always looking for people to say, "come on out and we'll explain how we tracked the availability of our safety trains." We intend to try to do that for the next year or so. We are going to look also at the NPRDS to see if we can develop a model, and talk with INPO to share some of its information. We also are going to see if there is any old information, before the rule change, that might help us better understand whether this model has validity.

Thank you very much.

Mr. Novak:

I will take one question, I have been told. I see none.

Mr. Miraglia:

Thank you, Tom.

During Tom's talk we had the wireless mike maintained, which is a timely topic.

The next presentation will be on maintenance inspections and maintenance team inspections, primarily.

Tony Gody—I have a hard time calling him Anthony because of my ethnic background. I am also from New York.

Tony Gody is the Chief of the Performance Evaluation Branch. He has been at headquarters and NRR for approximately a year and he comes to us from the field. He has many years of inspection experience in the field. The maintenance team inspections were processed and the procedures were drawn up through Tony's branch. Tony will summarize our position with respect to the maintenance rule. More particularly, he will summarize the results and the findings of the maintenance team inspections to date. There have been approximately 20 of those.

Without further ado, Tony Gody.

Maintenance Inspections

Mr. Anthony Gody:

Good morning.

My presentation today will cover the current area of emphasis in the NRC core inspection program, that is, the maintenance team inspections.

The first slide *[Figure 1]* please.

The primary objective of these maintenance team inspections is to determine whether component systems and structures of nuclear power plants are adequately maintained so that they are available to perform their intended functions.

An additional objective is to see if the maintenance process fixes things properly when they are broken. We are looking for prompt repair to a component once it does have a malfunction.

The next slide *[Figure 2]*.

A little background, the NRC has examined nuclear power plant maintenance programs for several years, and we have found a wide variation in the programs and in the implementation of those programs.

Inadequate maintenance has been identified as a significant contributor to plant and system reliability problems. Analysis of operational events show that nuclear power plant components were not maintained at a level commensurate with their importance to safety.

In the recent study by AEOD, we found that since 1985, 80 bulletins and information notices have been issued concerning maintenance deficiencies. The majority of these involved industry-wide problems. The issues included inadequate post-maintenance testing, procedural deficiencies, and problems with specific components such as motor-operated valves, diesel generators, check valves, air systems, and the like.

Consequently, the NRC conducted maintenance surveys and site visits from 1980 to 1985. The results were published in June of 1986 in NUREG-1212, *Status of Maintenance in the U.S. Nuclear Power Industry 1985*.

Some notable items in that NUREG included: component failures accounted for 60 percent of the total number of forced outages, 75 percent of engineered safety feature actuations were due to maintenance surveillance or component failures, and 48 percent of LERs in 1985 were related to maintenance. The SALP ratings in maintenance remained steady for a 5-year period from 1980 to 1985. In January of '85 there were 10 sites, which equate to 16 plants, that were rated a SALP Category 3 in maintenance. Consequently, the general conclusion at that time was that poor maintenance practices were the root cause of many operational problems.

In 1985 INPO issued guidelines on the conduct of maintenance at nuclear power plants. In 1987 INPO requested all the utilities to perform self-assessment activities.

The Commission issued a policy statement on maintenance in March of 1988 and a rule is currently under consideration.

In November of '88, NUREG-1333, *Maintenance Approaches and Practices in Selected Foreign Nuclear Programs and Other Industries: Review and Lessons Learned*, was published as a draft report for comment. This NUREG contained a review of maintenance approaches and practices in foreign countries and selected United States industries, including the airline industry.

During the same period, the NRC was revising its inspection program for operating reactors. The revised program included a core inspection program and mandatory team inspections. The team inspections were to be conducted in an area of emphasis. The first area of emphasis was the maintenance area.

I would like to give you some background on the development of the maintenance team inspection program. Our branch developed the temporary instruction guidance and a logic tree in conjunction with the regional offices. We requested the regional office to provide senior inspectors, senior residents—senior regionally based inspectors—and section chiefs to act as team leaders. The regions responded with something like 16 individuals, and we conducted three pilot maintenance team inspections.

At the conclusion of those inspections we all got together and had lessons-learned discussions. We went over the aspects of the inspection procedure, the guidance, and the tree, and made appropriate adjustments.

A few words about the team inspection, the pilot team inspection. The team leaders were split up in three teams to go to the various sites. This way they would have gained experience. Before we sent them out, we trained them on the use of the tree and the performance-based inspection procedure.

After completion of the pilot program, we had the lessons-learned discussions and then the team leaders set up their own teams for each region.

[Figure 3]

The inspection schedule for the teams consists of a 6-week inspection, that is for the team members. For the team leader, it generally is 8 or 9 weeks because he has a lot of preparation in the beginning and at the end he has the documentation to worry about.

The 6-week inspection period includes 1 week of preparation. That is either done in the regional office or at the site so that they can obtain their badges.

The inspections are conducted by the regional office using a senior inspector, senior resident, or a section chief as the team leader.

The schedule involves 6 weeks: the 1 week of preparation, 1 week of in-office review, 2 weeks on site—the 2 weeks on site is either simultaneous or split by the week for in-office review—and then 2 weeks to document the results.

Before the inspection, the team does a "bagman" trip: They go out to the site in advance of the inspection and pick up the necessary documents, maintenance procedures, policy statements, and administrative procedures that they feel are necessary to conduct the inspection.

The tree, or the inspection, is initiated by several factors: recent component failures, PRA insights, inspection history, observations from plant walkdowns, and findings from inspection reports or from the senior resident inspector. The team goes in, looks at these areas, and then starts their inspection.

Selected examinations of equipment failures attributed to maintenance are reviewed and an attempt is made to determine the effectiveness of the licensee's corrective action and root-cause determinations of the failure.

The inspectors concentrate on observing maintenance activities; work-in-progress is a major part of the inspection.

The next slide *[Figure 4]*.

This is a brief adaptation of the tree. The tree is divided into three major sections—following the top block of course, which is the entire maintenance process. The first major section is the overall plant performance related to maintenance; the second is management support of maintenance; and the third maintenance implementation.

These blocks are subdivided into eight categories under which program elements are listed. These are: direct measures related to plant performance; management commitment and involvement; technical support; management organization; work control; plant organization; maintenance facilities, equipment, and materials control; and personnel control.

I have three slides [not included] with me today, they are the results of completed inspections.

May I see the first one please.

Briefly, really briefly—it is not showing up too well: the green indicates adequate programs and adequate implementation, yellow indicates satisfactory, and red, of course, indicates poor.

Can I have the second one, please.

These are pretty weak. The first two slides are representative of the inspections that were conducted.

The third one.

This one was by far the worst one of the 20 odd inspections that we had. You will note an awful lot of red, especially in the lower half of the box and that part represents program implementation.

The next slide *[Figure 5]*.

I want you to note from these charts that the boxes are divided. The upper left-hand side of the box is the evaluation of the maintenance process element adequacy—is the program established and documented? The lower half of the box is the evaluation of the maintenance process implementation. Is the program being effectively executed? The majority of the inspection effort is spent evaluating implementation, the lower half of that block.

The next slide *[Figure 6]*.

Maintenance team inspections are planned to cover all operating plants by the end of Fiscal Year 1991. To date we have completed 21 inspections and five are currently in the process. The final results have been received from 20 of the inspections and we have used those to come up with the conclusions on the following slides. We have got quite a series of slides and I am going to go through them rather rapidly.

The next slide *[Figure 7]*.

Generally, there are the results—the overall results. As you can see in the program area, 55 percent were satisfactory and 44 or 45 percent were good. It was about a 50/50 split. In the area of programs, we have been coming out with some pretty good results.

On the implementation side, it is a little different: 75 percent of the implementation was satisfactory, 25 percent or so was good, and five percent was poor. As this points out, the programs are there, they are in place, and, as a minimum, they are at least satisfactory. Half of them are considered good, but the implementation is still lacking.

This same split prevails throughout the remaining slides. Sometimes it is a little worse than others, but you will be able to see that the implementation portion of it is not as good as the program area.

The next slide *[Figure 8]*.

The first branch of the tree covers overall plant performance as it relates to maintenance. This is the direct measures.

Generally, the first section of the tree, that is, direct measures, involves the plant walkdown to look and see what the status of the equipment is in the plant and the material condition of the plant. If the inspectors see a couple hundred valves leaking, they are going to look at valve maintenance. It heads them toward that direction.

Next slide *[Figure 9]*.

In this area, direct measures, it was pretty much an even split as far as implementation and program, with one area coming up poor. Five percent of the direct measures was considered poor.

The second branch of the tree is management support of maintenance *[Figure 10]*. That involves management commitment and involvement, management organization, and technical support. In this branch, the technical support area was clearly the weakest identified.

Next slide *[Figure 11]*.

The management commitment and involvement was again generally good for both the program and the implementation aspects.

Next slide *[Figure 12]*.

Management organization and adm... ation, satisfactory, was about 70 percent; good was about 30 percent in both areas, program and implementation. *[Figure 13 was not discussed but is included.]*

Next slide *[Figure 14]*.

This third area in this branch was clearly the weakest of the eight subcategories. One of the more significant findings from the maintenance inspection program is that technical and engineering support of maintenance was weak and required improvement. That is generally the weakest area observed.

The next slide *[Figure 15]*.

This points out that for engineering support only 25 percent of it was good, 10 percent was poor, the rest of it was satisfactory for the program, and for implementation, we identified 25 percent poor on engineering support; but only 10 percent good, and the rest of it as being satisfactory.

There ...re several examples of poor engineering supp...: the repetitive failure of equipment not being identified by site personnel for changes to the preventive maintenance program, inadequate root-cause analysis was performed for equipment failures, documentation of engineering involvement in the resolution of problems was lacking, preventive maintenance activities were not conducted, and no methodology existed to respond to or implement industry initiatives. *[Figure 16 was not discussed but is included.]*

The very next portion of the tree was maintenance implementation *[Figure 17]*. This branch and the third branch of the tree is subdivided into four areas: work control, plant maintenance organization, maintenance facilities, and personnel control.

May I have the next slide *[Figure 18]*.

In the work control area you can see the program was generally satisfactory or good, about an even split. Although more of the implementation was good than in some of the other areas, the majority of it was only satisfactory. *[Figure 19 was not discussed but is included.]*

The general weaknesses in this area were in the implementation portion of Section 5.3 of the tree, maintenance equipment records and history *[Figure 20]*. The weaknesses included: Site equipment history was not being used to its maximum advantage for trending or preventive maintenance. Maintenance equipment records were not being maintained current because of excessively long periods of time taken to complete package reviews. Also, there were difficulties in retrieving preventive maintenance history of components and failure evaluations.

Although plant failures were reported to NPRDS, generally the use of NPRDS was poor. Several system engineers in the inspections were not familiar with recent events and were not familiar with NPRDS data.

The next slide *[Figure 21]* please.

In the plant maintenance organization, again, you will see a large difference. Implementation was weak; 65 percent was satisfactory and only 30 percent was good and five percent was poor. In the program area, good prevailed. This is consistent with the rest of the findings in this area.

Next slide *[Figure 22]* please.

Weak elements in the plant maintenance organization included establishing deficiency identification and control systems and performing maintenance trending. Maintenance trending was not performed as much as we like to see in many of the inspections.

Equipment history was not used to identify subtle trends. It was not used to establish preventive maintenance programs or to add to existing preventive maintenance programs.

Next slide *[Figure 23]*.

This is maintenance facilities. Generally these came out pretty good. The inspection results contain the following example: "Licensee had provided excellent facilities and equipment in support of plant maintenance activities. Facilities were enlarged to provide ample space." We were encouraged with the results of this aspect of the inspection.

The next slide *[Figure 24]*.

This last area, personnel control, was by far rated the strongest area. The rate of experienced maintenance personnel to apprentices was on the average three to one. Onsite experience was considered a strength in the majority of the inspections. There were well-defined programs for hiring and good job descriptions and promotion policies existed.

In general, the maintenance people, especially the craftsmen and journeymen, were very familiar with their duties and responsibilities. They did a good job.

The next and last slide *[Figure 25]*.

In summary, we have completed approximately one-quarter of the inspections. However, already, several conclusions can be drawn from the inspection results and the activities to date. That is, all sites, at least have established adequate maintenance programs: they are well documented. Some of them or almost half of them were rated as good. However, the implementation of these programs was determined to be lagging in about 75 percent of the cases.

That concludes my presentation. If there are any questions, I will be glad to answer them.

Thank you.

Mr. Miraglia:

Thank you, Tony.

Our next presentation is from Gary Holahan, who is the Acting Director, Division of Reactor Projects III, IV, V and Special Projects. Gary's presentation will involve the topic of equipment operability.

Equipment Operability

Mr. Gary M. Holahan:

Good morning.

Frank asked me in the hall this morning, what the tie-in was between this discussion and the other papers in this session. I have to admit that I had not thought about it much, but I had the last two hours to think about it.

The previous papers provide an insight into maintenance or into a broad perspective of performance indicators. This topic really could be classified as a regulatory issue, if you wanted to. On the other hand, it really does provide some special insight into safety decision-making at a plant.

When a problem of equipment operability arises, it is something of a crisis situation and the method and the safety perspective brought to bear on the issue does provide us with a performance insight of a sort. It is the kind of performance insight, I think, that goes into the SALP area that Bert Davis was speaking of earlier: the quality verification and safety assessment.

Therefore, as I go through the discussion, I will be mainly dealing with how equipment operability problems arise and how we expect them to be dealt with. In a sense, licensee management and the NRC are able to draw safety insights from how these situations are resolved.

I promised Frank I would do this in 20 minutes, so I will see how fast I can move.

[Figure 1]

In dealing with the issue, I will be addressing safety assessment in general, operability determinations, how 10 CFR 50.59 evaluations fit into the process, licensing amendments when they are required, how corrective action plans fit in, and lastly, documentation that might be associated with it.

Next slide *[Figure 2]*.

The types of problems I would like to address are cases where equipment is in nonconformance with some condition established in the original plant licensing. Either it does not meet a code or standard or it does not conform to an as-built condition of the plant, or some condition that has been raised from operating experience: it could be from the plant vendor or information from another plant; it could be bench testing. Any sort of experience that leads to information that raises a question about the operability of equipment. There are additional examples; for example, there could be a problem that arises with respect to equipment qualification: whether files are available, whether new test data indicates that there could be a problem with equipment. Lastly, equipment operability issues arise when there is physical evidence of a degraded condition. The example I have here is when a heat exchanger is fouled to some extent. But a question may also arise any time some testing or observations of equipment put that equipment in question with respect to its ability to perform its safety function.

Next slide *[Figure 3]*.

I would like to discuss the initial actions or reactions to finding equipment in some degraded state. The first action is to identify if, in fact, there is some degraded state or a nonconforming condition: something is not exactly as it should be, as it was expected, as it was described in an FSAR or some other document.

The second action is the responsibility of the licensee, the basic safety responsibility, to determine what is the impact of this information on plant operation. There is sort of an instant initial assessment that needs to be made. This is the first decision with respect to whether plant operation is acceptable or not. In effect, the test is: Is there any immediate threat to public health and safety?

If a degraded condition rises to that serious a problem, then the plant needs to be put into a safe condition regardless of any other commitments that might exist in technical specifications or any other place. That is a very rare condition. I cannot even think of any examples. In most cases degraded equipment raises some questions, but it usually does not raise a serious enough question to warrant that the plant be shut down immediately.

The third action is to determine how this new information will affect the operability of the equipment. Therefore, the next test is a prompt determination of equipment operability. I will discuss a little later what elements go into that assessment.

Following that determination, there are followup actions to be taken depending on whether the equipment is operable or inoperable. I will follow through with some examples for operable or inoperable equipment in a minute.

The last action is to put together the documentation that shows you know what decisions were made. That is really the final step that comes after all the decision-making.

May I go to the next slide *[Figure 4]*.

In the operability determinations, the first thing I would like to stress is that operability really means the capability to perform a safety function. Operability does not mean that something conforms to a code and standard. It does not mean that it looks like it conforms to the as-built drawing. It refers to the equipment's functional safety capability.

In 1980 or so, the NRC issued a generic letter that required all licensees to put an operability definition into their technical specifications. These definitions are all pretty much alike; they all refer to operability in this sense: it is a capability to perform a safety function. What I am stressing here is that operability is a functional definition, whereas conformance to codes and standards really are a separate issue. Once we have established that the equipment is in a nonconforming or degraded state, the question of operability is a real question.

It is not unusual to have equipment that perhaps does not meet a code or standard or might have an equipment-qualification problem. Nonetheless, there still is a legitimate judgment that must be made about its ability to perform its safety function.

Because these are issues that arise on the spur of the moment, operability determinations have to be made promptly. We recognize that they are not being made with perhaps all the information that will ultimately be available. However, when a prompt determination of equipment operability is made, it ought to be made on the basis of whatever analysis is available, whatever tests or partial test results are available, whatever operating experience can be brought to bear on the issue, and it ought to be made with engineering judgment.

In many cases engineering judgment plays an important role in making a determination of equipment operability.

May I go on to the next slide *[Figure 5]*.

I would like to cover four individual cases where equipment is either covered by technical specifications or not and the determination is made whether the equipment is operable or not. This gives you a total of four possibilities.

The first example covers a case in which equipment specified in technical specifications is determined to be operable, on the basis of the factors I addressed in the previous slide. This equipment may, in fact, be in some degraded state for which corrective actions may be required later, but a decision has been made that it is capable of performing its intended safety function. If it passes that test, then in fact, by plant license and by technical specifications, operation of the plant is authorized and is not in question.

However, corrective action still must be carried out for that degraded condition or lack of conformance although it can be carried out while plant operations continue.

There are basically two ways in which corrective actions can be done. The action can be taken promptly. In this case, I do not think there is any clear time period that corresponds to promptly; I think it depends on the safety of the decision being made: how important the equipment is. Whether a prompt corrective action means a few hours or a few weeks, I think, depends upon the circumstances. It has to be left to the safety circumstances and judgments being made at that point.

The alternative solution is: If a licensee proposes, in effect, to live with this changed condition without corrective action, then, in fact, that could be justified through a 10 CFR 50.59 evaluation, which may or may not call for a license amendment. The point is that operability of equipment covered by technical specifications means that plant operation could continue in this case; however, some sort of corrective action is required to bring the situation back into conformance.

Let me go to the second example for equipment that is covered by technical specifications and is determined to be inoperable. The normal course of action is to follow the technical specifications. In many instances, this would put the plant into an action statement: it could require relatively prompt shutdown of the plant.

An alternative to that would be where the safety circumstances would allow, or in fact dictate, that the safer thing to do would be to operate the plant perhaps in some changed state—for example, to reduce power or to take some other compensatory measures, whatever. Under such circumstances, however, some emergency license amendment or other regulatory action ought to be proposed and dealt with promptly. In this case, also, the nonconforming or the degraded state of the equipment must ultimately be resolved through corrective action or a 10 CFR 50.59 evaluation.

The third example is for equipment that is not covered by technical specifications and is determined to be operable. There still can be safety implications of the equipment being inoperable. Therefore, a judgment about the operability of the equipment still ought to be made on the basis of whatever information exists with regard to meeting codes and standards. In effect, we are using the same standards we would for equipment covered by technical specifications, that is, engineering judgment, experience, tests, and those sorts of judgments.

If it is judged to be operable, then continued operation is acceptable.

Again, the degraded or nonconforming state needs to be clear; either by putting the plant back into conformance with the original commitments or by changing those commitments by a 50.59 process.

In some respects the fourth example is the most complicated. If equipment is not specified in technical specifications and is determined to be inoperable, there is still a possibility that that equipment is really not needed for plant operation to continue in the short-term.

A judgment must be made about whether there is reasonable assurance of safety. If that can be done—and I will discuss what elements go into that judgment momentarily—then continued operation of the plant would be appropriate. If reasonable assurance of safe operation cannot be determined, then, in fact, the plant ought to be placed in some safe condition. That might mean taking some compensatory measures or it might mean shutting down the plant.

As with the other cases, because there is some commitment to a code, standard, or some other commitment that is not being met as a result of finding a degraded or nonconforming condition, that condition needs to be corrected. Again, this may either be done by bringing the plant back into conformance with the original commitments through prompt corrective action or through use of the 50.59 process to justify the altered state of the plant.

May I go on to the next slide *[Figure 6]*.

In cases where there is equipment not covered by technical specifications, you need to make a judgment about reasonable assurance for continued operation. The considerations that would go into such a judgment involve the availability of redundant or backup equipment or other compensatory measures, such as operator action or stationing an operator by equipment or other kinds of activities that could affect your decision.

This judgement also should involve the consideration of what the safety function is; how important it is; what events it provides protection against. Such consideration also involves the amount of conservatism in the analysis and what margins are available and the probability of meeting that safety function.

This is a case in which judgments about the probability of seismic events would play a role in the decision-making process.

May I go on to the next slide *[Figure 7]*.

Corrective action plans are called for in most of these examples. Clearly, repair of the equipment to put it back into its originally designed condition is one option. Analysis to show that it can, in fact, perform the same function in its changed state is another possibility. In some circumstances, testing can resolve a question about nonconformance or the equipment being in a degraded state—for equipment qualification, for example, testing could resolve such issues.

Corrective action plans could also include 10 CFR 50.59 evaluations, license amendments, or other regulatory actions. In many cases, if corrective actions are going to require some period of time to undertake, a safety basis needs to be associated with that decision.

May I go on to the summary slide *[Figure 8]*.

In summary, I would like to stress that degraded or nonconforming safety equipment must be evaluated for its safety impact and for operability.

I would like to also stress, as I did earlier, that operability is the capability to perform a safety function, which is a different decision than determining whether the equipment is in a nonconforming or a degraded state.

And, in all cases, degraded and nonconforming conditions must ultimately be resolved, either through prompt corrective actions or through some process of showing that the changed state of the plant is still in conformance with 50.59, which include the original licensing decisions of the plant.

Are there any questions?

Voice:

I guess I am somewhat nervous about equipment that may be degraded and we determine it is inoperable. . .will come up in any job order or maintenance letter. That appears to be overburdensome. I also wonder if degradation with no action falls under 50.59. 50.59 is really the appropriate documentation for equipment we determine is operable that is rated. . . .

Mr. Holahan:

For those who could not hear the question, let me summarize it. The question, in effect, was that perhaps 50.59 is not the appropriate mechanism for dealing with equipment that is degraded because 50.59 is intended to deal with proposed modifications to the plant. Using 50.59 for degraded equipment might be overly burdensome.

Let me first suggest that this is an issue that I believe is not dealt with uniformly throughout the industry. I think there are, as most of you are aware, a number of discussions going on with the interpretation of 10 CFR 50.59, and there is a staff and NUMARC activity on that issue. There is also a generic letter under development on this subject, which hopefully will also clarify the situation.

Let me say that in instances where a physically degraded state is found in a plant and the licensee proposes not to put the plant back into the condition as it was originally described in the FSAR, then I think that is equivalent to proposing a modification to the plant and I think it does need to be covered under 50.59.

On the other hand, if, in fact, this degraded condition is something that, as you mentioned, is covered in a work order and that work order is intended to put the plant back to its original condition in some reasonably prompt manner, then I do not think 50.59 is appropriate.

I recognize that there is some grey area in terms of timing between which corrective actions can be done almost immediately and which ones are going to exist for such a long period of time that, in effect, they become the normal operating mode of the plant.

The example I would use is, if a licensee proposes to live with a degraded situation for an extended period of time, I believe it needs to be covered by a 50.59 evaluation.

Can I take any other questions?

Voice:

Are you considering a degraded condition of a safety related system. . . .

Mr. Holahan:

I will try to repeat the question.

In effect, what we have is an example of potentially degraded piece of equipment. The question is:

QUESTION: Is it possible to make an operability determination for an RCIC [reactor core isolation cooling] system in a BWR that, although required to start automatically, may have some problems and require operator action to immediately restart if it trips?

ANSWER: I think in all of these cases, because operability is a capability to perform a safety function, you need to clearly articulate what is the safety function. If the safety function is automatic start, then probably operator action does not provide the safety function. If this were an example where automatic start is not required—let me give you an easier example: An action that would normally occur automatically, but the automatic action is not required promptly or your safety analysis report did not take credit for automatic action, then, if the safety function can be performed by operator action—either by pushing a button in the control room or by stationing someone by the valve—and you can make an honest, legitimate judgment that the safety function is not lost—it is still available—then the equipment is operable.

I am not sure that I agree with this specific example. But cases like that can be made.

Yes, Mr. Olshinski.

Mr. Olshinski:

QUESTION: Does the operability definition, which is capability to perform a safety function, does it include the conditions under which the safety function would be called for, for example, seismic, environmental or any other condition?

Mr. Holahan:

ANSWER: Yes. The safety function may very well be automatic start of a pump following a seismic event. If the equipment is required in a harsh environment and following a seismic event, the answer is, yes, that needs to be included in the functional judgment.

General Questions/Answers

Mr. Miraglia:

A couple of matters of logistics. A number of you are turning your cards in and I encourage you to do so. I have an announcement to make with respect to lunch.

Lunch at the end of this session will be at 12 o'clock and it will be in the State and Chamber Rooms. I think the program just indicates State Room. It will also be in the Chamber Room.

I have a number of questions, one of which is directed to me or any member on the panel. I will read the question and I will attempt to answer it. If anyone on the panel would like to add to it, please feel free.

QUESTION: As a vendor of complex safety equipment we believe we have the foremost experts concerning operation and maintenance. We notice a distinct lack of communication between the utilities and ourselves. Does the NRC encourage or discourage more active vendor participation in day-to-day operations?

ANSWER: I think the short answer is that we would encourage that. One of the outgrowths and lessons learned in the Salem ATWS event was the maintenance of equipment is extremely important. It is extremely important to maintain vendor interface to ensure that the equipment is being maintained and in the proper manner.

Requirements came out of the Salem ATWS event in Generic Letter 83-28, which required licensees to assure that they maintained appropriate interfaces with the vendor. I think from our perspective we would say that is a prudent thing to do and we would strongly encourage that.

I know of instances where we have had meetings with licensees relative to certain pieces of equipment where either the licensee has brought the vendor in to assist in the technical discussions with the staff or on occasion, we have requested the utility to bring the vendor in.

On the basis of the question, I would assume that the individual asking the question has some specific interfaces with specific utilities in mind, and I would encourage you to discuss your views with those utilities.

Does anyone on the panel have anything to add?

[No response.]

What I would propose to do now is go around to each panel member and have them answer a question, a single question or a group of questions if they are similar and we will keep going through the panel until time runs out.

Bert, would you start.

Mr. Davis:

The first question dealt with SALP.

QUESTION: Unlike the more customary grading processes one is subjected to, the SALP results are often a surprise. It is used as a point to begin improvement. Is this a misperception or a functional part of the program?

ANSWER: I agree that the SALP results should be a point to begin improvement in weak areas. However, I believe that if the SALP results are often a surprise, that may be the misperception, at least from my experience in Region III. I would suggest that whoever wrote this should attempt to do some more interspection and also some more communicating with their region.

In Region III we have a couple of utilities who are doing what they call mock SALPs; they are doing their own SALPs. One of the utilities had an opportunity for—I think the number is 22—agreements or disagreements with us. Out of that number, there were 21 agreements with what we decided in the NRC SALP process.

Another utility has done one, and as I understand it from what they have told me, they predicted exactly what our SALP was going to give them. So I think it is good for a utility to be able to do that. It gives me a little comfort for two reasons: one, they are in perspective in looking at their own situation, and two, we are predictable and we should be predictable because we are both working from the same information.

Mr. Gody:

I bet you cannot guess what these questions represent. I am going to only read one because they are all pretty much the same thing.

QUESTION: If maintenance programs are generally good and problems are evident in the implemention of the programs, why do you want to create more problems with the maintenance rule?

ANSWER: As you know, this rule is under consideration right now. There is no way you are going to get me to say that we need a rule or that we do not need a rule based on Tom's PIs or the maintenance inspections.

What I can tell you, though, is that we have a presentation before the Commission on May 2nd regarding the results of the maintenance team inspections. Later in the month, I think it is the 20th or 21st, there is a presentation on the proposed rule. So, all I can say to the majority of these questions is that the rule is under consideration and we are presenting our facts to the Commissioners in May.

The other thing, the results of the maintenance team inspections show that implementation is lagging behind programs, and that is the one area that regulatory requirements concentrate on.

Mr. Miraglia:

Tony, will you repeat the comment and question, I am not sure everyone heard it.

Mr. Gody:

The comment was that if the maintenance team inspections and the results of those maintenance team inspections that we have conducted to date were compared to the NUREG-1212 information and surveys, it would indicate that there is significant improvement within the context of the programs that the utilities now have in place.

Is that a fair summary of your comment?

[No response.]

It does indicate an improvement.

The Commission is aware of what is in NUREG-1212 and they will be getting the new data. In addition, I quoted some SALP numbers earlier, which show that there has been improvement in the area of SALP. We will make those points to the Commission, and we will consider making the one you just brought up.

Mr. Miraglia:

The other point to be raised—I think this question came up in a similar context at the session yesterday—is that, yes, the rule is under consideration. I think the industry's view on that rule is clear. There are numerous letters that have been received and that are probably in the mail in which the industry's view is clearly stated.

The matter of maintenance is viewed to be an important item to the Commission and to the staff. Tony summarized the result of 25 percent of the inspections to date, which means 75 percent of the plants still have to be looked at. On the basis of the 25 percent samples, programs appear to be in relatively good shape; however, implementation is lagging behind. Those are the facts and the basis. Whether that is sufficient to say a rule is needed or not, I think only time will tell. That is the best answer we can give you to that question at this time.

Mr. Novak:

Staying in the same rut:

QUESTION: If your curves—looking at 1985 through 1988 data—show decreasing trends approximately 40 to 50 percent in maintenance indications, how does this support the NRC's rationale for a maintenance rule? It appears not at this time a right point for a rule.

ANSWER: I do not think, at least in our discussions when we presented this same information to the Commission, that it confirmed a number of other indications that the trends are positive in industry. What you heard yesterday in many overall indicators would not have occurred had maintenance not been improving over the last several years.

The answers will come from the Commission getting the best information they can. I think, if you are listening, we are reporting the facts as we see them. I do not think there is a question about that. The clearest hearing will be made.

Mr. Holahan:

I would like to address a couple of these questions.

QUESTION: Is it acceptable to use 10 CFR 50.59 to undo FSAR commitments?

ANSWER: Yes. As a matter of fact, that is one of the purposes of 50.59, to allow licensees to change commitments within the limitations of 50.59. And those changes will be documented in an FSAR.

QUESTION: The second question has to do with surveillance testing, which I did not mention in the presentation, but it is discussed in the paper. In effect, it says that ideally it seems that surveillance testing should be the touchstone for operability. Whereas, I suggested that operability means more than just passing a surveillance test.

ANSWER: I think the problem with relying on surveillance testing as the one and only definition for operability is twofold. One, surveillance testing does not completely cover all the circumstances under which a system is required to perform its safety function: It does not cover seismic conditions; it does not cover environmental conditions. In many cases, surveillance testing cannot really show total system performance. There are some limitations on surveillance testing that mean that it is not an absolute determinant of operability.

The second point is that surveillance testing is really predicated on the assumption that the equipment does meet the codes and standards that the equipment was originally designed for. Surveillance testing is supposed to be confirmatory, but it is not a substitute for any design margin or any other commitments.

I think that operability means both passing surveillance testing and whatever other judgments go into determining the capability of that system to perform its safety function.

Mr. Miraglia:

I think I would like to add a bit to Gary's first remark. We had a number of plants that were in extended shutdowns because of regulatory concerns. Major equipment failures and maintenance program problems or quality problems or design problems were encountered and uncovered as a result of these concerns. It became necessary to assure that the systems would perform their independent safety functions before startup.

I believe those utilities, at least three of them that come to mind, honestly tried to see how they could provide assurance that these systems could perform their safety function. In many cases, these utilities consciously decided that the surveillance test did not necessarily give a system's functionality check, and they devised test programs that went considerably beyond the surveillance programs.

As Gary said, the surveillance programs are confirmatory, extended pre-operational test programs to verify functions. There is a difference and I do not think they are an equal substitute. I think you have to look at it and make a decision on a case-by-case basis.

I would like to go back through the panel at least one more time. I am holding you over. We do have some time. There are lots of questions and I think this is the part of the conference that is probably of the most interest to you. If you have some additional questions, will you pass them forward and we will answer as many as we can.

Mr. Davis:

I will combine or address two of these at the same time.

QUESTION: What is NRC's view of using SALP ratings for a licensee's management incentives goals? That is, SALP 1 equals a good bonus.

ANSWER: I might expand that a little bit and say that a Category 3 SALP rating sometimes might cost a person a job. That is something that worries me a lot and it makes me feel that we have to even strive to do a better job with SALP because it is being used this way.

I guess, my view, as far as the bonus is concerned, is that I think SALP should be a consideration. If I were the CEO of a company, I would make sure that I listened to the SALP result, but I also would do my own evaluation of the overall performance in that functional area before I decided to give anybody a bonus or take a bonus away.

QUESTION: What is your perception of how CEOs view SALP ratings? Do you think they strive for Category 1 ratings or is there a tradeoff where cost is involved?

ANSWER: I have yet to talk to a top management representative in a company that did not say that the company's objective was to get all Category 1 ratings. Unfortunately, I do not see management performance following that statement all the time; it is mixed.

We had one licensee in our region that you probably know who received a Category 1 in all functional areas recently. In the last SALP, that licensee had received Category 1 in all but one area in which the rating was a Category 2. That licensee's management told me they were going to spend the money and do what was necessary to get all Category 1 ratings the next time, and they did. Obviously, they wanted to get all Category 1 ratings.

I think there is a real interest on the part of most people to not get Category 3 ratings. However, I do think there are utilities in my region th are satisfied with a mixture of Categories 1 and 2 and they do consider cost, and I am not saying that is necessarily inappropriate.

Mr. Gody:

I am going to be real quick here.

> *QUESTION:* Has the need to adjust the inspection tree to enhance assessment of those utilities who have a truly centralized planning organization been recognized? If so, are there any plans to restructure the tree to accommodate this?

ANSWER: We have made some adjustments to the tree, following the pilot inspections. We have planned another lessons-learned meeting in June of this year. At that time, we were about a quarter of the way through the program; by then we should be about a third of the way through the program. We will evaluate the findings, including this type of observation to see if we do have to make any adjustments. We will do what is necessary.

> *QUESTION:* Do you have any suggestions for licensee preparation for future maintenance team inspections?

ANSWER: We have been finding that when we go out to the sites, the licensees already have the inspection tree and inspection guidance. That pretty much encompasses everything we are looking for. I would have to say, if you are following the INPO guidelines on good maintenance practices and have programs that reflect it and are implementing those programs, you should fare pretty well.

Mr. Novak:

Let me wrap up a few very quickly.

> *QUESTION:* If there is a similar trend for Maintenance for pressurized-water reactors—similar to what I showed you on boiling water reactors—if so, how would you expect your data to impact the mainte-nance rule?

ANSWER: We really do not expect there to be major differences other than breaking out differences in PWRs to better articulate maintenance practices. I do not see that there would be significant differences.

I think this is a good question.

> *QUESTION:* What were the differences in maintenance practices that affected failure rates?

ANSWER: I do not know. From our screening tool, we recognize something about the maintenance that looks different. I think that is the part that is important to the utility, to try to understand what differences in practices might be responsible for differences in the quality of maintenance. That is the purpose of a generic data base: it permits one to look at the differences in maintenance practices across the board at relatively similar systems.

> *QUESTION:* Why does the industry need to have maintenance indicators that look into systems and components that are not necessarily associated with those systems and components needed to mitigate Chapter 15 type scenarios?

ANSWER: I think the Commission said very early that it is not limiting its concern of maintenance to just safety-related equipment. There have been many discussions that balance-of-plant equipment is important in the Commission's views in terms of the safety of operations. Therefore, a maintenance indicator that looks at the whole plant is most desirable:

> *QUESTION:* The new LER based on PI appears to have developed a new cause-code system different from NUREG-1022. Other informal cause codes are used within the NRR, such as for the SALP process. Have you considered developing only one cause-code system for LERs that is used within all the various programs of NRC and industry?

ANSWER: I do not think we have ever considered that possibility. I do not know that you need new definitions of causes. My experience has been that you think you have written it down as carefully as you can, but you will always get different interpretations from people who read it. It is just a natural reaction.

I am more interested in getting the kind of information that you need to really understand the causes of the event. I think that is one thing that we are learning from looking at licensing events: there are most likely multiple causes regarding significant events. I am not discouraged by variations in the definitions of causes. It has permitted us to use that kind of information. It is a pretty good screening tool.

Mr. Holahan:

QUESTION: What are NRC's expectations and/or requirements relative to past operability questions?

ANSWER: I guess my reaction is that I am mostly interested in the present and the future. My interest in past operability questions is not very great except to the extent that those conditions continue to exist.

If, in fact, we are dealing with a situation that is truly past, meaning there was an operability problem and in some way it has been resolved and corrected, there may be some leftover reporting requirement for 10 CFR 50.72 or 50.73, but that is low on my list of priorities.

If the question means there may be some past problems that continue to exist, then I would have the same expectations as I would if the problem were just discovered. That is, if there is a nonconformance or operability question that exists, it needs to be resolved. It needs to be resolved with an operability determination, with some corrective action, or with some sort of justification for bringing the plant back into conformance with its original design basis.

Mr. Davis:

I guess I will have to add to Gary's comment: If we, in our inspection program, found that you had operated for a period of time in noncompliance, we would have to address that from an enforcement standpoint even though it is past history.

I have several related questions. They concern the possible variation among the regions in the SALP process.

QUESTIONS: If SALP varies from region to region, how does the NRC achieve consistency? How does NRC normalize SALPs between the regions to ensure meaningful SALP comparisons? Are the SALP ratings regionalized on the basis of the regional administrator's personal philosophy and involvement in the process?

ANSWER: During my talk, I tried to give you a couple of reasons why we think we are somewhat consistent and why we hope to become more consistent. One is headquarters' involvement and the other is the regional observance of the SALP process in a different region. Those things are certainly going on.

There is one other thing I would add: If you read the SALP procedure, and I just glanced at it again myself, the things that you consider or are told to consider in each functional area are pretty prescriptive. That does not mean that a region does not take on somewhat of the personality of its regional administrator; I think it does. There would be an influence, even with prescriptive information, but I do not think it is that great.

One of the things that I did not share with you in my talk was that before I came in here, we took a look at the SALP ratings of all the regions for a number of years—I forget how many years—to determine whether or not there was a difference because some of the people in the NRC including myself thought there was. It turned out, as Tom said earlier, statisticians can do anything with a lot of data. They did an analysis of variance. Some of you might know what that is, I did not until they explained it to me. The statisticians look at the variation of SALP ratings between regions and compare it with the variation of SALP ratings within the regions. They concluded that, as a result of that evaluation, there was nothing statistically significant in the difference between the SALP ratings among the regions.

That is all I have on that.

Mr. Gody:

I have one more question on the SALP. My branch has the headquarters' function, the oversight responsibilities for SALP. One of the things that we are doing to ensure uniformity is having people from headquarters go out to the SALP meetings; we also are having some cross-fertilization between the regions. In other words, people will not only go to one region, they will go to the other and bring their experiences to the other region:

QUESTION: What direction, guidance will be given to regional inspectors and resident inspectors for inspection of maintenance programs if it is not the utility...if it is the utility program and not approved by NRC?

ANSWER: I assume this means if a rule is in effect or even if a rule is not in effect, right now we have issued inspection guidance. I would imagine that guidance would be pretty much the same whether or not we had a rule.

The utility's maintenance program is going to be based on guidelines and requirements that are in existence today. Therefore, the guidance we would give the inspectors is to inspect against the licensee's program, as we do in several other areas right now—we inspect against the QA plan or whatever.

Mr. Miraglia:

Right now the maintenance programs are in an area of emphasis within the inspection program and they are being evaluated under the maintenance team inspections. The intent is to inspect the maintenance programs at all the facilities. Certainly we could, drop back, identify in lessons learned and modify the program after the first time through, and that will have to be done as well.

Mr. Novak:

I have just one quick question.

QUESTION: How does your maintenance indicator avoid being skewed by repeat failures of items such as reactor coolant pump seals, which are design weaknesses?

ANSWER: That is a concern. I think what we did was to read these events in the NPRDS and, from a reading of the description of the cause of the failure, we concluded it was maintenance. We looked at each one individually. If we saw the same failure month after month, we recognized that it may not have been a maintenance problem, it may in fact have been a design problem. Clearly there is a concern. This is not an indicator without a certain amount of flaw. Nonetheless, I think things like reactor coolant pump seals can be recognized as design problems, as traditional, if you will. Again, it is not a perfect indicator and it may in fact have a number of flaws such as this one.

Mr. Holahan:

I have two more questions.

QUESTION: Let me summarize one by saying, it alludes to the fact that if equipment is in a degraded state, that implies that it will not pass a 10 CFR 50.59 test because there is an increase in the probability of a malfunction. Therefore, would not a safety assessment be a more appropriate test than a 50.59 test?

ANSWER: I think the answer is yes and no. For nonconforming equipment there is not necessarily an implication that the equipment is more likely to fail. Therefore, I think a 50.59 test is perfectly reasonable for nonconformances. In fact, I think a 50.59 test is very reasonable for degraded equipment also. However, if there is any significant degradation of the equipment, I think it would fail a 50.59 test, but, probably, appropriately so. I do not think that the right thing to do is to change the test because the equipment might fail.

If, in fact, there is some margin of safety lost in the equipment because of its degraded state, then the appropriate action is to request a license amendment. If it is needed on a prompt basis for continued plant operation or startup, then it can be dealt with as an emergency license amendment.

QUESTION: Is safety significance included in technical specification compliance or is it only really involved in license amendments?

ANSWER: I guess, in effect, I would agree with the comment, but I do not see them as so diverse. If, in fact, there is a safety reason why compliance with a technical specification is not needed or is undesirable, then that situation can be dealt with. An emergency license amendment is one alternative for dealing with that. Certainly, safety significance can be taken care of in that sort of review.

In any case where safety would call for an action that is different from what is involved in the technical specifications, then your resident inspector, regional office, and headquarters people need to be informed immediately and I think we are capable of dealing with those situations.

Mr. Miraglia:

I do not want to hold you up from lunch too much longer. I would like to hold you at least to five of and at this point I am going to make this the Bert Davis show. He has a large number of cards. I have asked him to summarize as many as he can between now and 11:55. Remember lunch is in the State and Chamber Rooms. I thank you all for your attention this morning.

Mr. Davis:

I have 34 seconds.

Mr. Miraglia:

You got three minutes by my watch.

Mr. Davis:

Okay.

QUESTION: When the SALP categories were combined did the new lower ratings mask the previously higher individual ratings, therefore resulting in an overall decrease in the SALP ratings?

ANSWER: I am not sure. I think it can go both ways. We had a case in our region recently where the utility had received a Category 3 rating last time in a functional area. They clearly would have gotten a Category 3 rating this time if it had been a separate functional area, but it was combined with operations. The utility wound up with a Category 2 rating because operations had many attributes. Thus, it was in their favor this time.

We had another case in which it was clearly a Category 2 in maintenance and a Category 3 in surveillance. The new functional area was combined. We did not know how to handle that so we used the option, as I indicated in my talk, to add a new area. We separated those two and showed one of them as a Category 2 and one as a Category 3. I really do not know what the effect is going to be; it will take more than just the short amount of time we have to consider that.

> *QUESTION:* The SALP Category 2 rating encompasses quite diverse performance. Is there any thought being given to expanding SALP categories?

ANSWER: I think so. I have made a recommendation in that regard and it is up to Tony Gody and his people to decide.

In particular there appears to be a need to add a category between the current SALP 1 and 2 categories to reflect B performance. That issue is still under consideration I guess.

> *QUESTION:* At the recent Region I SALP workshop it was indicated that the threshold between 2 and 3 rating was consistent over the years. The threshold for a Category 1 rating has been increasing. Has this occurred in Region III and is this overall NRC policy?

ANSWER: I would say it is not overall NRC policy. NRC policy gives you a definition on what is a Category 1, a Category 2, and a Category 3 rating, and you are supposed to try to follow those definitions.

On the other hand, I would not disagree with what Region I has told you. I think, inherently, we have become a little bit tougher in Region III; it might be a little bit harder to get a Category 1 than it used to be.

On the other hand, we have told our people for as long as we have been doing SALPs in Region III that if it is a close call between a Category 1 and a Category 2, make it a Category 2. If it is a close call between a Category 2 and a Category 3, make it a Category 3. We want utilities to clearly deserve a higher rating if they get that higher rating. This policy has been consistent for a number of years.

Mr. Miraglia:

You have one minute.

Mr. Davis:

One minute.

> *QUESTION:* Has there been any recent discussion with the NRC and State PUCs [public utility companies] with regard to the SALP process?

ANSWER: I do not have anything more to say on that than what I think Tom Murley said yesterday: We are watching the PUC rate decisions to see what kind of effect that has on safety. There had been a time in the past where one of the states considered using SALPs and we discouraged that.

In my own region, I have had a meeting with one of the PUC staff groups, they were more interested in using NRC performance indicators than they were in the SALP ratings. We discouraged that.

> *QUESTION:* During Session 1, Jim Sniezek stated that the number of LERs are not used in the performance evaluation of a plant. The SALP report specifically cites the number of LERs and trends of the LERs.

ANSWER: That is right, it does. I wrote that down in my little book, to go back and take a look at that in my region. I think what we do is, we do indeed tell how many LERs we have and what the number is compared to the last SALP rating. We also attempt to put it in perspective by saying that some of these LERs were voluntarily submitted by the licensee. We try to look at the safety importance of them. I think we make a statement in that regard, but I am going to go back and make sure we do that better than we have been doing in my region.

Mr. Miraglia:

That is Bert's last question. I am sorry if I held you up on lunch.

Again, thank you ladies and gentlemen for your attention.

5 SESSION 4: REGULATORY ISSUES

Mr. Dennis M. Crutchfield:

This is Session 4 of the Regulatory Information Conference on regulatory issues. I will attend to the administrative issues while folks are still coming in.

We are going to have a breakout session this afternoon at 3 o'clock in the Virginia Room. That session is going to be on life extension. As part of the registration process, we asked you to indicate any particular interest that you would like addressed. One of the issues that many of you showed an interest in was the plant life-extension issue. There will be a breakout session in the Virginia Room, which is on the second floor, at 3 o'clock this afternoon on that issue.

I have asked the speakers to limit themselves to about 15 to 20 minutes in presentation to allow extra time for questions. That will give us about an hour's worth of time at the end for questions and answers, which, I think, is equally or more important than just presenting our papers.

Please be sure to use the cards that were placed in the binder with your handouts to ask the questions. If you have a question that you want to ask and have not submitted it on a card, please come up to one of the speakers so that the poor lady taking the transcription can hear the question clearly and everybody knows what it is.

One of the principal themes yesterday was trust. Today you will hear from some of the speakers about issues that we are opening up a little more early in the process than we typically do. You will hear about these early in this conference. We are going to follow the lead on talking about trust.

It is very important to us that your views be heard. You know your plants. You know your staffs. You know what is important out there. You know what the effect of some of these issues will be on your plant and staff. We do not want to adversely affect safety; that is not our intent. We do however want to push forward.

A number of areas that we are going to talk about today are not finalized. Life extension of the plant is one; the 10 CFR 50.59 review is another area.

We encourage you to speak to us either individually or collectively. Come forward and speak or speak as a group representing INPO or NUMARC or whoever it is.

Today we are trying to focus on some of the broader policy questions. I would encourage you not to try and get into too much detail because we tend to get bogged down that way and that tends to slow things down to some extent.

These issues are not easy ones. I will tell you that in some cases they are very emotional issues. Bear in mind, however, that we are testing some of our thoughts and processes out and we are very interested in what you have to say.

In general, the views being expressed have been passed all the way up through the NRR office. Tom Murley has generally been aware of all of these issues and is in concurrence with the direction we are taking. However, we have not fully coordinated with other offices, nor have we run all these positions through the Commission. Therefore, these are not necessarily agency positions, but they are the views and the direction that we are leaning toward.

I have to remind myself that sometimes we handle issues sort of like the clumsy veterinarian would approach a lion: if you go to one end, you get bitten; if you go to the other end, you get dumped on. By the time you get your arms around the issue and the "lion" wakes up, you are never really sure what you have or what you are going to do with it. You are going to hear some of that today; so please bear with us and be patient.

The first issue I would like to talk about is our readiness to process future applications.

NRC Preparedness for Licensing

Mr. Crutchfield

About six months ago the boss told me we ought to prepare ourselves for new applications; I thought he was crazy. Six months later, I find myself feeling that he is less crazy than I thought before: I hate it when the boss and my wife are right.

[Figure 1]

We asked ourselves some questions about six months ago: Are we ready to process a new application if it comes in? What type of application should we expect? What process should we use? What type of documentation should we consider updating? What are the resource impacts? What organizational structure have we laid out?

With those thoughts in mind, let me go through the process that explains what we did and how we did it.

Next slide *[Figure 2]* please.

We went back and looked at the historical two-phase, two-step licensing process: This is the old 10 CFR Part 50 process. We looked at that process to see how well it worked. Apparently it worked very well because we processed 100 odd plants through a construction permit and an operating license.

Once we established that base process, we went on to look at a new custom-plant scenario. We found that we had to look at some items that we had not looked at before: fitness-for-duty questions, and severe-accident policy statement questions, which include TMI updates, unresolved safety issues, PRA [probabilistic risk assessment] questions.

We also thought it might be logical to look at a reactivated plant. Now we defined a reactivated plant as one of those plants that held an actual valid construction permit. There are not very many of them left; there are only about 10 or 11 of them. Some of those plants have resources already applied to them: Comanche Peak, for instance, has resources. Other facilities, like Perry Unit 2 and Grand Gulf Unit 2, have been shelved. We have not been doing much with them; that holds true for WPPSS [Washington Public Power Supply System] Units 1 and 3. We are not applying much in the way of resources to these plants.

The final scenario we looked at was a standard plant review on a previously approved site. This is the traditional 10 CFR Part 52 process that we looked at. We are encouraging that Part 52 process. It is no longer proposed; it is an actual rule that the Commission voted on earlier.

The purpose of Part 52 is to face the decisions that need to be faced much earlier in the process. We want to get certain issues out of the way so that it doesn't impact the licensing decisions.

May I have the next slide *[Figure 3]* please.

We developed a profile, if you will. This is an example of a custom plant that shows the type of resources that will be needed. I believe in the paper we show you the type of resources applicable to other facilities, other types of plants in the scenario.

As you can see, the total resources are significantly increased, especially at the end period when you have to issue the OL [operating license]. This is a custom-plant scenario on a custom site. It is similar to the licensing process we did 15, 20 years ago. If you came in with a custom plant and requested the Part 52 two-step process, or Part 50 two-step process, this is what you would get.

Next slide *[Figure 4]* please.

We took one of our recent applications that had been through the process for which we had data to look at some of the resource projections. We plotted selected scenarios and projected the resources it would take to issue a construction permit, to issue an operating license, and to do the inspections on those programs.

We then applied factors to the applications to include the fitness-for-duty questions and those sorts of things. We also included some contingencies because recent cases had shown us that a lot of problems are encountered during late parts of the construction phase before the operation phase begins. For example, allegations come up that have to be taken care of.

These different scenarios give an indication of the type of resources that will be expended and the duration of time that licensing will take.

The custom scenario will take about 155 staff people to complete the licensing process spread over a 13-year period.

The reactivated plants generally fall into two categories: There is a category to consider the second unit on the site, which includes an ASLB [Atomic Safety Licensing Board] decision, a staff SER [safety evaluation report] for an operating license, and construction being about 40 percent complete. The resources associated with this scenario would be about 70 staff. Our expectation is it will take about another six years to get through the process of construction, initial testing, and licensing before that plant would be ready for initial operation. Grand Gulf Unit 2 and Perry Unit 2 are the examples that fall in this category.

The second category of reactivated plants would be those that are about 70 percent complete. Bellefonte and WPPSS Units 1 and 3 fall into this category. However, for these plants we have not been through the licensing process, and we have not had an ASLB decision or a staff OL/SER. It may take a little less time, about 5 years, because of construction activities, but the resources to do it may be a little more, about 94 staff.

Finally, we looked at what it would take to do a standard plant application. We stacked the times in sequence: a preapproved site would take about three years; the combined CP and the conditional OL would take another two years for review. In total, it would take about 126 FTEs [full-time equivalent positions] of staff effort and about 13 years, which is a long time—especially the eight years for the authorization to operate. We expect, with the first one or two plants that come through the process, it may take that long. However, after the first couple of plants get through the process and the process becomes established—the design problems and construction problems get worked out—we think construction time will probably drop substantially. I know the Chairman [Lando Zech] has indicated that he thinks we can cut the time in half, and the man is right.

[Figure 5]

The next step we looked at was guidance documentation. What do we need to do to update the guidance? Some of this guidance has been around for years and years. I know that if you look at the existing *Standard Review Plan* [NUREG-0800], you will see that we made some major changes early in the process, but we have not made changes in a long time.

The principal purpose of updating the guidance is to incorporate operating experience and to provide some stability to the process. Scope and depth are questions that we are looking at: We want to be sure that we have the appropriate scope and depth so that we do not get carried away like we did 20 years ago. Our intent is to only update the guidance documentation that needs it, that is not covered by certification. The reactor systems area, instrumentation, and plant systems area, we expect will be covered by design certification and we are not planning to focus on that.

We are going to look at site safety aspects, the environmental aspects, and the construction inspection program. These are the principal areas that are going to try to get into and update as necessary.

There are approximately 30 sections of the *Standard Review Plan* that address siting, and we need to look at that. There are about 20 regulatory guides associated with the plant site that need to be addressed.

There are some rule changes for which the staff needs to promulgate guidance documents to itself. For example, 10 CFR 50.75, which is a decommissioning funding activity, will require some staff documentation so that we may better understand how we are going to implement the requirements.

Fitness for duty and access authorization are other questions that we need to look at.

The construction inspection program will take a substantial amount of resources to update. The last major revision we had to that program was in the early 1980's. I think everybody agrees it needs to be updated.

We then asked ourselves: What sort of applications should we consider? What is the growth of this industry going to be?

[Figure 6]

We looked at a DOE report [Department of Energy, Energy Information Administration, DOE/EIA-0055 (88/01) *Monthly Energy Review*, January 1988] to examine its capacity projections. The two cases, an upper reference and a lower reference, indicate the type of plants that DOE is predicting will be on line by the year 2007. That represents a lot of plants, if indeed true. The upper-reference case is based on projection of energy growth and a certain percentage of that growth, which is likely to be nuclear.

The next slide *[Figure 7]* is a figure directly out of that DOE report and it indicates the upper- and lower-reference cases. The only major plant we are talking about for the lower-reference case in the year 2007, is to compensate for a plant, about a gigawatt of power, that has been decommissioned, dismantled, or otherwise done away with.

The next slide *[Figure 8]* shows the NRC resources that we have, or we anticipate or plan to budget, to compensate for that expected application.

It appears logical to assume there will be a new application somewhere in the future. Somebody out there has a secret and they are not telling us, but we are going to be ready. If anybody wants to raise their hand as to who has it, I would be happy to take their name and we will start reviewing it right away.

We think it is prudent to plan for a reactivated plant. You may ask, "why a reactivated plant since there are so few?" The answer we have is that this will have the most effect on our resources in the first few years of the review. A custom application would have less of an effect on resources. A recommendation of 12 and a half, or 12.7, is a large FTE expenditure for a reactivated plant.

If you took the upper-reference case, the first year would be about the same, but by the time you got to the year 1995, the effect on resources would be over 100 FTEs. Therefore, we think it prudent to plan for one reactivated plant.

Next slide *[Figure 9]* please.

We also think it prudent to plan to update our regulatory guidance. We have set aside 9.5 FTEs in our planning resources for each of the years 1993 and 1994 to update that regulatory guidance.

At this point we need to consider the organizational structure that ought to be in place for this effort. With one or two new applications, we can probably fit the effort into the existing projects organization. To ensure the right visibility, we are planning to assign such an application, one or two, to one of our assistant directors. I am sure that we will get adequate resources associated with such a review because there would be a rather high level of visibility. Right now our indications in planning are for one application. If we had more than two or so, we think it would be prudent to plan for a new project directorate, and that is what we would do.

The technical organization, as it was re-established in 1987, is very consistent with what our needs would be. We can just add a few more resources in the technical area to take care of those interface questions that would arise.

[Figure 10]

The siting and environmental areas would be a little bit different because those specialists either have left the organization, retired, or have been spread to other efforts, such as low-level and high-level waste areas. We would have to get them back in some sort of discreet entity to process these reviews. However, we do not think that would be too difficult to do. Previously we used a lot of contractor support in those areas, which is what we will probably continue to do.

The anti-trust effort we have under way. The staff is still in place from before and we do not see a problem.

We would need to add extra construction inspection efforts to the regional staff as well as to the resident inspection program. Those are the types of activities that we think would be needed.

Part 52 is no longer proposed, it is actually in place and can be utilized. We do encourage the use of 10 CFR Part 52.

We plan to update our guidance documents in a limited number of areas; we see no major reorganization changes necessary; and we are planning resources in the 1991 and out years. We are ready; we are willing; and we are able. I will be taking applications early this afternoon.

Any questions?

Voice:

The 13-year period you cited for even the standardized plant is not really an inducement to start the process again for a new plant. So, I am wondering if the target is 13 years, or some number lower than that.

Mr. Crutchfield:

The target is much lower. We laid the process out serially. You obviously could gain some mileage by doing your early site review ahead of time and banking it, or perhaps doing it in parallel with your combined CP and conditional OL. You could save at least three years that way.

As you get better and better construction experience and we learn the process a little better, I expect that our early site reviews would also decrease and conditional CP/OL times would probably decrease as well.

Voice:

So what is your target?

Mr. Crutchfield:

The target is to get the time down to support your construction schedule.

An issue came up yesterday with regard to SIMS, and I see Tom Murley is here and he has indicated he would like to offer a few thoughts on that.

NRC's Crash Effort To Update the TMI Action Plan Status List

Dr. Thomas E. Murley:

Thanks.

A question came up yesterday morning; it came up again in the afternoon session and during some of our hallway discussions; I think it probably needs more elaboration.

The question is: Why did the NRC find it necessary to come out with a crash effort last week to update the TMI action plan status list and why did we find it necessary to make everyone work over the weekend?

It had its genesis in the preparation and evaluation of the past 10 years since the TMI accident. We prepared a report that was actually done on a crash basis because the thought occurred to us only recently. The report discussed what the NRC has done in the 10 years since the accident, particularly, what has been our response to the recommendations of the Kemeny Commission Report.

Our report was sent to the President. At about the same time, we received the congressional request for the status of the TMI action plans, including a printout of our SIMS file. SIMS is the safety information management systems, a computerized list of the status of all the TMI actions. It is a task to keep track of all this information.

Just to give you an idea of the scale. There are some 10,500 individual post-TMI actions integrated over all the plants.

In addition to that, since TMI, there have been some 6,500 other generic actions. We had to keep track of the status of some 17,000 actions: whether they have been implemented, whether they have been verified, and whether they have been inspected against, and so forth.

Not to mention, of course, the large number of licensing actions we have to keep track of. We sent the printout to Congress, and we thought that would be the end of it. But I guess we were not lucky enough, some congressional staffers started looking into the printout and they found discrepancies between that printout and the one we had put in the report on our response to the TMI accident.

The discrepancies between the reports was basically that they were prepared at different times by different people. In any case, Congress asked us to explain the difference and the reason for the difference. We did another SIMS run and got a third set of numbers. So we had to try to explain that.

Although I was not in the Chairman's office when the proposed reply to Congress came up, I can imagine what they were saying: "It looks like we have given the wrong information to the President; it looks like we have given the wrong information to Congress, and now we do not know how we are going to get the right information."

The Chairman said: "I have got to have it right. I want an all hands effort. I want it done and verified by the licensees, and I would like it done in a week." He was very forceful about this; in fact, we had to appeal with him to let us have a week. That was the reason for the crash effort.

Does this deal with some of the problems that I presented yesterday? Do we have some of the same problems that I have been preaching to everyone about? Yes, we do. This is basically an NRC problem. I thought that SIMS was accurate enough to date; in doing our recall analysis, we found it was not. We did not have a good QA system in place to make sure that every piece of datum that went in was accurate. Most important, we did not have a system to control what went into SIMS so that there would be a paper trail from one version of SIMS to the next. W did not freeze it monthly and have monthly printouts to create a clear paper trail.

We have learned from our mistake and we are going to implement a QA system. Also, it has implications for accountability. I realize now that I did not have a single person responsible for the accuracy of the data. I realize that it is difficult and I apologize for the effort that it has caused for utilities.

That is the complete answer of why we did it and what happened. I guess I will take any quick questions.

[No response.]

Mr. Crutchfield:

Thank you, Tom.

Our next speaker is going to be Cecil Thomas who is going to talk about plant life extension. As you know, we put out an advanced notice of proposed rulemaking in 1988. We received comments from NUMARC and various folks, and we have a revision that will be ready to go out a little later on this year.

It is an extremely difficult subject to have to deal with.

At the end of Cecil's presentation there may be one or two questions, but I think the real detailed questions probably ought to come at the end of the session. So if you will write them down, we will be happy to take them.

As I mentioned earlier there is a breakout session at 3 o'clock in the Virginia Room.

Plans for License Renewals

Mr. Cecil O. Thomas:

Thank you, Denny.

As Denny said, I am going to talk about our plans for license renewal. It is a very difficult subject to talk about: A lot of people are involved; it is very important to the industry; it is very important to us. I will talk about NRR's preliminary thinking on the subject of license renewal.

[Figure 1]

Specifically, I will discuss our view of the problem; I will summarize the activities that are ongoing and planned by both the NRC and the industry; and I will share some insights into some preliminary thinking that we have regarding our regulatory approach and our positions for license renewal.

Next slide *[Figure 2]* please.

Currently, 112 licensed nuclear power plants provide approximately 20 percent of the nation's electrical power. The operating licenses of these plants begin to expire in the year 2000. By the end of the year 2010, approximately 43 percent of these licenses will have expired.

The timely renewal of these licenses is essential to ensuring the adequate supply of energy to the nation during the first half of the 21st century. Therefore, steps need to be taken now by both the NRC and the industry to ensure the continuity of these licenses and, at the same time, to protect the health and safety of the public.

May I have the next slide *[Figure 3]* please.

This chart shows the distribution of current operating license expiration dates. The first license expires in the year 2000 and the licenses continue to expire over the next 29 years. The average rate of license expiration is about four per year. However, between the years 2005 to 2015, there is substantially more per year expiring. In fact, in the year 2008, 17 licenses expire.

Next slide *[Figure 4]* please.

I will now talk about some of the ongoing and planned activities by both the NRC and the industry. First, we have a rulemaking proceeding under way. In November of 1986, we published a proposal for developing a license renewal policy. After that was issued, we decided that it was important from a time point of view to proceed directly with the rulemaking—that really a policy was not that important. It was more important to get going with the rulemaking proceeding so that utilities would know what we were expecting in terms of license renewal.

In August 1988, we published an advanced notice of proposed rulemaking in which we solicited comments on a number of regulatory options and positions.

We expect to issue for comment a proposed rule this fall and to have a final rule in place by the end of 1990. We would expect that the rule would specify, to the maximum extent practicable, those issues that need to be considered in a license renewal application and would dispose of those that do not need to be considered.

The second major activity is regulatory guidance development. Usually NRC tries to promulgate its regulatory guidance coincident with any new rules or requirements. However, in the case of license renewal, we decided not to delay the rulemaking at the expense of the regulatory guidance development. Further, we felt that the regulatory guidance development could benefit from a number of parallel activities such as industry technical report reviews, which I will be talking about in a minute, and a lead plant review program. We expect to issue for comment draft regulatory guidance early in 1991 and to have our guidance finalized in 1994.

I mentioned the industry technical report program. This is a program that the industry, through NUMARC, is developing to address the technical bases for license renewal applications. The technical reports are expected to cover a broad range of generic issues, to focus on potential age-related degradation mechanisms, and to identify actions that are needed to support the license renewal program.

Finally, I mention our lead-plant review program. Northern States Power Company and Yankee Atomic Electric Company have agreed to participate in a lead-plant review program with the Monticello and Yankee Rowe plants. We are expecting the Monticello application to be filed in June of 1991, and the Yankee Rowe application in December of 1991. We expect to be able to complete the reviews of these two plants in approximately two years, exclusive of any hearings that may be held. We view the lead-plant review effort as extremely important. It will contribute significantly to the development of the regulatory guidance and will provide experience for the license renewal program and hopefully demonstrate the process.

May I have the next slide *[Figure 5]* please.

This slide depicts the major activities I described on a time line. As you can see, we have already begun. We expect to be completed with everything in 1994. The other point to be made is that the regulatory guidance development activity overlaps and takes input from all of the other activities.

May I have the next slide *[Figure 6]* please.

I will now describe our preliminary thinking on our regulatory approach and some of the positions that we are proposing. The approach and positions that I am going to discuss represent the views of the Office of Nuclear Reactor Regulation. As you probably know the Office of Research has programmatic responsibility for developing rules and regulatory guidance. We are working very closely with the Office of Research and these views generally represent those of the Office of Research as well. I would point out that these views have not been presented to the Commission. Our approach is based on the premise that: First of all, the current level of safety of each plant is acceptable for license renewal. Second, the current level of safety must be maintained throughout the renewal period. That is not to say that some changes will not be necessary to the plants. There may be some changes necessary to ensure, to provide, reasonable assurance that the current level of safety can be maintained throughout the renewal period.

The current level of safety is really a perception based on your perception and our perception of the design bases of the plant. How well they are operated and so on. Once we get into the reviews, we may find that our perception is not correct. In those cases, there may be some changes made to restore the current level of safety to what we thought it was.

We hope to limit the number of issues that need to be considered for license renewal through the rulemaking proceeding. As I mentioned earlier, the rulemaking would specify those issues that must be considered and hopefully dismiss those that do not need to be considered, to remove from litigation those matters from any individual hearings.

Next slide *[Figure 7]* please.

I will now talk about some of the preliminary positions that we see for license renewal.

First of all, the type of license: we envision a supersession-type license that would be effective upon issuance. It would cover a renewal term as well as the balance of the term under current license. The renewal term would be a maximum of 20 years, and there would be no limit on the number of renewals that you could request provided they were technically justified. We believe the 20-year term is reasonably long. We believe it is about as long as is technically supportable today. It would allow for applications to be submitted reasonably early so that licensees could make informed decisions on replacement capacity, based on our limitation of the 40-year total license.

Second, we would expect that applications could be submitted, applications for renewed licenses could be submitted between 20 years and 5 years before the current license expiration date. The reasons for the 20 and 5 years: First of all, for the 20 years, we wanted to come up with a time that would provide for a sufficient amount of operating experience to be gained. It is reasonably early that a licensee knows what is to be required and whether or not it would be successful—whether its plants could successfully have their licenses renewed. Again, it is consistent with the 40-year Atomic Energy Act limitation on the maximum duration of the license.

The second reason for the 5-year period, the 5-year limits would be based on the timing that is consistent with our current requirements for coming in with a preliminary decommissioning plan. The thought is, if a utility decided to renew its license, it would not have to come in with a decommissioning plan at that time. However, if for some reason we found that the license could not be renewed, then the licensee would have to come in with its final decommissioning plan 1 year before the license expiration date. We believe that this is reasonably late in the period, thus the licensee would be able to submit its application and we would be provided with a reasonable amount of time to complete our review.

Recalling the distribution of current license expiration dates, it appears evident that we are going to run into a logjam of applications pretty early in the process. Therefore, it may be necessary to specify timing for the submittal of these applications. Our goal is to complete the review of each renewal application in approximately two years, exclusive of any hearing.

The third reason for the 20 and 5 years is that operation beyond the current expiration date would require a "no undue risk" finding by the Director of the Office of Nuclear Reactor Regulation. We believe that more is needed than the current 10 CFR 2.109 timely submittal of application provision. The finding of "no undue risk" by the Director of NRR would be based on a completed safety evaluation report that documented the results of the staff's evaluation.

We feel that we need to provide some opportunity for public participation. This opportunity would be provided through the rulemaking proceeding that I discussed earlier, as well as through any plant-specific adjudicatory hearings.

The hearings that we envision would be somewhat similar to opportunity for hearing that is currently provided at the OL stage. It would not be a mandatory hearing. Presumably there would be some threshold that a potential intervenor would have to meet to justify a hearing. We would hope to specify in the regulations a provision that would allow continued operation, on the basis of a finding by the Director of NRR, while the hearing is in process so that operation of the plant would not be interrupted pending the completion of the hearing. The renewed license would be issued upon the completion of the hearing, if a hearing were held.

We are considering requiring a PRA to identify risk-significant components and systems. The PRA would be plant specific. We envision it would be similar to the PRA that is required—similar to the PRA that you might submit in response to your IPE [independent plant evaluation] generic letter requirement. We would expect that a PRA would be maintained current and would be part of an ongoing reliability assurance program.

The licensing basis that would support the renewed license would consist of the current licensing basis. That is, the licensing basis to which the plant was originally licensed, as modified during the life of the plant, plus any modifications that were needed to ensure that the current level of safety would be maintained throughout the renewal period. Somehow this licensing basis will have to be documented in the application. It will have to be referred to in the renewed license.

We believe we need to reconsider any exemptions that have been issued on the current license because the existing exemptions would expire upon the issuance of the renewed license. We would need to reconsider the technical bases for any exemptions that you would request for the renewed license. There are reasons for this: Many times, explicitly or implicitly, time was a factor in the issuance of the current exemptions. In some cases there have been modifications made to the plant through 10 CFR 50.59 or whatever that could have an impact on the current exemptions. We want to be able to look at the exemptions requested for the renewal license in an integrated fashion all at once.

The backfit rule would not apply to any plant-specific changes needed to ensure that the current level of safety is maintained throughout the renewal period. Basically, this means that the backfit rule would be off. It would not apply during the review of the application for renewed license. Once a renewed license was issued, however, the backfit rule would be in force just as it is today.

Finally, we will need to consider environmental factors, both for the rulemaking and during our review of each application for renewed license. We will attempt during the rulemaking proceeding to generically bound the effects of as many environmental issues as possible to try to cover these all at once and to remove them from the possibility of litigation during the individual licensing proceeding.

We do not know how successful we will be, but we have an effort under way to identify as many issues as possible that we can handle generically. We will start out with a rulemaking proceeding with an environmental assessment and that will tell us whether or not we need to prepare a generic environmental statement to support the rulemaking proceeding. The same process would apply to individual licenses.

In summary, the NRC and the industry have undertaken ambitious programs to be ready to accommodate the substantial number of license renewal applications we expect to receive in the mid 1990's. Our ability to meet the schedules depends not only on ourselves but the ability of the industry to provide quality and timely support. We intend to do all we can to meet our goals and we encourage the industry to do the same.

I would remind everybody, I will take one or two questions now. There will be an opportunity for questions following the completion of all the speakers' presentations. However, if you have any detailed questions that are not covered at this session, I will remind everybody that at 3 o'clock this afternoon we will have a breakout session in the Virginia Room.

I have Frank Akstulewicz and Darrel Nash from my staff with me today. They have been working directly with Research on the development of the rule and on a number of the other activities I have covered. We will be prepared, hopefully, to respond to any detailed questions that you do not get a chance to ask at this time.

That concludes my presentation. I will take one or two questions.

Voice:

You mentioned the idea of part of the process going through all the existing. . .reviewing all the existing exemptions throughout the life of the plant. It would seem to me that that alone is the 2-year effort. I am talking about all the plants that are out there. If you are talking about all the fire protective exemptions, all the Appendix J exemptions, all the ASME exemptions that have ever been docketed. Are you going to screen those as to which ones were time dependent or are you actually going to do a review of all the technical bases for all exemptions that the licensee has filed since it has received its license?

Mr. Thomas:

Well, hopefully, on an individual license there are not that many. We know there are quite a few, but we will not be reviewing all of them for all plants at once. We would anticipate that in the application, each licensee would file, would list, the exemptions that were enforced for the current license. We would do whatever review of those that was necessary.

As I indicated, when you apply for your renewed license you would reapply for the exemptions that you felt were needed for that license. With regard to the exemptions that you already had in force for your plant, our review of those would be in the context of the overall application and the bases for those that you request for the term of the renewal.

I do not see this as being that big of a job.

Voice:

Thank you.

Mr. Thomas:

You're welcome. Any others?

Voice:

Cecil, could you just develop a little bit more the idea of the undue risk finding. Is that analogous to a justification for continuing operation? Does that mean you are taking time from the renewal and adding to it the word reinforcement? What is the idea behind that?

Mr. Thomas:

Good question.

Right now the 2.109 timely renewal provision, as I recall, provides for an application to be submitted 30 days before your license expires. This was primarily intended for CPs. We used it in nonpower reactors and a number of other applications.

However, we feel that here you are talking about a new license in effect for your plant, and, really, more is required than coming in with an application at the last minute, at the eleventh hour. We have not had a chance to look at it yet. If we were to go with the 2.109 provision as it currently exists, we would be going under presumption that everything was okay for some unspecified period of time beyond what you justified in your current license and your current documentation. We feel that more than that is needed. We want to require that you come in sufficiently early—at least 5 years earlier—hopefully, this would provide us with the 2-year goal for completing our review.

Hopefully, our review and our issuance of the safety evaluation report would be out of the critical path. You would know whether or not you would qualify for a new license. It would give us the assurance that we feel is necessary to allow you to operate beyond the term, the statutory term, in most cases, of your current license. It is just an added assurance that everything would be okay beyond that time, especially if you were to wind up in a hearing situation that would otherwise cause problems. It gives us a sounder base for allowing you to operate during that period of time.

I will be happy to answer any more questions later on and this afternoon.

Mr. Crutchfield:

We will be happy to accept the written questions a little later on.

I think one of the last items that Cecil wanted to emphasize was that in many cases we granted relief to a utility for the remainder of its life of the plant for a particular item—we either granted an exemption or granted a relief—recognizing that in 15 years or 12 years or whatever it was that the license would be over and we would not have to be concerned about that issue.

If we are going to extend the license beyond that period, we need to rethink that issue to see whether we need to make a change. Perhaps the area for which we gave you relief should be reconsidered to see if we should withdraw the relief and make you implement whatever is required. That is part of the undue risk question as well.

The next speaker is Steve Varga and Steve is going to talk about our prioritization and categorization system.

We had to go into this process of prioritizing and categorizing our work because of resource limitations on the technical staff. The buildup and backlog of licensing activities drove us there, as well as our inventory problems.

The question of trust again comes up. Many of you have learned to play the process very well in that some of you have recognized that one way to get some of the regular work by us, is to bury it in a priority one application. We have caught on to that, so we are aware of it.

So Steve is now going to chat with you about that. One of the areas we want to be sure to emphasize is certification, which was mentioned yesterday. If we issue a generic letter or requirement, which we will talk about later with regard to technical specifications, and you can certify that you meet precisely what is in that generic letter or requirement, it will be much easier for everybody, for all parties concerned. It will be easier for us to handle and it will be easier for you to get through it. Thus, to the extent possible, it would be advisable for you to be as precise as possible; I urge you to do that, to speed up the process.

Prioritization and Categorization of Licensing Actions

Mr. Steven Varga:

I came down here to give you a three-hour presentation and he says I have about 20 minutes. I am going to do my own viewgraphs so I can control more or less how it is going. I think everyone can hear me.

As Denny mentioned, our internal procedures were driven by resource limitations, work-load escalation, and several criticisms over the past year or so about license amendment buildup and delays in processing applications or license amendment requests.

[Figure 1]

So very quickly, let me just go through the two that I am going to talk about, which are categorization and prioritization. The purpose is more effective management, effective resources, to formalize the programs and to focus the technical resources on the important new issues that need attention.

[Figure 2]

With regard to our internal procedures, categorization was initiated in September of 1987. We had some startup problems with it, and we had several discussions to be sure we all understood what we were doing internally. The prioritization procedure was essentially effective April of 1988.

[Figure 3]

The categorization procedure initially focused on amendments because that was where we were having much of the problems in terms of timely processing of the licensing applications for amendments.

The goal is to shift technical review to the project management staff as well as to be sure that the safety considerations are met. There is fairly extensive library of knowledge and experience already established by the many years of amendment processing that the project management has accomplished. Therefore, the goal is to use that extensive knowledge that project managers have.

As you know, project managers are experienced people with many years of experience in the technical field; they can handle and understand the issues that are being raised. Approximately, at the present time, 60 percent of incoming amendments are being processed by the project management staff.

There is an important area that I would like to concentrate on, and it may seem like preaching or a tutorial, but I think it is going to be important. For the license amendment process to continue, we need to increase its sufficiency through the license amendment application that comes in from the utilities.

[Figure 4]

We have established three categories of license amendments: License amendment Category I is for those amendment requests that we reject; Category II is for license amendment requests that the project management staff will process; and Category III is for license amendment requests that will go through, will be detailed to, the various technical disciplines to go through the more or less historic way that we have handled license amendment requests.

What is the rejection? As you know, if you look at the many thousands of amendments we have processed in the past, very few have been outright rejected in terms of safety significance. We may have made changes here and there for some of them; added footnotes perhaps to the license text specification. By and large, after a, in many instances, fairly laborious question and answer process, we have found the amendment request acceptable. Eventually the technical resolution was found and the license amendment was issued.

We do not have the time or the resources to continue that question-and-answer phase with as many operating reactors as we have and with as many license amendment requests as we have. That phase must be curtailed. We are establishing fairly rigorous requirements, which should be successful.

You may recall when we first started the Sholly process with regard to significant hazards, the staff at first was somewhat confused about exactly what it was that was needed. However, as we worked through it, and we were working with the industry, I believe that we resolved the problems because most of the Sholly amendments that we require from licensees are pretty good and the amount of time we spend on reviewing these amendments now is fairly short.

We would like to do the same thing on the technical side: Thus we say an amendment is not adequately justified. Inadequate significant hazards consideration, I think, is of secondary concern now, although we encourage you to continue the improvements that you have made. An inadequate description of the licensing basis and an inadequate safety analysis of the reason for the change is not good enough. Just as we have accumulated a fairly extensive library for almost any amendment request you can think of, and the justification with it, you must also have acquired fairly extensive knowledge about what we require in an amendment request to evaluate it and to find it satisfactory.

This rejection approach is to encourage a heightened sensitivity on your part. If we receive a license amendment that we believe is significantly deficient, we will return it to you. We will not continue with the process of questions and answers. We will, essentially, return the request with a statement that it is inadequate and must be resubmitted.

This is also a discipline on the staff, not just on the licensee. We do not want to use license amendment reviews as tutorials for the staff; we do not want to have, as someone once characterized it, the tyranny of the reviewer. We want to be sure that the technical review focuses on the significant salient events and salient parts of that amendment and does not focus on what would be nice to perhaps amplify or to know. Thus there is a discipline required on the staff as well.

Again, the rejection—I am sure it will cause some questions, which is why I am spending a little time on it. The rejection is not going to be a request for additional information; it is going to be a request for more clarification of a subtle portion. The amendment request will be returned with essentially a rejection, a closeout of that particular action and a resubmittal if the licensee so wishes.

For NRC-initiated events, we have several instances where the staff has a requirement that seems odious or is odious or burdensome to the licensee. We are taking a very close look at this from a management standpoint in terms of what we believe is acceptable. Rather than having issues drag on in question-and-answer form, which goes on and on, the staff is going to come to a specific resolution, communicate to the licensee, and essentially end the interminable process of questions and answers. The staff must be prepared, if faced with further licensee resistance, to order that particular action and close the action out.

If the licensee's amendment request has been rejected, it is up to the licensee to make a resubmittal, to withdraw the request, or to make a new submittal at any time. Hopefully, this process will minimize the number of Category I rejections that we process.

[Figure 5]

When a license amendment request is designated a Category II, the PM (project manager) does the review. Again, it is dependent on the licensee's application. As I mentioned earlier, a library of amendment requests has been established so that we can maintain, within the project management staff, evaluations that can be used for very similar type amendment requests. I think we are making good progress in this.

The advantages: it generally saves time in the entire NRC review process and it allows the technical staff to concentrate on more difficult issues. We no longer have the administrative problems of memorandums back and forth internally with a Category II. The project manager takes it, understand it, and processes it. He can schedule his own time, and, within his own group, he can process it and get the amendment out without having interaction with other divisions or other branches.

The other advantage, as I mentioned, is that it allows the technical staff to be concentrating on steam generator corrosion, severe accidents, and all the host of issues that have come up over the last year and will continue to come up. Rather than divert the technical staff, the detailed discipline technical staff, from the more or less routine amendment request, we give it to the PM. This process appears to be working.

As I said earlier, about 60 percent of the requests are now being handled by the project manager.

[Figure 6]

When a request is designated a Category III, it goes through the technical staff. It generally involves a more complex issue, or basic policy issue, and the review schedule is strongly driven by the priority that is assigned.

The project manager's review effort also is driven by priority, but he has a lot more control over his own efforts. Those issues that might be a Priority 3, which I will get into in a minute, for a project manager perhaps has a little better chance of getting processed than a Priority 3 in a technical branch because the technical branch has a host of much higher priorities in terms of generic issues or other kinds of actions.

[Figure 7]

Let me talk about prioritization a minute. There has been a lot of internal work in establishing priorities; it has been documented and officialized in NRR office letters. However, it is a subject that has continual revisions. As Dr. Murley indicated, when we had this TMI-action reconstitution, this exercise, of course, has a very high priority because the directions came from Congress and the Chairman.

Priorities are needed to establish our efforts, but they do have flexibility. There is a uniform priority ranking scheme used within NRR, not only for amendments but for MPAs [multiplant actions], for bulletins, for anything else that requires staff resources—severe accident efforts, for instance, the IPE [independent plant examination], the preliminary work on IPE, and those sorts of things.

The establishment of a schedule, of staff assignments, of priorities are based on safety significance, the

Commission's statutory responsibility, and the effect on operations. Let me give you a couple examples. Of course, prioritization requires a significant amount of discipline within management as well as within staff. Many of us have things we would like to work on that are very challenging and interesting; it requires a great deal of discipline to be sure that the priorities are correctly assigned in terms of the resources that we have.

[Figure 8]

Priority 1 is for significant safety concerns or very high-risk, significant events requiring immediate action. Any of the LERs that appear in our weekly operational events briefing usually have a fairly high priority assigned to them. Emergency or exigency requests—these are when some relief is needed, either an enforcement or an emergency technical specification request, immediate action needed for compliance of statutory or judicial requirements or Commission directives. If we are in a hearing, the licensing board has established a hearing, a hearing schedule, for staff testimony to be produced, that also has a high priority.

[Figure 9]

Priority 2 is for a significant safety issue requiring near-term staff evaluation. Justification for continued operation comes into play for these issues, and priorities are established within that framework. We determine the safety significance of an operating event. Similarly, an issue may not have risen to Priority 1 because there are circumstances where continued operation or immediate action is not needed.

Plant-specific resolution of very significant generic topics also are considered Priority 2. If we are in the licensing process and the plant is in a particular status of either coming back from refueling or after an extended outage, there may be some specific items that need to be resolved at that particular time, which may have the potential for impeding startup or continued plant operation.

Topical report reviews, which will have extensive application in the short- to mid-term, and licensing reviews for which SER preparation is needed within 6 months, are usually Priority 2. For instance, the South Texas plant, the Vogtle plant, and coming up, the Lemerick fuel plant, will receive Priority 2 as the schedule of completion gets closer.

[Figure 10]

Priority 3 is for important issues that are essentially of moderate safety significance requiring staff action over the long-term. This category also includes generic issue resolution and multiplant actions and topical reports that rely on accountability in the short- to mid-term to offer an operational or economic benefit.

[Figure 11]

Priority 4 is for issues not directly affecting plant safety, such as: administrative technical specification changes, changes removing the fire protection details out of the technical specifications, topical report reviews with limited application to safety benefit, and generic or confirmatory items with relatively low safety impact.

[Figure 12]

What are some of the problems that we are experiencing here? How are we doing? Well, as you might expect, a large number of Priority 3 and 4 issues, essentially Priority 4 issues, have an indefinite schedule. They are constantly bumped by higher priority efforts. However, we have recently had an attitude readjustment by Dr. Murley on some of this. We are no longer going to have indefinite schedules on licensing actions; rather, we are going to have specific schedules established, particularly for amendments or multiplant actions. The goal is to not have "sleepers" as these issues mature. We must work on them.

[Figure 13]

Let me tell you where we are—what our goal is, what we are striving for. We are striving for an average of 20 or less active licensing actions per plant. Today, the average—the average, not median, but the average—is about 31, 32, or 33 per plant. We would like to work on this distribution: 80 percent of active licensing actions less than 1 year old, 95 percent of active licensing actions less than 2 years old, and nothing greater than 2 years old.

[Figure 14]

That is the motivation for not only categorization and prioritization, but also for asking you to give us as good an amendment application as you possibly can.

[Figure 15]

What would be licensee participation? We know—in fact I think it is almost universal—the support and cooperation that we are getting from licensees in the meetings with the project managers. I think about every month, two months—every six weeks or so—the utility's licensing group, the licensee, sits down with our project manager to discuss all of the various items that they have listed.

We want you to recognize the priority system and to limit independent Priority 4 issues submitted for review. This does not mean that you should not submit them, but recognize that Priority 4 issues are going to be rather low in the immediate-action framework. Communicate with the assigned project manager about your own priority in an amendment and the reasons behind it. It is very important that you discuss your plans for the next year; it is very helpful to us to know what you have coming up, what your requirements and plans are for an amendment request, and where you place them in your priorities. Submit detailed amendment requests that can readily be classified as Category II for PM review.

That completes my presentation. If you have a quick question or two, I would be glad to answer it.

Mr. Crutchfield:

Better have a lot of questions, otherwise you are going to have to stay after school and write them up. So make sure you get them together.

The next speaker is—oh, we have a question. Good.

Voice:

Steve, as you know there were many. . .of one SER still out there controlling SPDS [safety parameter display system], Regulatory Guide 1.97, and that is not in the project manager's role to do. How are we doing on those?

That was one of the issues that made responding in my letter a little difficult. A lot of us are taking exceptions to certain parts of those documents and submitting them. While discussions with staff in the past few years have indicated that those would be acceptable, we are getting an SER back saying everything is okay except for this item and that item, that item and that item.

Mr. Varga:

Well, there are several answers to that. First, the SPDS, Dr. Murley's discussion here about the problems that we got into, I think focused on the SPDS situation. Second, there is a generic letter that is coming out—if it has not already come out—there is a generic letter that is going to attempt to put into perspective what it is that we believe is acceptable and what we require from the licensees.

There is a great deal of attention, not only because of what we have been doing, but because of this emphasis that Dr. Murley was talking about: About being sure we understand where we are, that the licensee understands where we are, and that we are in agreement with it.

All I can say is that there are significant actions under way with regard to not only SPDS, but detailed control room design review and Regulatory Guide 1.97 and EOPs [emergency operating procedures] as well.

Mr. Crutchfield:

Our next speaker is Ed Butcher. He is going to talk about the technical specification improvement program. This is a program that we fully expect will improve safety at facilities. It is going to remove those issues that do not belong in technical specifications and put them some place else. It is going to focus on the principal key safety issues. Standard technical specifications should also probably be going hand in hand with configuration management considerations that we heard about yesterday for updating your engineering design and knowing what your plant design is.

Improved Technical Specifications

Mr. Edward Butcher:

I would like to get down here where I can walk around a little bit in case I get nervous. I will start off by saying that I am going to move through this as fast as I can this morning. We are running a little bit behind schedule.

The presentation is accompanied by a companion paper that you should have in the materials that you received when you registered. Everything that I am going to talk about here this morning is covered in greater detail in that paper, so I would encourage you to read it. [The paper is contained in Volume 2 of NUREG/CP-0102.] Also in the paper, I have provided a large number of references to specific documents that provide even further detail about the topic matter. If something is of particular interest to you, you can search out the reference and get the information that way. Finally, if none of those sources satisfy your need for information, feel free to give me a call at the office. It is a simple switchboard and just ask for Ed Butcher; they will find me somewhere in the building and we can deal with your questions that way.

I always like to start off with this slide *[Figure 1]* reminding people that the whole purpose of the technical specification improvement program is to focus on safety. People have become increasingly aware over recent years that the technical specifications had somehow or another lost their focus on safety. They have become more of a catalog, almost an administrative collection of all of the requirements that had at one time or another been considered as being useful for maintaining a license for one of these reactors. Thus, the focus on safety was lost. The whole theme behind the improvement program is to get that focus back.

The second slide *[Figure 2]* reiterates that same theme. The program has basically two goals: The first goal is to improve operational safety. A key element in that is to reduce the size and complexity of technical specifications.

Through the program over the years, as we have moved towards the development of the new STS [standard technical specifications], we have discovered that approximately 40 percent of what is in the current standard technical specifications, and in many of the actual specifications for the plants out there, does not meet a reasoned set of criteria for what are the most safety-significant requirements in the plant. The focus of the document will be significantly reduced to a finer set of requirements. Approximately 40 percent smaller than the current technical specifications. That alone should go a long way towards achieving our goal.

Another element is to make technical specifications more understandable to operations personnel. To a large extent, some of the current technical specifications read more like a novel than a technical document. I think when you see the new standard technical specifications that are being developed, you will agree that we have gotten a lot of that extra verbiage out of there.

Another element in moving towards the overall goal of improving operational safety is to reduce unnecessary transient shutdowns and even the trips and scrams that come from the requirements. These may not have been as well thought out as they could have been.

The second goal is to provide a clearer link between the specific requirement and the safety significance of the requirement. We have become aware that for as many times as you go through the specifications, even in those cases where the requirement seemed to have some substance in terms of being important, it was not always as clear as it could be as to what the actual safety significance of that requirement was.

Our principal mechanism for achieving this goal is to do a complete rewrite of the bases section to make that link a lot tighter.

To provide an overall direction and focus for the program and an engine to drive the process, the Commission issued a policy statement *[Figure 3]* on technical specification improvement. I believe that was in 1987. I do not have the exact date. It is in the paper. That policy statement had five principal elements. The first element was a statement of what the purpose and scope of technical specifications ought to be. An objective broad statement of the purpose of technical specifications was provided in the policy statement, and then three very subjective—excuse me—very objective—I misstated it. The first one is a rather subjective statement, and then three very specific criteria for determining which specific requirements would meet that overall statement of purpose. Those are in the policy statement. I will show a slide of those in a moment.

There is an element of the policy statement that deals with risk considerations and how they ought to be factored into the development of the specification, a well-designed technical specification.

Another principal and key element of the program is that the new standard technical specifications ought to be, at least in the first draft stage, proposed and developed by the users of these documents. Clearly, the folks that are closest to the documents ought to be the ones that can make a significant contribution to determining what they ought to actually look like.

Of course, the program has been a voluntary program. It was felt that because everyone shared the objective of improving the focus on safety, it was not necessary to make it a mandatory program. I think that has been borne out by the number of utilities that have participated in the program.

There have been many, many different utility organizations and members of the public, that have provided comments and input to the process. I see several of them in here this morning, some of the earliest participants in the program. I see Bob Gill and Al Passwater, they go way back in the program, I think I saw Biff Bradley earlier. The point I am trying to make is that there has been wide participation in development of these new standards. There is no reason why any particular utility would find—should find—them alien to the utility's perspective on how a reactor ought to be operated.

These are the three criteria that I spoke of earlier *[Figure 4]*. I will not say anything about them other than the fact that they are in the policy statement and they kind of provide the glue that has held this whole program together. Whenever there were differences of opinion as to whether or not something ought to be in a technical specification or not, we immediately went back to the Commission statement of purpose and these three criteria for defining what ought to be in there. These really have served us well in the process so far.

To implement that policy statement and the nuts and bolts of the improvement program, we have broken the program into three principal elements *[Figure 5]*. The first is the development of the new standard technical specifications. The second is a parallel program with specific line item improvements to the technical specifications as we went along. The third is the inclusion of other activities that were necessary to fully implement the policy statement. I will talk about each of these elements briefly; they are talked about in much greater detail in the paper.

The first element of the program is the development of the new standard technical specification. I have listed some completed activities *[Figure 6]*. The most significant of the completed activities so far is the industry's submittal—I indicate this as ongoing, because we do not have all the new STS. We have actually received the Westinghouse proposed new STS from the Westinghouse Owners Group, and circulated them among the staff. There are some 37 different people at the NRC that are looking at that document. Probably some of them are at the conference here. It is getting wide distribution. On last count, I think the feedback I got was that 31 of the 37 regard it as a vast improvement over what they had before and see no reason why we cannot proceed with a full-scale review of the document. That is good news.

Other milestones in the process include the submittals of lead plants. The plan calls for—about half way through the review of the new STS—to begin a review of individual plant conversions to it so that if there are any problems with the new standard technical specifications—even though it was, in effect, written by the industry itself—if there are any problems with the implementation of the new standard at any of the individual plants, we can sort those out before the NRC makes a final decision on whether the new standard is acceptable.

I will not talk in detail about the key implementation issues. Back in January of 1988, there were a number of questions related to how the new standards would be implemented at an individual plant. Questions like: To what extent would individual plants be required to accept things in the new standard that are not now in their custom specifications when they convert to the new standard? How will we handle the Sholly noticing procedures; will the bases need to be considered as part of the specification; will it need prior staff approval before it can be changed? Positions were taken by the staff on all these issues, and they are documented in formal communications back to the owners groups that we are working with. The details of the staff position on each of these issues are provided in a reference in the paper.

I would encourage all the individual utilities to take a look at these issues because they provide important information on how you might convert to the new standards.

Let me see if there is anything else I want to highlight. The additional conversions to the new STS after the lead plants. You can see that in late 1990, we plan to be prepared to receive wholesale numbers of applications for conversions to the new STS. We have done informal polls: I think the licensees of something like 60 of the 110 reactors out there have already indicated a desire and a plan to convert to the new STS. I think that is fairly remarkable at this early stage of the program. People must have liked what they saw in the draft stages.

The line-item improvement activities *[Figure 7]* have probably been the most productive element of the program so far in terms of actually getting some changes made because we have begun to get many plant-specific amendments to implement some of the changes in the current technical specifications that have been approved.

The relocation of organization charts, hopefully, will cut way back on the number of license amendments that come in. We were getting an average of one amendment per plant per year from this alone. Let me just say one thing here. I might suggest that you wait until the next time you plan to modify that organization chart before you submit an amendment to relocate the organization chart. That way we do not end up generating an extra amendment that we would not otherwise have had. Some of these other things might fit in that same category. We are not trying to create a hundred new licensing actions by each one of these items. The timing of it is probably something that ought to be considered.

Relocating fire protection program requirements and radiological affluent technical specifications are significant items. I once did an informal survey of the number of LERs that were generated as a result of fire protection technical specifications. The result was something like 20 to 25 percent of the total number of LERs that any specific utility generated, was through fire protection-related technical specifications, which indicates that that should result in a significant reduction in resource commitment.

I briefly listed some of the other activities that are ongoing in the plan. The issue regarding removing the limit on extending refueling outage surveillances is sitting on the section chief's desk right now in the final stages of getting approval. That should cause a lot less of what I will call nuisance interaction between the utilities and the NRC. There is really no safety significance to these one-time extensions that are necessary, but in many cases we end up having to review them.

There is a major program of reduced testing at power. I do not have time to go through that. There is a reference in the paper that will give you some specific details on some more things that we are considering to reduce the amount of surveillance testing that is done at power plants.

Mr. Crutchfield:

Okay, I am getting word to speed up.

Do you want to go to the next slide?

Mr. Butcher:

I am going to have to encourage you to read the paper. We are just going to run out of time.

This is the next to the last slide *[Figure 8]*, however, I will not say anything at all about the guidelines for conducting 10 CFR 50.59 reviews because Marty is going to talk about that. I will only say that it is very important to the improvement program because the policy statement says that no individual utility can convert to the new STS until they have their 50.59 process squared away, so it is in the critical path.

Finally, and this is an area that I am very excited about, that is, risk-based technical specifications. We think we have gotten to the point where we have just about optimized the deterministic approach to technical specifications through the new STS. However, there are some very exciting things going on in Europe and other parts of the world that relate to the development of a risk-based specification. I would encourage you to read the paper in that area. Let me wet your appetite. This type of specification would have no fixed AOTs or surveillance intervals. The goal here is to set AOTs and surveillances such that you do them when it is an optimum for safety. You do not do them in accordance with a set of arbitrary rules.

Let me just put this last slide *[Figure 9]* up here, because I would like to go back to the beginning: the overall program effect on safety and resource requirements. We think the program will improve operational safety; there is no question in our minds about that. We think it will result in more reliable and efficient plant operation, and we are certain that it will result in resource savings to both the NRC and industry. The significance of this is that all that resource savings gets plowed right back into the top two, and that means safe operation.

Denny, I guess that is it.

Mr. Crutchfield:

You might want to take one or two questions.

Mr. Butcher:

Any questions? [No response.]

Mr. Crutchfield:

Marty Virgilio is going to chat about 10 CFR 50.59 reviews. This is an area that has become more and more interesting to us and to you. We are working together. It is clear we have a lot of progress in a number of areas; however, it is also clear that we still have a number of areas in which we have to make progress.

There are a lot of folks standing in the back. There are a lot of seats empty up here. This is just like church. We are not going to take up a collection or anything, so come on down and sit. Feel free to leave whenever you wish, but please join in and have a seat up here, if you would.

Conducting Changes, Tests, and Experiments Without Prior NRC Approval

Mr. Martin J. Virgilio:

If we could have the first slide *[Figure 1]* please.

In 1962 the Atomic Energy Commission amended its regulations to clarify the extent to which a licensee may make changes or conduct tests or experiments without prior NRC approval. Although revised several times since its first introduction, the intent remains the same: to provide a framework for determining what changes do in fact require prior NRC approval.

I would like to state at this point in time that 10 CFR 50.59 is not the principal safety test; that test comes long before you get into the 50.59 process. It is strictly a test to determine whether NRC and the public get involved in the process.

What is the problem? In the mid-1980's, the NRC and the industry recognized that there was a lack of specific standards for interpretation of 50.59, which has led to misunderstandings in this area. Inspections and audits by the NRC staff found that there were inadequate criteria in the licensee's own procedures for determining when unreviewed safety questions might exist. The criteria of 50.59 were often narrowly applied; as a result, some changes were made without prior NRC approval that should have gone through that process.

What is the course for resolution? With a common goal of providing the tools for people to use in properly interpreting 50.59, both industry and NRC established working groups. In 1986, the industry working group provided a first draft guideline document for review to the NRC and its industry members. There was much interaction and discussion between that time and 1988.

In May of 1988, NRC released its official comments on that first draft guideline document. There were five key issues identified and 33 detailed comments.

In November 1988 industry responded to those NRC comments with a revised guidance document. The guidance document was substantially revised to include both the NRC comments and the comments that had been received from the industry members.

Although we still have not completed our review of that revised guidance document, we are coming close to resolution. We have had one meeting with the industry that was held in NRC's offices on April 6, 1989. At that meeting, NRC identified three significant areas that we feel need further revision. We will get into those areas in just a minute.

The next slide *[Figure 2]* please.

As you can see, 50.59 is a fairly straightforward rule that includes two tests. The first test: Does it require a license amendment? You can make a change, conduct a test or experiment without prior NRC approval provided it does not require a license amendment. The second test: Does it involve an unreviewed safety question? The definition of an unreviewed safety question is included right in the rule. The first part involves any increase in the probability of an occurrence or the consequences of an accident or malfunction. The second part involves any probability for an accident or a malfunction of a different type. The third part involves any possibility of a reduction in the margin of safety as defined in the basis of the technical specifications.

Let me go on to the issues. The next slide *[Figure 3]* please.

The industry proposed guidelines and provided some direction on judging increase in probability based on an example utilizing a standard [ANSI 18.2] that was developed in 1973. The standard was principally developed to provide guidance to the design and licensing people in the early stages of the NRC licensing process. It identified a number of categories for events and it provided examples for those categories.

The industry proposal essentially looks at those categories and provides, by example, a change in frequency from one category to another as the type of frequency change involved in judging whether there is an unreviewed safety question.

Just to clarify that a little bit. Normal operations defined in that standard include the regular activities such as power operations and maneuvering, maintenance, and refueling. Moderately frequent incidents are somewhat degraded conditions, because of human errors or equipment malfunctions that are expected to occur no more frequently than once per year. These include loss of offsite power incidents, loss of feed water, loss of load and turbine trip, and minor leaks that are capable of being made up by the plant's normal systems. Infrequent incidents are substantially degraded conditions resulting from human error or equipment failure. They are expected to occur no more frequently than once in the life of the facility, and they involve things such as small-break LOCAs [loss-of-coolant accidents] and radioactive gas tank ruptures. Limiting faults, the last category, are substantially degraded conditions with potential for releases of significant amounts of radioactivity. These are not expected to occur at all in the life of the facility, but serve as the design basis for the protective features of the plant. Examples of incidents in these categories include the large-break LOCA.

Basically the NRC felt that this was too course a measure. Changes within a class may, in fact, involve an increase in probability beyond the licensing basis. Examples would include a change that might affect the reliability of the ties to the offsite network. Such a change might increase the predicted frequency of a loss-of-offsite-power event from possibly one every two years to once per year. While this would not change the category because it would remain an incident of moderate frequency, we recognize that it would be a significant departure from the licensing basis and may in fact be something that should be screened and reviewed by the NRC in detail.

With regard to accidents, the guidance appeared limited to transients and postulated events that were reviewed in the licensing process. The NRC felt that this was a little bit too narrow in scope: it appeared to exclude a number of significant issues that have been added to the licensing basis throughout the years by regulations. For example, station blackout added by NRC rulemaking, and for example, intersystem LOCAs by NRC orders, as well as additions by generic letters such as the loss of shutdown cooling during mid-loop operation. We felt that these are accidents and events that should be evaluated pursuant to 10 CFR 50.59.

Go to the next slide *[Figure 4]*, the second issue.

The NRC felt that additional guidance was necessary with regard to an increase in consequences. The industry proposal looks at dose and finds that as long as the dose is increased up to regulatory limits defined in NRC's *Standard Review Plan* and regulations, there is no increase in dose significant enough to cross the 50.59 threshold.

The NRC concern was that calculated increases up to regulatory limits involve real increases, or may involve real increases, and as such, may violate the licensing basis of the plant and should trigger prior NRC review. For example, a fuel-handling accident is outlined in the *Standard Review Plan*, and the dose limits that are outlined there include 25 percent of the Part 100 limits. If, for example, during the licensing process it was proposed that the dose limits would not exceed 12 percent of the Part 100 limits for some specific reason, and the NRC reviewed and accepted that, that became part of the NRC's licensing basis for the plant. Even though the *Standard Review Plan* may allow up to 25 percent as acceptable on a plant-specific application, we feel that exceeding the 12 percent up to the 25 percent is something that should be reviewed by the NRC and, as such, should trigger the 50.59 threshold. It is inconsistent with the intent of 50.59 to violate the design basis of the plant without prior NRC review and approval.

The third and last issue *[Figure 5]*, in which we found that significant improvement to the industry proposal was necessary, involved reduction in margin. The industry proposal was, by example again, defining certain points and limits.

May I have the next slide *[Figure 6]* please.

This figure more or less recreates what was included in the guideline document presented by the industry and it shows bounding events, licensing acceptance limits, and failure points. The bounding event in this example was the pressurization of containment included in the SER and FSAR. The licensing limit was what was found acceptable during the licensing process. In this case the bounding event, the worst-case scenario, took the containment to a pressure of 35 pounds. In the licensing SER, the NRC had said that was okay as long as it did not exceed 50 pounds. We felt that there was sufficient protection provided.

In this instance, margin was defined as M-1 and M-2 in that figure. There were two components to margin. Although we did not see any problems with this, we felt it may be a little bit narrow in scope.

Go to the next slide *[Figure 7]* please.

We thought about how we typically do a design review and analysis, and looked at pressure in the reactor coolant system of a typical boiling-water reactor. We saw that allowable limits are established in the technical specifications. There is an analysis set point. There is a bounding event, a licensing safety limit and a failure point.

As we established each one of these, we found that there are margins included in these. As part of the 10 CFR 50.59 review process, we felt it necessary to look at the design basis for the plant and see the margins were located, where they were specifically identified by the NRC, and where one must look to determine whether there really has been a reduction in the margin of safety.

Next slide *[Figure 8]* please.

Those are the three areas that we are currently working on. As Denny said, this is somewhat preliminary; we are documenting the results of our review at this time.

There is a lot of good news in the industry standard, and I do not want you to think that we find it totally unacceptable. The safety review process that is outlined in the standard provides a conservative methodology that traces a change from conception all the way through safety review and the 50.59 process. It does a very good job at looking at guidance on secondary effects. It also provides very good guidance on changes to the design basis to provide consistency with the as-built conditions of the plant when discrepancies are identified.

However, it does allow some changes to the licensing basis, and it does provide for judgments about conformance to regulations, which are part of the NRC's responsibility. Tools that NRC uses are the regulatory guides, standard review plans, and other guidance that we have at our disposal. These decisions are meant to be carried out and documented in the public forum when they involve changes to the licensing basis through established administrative procedures, and that really is the intent of 50.59. As such, we find that additional clarification and guidance is appropriate in a number of areas; specifically these three that I have discussed.

As a postscript, on April 6th we met with representatives of industry and discussed each one of these issues. Industry left that meeting and left us with the feeling that they understood our position and they would go forward and try to modify their guidance documents before it would be reissued to industry on a trial-use basis to incorporate changes necessary to resolve these concerns.

That is all I have in my presentation. If you have any questions, I would be happy to answer them at this time.

Yes.

Voice:

On Issue No. 3, can you put up the slide of case number once again, please?

Mr. Virgilio:

Sure.

Voice:

I did not have a clear idea of what the ranking on that would be? That is in pressures are calculated by less than the. . .

Mr. Virgilio:

If you got to the first margin case. . .

Voice:

The first case on Issue No. 3 is 35 psig, which is a calculation done usually by. . .accident pressure.

Mr. Virgilio:

Right.

Voice:

I use proof codes. I go look for them, ask them to change the parameters that go into that code and the number comes out to 38. That number is not in my technical specifications. In my FSAR, I have the 50. . .licensing accident. . .are you agreeing that that can be made under the 50.59 process?

Mr. Virgilio:

What I did is really take the numbers right out of the industry guidance document, that figure.

Voice:

That is right.

Mr. Virgilio:

That guidance document says that you would have to look to see if you decrease the margin of safety. What you have done is you have decreased the margin too.

Voice:

That is right.

Mr. Virgilio:

It has to be reviewed; I would not want to say right now that it does cross the threshold of 50.59. The industry guidance document provides more information on that. But, if it does decrease the margin that was specifically taken credit for in the licensing process, if the NRC said, when it granted you a license, that 50 was okay, we, recognizing that the bounding event is 30, and would say that it provides us a degree of margin between the bounding event and this limit, and also a degree of margin between the limit and the failure point.

If you start to encroach on that margin, you may, in fact, trigger the 50.59 threshold.

Voice:

I understand that, but the question is what is the margin that ... which margin?

Mr. Virgilio:

If the NRC specifically focused on the 35 pounds and said, we find 35 pounds acceptable because it provides a margin between 35 and 50, as well as margin between 50 and the failure point, you have crossed the 50.59 threshold, and that requires prior NRC review and approval. That margin was specifically addressed in the licensing process.

Voice:

I do not know if 100 percent of us agree with that.

Mr. Virgilio:

Okay. Any other questions?

Voice:

I have a question on the same subject. It seems to me that that controversy can be avoided completely by writing the SER carefully. In other words, write that the results are less than 50 pounds, which is the design value.

My understanding of 50.59 is that it was published at a time when the Commission got sick of being asked to rule on a lot of things that were considered trivial. It sounds to me that if this issue goes in the direction that it seems to be going, we are going to be sending you a lot more of those issues that in 1962 you decided you did not want.

Mr. Virgilio:

Actually, I believe that what is going to happen is that you are probably going to, in your purchase order specifications for analyses, become a little bit more strict and a little bit more precise. It could involve sending us more information, but I do not believe that is going to happen.

Voice:

So you want that stuff. . .you want the 38 pounds?

Mr. Virgilio:

If, in the safety evaluation report, we specifically took credit for the difference between 35 and 50, providing that margin of safety between the bounding accident event analysis and the failure point of containment, yes, that should be reviewed and documented using approved procedures in a public forum.

Voice:

So it is up to us to watch the wording of those SERs very carefully, I guess, including recommendations.

Mr. Virgilio:

It is incumbent on both of us to make sure that we clearly delineate where the margin is.

General Questions/Answers

Mr. Crutchfield:

We have a number of written questions. I think we will get to some of those. If you want to jot down questions for Marty, we will pick them up during this question session.

By far, Cecil has the big majority of questions. That is why I asked him to sit at the end of the table. If you start throwing things, you will hit him and Steve and not me.

Cecil, why not start with a couple of your questions.

Mr. Thomas:

Okay. I will try to paraphrase the question and answer it, rather than read the entire question.

> *QUESTION:* Have we considered any alternatives to the hearing process other than the current adjudicatory-type proceeding that we employ for the CP and OL? The questioner notes that this type of process appears to have caused unnecessary delays, or have resulted in delays.

ANSWER: First of all, we have considered other types of hearings. While we are not completely locked into the adjudicatory process, as I indicated, we do intend to cover as much generically in the rulemaking proceeding as possible to try to minimize those issues that must be litigated on an individual-case basis. I am assuming that if you get into a hearing, it would not be a mandatory hearing. Persons whose interests are affected would have to exceed a certain threshold to have a hearing granted.

On the subject of delays, we feel that the finding of no undue risk by the Director of NRR should allow you to continue to operate while the hearing is proceeding. I recognize this is different than the current practice: for example, you cannot begin construction, or you are limited in what you can do under preconstruction agreement, or you are limited in power until that particular aspect is litigated.

We would hope to build into the rule a provision that would allow you to continue to operate upon a finding of no significant risk by the Director of NRR while the hearing is ongoing. We have, I think, taken this into consideration and, hopefully, we will address it.

> *QUESTION:* What if, for some reason, the staff rejects a renewal application, what would that imply about the ability to operate under the current license?

ANSWER: I guess I have to qualify my answer. It depends on why we would reject the renewal application, or why we would not find the application suitable. It depends on the reason.

If the reason is that we find that the plant simply is too old, the vessel is too embrittled or whatever to operate beyond the term of the current license, that is one thing. If we find a problem that has implications with the current license, certainly that would have to be fixed. It really should not imply anything. If we found a problem with the current license, we would require it to be fixed. There should be no adverse implications beyond the current license. We would treat them as two separate actions.

> *QUESTION:* What is the relationship of the document issued by the staff as a result of the rulemaking to the current license, and is a renewal license more of an amendment or a renewal? If it is an amendment, does it have to go through all the current amendment hoops like the Sholly notice and so on?

ANSWER: Well, the result of the rulemaking would be a rule that would not have any effect at all on the current license unless you decided to apply for a renewal license. We would view the renewal license more as a new license even though it is not the same as a new license that would be issued for a plant that just had a CP [construction permit]. There are clearly some differences, but it is certainly a lot more than an amendment.

We would envision an application would be submitted for a license renewal and that application would be noticed in the *Federal Register*, or with opportunity for hearing and so on, much as a new application. It certainly would be a lot more than an amendment.

Those are three of the questions I have. Let me give somebody else a chance.

Mr. Crutchfield:

QUESTION: A question came up with regard to a project manager indicating that a particular application for a license expiration date is being put on hold pending generic activity in this area.

ANSWER: If you received that kind of answer from your project manager, that is the wrong answer. I would either go back to the project manager or go to his/her branch chief and indicate they still ought to be processing license applications for extensions from 40 years of your operating license versus 40 years of your construction permit.

If you have any questions about this, go back and see your PM or talk to his boss.

QUESTION: A question that came up with regard to the new applications, license renewals, license extensions, and all those issues. The comment suggested that these activities would result in an horrendous increase in staff for the NRC.

ANSWER: Unfortunately, that is the wrong assumption. The staff is not increasing; we are not getting the resources. Our activities with regard to prioritization and standard technical specifications are intended to free up some of the resources, make the process easier on you and make it easier on us. That way we both save resources so we can focus on these new activities.

We are encouraging you to take the certification route for generic letters or whatever. We are encouraging you to use the standard technical specifications and adhere to them completely—deviate as little as you can from them, to save us all resources and effort.

QUESTION: The question came up about the final 8-year period of the 13-year standard plant review schedule limitation. Is it limited by construction activities or by licensing activities?

ANSWER: It is clearly construction activities. Our intent is not to hold up the licensing process. We recognize there are some hearing implications in the construction activity time. We are going to try and make sure that these do not impact the licensing activity.

One last announcement: Lunch will be in the State and Chamber Rooms when the time comes.

Mr. Varga:

QUESTION: Does the prioritization system discourage priority for submittals, or should we load the system beyond capacity?

ANSWER: You already have.

QUESTION: Has anyone passed the message on to the resident inspector?

ANSWER: The resident inspector should know what we are planning to do because he should have received all of these documents, the internal documents that I mentioned earlier. If not, I will make sure that the project managers apprise their resident inspectors of what is going on.

As far as the question goes about loading the system: you manage your plants; we are a public agency. If you believe you need an amendment request, you make that amendment request. I would encourage you to work with your project managers to clearly identify your priorities for amendment requests. If it is an amendment request that can be handled by the project manager, that is good. My assessment is that a Priority 4 application will get a little more attention when the project manager has the flexibility to handle it rather than if we have to send it over to the technical review branch.

The quality of the submittal is very important as well. A nice, well-documented Priority 4 application, which the project manager can handle, will move along, consistent with the priority scheme.

Again, should you load it up? The answer is yes, but be careful and load it up with quality submittals.

QUESTION: Please elaborate on the NRC standards for determining the adequacy of amendment submittals. It seems to vary significantly from project manager to project manager.

ANSWER: That is true. I think that there is a variation in terms of the project manager's view of a submittal, depending on which project manager you are dealing with. However, I think we are establishing more consistency because an amendment must be reviewed by the project director and the assistant director as well as the project manager before it is rejected. It is not a cavalier unilaterial rejection to eliminate workload for the project manager. It is a very careful and thought out process to ensure that we return an amendment for the proper reason and that you understand the reason it was returned. It will have been reviewed very carefully for its deficiencies and they should be stated clearly.

> *QUESTION:* With regard to the resolution of an ongoing dialogue between a licensee and the NRC by an NRC order, how does the backfit rule apply? Will advance notice of an order be given so that the licensee could initiate a backfit claim.

ANSWER: As I understand the question, I assume it is with regard to my discussion earlier when I had said that there are initiatives and license amendments associated with actions that the staff has deemed to be a requirement. These would be the types of requirements that would result from NUREG-0737, or action items, or a duly constituted MPA [multiplant action] item, bulletin, or an order, which has behind it the regulatory requirement in a thought out and deliberate way.

If that were the case, we will have negotiated, as I said. I think we would then eliminate the repeated question-and-answer sessions, which in our view, may only be amplifying areas we have already discussed. If we, collectively, the staff and management, decided that an order should be issued, we would be very careful to make sure that the order was warranted so that, if you requested a hearing, we could support and sustain the justification for that order. That we would do.

However, if we believe that an order is going to be forthcoming, I believe that you will receive plenty of signals to know that that is going to happen, or to know that we are on that path to resolution of the issue.

> *QUESTION:* How can NRC justify downgrading review of Unresolved Safety Issue A-46—I guess that is the seismic margins—after industry and the NRC have expended 10 years of effort and are now essentially complete?

ANSWER: I was not aware that we had downgraded it, and I am not the definitive spokesperson for this issue, necessarily. However, my understanding is that as a result of the extensive work done by the licensees and by consultants and all the people associated and involved with that issue, we have come to at least a preliminary conclusion that there is a lot more margin out there than we really had thought. While I do not think we have downgraded it, perhaps we realized, after weighing the issue, that our specific concern was not as great as originally thought

However, I was not aware that the particular place of this issue in priority had diminished in any way in the regulatory scheme. Therefore, I will have to communicate this concern to the appropriate people and have them then get in touch with you.

Mr. Butcher:

My presentation must have been very clear and informative because I only have one question here

> *QUESTION:* Are there any plans—I will paraphrase it—any plans to make the conversions to the new STS mandatory at this time? If not, will utilities be able to choose those aspects of the new STS they might like to implement versus a complete conversion to the new STS.

ANSWER: There are no plans at this time to make mandatory conversion to the new STS. We have seen at least one example where both the NRC and the utility itself was not satisfied with the quality of operation of the facility and it was thought that conversion to the new STS might be an important mechanism for improving performance. There was mutual agreement that perhaps that utility could benefit from a conversion to the new STS.

The policy statement specifically addresses the question of priority on conversions to the new STS versus what I will call "picking and choosing." What it basically says is that first priority will go to those utilities that elect to make a complete conversion to the new STS. After we have completed all of the reviews for those conversions, we will entertain individual amendments to do partial conversions to the new STS. That process can be very resource intensive for both the utility organization and the NRC.

I would just close by making the remark that it may not be immediately obvious on the surface, but many of the plants with custom specifications have looked at the new STS and have concluded that they would convert to the new STS even though they have a relatively small and fairly compact set of custom specifications. It is in their best interest and it would improve safety.

As I said earlier, about 60 plants have indicated a desire to convert. Many of those are custom facilities.

I would suggest that you do not automatically conclude that because you have an older specification, you will leave well enough alone. You ought to give honest consideration to a conversion; you may well conclude that it is in your interest to do so.

Mr. Virgilio:

I wish, like Ed, I could say I only had one card, but my presentation obviously stimulated a number of thoughts. I have tried to combine the questions because a lot of them really lend themselves very easily to consolidation.

QUESTION: I stated that 10 CFR 50.59 constitutes the test by which it is determined whether NRC gets involved or not, and it is not really the safety test. The question is: where do you do a safety test?

ANSWER: I think the industry guidelines provided a very good, clearcut methodology for first doing the safety review and then cascading down a process where you eventually get to 50.59 after you have gone through that step.

Again, 50.59 is not meant as the final test for safety; that should be done long before you get into the 50.59 process. I refer you back to the industry guidelines because I think they do a tremendous job of outlining the process.

QUESTION: This next card states that only three areas of disagreement remain. Unfortunately they encompass the entire definition of 50.59.

ANSWER: I will not go on to read the rest because Denny says that it is his card.

It is a little preliminary at this point to tell you where we are because this is a proposed response to industry. I will, however, share with you what we said at our April 6th meeting:

With regard to probability of occurrence, we talked about utilizing methods such as the IPE, generic and plant-specific PRAs, and just plain old engineering judgment to determine whether you have increased the probability or not.

With regard to consequences of accidents, again I think people have to go back and look at the licensing basis of the plant: Why did we accept 25 percent of the Part 100 limit? Is that clearly specified in either the licensee's incoming evaluation or in the NRC's acceptance SER?

With regard to the margin of safety, again, you have to look clearly at the licensing basis of the plant. I am not asking you to bring another rock; I am just asking you to go back and look at the basis to which we licensed the plant. Are the four margins that I outlined clearly specified in either your incoming document or the SER? That information comes right out of the incoming that is submitted to us for our review of how you established the maximum pressures that would be experienced in a BWR reactor coolant system. This is nothing we made up, it is clearly a part of the incoming submittal. I grant you that it might not be clearly specified in the staff's SER, but it was clear as day in what was submitted to the staff as part of the licensing basis of the plant.

QUESTION: The questioner on next card writes about the results of a safety analysis generally being stated as fact with no specific wording regarding margin.

ANSWER: This is similar to the last card in that I think you have to go back to what was submitted by the licensee to the staff for review and approval. On what basis did we find it acceptable and what were the margins that we took credit for in the licensing process?

QUESTION: Does the NRC plan to adopt the NUMARC guidance as a regulatory guide and is there a schedule for this?

ANSWER: Although our plans are not yet concrete, that would seem to be the logical process that we would follow at this point.

QUESTION: Another question using PRA techniques: Can the probability of an accident initiation be increased if down the sequence the probability of subsequent events or failures are decreased?

ANSWER: We are currently looking at this concept. It was presented to industry during the April 6th meeting and we are trying to refine the concept and better explain our position on the matter.

That pretty much summarizes the questions.

Thank you.

Mr. Crutchfield:

Any more questions out there? We will have somebody pick them up if there are.

QUESTION: There was a question that came in: If we are ready to process new applications, are we developing staff guidance for looking at combined CPs and OLs?

ANSWER: Part 52 was just finalized within the last week or so. We have not had the opportunity to do that; however, we are beginning to do that. So we hope to have some guidance in hand for the staff as to how to utilize early site reviews and combined CPs and OLs.

Steve has one more question so far. After that we will go back to Cecil to let him wrap up.

Mr. Varga:

I think this question came from a review of the printed material.

QUESTION: It is indicated that the February 1989 licensing amendment backlog was 1020. The new guidance is an average of 20 active licensing actions per plant. This value multiplied by 110 plants equates to a new allowable backlog of about 2400. This is not the backlog reduction result the NRC is expecting of the industry.

Is a factor of the increase in the backlog viewed as acceptable by the NRC?

ANSWER: Let me explain the backlog a little bit. That number of 1020 license amendments constitutes about 30 to 35 percent of the total backlog of licensing actions that the staff has. I was concentrating specifically on licensing amendments. There are relief requests, there are SERs that we issue, there are other documents that we provide, that we respond to and that require staff action, that do not necessarily constitute a license amendment, a technical specification change, for instance.

The total backlog in February was about 4,000. Dr. Murley has established a projected backlog criterion, which states that of all the licensing actions we receive in the year, the backlog should be no more than that. In other words, if we receive 2400 licensing amendments, 2400 licensing actions in the year, we should process about that number. They will not be the same ones that came in, but the backlog should constitute no more than the amount of licensing actions that are generated during that year.

QUESTION: How are review priorities for vendor topical reports assigned? Which topicals come first?

ANSWER: Again, I am not the definitive person to answer this. However, the topical report priorities are established by the review branches responsible and the schedules are influenced by the specific safety issue involved.

I cannot speak to any specific one, but those issues, those topical reports that are related to current ongoing significant-safety issues are being considered. Those topical reports have high priority and are being resolved.

Those topical reports that will be used—perhaps by a vendor for instance—in establishing a generic position that might influence several licensing actions that are not of immediate safety significance would receive a lower priority.

So in general, my best answer is that we establish priorities for the topical reviews consistent with our view of the safety significance and the resources available.

Mr. Crutchfield:

The other aspect we look at is the number of plants that that particular topical report is intended to cover. If it is only applicable to one or two plants, it likely will get a lower priority than one that covers 25 or 30 plants. This too influences prioritization.

Cecil has a large deck of question cards that he has reshuffled. He is going to go at it again.

Mr. Thomas:

I am going to remain seated in answering these. I am afraid I cannot stand up and hold all these cards at the same time.

QUESTION: Plant life extension has a significant effect on the decommissioning funding rule: How is this being addressed?

ANSWER: Yes, that is true. It may sound like a Yogi Berra type answer, but, until a renewal license is issued, the current license expiration date is the determining factor.

Of course, if a renewal license is issued, the date of the new license becomes the determining factor. We have recognized this, and we will have to consider it in rulemaking. Exactly how, we have not worked out yet; but it is certainly on our list of things to consider in a rulemaking package.

We have not looked at the whole rulemaking package yet. I refer to the licensing renewal rule, which may certainly be more than one rule. We may go back and change individual rules, such as, the decommissioning rule, that are affected by licensing renewal, or this may be put into one part of the regulations. This has not been worked out, but certainly the decommissioning rule will have to be looked at.

QUESTION: The speaker indicated that a PRA was being considered during the relicensing process. Is this not a little weak as a statement or characterization? Is it not more likely the PRA will be required?

ANSWER: Yes, there is a good likelihood that a PRA will be required. However, I am not prepared to say that one will be required. To require a PRA is a substantial change in the way we do business. There are a lot of people who would have a lot to say about whether we go so far as to require a PRA.

When we issued the IPE generic letter, of course, we encouraged the PRA. We indicated in the generic letter that if you did a PRA, you would probably have a leg up on plant license renewal.

I think we are not really ready to say we are definitely going to require it, but, yes, there is a very good likelihood that a PRA would be required

> *QUESTION:* A related question: If a PRA is required for license renewal, does it not become part of the docketed application and therefore become subject to litigation?

ANSWER: Yes, it would be part of the application and it would be subject to litigation to the extent that the issues in the PRA were in controversy. It depends on what the issues are and how they relate to the PRA.

> *QUESTION:* I have a couple of questions related to the format, content, and level of detail for documenting what constitutes the current licensing basis.

ANSWER: The current licensing basis, as I indicated earlier, consists of the basis, the licensing basis at the time the original license was issued, plus anything that has changed the licensing basis since that time.

There is a whole plethora of documents that constitute the current, or define the current, licensing basis, including the FSAR, as amended; the SER that we wrote to issue the operating license; any license conditions, orders, amendments to the license and supporting SERs, and so on. Somehow we have to pull all these documents together. I say "we" because that includes the NRC. We have to look at the overall current licensing basis as well as you; however, the burden really falls on you and how you describe them.

We have not come to the point that we are ready to specify how the licensing basis would have to be spelled out in an application for license renewal, whether it could be done in part by reference or whatever. We have not come to that point. Certainly we have to know what it is we are relicensing. When we issue a renewed license, we have to document what it is that we are licensing.

Somehow this is going to have to be faced. I am not really ready to tell you how, but it is something we are all going to have to face.

> *QUESTION:* How can the licensing basis consist of the current licensing basis when studies about the effects of aging are not yet done?

ANSWER: As I indicated, the licensing basis for the renewed license would consist of the current licensing basis plus any changes that would be required to ensure that the current level of safety is maintained throughout the renewal period.

Aging relates not only to the renewed license but to the current license. Any information developed on aging as it would apply to the current license would be applied to the current license. They really are separable. Anything that would be required in addition to the current license, to ensure that the level of safety would be maintained into the renewal period, would be reviewed toward the end of issuing a new license, or a renewed license.

Mr. Crutchfield:

Lucky Ed has picked up another question. We will give him the opportunity now.

Mr. Butcher:

I am not quite certain I understand this question, but I will try to answer it as best I can.

> *QUESTION:* If a plant submits new STS for review, will other plant-specific technical specification submittals be considered?

ANSWER: I presume the question to be: What happens to the current list of amendments that I have being processed while you are reviewing my conversion to the new STS.

Frankly, I do not think we have given a great deal of thought to this. However, it would seem that, before the new STS is submitted, we would have to sit down with the licensee and the project manager and the branch that will do the review and take an inventory of what is currently in house. We would have to determine which items should be folded into the conversion process and which are of immediate importance to the operation of the facility. Those that are of immediate importance would have to be processed in the current format that the utility has.

I guess what I am saying is that I believe the NRC would have to exhibit considerable flexibility in scheduling the continuing review of pending license amendments when we develop a conversion process. The practicalities of the situation would dictate that.

Mr. Crutchfield:

The question has come up about staff guidance on 10 CFR 50.59 appearing to suggest that industry should be filing more applications and more information with us.

QUESTION: In light of your backlog problem and your cut resources, how do you correlate those, is this in the best interest of plant safety?

ANSWER: I do not think the 50.59 process is intended to get us more documents, more issues to review. In those clear cases in the staff SER where we tied our conclusion to a specific value, when that value is changed, we want to know about it. In other circumstances we may have not tied ourselves to a specific number whether it is 35 or 38 psi. In those cases you do the 50.59 analysis, you satisfy yourself, and there is no real need for you to file an application or an amendment with us.

The intent is not to increase our inventory and backlog as a result of 50.59; the intent is to get you to focus on what is important and to get us to understand what you are changing.

I have already had one more question, then we will let Cecil finish up in the next five or ten minutes.

Mr. Virgilio:

I had a couple, but they really go back to the heart of what Denny just said.

It was very easy when we went back and looked at the reactor pressure in a BWR to see where the margin was. It was in big bold letters in a number of different areas. It was part of what was submitted by the licensee to us.

These are the margins that became part of the licensing basis. I am not asking you to go in and search for other margins because a nuclear power plant, just by its very nature, has margins throughout, margins in each one of the components. However, the margin that constituted the basis on which the staff accepted the application formed the licensing basis of the plant, these are the margins that we are talking about.

They are specifically outlined and taken credit for by the staff in the licensing process. These are the margins that if they are reduced, trip the threshold to 50.59.

Mr. Thomas:

QUESTION: The questioner asks if I had anything in mind when I mentioned that modifications might be required to ensure maintenance of the level of safety throughout the renewal period.

ANSWER: No. It really depends on how good your application and your plant is. If your application shows, for example, that the plant is perfectly capable of maintaining its current level of safety for another 20 years, then maybe nothing would be required. For other plants where there was less certainty, perhaps something like a reliability assurance program would need to be implemented.

There may be environmental qualification considerations that would require some changes to be made.

Those are just some possibilities, but I did not have anything specifically in mind as far as general modifications.

QUESTION: The questioner questions the 20-to-5-year range before expiration of the current license as a window for submitting license renewal applications. He says, would this not force renewal license applications toward the end of the initial term, would it be discouraging renewal applications, or is the intent to allow early applications and delayed implementation?

ANSWER: To the contrary, the window was established to allow as much flexibility as possible.

Several considerations entered into that decision. First of all, we want the utilities to have a very reasonable operating base, operating experience period. We felt 20 years was a good basis. The 15-year window provides a lot of flexibility on when you could submit the application.

We also had our own needs in mind. Beginning in the early 2000's, we are going to have a lot of applications coming in. We hope to be able to have them spread out naturally over a period of time so that we can accommodate them, stay out of the critical path. As I indicated earlier, it may be necessary to somehow time the submittal of the applications.

Finally, the renewed license would become effective immediately upon issuance, and it would not be put on a shelf, as the questioner suggests. It would become immediately effective as soon as the license was issued.

Mr. Crutchfield:

I think Cecil will answer the remaining questions in the session this afternoon. I am not going to tell you where the breakout session is or what time it is because we have told you that 20 times already.

There have been a number of questions on the 50.59 process. If during the lunch break there seems to be enough interest, we will see if we can schedule a separate session to go into the 50.59 questions in further detail. If you do have an interest in that, do you want a show of hands now, or come to me during the lunch period and let me know and we will see if we can schedule one.

[A show of hands.]

It looks like there are enough 50.59 people. We will see if we can schedule a session. We will probably announce it at the start of the next session. We will do what we can.

Again, a reminder, lunch is in the State and Chamber rooms. Thank you very much.

LUNCHEON SPEAKER

Remarks by Commissioner Kenneth C. Rogers U.S. Nuclear Regulatory Commission at NRC Regulatory Information Conference April 19, 1989

PROFESSIONALISM IN PLANT OPERATIONS

Good afternoon ladies and gentlemen. It is a pleasure to be with you today and to participate in the NRC's Regulatory Information Conference. I would like to speak to you briefly on professionalism in nuclear plant operations. The Commission has continually considered professionalism of plant personnel when addressing such issues as education and experience requirements for supervisors and senior reactor operators, the requirements for reactor operator (RO) and senior reactor operator (SRO) requalification examinations, and other Commission initiatives which aim to enhance operational safety of nuclear plants. In doing this, we had to consider what we mean by "professionalism." What is a professional? How do we measure professionalism? Webster states that a professional is one "characterized by or conforming to the technical or ethical *standards* of a profession." A "profession" in turn is defined as "a calling requiring specialized knowledge and often long and intensive academic preparation." However, these definitions do not help to identify or measure professionalism in nuclear power plant operation. More useful is to ask what are the *attributes* of a professional? Might they be the same for a respected jurist or a scholar, a sea captain of an ultra large crude oil carrier; a 747 captain or senior pilot, or even a professional sportsperson?

In considering the central elements of professionalism and whether commonality may exist between diverse occupations, I came across a list of key attributes of a professional by an American Nuclear Society colleague, Dr. William R. Corcoran of Tenera Corporation, the gist of which I would like to share with you.

The foundation of professionalism is the acceptance of personal responsibility. A professional assumes *personal responsibility* for all aspects of his own professional activities. The standards of this element suggested by Dr. Corcoran have been abbreviated as follows:

Professionals

- Meet their commitments with quality performance.
- Have high standards of honesty and live by them.
- Organize their lives so as to be physically, mentally, and emotionally prepared to perform work assignments.
- Enhance the overall performance of the organizational unit to which assigned.
- Assume complete responsibility for their own attitude, training, performance, and career development.
- Establish the requirements of assignments and ensure that the work is commensurate with these requirements.
- Maintain the demeanor and appearance of a professional.
- Encourage professionalism in peers and subordinates.
- Assume responsibility for their effect upon the organizational unit and its performance.
- Demonstrate respect for human rights and personal dignity.
- Get the job done even in the company of peers who may not be as professional.
- Assure completeness of their work and the work of others.
- Insist on minimum standards of performance at all levels of the organization.
- Continuously seek to develop further their talents, skills, and knowledge in order to improve the overall

mission-related performance of the organizational unit.

- Do not allow elements beyond their control to affect their professional performance.

- Do not provide professional advice or recommendations on issues that they are unqualified to address.

- Welcome supervision of their work and review of their work products.

- Support peers or subordinates and assist in the training and development of others.

One could reduce this list of eighteen attributes to a single global statement: A true professional comports him or herself so that he or she always contributes to the solution of problems and avoids becoming a part of a problem.

I would like to apply these measures or attributes of professionalism to two positions in a typical operating nuclear plant organization: Plant Engineering Manager and Plant Operations Manager.

Professionalism in Plant Engineering Management

A definition of nuclear plant engineering management should include such engineering-related functional activities as

- mechanical/civil-structural engineering
- electrical engineering
- instrumentation and control engineering
- nuclear fuel management and safety analysis
- configuration management
- chemical engineering and corrosion control

A professional in plant engineering

- Identifies all the technical requirements, including regulatory requirements which are technically-based and ensures they are met in the work product.

- Is alert to errors and omissions in the work product (whether his or her own or those of others) and corrects or seeks resolution as appropriate.

- Continuously increases his or her professional knowledge.

Let me expand on each of these.

The first point emphasizes the vital importance of assuring not only the incorporation of good engineering practice, codes and standards of a particular discipline, but also all regulatory standards that apply within the four corners of the technical problem to be solved.

The second point stresses the importance of personal accountability in technical work: careful examination of the underlying assumptions, selection of a calculational method, and self-checking of numerical results. These are particularly important in using computer programs. There the engineering professional should ensure that the program itself has been validated, should be aware of significant assumptions and possibly uncertain physical constants embedded in the computer model, and should check the reasonableness of the calculated results by approximate analytical calculations.

In general, consistency of engineering solutions to various subparts of a total problem should be checked. This includes the consistency of assumptions, the applicability of codes, standards, and regulations; the appropriateness of the solution method; and finally the global sensitivity of the solution to any possible uncertainties in data and method.

The third point refers to remaining abreast of current technical developments in one's field: seeking professional registration by state authorities where appropriate or useful, participating in appropriate technical professional technical societies, and constantly searching for solutions adopted by other professionals to similar problems. While engineering professionals should not be expected to participate in a discipline other than that in which they are trained, they should be sensitive to the effect of their discipline on the technical "boundary conditions" of another discipline. This is another situation which illustrates the importance of a systems engineering approach in the nuclear industry. The designs of current licensed reactors are complex and operating experience has revealed unpredicted intersystems dependencies that have occasionally resulted in common-mode failures.

Professionalism in Plant Operations Management

All eighteen attributes apply, but particularly important are six which relate to communication, coordination and team work—all essential for effective plant operations. They are

- high standards of honesty in all duties and relationships

- physical, mental, emotional, and professional preparation for excellent performance when on shift or at a work location

- assumption of complete responsibility for one's own morale, attitude, training, job results, and career development

- a professional appearance and demeanor to others
- respect for human rights and dignity of all team members (not just operations personnel)
- continuous expansion of knowledge of plant operations details and of unsafe operational regimes, including appropriate corrective actions to plant transients (e.g., emergency operating procedures, accident management strategies, et cetera)

I believe that there is a hallmark of the professional, whatever his or her occupation, and that is: an unrelenting personal independence. The true professional in my opinion takes complete responsibility for his or her attitude, morale, training, personal fitness, job performance, career development, and almost anything you can think of!

This observation leads naturally to a question. If somehow we could measure objectively the key attributes of the professional coupled with certain specific and basic technical knowledge, would not a formal attestation of this achievement be a very valuable and transportable credential for an individual? It would be a credential identified with the person rather than a particular organization employing him or her. Would not an individual having such a credential be more independent (and therefore far more professional) within the U.S. nuclear community and thus be potentially more valuable to our society? If the answer is strongly affirmative, the next questions would be: Should such credentials take the form of certificates or licenses? What mechanisms and organizations would be most suitable for awarding them?

In what other ways can we create or foster the sense of personal responsibility and other attributes that are at the heart of professionalism? Can these key attributes be taught or reinforced through some cognitive process? Are we born a "professional," or can we become one through some systematic learning process? Can one be a professional without having an identified specialized profession? (I think the answer is emphatically yes.) Is one's future professionalism or lack thereof shaped at an early age in the home through parental insistence on high standards, honesty, and doing a good job on time every time? Put the other way around: for those of us who may *not* have received such virtuous training or guidance at an early age, is there a chance that we also might become a professional?

There have been many attempts in the past by different organizations to confer the seal of "professionalism" on an occupation; as some of you know, the National Society of Professional Engineers has long labored to establish the broad field of applied engineering as a "profession." More recently, the Institute of Nuclear Power Operations (INPO) has stressed "professionalism" in the control room, and INPO's utility members have established a Code of Ethics of Reactor Operators--a joint proclamation by each person of his or her own unrelenting drive for excellence in performance. The Japanese have embedded this philosophy in their very successful "kaizen" approach: a never-ending quest for ways to improve a process. That philosophy is the antithesis of "if it ain't broke don't fix it." It replaces that farmer's homily with a more aggressive quest for uniform excellence. And perhaps in reevaluating our priorities and allocation of resources we should add a pinch or two of kaizen to our recipes!

I have asked more questions than I have answered. The fact is that I do not have the answers. However, I urge *you* to think of new imaginative ways to nourish and encourage professionalism in your own organizations—perhaps such as providing credentials to plant staff as a first step. A credential would bolster an individual's self esteem; it would serve as an objective measure of accomplishment and personal success.

There are many other ways to increase professionalism at every level in an organization. I invite your thoughts and ideas on the subject of how best to foster and measure professionalism, and I would like very much for you to share them with me.

I thank you for being here, and trust that your attendance at this conference will prove to be time well spent together.

6 SESSION 5: NRC INSPECTION EXPERIENCE

Mr. Frank P. Gillespie:

Normally I do not get to speak to industry groups, mainly because they keep my staff hidden in the background at NRR [Office of Nuclear Reactor Regulation]. We do report directly to Tom Murley. Fred Hebdon is part of the staff. Fred is overseer of the inspection program since the reorganization of I&E [Office of Inspection and Enforcement] and NRR two years ago.

What has happened over the last two years in the inspection program has been a change in both the substance and management approach, which has caused the headquarters organization to get much, much more involved in enforcement meetings and generally with what is going on in the regions. Part of that involvement also includes master inspection planning. In several cases, a division director from headquarters has gone to the region for quarterly meetings on each plant to discuss the focus for the next quarter. This gives the regions insight to the issues that are occurring at headquarters, such as problems with implementation or whatever. These insights are now being factored into the inspection planning process.

Another major change that has happened over the last two years is a view more towards a subjective program rather than a quantitative program. The nomenclature within our office—you will hear people in the office say, "we are going to look at safety versus compliance." That is, the number of hours that any particular plant is inspected is actually not correlated to the number of months and what was found over the last year, it is actually correlated more toward everyone's feelings of how good that plant is doing.

I go to a plant or two a month and spend some time with the resident inspector. It seems that at every plant they keep track of the number of hours that NRC inspectors spend on site. A utility will inevitably ask me: "If we are doing such a good job, how come you are still beating us to death?" Well actually we get about a thousand hours of onsite time between resident and regional inspectors on an inspection effort. Right now, with 25 plants in the country, we have, on the average, about three full-time inspectors working on 25 plants, and with another 50 plants in the country, that doubles. These tend to be the plants that are looked at as being actually pretty good performers *[Figure]*. This is the average. Let me concentrate on this little piece right here: that piece is where people are perceived to be in trouble. "In trouble" means that we, the NRC, may not have an exact opinion on what is going on or not, but people do not feel comfortable with what they see at the plant.

I will give you an example. I was at a plant within the last two months, and I spent some time with the resident inspector just to get a feel of how the program was going. We were going to observe his monthly maintenance observation of a calibration of a DP cell. It required an instrumentation and control technician to be at a panel, and it required another technician at the control. The inspector and employees were in the containment and the I&C technician and I were talking to them over the telephone. Apparently the procedure called for a manifold that is supposed to be there and it was not. The manifold was not there. So, the I&C technician said, "Okay, wrap it up, come out, and let's find out what is wrong." They looked around and found out that there were also a half a dozen valves that had to replace the manifold that did not have any valve labels on them. They checked the prints and talked to the shift supervisor. The manifold was taken out something like two years earlier. The prints were never brought up to date, and the valves were never labeled. The I&C technician had been at the plant for about six years doing the same preventive maintenance work, and he did not know about it. This work had been done semiannually for the 2-year period since the manifold had been removed; the procedure was invalid because there was no manifold in it; yet people were signing off on the work. This did not become a compliance problem, but it certainly did not give me a warm feeling about how that plant was being run and the attention to detail that was being paid by plant management.

I can give you another instance. I went out to a plant that was going into a major outage. The licensee had happened to do absolutely phenomenally well on an equipment qualification inspection. There was a big EQ review and the plant did really great. After the inspection, the licensee had cut back on the number of people working in EQ from eight to two, before the outage. As you can imagine, after the outage, they had a followup EQ inspection and they had problems. The utility had consciously decided that it did well in the EQ area with the NRC; it was having a problem financially and it wanted to cut back; and they cut back in that area a little too far, and they paid for it. How come the utility did not know that there was a procedural problem? That is very, very subjective, and it is very management oriented. You will find that we are more and more not counting numbers, not counting widgets, in our program now. When someone goes in and sees something like that, when the resident inspector sees a problem, we are interested in knowing the root cause. There was a discussion earlier about root cause. The root cause many, many times seems to be that no one at the utility bothered to look. No one bothered to go out with an I&C technician and watch him go through a procedure. You are not checking the technician's skill, you are checking the other peripheral things.

That type of involvement tends to tell us how good or bad that operations management and that engineering management at a facility is. That is starting to have a more and more, a larger and larger, impact. Those are the kinds of things that are being focused on very, very much at the plants.

Fred is going to go through our programmatic approach to this—on how we are trying to allow the regions a significant amount of discretion in what they look at to follow up on these kinds of findings, intuition, the subjective half of things. We, at headquarters, are trying to give the regions as much support as possible to make it a total picture.

If you are having a problem with an inspector and you are being reticent about making safety changes—you have submitted a package that is poorly done from an engineering sense—the inspector is going to feed that back into the SALP process and back into the inspection program in the region. You will then have someone looking at you from an engineering point in the region, looking for similarities.

Fred is going to discuss how the program is trying to put together the pieces. Stu is going to talk about how the region deals with this quantitative, subjective tradeoff—how it is arranged in the region, and who makes what kinds of decisions, and how that feeds into the SALP process, which now drives the inspection finding. Charlie is going to talk about special team inspections and what the results of those are.

Let me talk about how those are initiated. Those are initiated by someone at the director level of NRR, at that person's discretion more and more. In the past, they tended to be somewhat more scheduled and routine. If there is a feeling that we have not quite gotten a handle on what is happening at a site but we are getting indications—be it more maintenance action, more LERs, or an accumulation of things—that something is going wrong, you will find someone from Charlie's branch leading the team and showing up, or you will find them participating with the regions to lead a team and show up and look at you.

When a special inspection team shows up, that is your signal right there that there is someone at the director level of NRR questioning your plant's performance. So it is not a coincidence when they just show up—it is definitely not routine. We really are focusing on that indication, suspicion of a problem, when Charlie's team is involved.

The ultimate team inspection is a diagnostic run by AEOD. More and more the diagnostics are becoming, or actually have become, a tool at a senior management meeting. The senior management meeting was covered by Frank earlier this morning. The diagnostic evaluation can be performed either before or after the senior management meeting, but it always has the consensus view and has been agreed upon by everyone participating in the senior management meeting. In the cases where the diagnostic evaluation is before the meeting, it is to find out whether that plant really needs special discussion and attention at the senior management meeting. When it takes place after the meeting, it is to confirm that things are the way that was thought. So the diagnostic evaluation is very much tied into the overall view of the site.

The reconstitution of design bases and documents is another good example of an area to watch out for. We are not trying to design inspections just to accumulate a list of things that are wrong. One of the things that came out of the regularly scheduled inspections for SSFIs was that there was a problem with the design basis. In fact, what we have seen since then is actually a slowdown in SSFIs being done.

It is a generic problem, and Gene is going to cover how that was turned into a generic approach and what the plan for resolution is. You will see similar things happening in the future, possibly in the area of maintenance inspections. which are part of the program, and in the area of EOP inspections.

We are going to do a sampling of plants. If there are indications of a generic issue, we are going to slow the process down, get some generic communication out, and then follow up on it. So we are not necessarily going to go out and just try to get a count of compliance problems across the whole industry.

With that, let me have Fred start on the overview of the whole program.

NRC Inspection Plan

Mr. Frederick J. Hebdon:

I am Chief of the Inspection and Licensing Program and I will be talking to you about the NRC inspection plan. I would like to give you an overview of the operating reactor inspection program. Hopefully that will give you the context for a number of the other speakers who are going to talk about some of the areas in considerably more detail.

[Figure 1]

The purpose, or the objective, of the reactor inspection program is to obtain information through direct observation to determine whether the plant is being operated safely and whether the licensing management control program is effective. This is really the bottom line. Certainly we are looking at compliance and we are concerned about whether the licensee is complying with the regulation, but the bottom line to all of it is whether the plant is being operated safely. We also gather information to support the systematic assessment of licensee performance, the SALP process, that I am sure that you are all quite well aware of. Hopefully, as we go through this, you will see that there is a very strong tie between the SALP process and the inspection program, particularly now that we are trying to develop tailor-made inspection programs for each facility.

[Figure 2]

This is a list of the elements of the reactor inspection program. There are basically four principal elements, and I am going to spend a few minutes talking about each one. Some of them, like the special team inspections, Charlie Haughney is going to discuss in considerable detail.

[Figure 3]

The first element that I want to talk about is what we refer to as the fundamental inspection program. It is made up of two parts, the core inspection program and the mandatory team inspection. Now the core inspection program is a selected set of inspection procedures that are done at every facility, at every site. They have different frequencies. Some of these inspections are done as often as monthly, and some of them are done as infrequently as once every other SALP cycle, but they are done at every facility in accordance with the frequency that is defined in the program.

They cover all of the SALP areas, and so they are fairly broad. They are considered to be the minimum of effort that we would devote to the best performing plant in the nation. They do include a large portion of the resident inspector's time. If you looked at the procedures themselves, you would see that they do require a considerable amount of effort by the residents, and they account for a rather large percentage of the resident's time.

The next part of the fundamental inspection program is the mandatory team inspection. This is just one of many team inspections that we do. There are a large number of teams. Charlie is going to talk about some, and Stu Rubin is going to talk about the diagnostic team inspections. This is one particular one that is considered to be part of what we call the fundamental inspection program.

The mandatory team inspection is done at every site on a biennial cycle. We will make some mid-course corrections as we work through the cycle, but basically the concept is that it will be done everywhere over a 2-year cycle. For each 2-year cycle, we identify an area of emphasis that will be emphasized by the teams for that particular cycle.

Right now the area of emphasis is maintenance. So when you heard Tony Gody, for example, in his presentation this morning, talk about the maintenance team inspection, that is what we consider the mandatory team inspection, and it is the first cycle of the mandatory teams.

[Figure 4]

The next element of the reactor inspection program is really one of the key parts and one of the most important parts of the program. It is an area that we have been changing fairly substantially over the last couple of years. It is called the regional initiatives and reactive inspection program.

Most plants will receive some regional initiative inspection. As I said, there is the core program that is done at every facility. Only the best plants in the country would receive just the core program. Almost everyone else will receive some amount of inspection in some technical areas based on their performance. That is the whole key to it, it is based on performance.

The resources are allocated and they are focused on the basis of performance of the plant. There are two parts to this: One part is the regional initiatives, which are the planned inspections that are based on the region's and NRR's perception of the performance of the particular plant. The second part is a reactive inspection, which is the unplanned part, and that is, for example, reaction to operational events or reaction to situations that are rather rapidly emerging.

The idea, the philosophy, of this is that we cannot do everything everywhere; therefore, we have to focus and allocate our resources to try to get the maximum return from the resources that we have available. The way to do that is to try to focus on the areas that we feel have the problems, both the areas within a particular plant and whatever plant we perceive to have a particular problem. Let me give you an example. This is a little simplistic, but I think that it will help illustrate the point. It is in the area of security. I was talking to the people who do the security inspections for one of our regional offices, and they were explaining how they were planning to allocate their resources.

For its good performers, the region planned to have one inspector on site for one week. Basically, the region will send a single inspector to the site for one week, and that inspector will just do the core inspection procedures in the security area. For the plants that it perceives to be average or maybe a little bit below average, the region will send two inspectors for one week. Those plants receive twice as much effort. The inspectors will do the core inspection procedures as well as some number of regional initiatives.

For the plants that it feels have some real problems in security, the region is planning to send two inspectors, plus the region will request that someone be sent from NRR. This illustrates two points: First of all, that particular plant is going to get three times as much inspection; it also shows how we are trying to integrate NRR into the process by having NRR participate. NRR people participate in inspections with regional people, particularly in areas like this where you have a poor performer and you need to expend a lot of resources.

Stu Ebneter will give you a lot more detail on how these decisions are made and how the region does this allocation. I think that Frank Miraglia also discussed it to some extent in his discussion earlier about operating performance evaluations.

[Figure 5]

The next element in the program is the special team inspections. This is a special set of team inspections that are structured to address specific concerns. Some examples are the SSFI [safety system functional inspection], the SSOMI [safety system outage modification inspection], and the OSTI [operational safety team inspection]. I am sure that most of you are familiar with at least some of these acronyms and some of these names because they have become quite well known in the industry.

Charlie Haughney is going to talk about this particular part of the program in quite a bit of detail. This will give you an idea of how it fits into the overall process. These inspections can either be led by NRR people or they can be led by regional people. They can be initiated by the regions as well.

[Figure 6]

The final element is what we refer to as the safety issue program. These are one-time inspections to address specific safety issues or concerns. I have provided a few examples here. As you can see, they can cover a fairly wide range of both scope and level of effort. Everything from the emergency operating procedure team inspections, which are a substantial effort and require about five people for a period of five or six weeks, down to inspections that require a relatively small effort like the receipt and storage, and handling of diesel fuel oil, which is a relatively small issue, but still an issue that we consider to be important.

This is the way that we would inspect a concern that is addressed in either a bulletin or a generic letter. For selected bulletins and selected generic letters that we feel are very significant and are amenable to inspection, we will develop an inspection program, and go out and conduct inspections. Usually the inspections are done at all of the plants, although there are provisions within the program to address just specific plants. For example, BWR power oscillations obviously applies only to BWRs.

The inspection requirements are defined in a temporary instruction (TI), which is the name that we use for the document that defines the inspection requirements to be conducted. Generally we try to complete each temporary instruction within a period of about two years. Some go a little faster and some take a little longer, but generally the goal is to have them done in about two years. They are a one-shot deal, generally just one inspection or one series of inspections at each facility. The TI is closed out at that particular facility once the inspection is done.

The next slide *[Figure 7]* please.

There are some related activities to the reactor inspection program that could be considered a fifth element to the program.

The first of these related activities is the systematic assessment of licensee performance. I am sure you are all quite familiar with it. It is very closely integrated with the inspection program. The inspection program feeds the information that is used as the basis for the SALP boards, and the SALP results are used as the basis for defining the inspection program at a particular facility for the coming SALP cycle. They are very closely integrated and they have a lot to do with each other.

Another related activity is what we refer to as the master inspection plan. We have developed a master inspection plan for each site. It is initially based on the SALP results. One of the things that will come out of the SALP process at a particular facility will be a master inspection plan for that facility for the coming SALP cycle.

The idea is to have a tailor-made inspection program for each facility. Every facility gets a different inspection program based on their particular strengths and weaknesses.

The master inspection plan at each site is updated quarterly as the perceptions about the plant's performance change; so it is also a living document. At least on a quarterly basis we will go back, look at the facility, and see if our perceptions about the facility have changed. If they have, we will modify the focus of the inspection effort: take a little of the resources from here, borrow a little from there, and adjust the resources that are devoted to the particular facility based on our perception of their strengths and weaknesses.

The last related activity is probabilistic risk assessment. We have been trying to use the insights from PRA in the inspection program to identify the activities, the issues, the systems, and the components that are the greatest contributors to risk. For example, if somebody is going to observe maintenance as part of the inspection program, it would be good if they could observe maintenance on a component that has a high risk contribution. The staff will use the insights from PRA to try to focus the program. Again, the idea is to try to get the maximum results for the resources that we have available and to focus those resources on the areas where we have the biggest chance for a payoff.

That is basically a very quick overview of the program. As I said, a number of the speakers throughout the session are going to discuss some of these subjects in considerable detail. If you have questions in those specific areas, keeping in mind the agenda, I would ask you to hold those for the other people.

If you do have any broad programmatic questions, we can try to handle those now. If you think of something as we go along, I think we are going to have another question-and-answer session at the end where we will give everybody an opportunity to ask any other questions they might have.

Anybody, the people that are standing in the back, there are all sorts of seats up here in the front if you would like. We will just give everybody an opportunity to come on forward and grab a seat while we are filling out cards.

Mr. Gillespie:

It is not like in church, you do not have to leave the front seat empty.

Mr. Hebdon:

If you would come to the microphone, please, because one of the things we want to do is make sure we do capture the questions.

Voice:

Is the quarterly update a scorecard where you check off the inspections you have completed?

Mr. Hebdon:

One of the things we do look at in the quarterly review is what inspections have been done and that part of it is more of a management tool to make sure we are getting everything finished.

Voice:

Do you plan to share that plan with the licensees?

Mr. Hebdon:

My understanding is that generally such plans are not distributed, that it is really an internal management document that is available to the region.

Mr. Gillespie:

Would it be beneficial if they were distributed to the licensees? Would it matter?

Voice:

. . .instructed as to the task.

Mr. Gillespie:

Or at least the knowledge of what areas you are perceived to be weak in.

Voice:

[Not heard.]

Mr. Gillespie:

Well, the question is more if it is going to be updated quarterly and it is kind of a progress report, the status of that quarterly update may not necessarily be communicated.

Mr. Hebdon:

If there is anything really significant or fundamental, I think that will be communicated by other mechanisms.

I am not sure that the master inspection planning process really is the right vehicle. If the region has an emerging concern about a weakness developing in a particular area. I am sure they will find an effective mechanism to communicate that to you. Again I am not sure that the master inspection plan would be the best way.

Mr. Gillespie:

Okay. One more.

Mr. Hebdon:

We have one more.

Voice:

Recognizing that inspections by the NRC, as well as others, can be very destructive to the plant organization, are there any plans or do you have any mechanism to evaluate the benefit and results of the inspection and compare that against those effects to the plant organization or do you think this would be something worthy of giving some consideration to?

Mr. Hebdon:

There are two parts to that really. We do in the master inspection planning process try to identify significant things that are going on at the licensee's facility so that we do not for example have two teams there at the same time or two groups of people that need to talk to the same person there at the same time.

We also rely very heavily on the resident inspectors to try and coordinate the activities to make sure that we get the most out of the inspections. I think that is something that we have been doing a lot more, particularly in recent years, using the resident inspector in that process. For example, if for nothing else, we rely on the resident inspector to make sure the right people are available. If somebody is going to do a security inspection, it does not do any good to have that inspector at the facility when the security manager is on leave. We have been relying a lot on the resident inspectors to try to help make sure that we do inspections at a time when we can get the most out of them and in such a way as to not place an unreasonable burden on the licensee.

We also are going back and looking at the results of the inspections to try and get a feel for whether or not we really are getting a lot out of them. If we send someone to a site for a couple of weeks, or a week, and we do not get much out of the inspection and that starts happening with any degree of consistency, then obviously that is something the region is going to want to look at to decide if we should redirect that resource in some different direction.

Mr. Gillespie:

There are 25 plants in this country that do not have a lot of disruption. That is something to consider. The graph I put up there to start is actually real data. We did not even have to hokey it up.

There are 25 plants in the country that I will say have been rated as SALP Categories 1, and 1 and 2, that have not complained about our being disruptive. So the disruption is directly proportional to the perspective that the NRC has at your facility.

Now, if our perspective is incorrect, you need to work with the regions to correct the perspective. The system does, in fact, allow for the Regional Administrator to cut back to a very bare bones program if he perceives that things are going well at a facility.

I do not have a lot of sympathy for universally just saying we are going to cut back across the board.

In fact, it is there, and Stu, maybe you could address it either now or when you get up. How do you perceive it?

Mr. Ebneter:

We will perform the inspections in their most appropriate form. In conjunction with the new philosophy of performing paced inspections, we want to see performance. We do not want to come out and review your records and procedures. We want to see you in action.

I know what you are probably referring to is outages. Certainly, we send people out there during those time periods and it is disruptive even though the inspection is scheduled. We do the best we can to minimize the disruption. However, I can assure you that it does not do me any good to visit a plant in the middle of a nice long operating run because we do not see anything then. We are going to look at plant operations in the appropriate time periods.

Mr. Gillespie:

Stu?

Mr. Hebdon:

Stu, with that introduction, you are up.

Integration of Inspection Findings

Mr. Stewart D. Ebneter:

Thank you.

Well, good afternoon. I am certainly glad to be here and I am glad to see all of you here.

As Vic Stello said, we certainly have to communicate better. We have to develop some trust. The main theme of the conference is operational safety; we are going to focus directly on that.

The topic that I will be presenting is the integration of inspection findings. I hope throughout this that I can integrate some of the thoughts that have been presented to you by the other people who have made presentations at the conference.

For example, Dr. Murley's concept—if you get one image out of this conference that should be most important to you, it is that one that Dr. Murley presented, the two cultures: the Plant A Culture and the Plant B Culture. We look at that in SALPs; I will cover that a little more.

My presentation will bring together some of the things you will hear from Gene and Charlie and some of the things you heard this morning and yesterday.

A couple of concepts that are really important to all this integration of inspection findings are root-cause analysis and self-assessments. You heard Jack Martin talk about self-assessments and you heard Mal Ernst talk about root cause. In fact, several people have mentioned both of those concepts.

If you do not develop both of these techniques to the nth degree, you will almost always get into trouble. You should be using our findings and integrating ours with yours to end up with your root-cause analysis.

What I will do basically is start with a viewgraph showing some of the types of inspections we use. They vary from a single inspector to very large teams.

I will briefly discuss some of the findings we have and how we group them as well as discuss some of the concepts related to them. I will discuss some integration techniques, not techniques, but the method we use at management levels and over periods of time. My main focus will be on how we integrate findings for enforcement and how we integrate findings for SALP.

Now, the SALP is extremely important because as you have just heard from Fred and Frank, the SALP helps determine where we put our inspection resources.

I want you to keep in mind one thing that Frank said, if you get a diagnostic evaluation team at your plant, you know you are in trouble, you know you are being looked at very, very closely. That is a very large team inspection. So just keep that in mind.

May I have the slide *[Figure 1]* please.

This is basically a matrix of inspections, typical of what we are doing. If you look down the column "Inspection Type," you will see region-based specialist, resident inspector, regional team, program team, and special teams. Going across the other columns, I have listed the typical staffing hours that are involved and the characteristics of each team.

The region-based inspections are typically one or two specialists. They look at a highly specialized area. It is focused, in-depth, and lacks some perspective in terms of interfaces. It is directed towards our specialty area. These generally are done within one week, and you will get an inspection report that defines our findings. These inspections reports may have one, two, three findings in the enforcement category and many others, perhaps in the unresolved item area, which I will discuss in a minute.

The resident inspector is at the facility full time. He deals with you daily. If we have two residents at your facility, you can get 160 to 200 man hours of direct inspection in the plant per month. The resident inspector is more system oriented, more generalized in his technique. He looks at interfaces and he focuses on a lot of different operational areas. His report is produced once a month; it comes into the region, gets reviewed by our managers, and becomes another set of findings that we will integrate over the different time periods.

Frank mentioned, or Fred mentioned, regional initiatives. The region has certain initiatives that it can implement depending on how we see your plant. You can be assured, if you are getting some team inspections from the region, several of them over a period of a year, you are a suspect licensee.

Now, some of the team inspections that we do are mandated. Some others are performance-based, such as the operational safety team inspection, which means that we want to know a little more about operations. We have a few findings, but we want to amplify those.

These regional team inspections typically range from 5 to 6 people. They will be at your facility for probably two weeks. Typically they will look at interfaces. These are the types of team inspections that will have an effect on your operations.

I have listed program teams. These teams are primarily the ones that are directed by headquarters, the ones that Frank and Fred talked about. These are very large teams. The ones that Gene Imbro runs, for example, have up to 15 people on a team and they may be there for a total onsite visit for three weeks or more. When you total up the direct man hours on an inspection like that, you will get 900 to 1500 direct man hours at your facility. It is a lot of effort, very manpower intensive.

They are multidiscipline, many different engineers, disciplines, engineering orientation, functions. They will look at specific systems, specific disciplines. These inspections are very broad in scope, but they also go very deep in the specific areas.

The integrated design inspections that Gene will be talking about fall in that category. The maintenance team inspections are in that category. SSFIs fall in that category. There are quite a few of them.

The diagnostic team inspections that Mr. Rubin will be talking about are even a greater team effort. The decision to do a diagnostic team inspection comes from the integrated viewpoint of the region and NRR headquarters staff; it is typically presented at the senior manager's meeting, which is chaired by Vic Stello.

So if you get a diagnostic team inspection, as we said, you are at the highest level of integration of inspection findings and redirection of the program.

Next slide *[Figure 2]* please.

I know you did not all realize there were this many different findings. Actually, there are many more than this. I put them up here just to give you an idea of what we consider as findings when we go through our integration of data.

In the first grouping, I have listed violation, deviation, unresolved item, open item, inspector followup. These terms are typically defined somewhere in the inspection program or within the documentation of the NRC. I am not going to go over each of them individually. You know what a violation is. It is a failure to meet a requirement. A deviation is a failure to meet a commitment. These are conveyed to you in the inspection report, normally in these terms. Typically when you get a noncompliance, the cover letter will indicate this, some people will read that. However, many people do not read what is in that inspection report with regard to unresolved items: that is a major failure on their part. Those indicate precursors to areas that we have concerns about.

The second group of findings may not be as familiar to you; you may have never seen some of these such as vulnerability. We use that in relation to safety when we are trying to assess safety; we are going to say the plant is vulnerable to a certain area. Within the framework of the program, vulnerability is used officially in terms of safeguards inspections where vulnerability is an issue that requires prompt attention because, for example, there is a sabotage vulnerability at your plant. A vulnerability in itself can be an integration of several inadequacies. If you have several inadequacies that are defined by an inspection, we integrate those and come up with a vulnerability.

Deficiency is an official term that we use with regard to emergency planning inspections. FEMA will use this and the NRC will transmit it to you. You will see that term used.

The next group, concern, weakness, and improvement items, typically are not framed in the enforcement regime. They may be used interchangeably by the staff, and they typically mean that you have not fully implemented a program within the intent of what the NRC thinks it should be. These terms will be used in reports. You need to watch them. They are definitely there.

One that I did not list that I have seen used on occasion is the word flaw, your program is flawed. That has got a lot of attention recently in relation to emergency preparedness.

The last one on the list is strength. I am sure you have not seen us use that very much. We have used it though. We have used it on team inspections: I have been on some and I have used the word strength. It means that we really do believe your program, as implemented, is superior. There is a provision for the staff to use that term and to put it into the inspection report. As I have said, you do not see it very often. It is rare.

One other term that I did not list was the word adequate and that is used quite frequently for us to express some satisfaction at some minimum level.

I would like to give you a little different perspective on what these findings are.

Next slide *[Figure 3]* please.

I have categorized them into hard findings and soft findings. The hard findings are those that are related to enforcement programs. They are quite quantitative, specific, well-defined, not too much argument over them. We occasionally argue over an enforcement issue, but usually it is an issue of compliance: you are supposed to do this, you did not do it; therefore, this is the finding and this is the result. Hard findings tend to be compliance structured and more oriented towards hardware and procedures. These findings are items that we can get our hands on, can look at and review in depth. Thus, they tend to fall into this hard category.

The soft findings are more difficult. Those are the findings that we come up with that are more qualitative. They are imprecise. We do not always have an exact definition that we can fit these into. They may not directly relate to regulations, but there is some indirect nexus to the regulation. These tend to be more subjective. These are the ones that we have difficulty with and you have difficulty with. Nonetheless, when you see soft findings in inspection reports, you certainly should pay attention to them and you should do something about them. You should not let them lay in the inspection report for a year, particularly if a specialist inspector has found an issue and he has it listed as a concern, something very soft, but you ought to be putting in some effort to try to resolve it before it becomes an even larger issue.

The subjective nature of some of these soft findings by the way, and I do not like to tell you this, but they may not get transmitted to you. Some of them may be opinions of the staff. However, they will get incorporated into the SALP report; they will be discussed through the SALP board process. Soft findings again, are the ones that are difficult to really put in total perspective because they are not precisely defined.

Now, let me give you an example of a couple of soft findings that you heard yesterday. You heard Jack Martin say—Jack Martin is the Regional Administrator in Region V—he made a comment in his speech . . . By the way, he made this same comment on the executive telephone call last week and I made a note of it and I was sort of glad that he made it yesterday. Jack said there is a plant out in Region V at which the QA manager is not even "badged" to get on site. You do not think that is a finding? He told you people about it and he told all the NRC senior executives about it. Here is a licensee with an attitude problem. The QA manager is supposed to be an important part of a self-assessment program, and he cannot even get on the site; he does not have a permanent entry badge. That is an attitude problem.

How many of you heard the Commissioner, the Chairman talk yesterday? How many of you heard him? Most of you? Good. He also made a comment that is another soft finding by a senior executive in the agency. He was at a plant, he did not say when, but he went to the plant with the Vice President of Nuclear—an important official. The man could not get on site, he had to get a visitor's pass to get on site. That is terrible. The Vice President of the nuclear organization and he is not even badged at his own facility. That is a soft finding you will not see written up, but I can guarantee you when we sit down in the senior executive meeting that is in the back of somebody's mind. In fact, you know it is when it is brought up at a conference like this. Those are soft findings that are not forgotten. If your facility happens to fall into this category, you had better get badges for your vice presidents and managers. Those are just two.

Next slide *[Figure 4]* please.

We look at the integration of these findings in two different ways and of course the management integration occurs at different management levels. I am not going to spend a lot of time on this. This is typical. We integrate at line management, middle management, and senior management levels.

At the line management and middle management levels, at section and branch chief levels, we typically find, particularly in the projects, in the Division of Radiation Safety and Safeguards, and in the two specialist organizations in the region, that we can identify generic issues because those managers supervise inspectors who go to all the sites in the region. Therefore, we can relay the information to headquarters. If any of you heard Carl Berlinger yesterday, Carl commented on his interface with the region and how they take generic findings from the region and try to massage them into bulletins and generic letters.

The senior management integration occurs quite frequently when we are anticipating escalated enforcement and quite often through the SALP board. Those two are senior management integration activities.

There is one other that I did not put on the slide and that is the senior managers' meeting. That meeting is the one for which the regional people come to headquarters. We prepare packages on our plants, we send them to NRR—Tony Gody's group, if any of you heard Tony talk—he puts those into a package for presentation to the senior managers; the senior managers are Vic Stello, Tom Murley, Hugh Thompson, Jim Taylor, and the regional administrators. They meet and discuss the plants. Many of the soft findings really come out at these meetings. The soft findings complement and are integrated into some of the hard findings and soft findings from my level. This process is continuous by the way; I just wanted to mention that. For example, the last senior management meeting we held was last December, and we presented all those findings to the senior managers. Throughout this time period the region was continually updating their data base and integrating findings into the data base. Then, in April, we prebriefed Tom Murley and the NRR staff on what our present findings are. These will be put into a new form—it is ongoing, continuous integration findings—and it will be presented to senior managers on May 17 and 18. This integration process is continuous and it is at senior management level.

Next slide *[Figure 5]* please.

The time integration occurs over various different time frames. We use this for specific sites. The SALP process is used in the escalated enforcement. The SALP typically will cover a 12-to-18-month period, maybe even shorter, depending on your plant status.

We have done SALPs at plants on a 6-month level, if the regional administrator in conjunction with the EDO's office, decides that we need to have a closer look. We have done SALPs on 6-month intervals. This is done in some cases on a plant that is basically in trouble, one that has a lot of precursors of problems. We can get it down to a 6-month interval, but typically the SALP will cover 12 to 18 months.

The time integration for that site escalated enforcement—I am going to hold that until my next slide.

Time integration of generic issues—as Frank mentioned, you will frequently hear the comment, "we are really focusing on safety." By the way, many safety issues are hidden in unresolved items: they are safety issues and they are hidden because they are not defined in the regulations. There is not a regulation that will allow the staff to put it in a compliance context.

So many unresolved items, many safety issues, are really hidden down in these soft areas, which just are not well defined. You should look at them though because we look at them over a time span to try and define the safety issues. The time span involved varies, but it does give us the opportunity to see recurrent problems. If it is strictly a random failure on some safety system, it will show up as a random failure. If we have systematic failures and recurrences, then there is a basic problem. When you integrate these findings, you can certainly identify recurrent systematic problems and then relate it to say a design area or personnel area.

The time integration also gives us a chance to check on our positions and our rules. I do not like to tell you this, but we are not exactly perfect. Some of our rules are not that good. This integration process does come into effect and we do feed back to headquarters to try to get the rules changed or position statements changed.

With regard to the enforcement, this slide *[Figure 6]* to me is a compliance-oriented slide and it is an extremely important one.

The integration of findings in which we are looking at recurrent findings and similarity of findings. When you have multiple findings, the integration process should tell you that, yes, there is a problem here, which is recurring, and there is a root cause that is related. The similarity of findings is interesting to us because in many cases, when we have similar findings, they do not look the same. They look like they are something else. However, when you integrate them with some other facts, you find that the basic root cause of these problems is the same root cause. That is another reason why you should focus on root cause.

You should integrate your findings and look for root causes—the ones that have the common thread running through them. Then you should be doing your self-assessment and correcting the problem. It is just as simple as that.

The integration of escalated enforcement means that when we go into escalated enforcement, we have the option of taking integrated findings and either mitigating the civil penalty or escalating it. I am sure you are all aware of that. There are five factors that we look at when we do that. Those five factors are listed on the chart: identification, corrective action, past performance, prior notice, and multiple occurrences. You get credit for some of these. The one I really want to focus on is past performance. When we integrate findings for the escalated enforcement and go through the analysis, we look at all these findings that have occurred over a time period as well as previous enforcement actions. We look at the SALP ratings and we integrate all these factors to determine whether you are a good performer.

If you are a good performer, we can mitigate the fine 100 percent. If you are a bad performer, we are going to escalate the fine. Therefore, your past performance in the integrated inspection findings that we put into this enforcement effort largely determine how you appear to the press, the public, and the NRC with regard to the fine in the escalated enforcement action.

I just wanted to emphasize past performance; you should really be concerned about it. Particularly—and I know you are—in the SALP area, in the 1, 2, and 3 categories. I think Bert Davis mentioned this morning that every licensee has told him, "we strive for level ones." However, as Bert said, the facts do not support that. Many of you are level twos, some of you are level threes, and this indicates that there is something wrong.

I recently had an experience with a licensee that included past performance. We were in a startup situation at a utility. We had three different incidents over a period of time: one was a spill, one was a mispositioning of a switch in the control room, and another one was a failure to follow procedures. We started looking at these in an integrated fashion. What did we find? They all occurred on the same shift. The licensee had not looked at this that closely. We went a little bit further and we found that the same operator had made each one of these mistakes. The same operator. The licensee had not detected that, which indicated a very poor root-cause analysis.

When we brought that up, the licensee had to replace that operator, take that operator off shift, and put him into training. By the way, at that enforcement conference, we had that operating crew come into the enforcement conference so that they could hear our comments, which was very effective; I know Jack Norton has used that technique also.

Enough on the enforcement—past performance, integrated findings, are really important.

The SALP process *[Figure 7]*, this is our premier integration technique. It is a board, a committee review, that consists of seven or more people. A significant number of SES managers, senior agency managers, not only from the region but from NRR, participate on this board.

A unique feature of the SALP process, which Bert Davis, if any of you heard his talk this morning, commented on also, is that it incorporates subjective findings. Therefore, it is not a perfect process. We do have our own views and that ends up as an agency view. If you have problems with the process because it is subjective—Bert made this comment and I will reiterate it and I am sure every regional administrator in the agency will tell you the same thing: we do expect you to tell us where you think we are wrong. You have to have some logical basis for that; we do entertain such objections, and we incorporate them in the final SALP report.

The basic difference is that the SALP process does incorporate subjective findings. They do get rolled in there. Again, this is where those soft findings come into play.

The next slide *[Figure 8]* please.

When we do the SALP, it ends up as a seven-by-seven matrix. We take each functional area related to operating the plant and put them in one column, and on the other axis, we list the criteria to be evaluated for each one of those areas. When the board meets to discuss the SALP and go over each area, they will fill in that matrix.

The final integrated value will appear in the SALP report on the horizontal integration by functional area. We will rate you as a Category 1, 2, or 3. I am not going to go into those. Bert discussed them earlier this morning.

The integration process includes inspection findings, NRR inputs, and subjective findings of the staff and managers. We do get input from AEOD; we do get the performance indicators; and we do look at them. All of those sources of information are integrated into a finding for each functional area. That is the horizontal integration and that is the one you see in the report.

This is also an interactive process. For example, as we go through these functional areas, we do operations first and when we end up two hours later down in maintenance and surveillance, something that may have been ascribed to the operators making a personnel error in the plant may really have turned up in final discussions as coming from the maintenance department. Therefore, because this is an interactive process, we will go back and revisit the operations area to integrate that finding in the appropriate area.

The integration can also be done in a vertical direction. If you look at the first column, management involvement—which may not appear as a rating to you but I can guarantee you that I use it and I know others use it. When you go down that first column of management involvement in that matrix and you find the integrated findings for several plant departments—operations, rad con [radiological controls], and EP—have a rating of Category 3, you have a significant problem in your management involvement. I can tell you that if a vice president came in and he did not have a badge at the site, I would list him as a three right there on management involvement.

I want to focus on a couple of areas that have gotten a lot of attention: engineering and technical support. We have a lot of findings lately in that area. This is probably, I would guess, one of our biggest problem areas now. Jack Martin touched on it yesterday. He discussed it at length. Tony Gody mentioned it in his findings. If any of you heard the maintenance presentation, much of the maintenance program came out pretty good on these maintenance team inspections, but one area that was flawed was the technical support for the maintenance department. Therefore, if you are paying attention to these other speakers, a word to the wise is sufficient. You go back home and you look at your engineering and technical support parts, you had better pay some attention to them. They are really going to get looked at in our inspections and our SALPs.

In Region 2, I have already told the staff that we will be inspecting engineering departments, not engineering interfaces, but engineering departments.

One example in that area from when we were working on the TVA recovery effort—Gene Imbro did the basic inspections for us on the integrated design inspection—we found all of those problems that Jack Martin talked about and we found them in spades. We found thousands of calculations that were missing; the calculations on supports were thrown out because there was lack of engineering.

Every station we have ever looked at with regard to configuration control and growth on structures and electrical buses has had a problem. There has not been a station yet that has come away clean on configuration management and load growth on the buses. If you have not looked at those, you should look at them.

Those are the kinds of experiences that are going to get factored into these SALP ratings. The last SALP we did in the region came out a three, very clearly. You ought to be looking at those and you ought to look at safety assessment and quality verification. The safety assessment that is your self-assessments, are a significant factor and that is tied directly into quality verification. You need to look at them.

If you get level twos—I looked at a SALP recently in which the licensee had mostly Category 2 ratings. He had one Category 1. I talked with the staff about the past history of this particular licensee. They said, "oh, well, Stu, he's been a two performer for years." My question was, why is he just staying a two? The staff's view—and this was based on interviews with licensee managers—was that this licensee did not want to be a number one. That licensee, one of the utility people, had told me he wanted to be a number one when I asked him. But the staff was getting different feedback. Why did that licensee not want to be a number one? Perhaps, because he was afraid of all the publicity and that the other utilities would know he was a number one and they would come and hire his good managers away. I am serious; that is right.

Let me tell you though, if you want to be a number two, you are not going to stay a number two, you are going to end up a number three. Because, as they mentioned yesterday, it is an evolving standard. Two is not good enough. You constantly have to work for number one. The more margin you have from Category 3 to 1—and by the way, three is not an unacceptable rating. If you are really a bad guy, you know, we shut you down. However, with a Category 3 rating, you do not have much margin left. You are right on the edge. You are the ones living on the edge if you have a bunch of threes. You are about ready to flop over when you have a problem because there is no margin for you to pick it up, and that is directly related to that comment I made before, past performance.

Random errors and significant enforcement actions can be accommodated by past performance if you have margin. However, when you are operating in the three level, you do not have any margin left.

One item that comes out of this matrix is the culture of the organization. Tom Murley's chart on Plant A and Plant B, I want to make sure you all see that; I did not make one one, but if you did not see it, you ought to go look it up. That is really a culture chart. All of those characteristics in Murley's culture chart are in here. They are in this matrix. You may not recognize them, but if you sit down and try to piece those two together, you will find they are all there. When we look at you through the SALP process, we are really looking at the culture of the organization.

Let me put one other slide *[Figure 9]* up here quickly.

This is an integration of SALP findings over a 5-year period. Does anything look strange about that chart? What do you see mostly on there? Threes? Did somebody say three? You better be right. Just look at the threes on that chart.

These are actual figures. I did not make them up. I took the name off, but you can find out who it is because there is only one like this. If you go horizontally across the chart and you look at those time periods, you will see that the first one back in the 1980s had 20 percent of those ratings as threes; the next time period, 40 percent of them were threes; the next one was 50 percent, and then 60 percent and then 70 percent. That is absolutely atrocious.

I know what you are going to say: "Well, NRC, why didn't you do something?" We did do something, eventually.

If you look at that column vertically, there was not one bit of improvement in that management in the operations area. Over a 5-year period they had 80 percent threes in operations. Look at rad con [radiological controls], 80 percent were threes. Maintenance did not do too badly, they were only 60 percent threes; security 60 percent; and QA had 100 percent Category 3 ratings over a 5-year period.

Where do you think that plant is today? Anybody want to guess?

Voice:

Shut down.

Mr. Ebneter:

You better believe it.

Voice:

How long?

Mr. Ebneter:

It has been shut down since 1985.

I do not think that I need to tell you any more experiences with regard to some level threes. Pretty bad.

Well, that is enough. Somebody said this is not church, and I guess you think I have been preaching to you. But seriously, the integration of the findings is important to us and to you, in both enforcement and in the SALP rating, particularly in the SALP ratings. If you get threes, you will get more inspections because our present program does require that we look closer. If you get ones, as Frank and Fred talked about, you will be, if you get mostly Category 1 ratings, you will be up in the core inspection program, and we will reduce our inspection effort. Now, I do not need to tell you, or I should not need to tell you, the more we inspect, the more we find. The more findings we have to integrate--guess what? The more inspections we do. The more inspections, the more findings. You are in this vicious cycle. Where does it end up? It ends up right where that other plant was; unless you can correct your problems quickly, through good self-assessments and good root-cause analysis and good management involvements.

If you want a little better, a clearer definition of it, and I was in the Office of Special Projects for a while--anybody from Comanche Peak in here? There are a couple. Anybody from TVA in here? There are a couple. Any of you who want a clearer idea, talk to those people after this meeting.

Do you know how many inspectors we had at Comanche Peak? Anybody want to guess? We had 15 to 17 full-time inspectors at Comanche Peak, full time. I mean, they are sitting in your buildings, walking around your plant, every day.

At Sequoyah, we had five full-time resident inspectors, four full-time contractors supplementing them, and at least one team inspection per week.

If you think we are picking on you in an outage or something, think again because you never want to get to the place where these other utilities have been. They are recovering. Do not take me wrong, but it really is a burden on the licensee; it is a burden on our staff, we really put a lot of resources into these facilities.

Enough said. I just want to make one last comment about a plant culture: I talked with Jack Carey this morning. Jack Carey is senior executive out at Beaver Valley. He had a little pin on, and it said "Attitude." Safety culture is attitude. And let me tell you, we can pretty much get the pulse of your attitude. You see it in a lot of different things out there at the plants: you can see it in maintenance practices, badging practices, you can see the attitude.

It was rather interesting because one of Jack's senior managers was right behind him, and I asked Jack, "well, why doesn't he have the 'Attitude' pin on?" Jack said he would check.

That is all I have. If anybody has questions, they can put them on the cards. Do you want to take questions now or later?

Mr. Gillespie:

We are not willing to take questions now because we are running a little late. Mr. Haughney is going to talk about special team inspections. We let Stu carry on longer than we had intended, so we are going to march right through these.

Special Team Inspections

Mr. Charles J. Haughney:

All right, I am going to start. Good afternoon, I am Charley Haughney, Chief of the Special Inspection Branch. This is a group in the Office of Nuclear Reactor Regulation. It is a new entity as a result of our Spring 1987 merging of the old Office of Inspection and Enforcement with the statutorily required Office of Nuclear Reactor Regulation.

Our functions are steeped in history and go back even before TMI to the performance-appraisal-team days, the construction-appraisal-team days, the integrated design inspections, and some other fond teams that some of us remember very well.

In 1989 my branch has been doing three principal types of inspections *[Figure 1]*. They have been alluded to earlier today and I am going to briefly talk about them. I think most of you are familiar with the types, but just to set the stage, I will spend a few minutes on those.

If you need more details, I can talk about how you can get that from me or some of my staff members.

Incidentally, we occasionally do other types of inspections at the behest of senior NRR and regional management. For instance, this last summer, on short notice, my branch led and conducted 13 emergency operating procedure inspections at BWR facilities with Mark I containments. We had that done in about five months to satisfy a particular interest on the part of Dr. Murley. We are out of that business for now, but every now and then we get a tap on the shoulder. As far as I am concerned, we respond as quickly as we can and still do a good job.

May I have the second slide *[Figure 2]* please.

The first of the three principal inspections that are on my plate focus on the most important aspects of any plant operations. We have coined the acronym "OSTI," for operational safety team inspection. Region 2 has adopted that as its term that it uses for similar inspections. I must confess some of the other regions are still creating a few other terms for some fairly similar inspections, but I will not debate the team inspection naming issue in this forum.

Very quickly, the principal technique we use is direct observation of activities in the control room and in the plant. We do this usually with round-the-clock coverage and when we do the round-the-clock coverage, we will put about three to four people on the team on shift work for typically about a 72-hour period, usually on Wednesday through Friday of the first week.

We will adjust that and maybe just do deep back shift coverage, depending on the age of team members and activities in the plant. We have sometimes stayed on shift work for eight days. We have seen startups, shutdowns, all kinds of interesting things. We have never asked that anything be done specially for us, but there is just routine surveillance and maintenance activities and periodic problems that might arise in the day-to-day running of the plant that you deal with all the time. We observe those as we can.

So the focus is on the operations department, but it extends outward into the key support interfaces. We typically will look at maintenance, engineering, QA, onsite and offsite safety review committee activities, and maybe some other things as they support operations looking inward.

The level of effort for this group is typically a six- to seven-person team. Two weeks of onsite activity is the most traditional way of doing it. We can vary that.

In addition to that, we will have, of course, some upfront preparation time and some post-inspection report-writing time. For us, this inspection consumes typically about one staff year of total effort.

The team members will be a mix of my people, regional people, contractors, anybody who has the talent and meets my standards.

Next slide *[Figure 3]*.

Well, this inspection, of course, is probably one of my more famous ones, the safety system functional inspection, or SSFI. In my view, this particular inspection technique gives us the most direct safety bang for our buck today. In terms of our inspection man hours expended, we can get to more fundamental safety issues that would certainly trouble me, and I think trouble most of the licensees, the quickest.

Now having said that, I will not say it is necessarily our best inspection technique. For one thing, it does not necessarily look at attitudinal issues. However, to get to the lurking unreviewed safety question, this is the best way I know of how to do that today. Of course, it is a deep, vertical slice of a single safety system. That is a bit of a simplification because we will look at supporting systems that feed that safety system.

For instance, if we would pick emergency electric power, we will look at room cooling for the batteries, the switch gear rooms, the diesel, and those are certainly mechanical systems. We will take diesel cooling all the way back to the ultimate heat sink, but we will not inspect all of service water. That is the kind of approach we use in our vertical slice.

There are other key aspects of this inspection that expand beyond engineering. We get into the operations aspects of the activities that support that system; these include the surveillance tests, the normal system operating procedures, the abnormal operating procedures, the annunciator procedures, et cetera, et cetera—maintenance similarly.

By using this vertical slice technique, we avoid the classic problem that a team inspection used to have, of having to look at maintenance for the whole plant. You can narrow it so that you can look at all the maintenance work requests done on a single system for the last two years. You can look at every modification done on that system for the life of the facility. By narrowing your sample size, you can get deeper into the fundamental problems.

We get into all kinds of interesting interface issues in the design area. We will typically pick an AE [architect/engineer] designed system with a lot of interfaces because we are more likely to come up with issues there. That is not necessarily the best choice if you are going to pick an SSFI to do yourselves.

The level of effort requires a little bigger team than the OSTI. We vary the team size depending on system complexity: whether we have some trainees along or not, how much we want to push some buttons and operations, or what have you. So, it is a bit larger.

The time on site will vary depending on a whole lot of factors such as where is the engineering office related to the site and how much travel would we have to do and that sort of thing. If you examine our inspection reports, which, of course, are all available, you will see this sort of variability. We do it for a reason.

Next slide *[Figure 4]* please.

The third principal type of inspection is the SSOMI [safety systems outage modifications inspection]. It has not only the most complicated acronym, but it is the most complicated inspection for us to do. I think it is the most complicated inspection for you to receive as well because it is intensely involved in outage activities. To do it right, we cannot avoid being on station during portions of the outage.

I will agree with the adjective "disruptive," but I will also add "necessary," in our view. We never used to look at outages in any depth; I think that was a mistake from a safety standpoint. Now we do, once in awhile.

This is a multiphased inspection. In the first phase, we will look at the modification packages that you are going to do in cycle 6 outage, or whatever is coming up.

You know what happens most of the time? We cannot do that inspection before the outage. You know why? The engineering packages are not ready. You know what? Most of them are not ready until halfway through the outage. That reminds me of construction plants that used to have problems: We keep doing as-builts and redo the calculations, and hope it will work out the way the craft managed to install it. That is bad news. A lot of people are trying to get away from that and I recommend it heartily: Get that engineering done early, and then your field changes that you have to make will be more modest and narrower and easier to control.

When we are done with the design inspection, the second phase will be a direct observation of field activities. We will look at the craft. We will concentrate on installation of modifications. We also will look at maintenance on the big jobs that are in progress at that outage, whatever strikes our fancy. We also will look at some jobs that are not high on the plant manager's list of things to watch every day in an outage. When we go to sites where they are doing BWR pipe replacement or replacing steam generators, we note that those jobs get all kinds of attention. However, when we go to a site during a really big outage like that, we may concentrate on the ones in the middle of the plant manager's list because those are often safety-related, important to safety, very important, and are not getting as much attention. That is my way of thinking. I suggest that perhaps you think about it too, if you are involved in a big outage.

We look at testing. This is one area that is difficult; we have not been able to look at it often as I would like. Perhaps partly because we are there, but the testing is often delayed and we have got to finish up some time. We have not been able to see as much of the post-outage testing as we would like, but we have seen enough.

In a nutshell, if I had to summarize the installation and testing findings that bother me the most, I would say that we still see many of the same problems we would often see at construction sites years ago and at operating sites years ago: personnel under pressure in the field making changes without proper engineering and line management review. We observe those problems in spades.

Now, when we make note of it, it gets fixed. When we print it out, I have found that most of the management at the sites get upset and start looking more carefully themselves. That is wonderful, but we are not at every plant during every outage. So please take my perspective and think about it.

This is a bigger inspection effort. We may have up to three, sometimes four teams, because sometimes we have a procurement phase. We have probably only done that about 25 percent of the time in any depth. We will link procurement sometimes with the design phase with a couple of people. We sometimes send the procurement inspectors out to the vendors. We can tailor this inspection in all kinds of ways. Sometimes we combine the installation and test phases into one 2-week inspection, or two 1-week segments, particularly for the smaller outages such as your typical six- to eight-week refueling outage, which has a relatively modest modification package. That is the SSOMI.

I have a confession to make: We have not articulated, other than in the inspection reports, our thinking about how we do these inspections. We have been staying off the road a little bit in 1989 and some of my crackerjack inspectors have been putting down on paper some more details of how to do these inspections. We are about to provide Mr. Gillespie and Mr. Hebdon some . . . in fact, we already have given them at least one procedure. I would say by the end of the summer, if we do not spend too much time on the road, which may come first, we will publish—in the NRC Inspection Manual for all to see—the 1989 version inspection procedures on the OSTI, the SSFI, and the SSOMI. Stay tuned.

I would like to shift gears. I have talked about the three inspections. If you have questions, you can buttonhole me later or call me on the telephone, although I am almost never there; I am usually on the road; talk to my people; they know the procedure.

Let me have the next slide *[Figure 5]*.

You may wonder: "How do I get so lucky to have Haughney call me up on the phone and say, I'm coming?" Frequently the region initiates these inspections. One of the regions will have an issue at a plant and request to have an outage inspection done, or feel they need a new, fresh pair of eyes to look at the operations at this plant. We will come and do an OSTI. Perhaps a region is not very happy with the performance of XYZ system, and it will request that we bring some of your crackerjack people out to shake things up with the SSFI.

Similarly, the licensing half of NRR may occasionally, and as the office has been integrated with the inspectors, this happens more and more frequently, they may trigger a similar series of questions.

It is rare now that I will go to a plant because I feel like it. We used to do that. We used to rummage through the LERs and the SALPs and figure out a likely candidate and call people up in the region and NRR. They usually would not like that call very much, but we would force our way through, call one of you and away we would go. That does not happen very often.

The teams are led by either my staff or the regional office because I have been under extreme and appropriate pressure to export this technology to the regional offices. The regional offices are starting to do the inspections, and I think they are doing a pretty good job. We usually are involved to some extent. I like to always have one of my staff members, if not traditional contractors, as a member of a regional team, and we can usually do that. In fact, I will usually try to go to the exit meeting if I am not some place else.

You also might get chosen for an inspection through the senior management meeting process. There have been three or four inspections from that source since we reorganized. One time my entire agenda for the next six months was by request of the directors from the senior management meeting; another time none of my activities were.

Typically, one to three or four, particular key inspections, are explicitly directed by the senior managers. It is wonderful, I would just as soon do it, although it is a little disruptive for planning purposes, but it makes life interesting. That is how a licensee can get chosen for an inspection.

Next slide *[Figure 6]*.

This is more for my views of what the utilities are doing. I will give you a little preamble. I myself have not looked at a utility-conducted self-assessment in any great depth at any facility although I have stacks of reports that you have shared with regional offices. Region V, with some of my people, did a detailed review of some self-conducted SSFIs and SSOMIs at one West Coast plant just last winter. I have not personally had a chance to even talk about how it went.

The bottom line, though, is in the first bullet; and I cannot emphasize that often enough. This is very important, and it is not just my view. We really do encourage your thorough, technical self-assessments. Perhaps some of these three techniques that we have developed could be useful to you. That is your decision. Probably exactly the way you do something that will not exactly fit your station, so think about it carefully and plan what is right for you.

The reason I feel that way is you have a lot more people. By "you," I mean the whole collective nuclear community, including the contractors and the AEs and anybody that perhaps may help you. The industry has an incredible safety resource leverage that we cannot touch, which includes the very fine people that populate all of your stations. I have yet to be at a station even in deep trouble where I have not found some real super stars.

We would much rather you uncovered the safety problems first. It is an opportunity for you to discover the inadvertent, unreviewed safety question. It may be the result of an installation through a change in the facility, or, perhaps, the original design. It has never been detected during normal operations, and it did not show up in some exotic pre-operational or startup test, but that safety question is sitting out there at the edge of the design envelope of that system, as it exists today in that plant, ready to bite you if you get in a complex event.

Yesterday there was an interesting exchange about how much is enough and enough is not enough. I am a firm believer in any endeavor in human society, including farming or hair dressing or whatever it might be, baseball, but certainly nuclear power plants, you must keep striving for better. I personally feel that nuclear is a fine way to make electricity, but if we do not understand it and treat it with respect, it can do all kinds of damage nationwide. We need to find and get after the problems.

In recognition of the staff's view that these self-assessments are crucial, there is a bullet missing from this chart. A few months ago our lawyers made a rather significant change to 10 CFR Part 2, Appendix C, the enforcement policy. That change allowed for codified exercise of regulatory discretion in the enforcement arena for self-identified problems that you may come up with through a meaningful self-assessment. I am not an expert on all the subtleties of Part 2, but Mr. Lieberman—I have seen him around here--would be delighted to discuss that in detail with you. Of course, we are still implementing that newly changed policy.

The last slide *[Figure 7]*.

This chart involves what I think constitutes self-assessment excellence. First of all, technically sound issues are developed and resolved. I have seen a number of stations where the issues are developed and they sit for corrective action and they do not get worked on for a variety of reasons—some of them excellent. However, it causes real frustration on the part of the staff that has worked on that self-assessment and those who are responsible for correcting it. It is a tough management problem, but if you do a crackerjack job on the first 90 percent, why forget the last 10?

The other thing is the training leverage for your staffs. If you do these self-assessments, get your key people involved as best you can, link them up with some outside experts. However, do not have a contractor give you a bunch of glossy three-ring binders that are going to sit on a shelf and not do you any good. That is useless: it is a waste of money; and it does not enhance safety. Now that is my personal view, but I think that I can back it up.

Next, root-cause determination—my own view is that sometimes that is a bit of an abused buzz word, but needless to say, it is nice to find out what really caused the problem. There are also contributing causes along the way that can spider their way throughout the organization and cause other problems. At any rate, as you do a deeper analysis into the reasons of whatever issue has come to the plate, that is where I think you can get the biggest mileage out of these self-assessments. For God's sake, do not merely correct the symptoms. The bottom line is a very good phrase from 10 CFR Part 50, Appendix B, that is, "corrective action to prevent recurrence." We must learn from our mistakes, and we must go onward. Enough is never enough. That phrase, as I thought about it over the years, has given me an encyclopedia of ideas to help find the path to excellence. I hope it serves you as well. Thank you.

Mr. Gillespie:

Are there any questions for Charlie? I know that he and/or his teams have shown at a number of sites. Now is the chance to put him on the spot.

Mr. Haughney:

I am going to hang around for a bit afterwards too.

Mr. Gillespie:

His findings tend to be somewhat controversial at times. Nothing? Okay. If anyone has something that they want to write down, we do not read the names on the cards. We will be happy to collect some cards.

Let me now turn to Stu and diagnostics.

Diagnostic Team Inspections

Mr. Stuart D. Rubin:

[Mr. Spessard's paper is being presented by Mr. Rubin.]

It looks like all of the SALP Category 1 plant representatives have kind of left the room. They probably think that this is not applicable to them, and they are probably right.

First, I would like to explain what the diagnostic evaluation program actually consists of, explain what a diagnostic evaluation is, what our program objectives are, and finally the special features of a diagnostic in terms of how it compares to other NRC team inspections.

With regard to the evaluation process itself, I would like to briefly go through how a plant is selected, the evaluation areas that we consider, the planning and preparations that are involved as well as the evaluation sequence, and finally, how we communicate our results. I would like to talk about the results to date in general terms and try to sum up with some conclusions on the effectiveness of the program.

The slide *[Figure 1]* please.

A diagnostic evaluation is a broad based independent evaluation of licensee and plant safety performance. It encompasses technical, programmatic, management, and organizational aspects.

The next slide *[Figure 2]*.

In terms of our objectives, we provide the agency's senior managers with an improved understanding of licensee safety performance to guide appropriate regulatory action. We give them an up-to-date snapshot of plant performance at that time. Second, we provide a fresh, independent look at the plant performance, through direct observations. We use people who have not been involved with the plant before to any great extent. We evaluate the effectiveness of the licensee's programs and management practices for achieving and maintaining a high level of safety performance. Finally, and I think most importantly, we determine the probable root causes of identified problems that affect plant or organizational performance. Root causes are very important because they enable us to determine whether or not the licensee's ongoing actions and plans for improvement are likely to succeed. It is very important to the agency's senior managers in determining whether or not additional regulatory action is needed.

There are a number of special features of a diagnostic that sets it apart from other NRC team inspections.

First, as I indicated before, the EDO, Mr. Stello, selects the plant that we visit. The EDO also approves the team, as well as the actual plan, that is developed. Each plan is different because plant performance problems are different, so each is tailored to the specific needs of the NRC senior managers.

The diagnostic team is headed by an NRC senior executive manager. The team members are also independent in the sense that they have not had significant prior involvement with the plant. That is, the team members have not been significantly involved with the plant's inspection, licensing, or enforcement actions. We also make extensive use of management consultants as well as engineering consultants, if engineering support problems are evident.

The evaluation is very comprehensive from a performance standpoint, as opposed to a compliance standpoint. It covers the plant as well as the corporate offices and management effectiveness as well as the assessment of organizational culture and climate. That is typically where we use our management consultants as well as our team leaders. We do this by conducting extensive interviews. Typically, we conduct about a hundred interviews from the chairman of the board down to the working level people in the plant, and interviews generally last from one to two hours each.

The diagnostic evaluation emphasizes root causes and evaluates, as well, if the NRC was a contributor to any performance problems. Finally, the EDO, Mr. Stello, transmits the report to the utility, and generally will require a response. The EDO assigns NRC staff followup actions to follow up on any generic or plant-specific issues.

I would like to go quickly through the evaluation process. The process starts with plant selection *[Figure 3]*, which evolves from the discussions at the semiannual senior managers meetings. Out of those discussions flow senior managers' recommendations to the EDO, and Mr. Stello makes the decision in terms of what plant he wants to evaluate.

The areas covered by a diagnostic closely parallel the functional areas in the SALP program. We typically focus on plant operations and operations interfaces with other organizations, such as maintenance, engineering support, and so on. As I mentioned before, we also emphasize management practices and organizational culture.

Team planning and preparations *[Figure 4]* are very extensive and typically cover six to eight weeks. This includes a trip to the site as well as the regional office in order to collect information to begin team preparations. We also brief the involved utility on our evaluation process. On the basis of the review of extensive information collected from the licensee and NRC staff briefings regarding the plant's problems and improvement programs, the team forms what we call our "regulatory picture." This gives us a good idea going in of what the performance issues have been over time, as well as the actions ongoing that are intended to address those issues.

We also make sure that we have an understanding of NRC senior managers' concerns about the plant, and from that, we map out the special areas that need evaluation, as well as develop the team itself in terms of the requisite experience. The team develops detailed evaluation plans for each functional area. Within those plans, we have previously identified performance issues that we want to better understand, to see if they are still there or have been fixed.

The plans are also intended to identify new issues so that we can see how they tie together and build a picture. The objective of our preparations is for the team to be as well informed as it can be without having a bias or predisposition as to how it might all come out. When the team arrives at the site, it is fully prepared and ready to go to work.

As far as the onsite evaluation sequence is concerned, it typically covers four weeks. The team is on site usually for two weeks. We then come back to the office where we continue our in-office evaluation in terms of evaluating our results as well as redefining our plans for the third week out. We go out for the additional week to complete our efforts, and then we begin our actual report preparation phase.

The next slide *[Figure 5]* shows our evaluation process sequence. We cover our evaluation at four levels, and we work it from "level one" or step one at the bottom up, which is looking at performance issues across the functional areas. At this level, we use proven inspection techniques such as reviews of documents and of completed work and observations of activities in progress. This can include shift training on EOPs, observing shift activities and turnovers, maintenance and testing activities in progress and so on.

We do this to identify functional area performance issues as well as strengths. We then evaluate the licensee's technical program documents in terms of their overall scope and content and effectiveness of implementation. That is our "level two." We also look for strengths as well as weaknesses in the documented programs, and how they contribute to the problems that we identified in the first level of our evaluation.

Now "level three" is where we do our assessment of management and cultural factors and their contribution to the weaknesses that we have identified in levels one and two. This is where we use our detailed formal interviews and obtain input from our management consultants.

Management factors would include: goals and objective setting, performance standards, monitoring and feedback, problem solving and staffing, et cetera. Organizational culture would include: worker attitudes, morale, teamwork, accountability, and so forth.

When the interview results are pulled together and evaluated by our management and organizational specialists and team leaders, the team can develop a rather good picture and detailed mapping of the management issues and the relationship to the performance problems, in terms of such things as lack of teamwork, accountability, poor communications, et cetera.

Finally, we merge these findings with what we believe to be the root causes of performance issues that we have found at levels one and two, and therefore management's contribution to those issues. To develop this, we have nightly team meetings with a lot of team synergism and discussions, and the picture begins to emerge after we have been on site for about a week and a half.

After completing our onsite evaluation, we provide our senior management with a briefing on the results *[Figure 6]*. We have about a 95 percent good snapshot within about two weeks after we come back. Following these briefings, we meet with the utility and present our findings. The team report is then transmitted to the EDO.

Following his review, and any discussions that he may have with the agency senior managers, the EDO transmits the report to the licensee. At that point, the document becomes a public document. Typically, the EDO will require a response as well as assigning NRC staff followup actions to the office directors involved and to the regional administrator.

With regard to the results of our effort *[Figure 7]*, we conducted four diagnostic evaluations, and one is currently in progress. One special evaluation was also done at the request of Mr. Stello. The plants, as well as the dates, as you can see there, are listed for your information, and I will not discuss that further.

With regard to the results to date, I will talk about some of the root causes of performance problems that we have identified *[Figure 8]*. These are just typical; there are others. First, one particular plant had been neglected in favor or other priorities by utility management. Examples of this might be corporate management focusing on completing new plants, such that the other operating plants did not get adequate attention, or highly focusing on things such as TMI action items, and completing those, as opposed to addressing their own identified performance issues.

A fossil plant attitude. By this we mean seeing band-aid fixes, running equipment until it breaks, or emphasizing short-term availability over long-term reliability. Another one was a lack of clear performance goals; this was a bigger problem at some plants than at others. Ineffective planning for operations, a lack of staff operating experience, a lack of attention to human relations matters, and corporate micro-management are some other examples of root causes for the performance problems that we observed.

In terms of the performance strengths and improvements that we have seen *[Figure 9]*. We did visit a plant with good overall performance. We went to that particular plant in an effort to get better calibrated in our program, although at the same time there were plant performance issues for that plant that did not seem to match up with the utility's reputation. We observed that corporate leadership, oversight, and involvement were clearly there for that particular plant. Integrated plans, which flow from the strategic plan from the board of directors, to the company business plan, and then to division level plans with established tasks, accountabilities, schedules and measures for feedback were other examples.

Technical staff capabilities in one organization were clearly a strength in terms of the corporate support organization, as well as the engineering staff capabilities. Strong management and staff attitudes towards safety and managerial and organizational improvements are other examples.

One of the things that has become evident to us is that if a plant is in trouble, it takes a significant amount of time and effort to bring in new managers, reshape the organization, and change the policies to get it out of trouble.

In terms of the performance weaknesses that we have seen, strained resources was one problem *[Figure 10]*. By this I mean that poor performing plants have more work than the staff is capable of doing in certain areas. Another would be continuing change in the organizational structure, managers or functions. Communications problems and ineffective engineering support are a few other examples of weaknesses that contributed to plant or personal performance problems. The sheet contains a number of other examples that I will not get into here.

In addition to the plant-specific issues, we sometimes see what we view as generic issues requiring generic staff actions *[Figure 11]*. These are handled either generically, or on a plant-specific basis, by the EDO, through assignments to the office directors or the regional administrator. A typical generic staff action would be for the staff to expedite review on IST programs for pumps and valves. As far as plant-specific actions go, they are handled on an individual basis either by the office or the region that has been assigned the action.

In conclusion *[Figure 12]*, I would like to say that the success and the effectiveness of the program depends heavily on intense preparation, an experienced team, and good team communications. The management and the organizational culture evaluation also enhances our root-cause assessment. We think that the root-cause determinations improve our understanding of the performance problems, and therefore the likelihood for improvement in terms of actions that are presently ongoing or planned by that particular utility, and whether additional actions by the NRC are needed.

We view this as a proactive program to make sure that we can head off problems before they become more serious down the road. We have also generally found that the diagnostic evaluation has confirmed the agency's senior managers' views on performance that we have obtained and that they have deliberated on at the senior managers' meeting.

Lastly, the evaluations have been well received by the utilities as well as the agency's senior managers. We also believe that these evaluations have contributed to the licensee's action plans for dealing with their performance problems. When we look at the performance indicator data and other staff data for the earliest plants, we see that performance has, in fact, improved at those plants.

Therefore, I believe that safety has been enhanced on a plant-specific basis as a result of these evaluations as well as on a generic basis through staff actions. That is all that I have to say.

Mr. Gillespie:

Okay. Thank you, Stu. Any questions for Stu on diagnostics?

Mr. Gillespie:

Gene is going to talk about one of the major results that has come out of the SSFI inspections over the last three years.

Mr. Imbro:

Five or six years.

Mr. Gillespie:

He will be our last speaker.

Reconstitution of Design Bases and Design Documents

Mr. Eugene V. Imbro:

Thanks.

I am going to talk today about the reconstitution of design basis and design-basis documents. This is a new initiative within NRC. We have been working on this for about the last six months. This task really came about as a result of the SSFIs and the SOMIs. In many instances, we have identified modifications that have been made to the plants without sufficient engineering basis and, in some cases, these modifications have compromised the functionality of safety systems.

Missing documentation appears to be a root cause of some of these problems; in fact, we have numerous instances where this has been the case.

Unretrievable documentation, is really just as much of a problem, i.e., if you have documentation and it is inaccessible, it is the same as if you did not have it at all.

The title of this slide *[Figure 1]* is "What are Design Documents." I have to confess that we changed our nomenclature after visiting the first plant in our survey, which I will discuss a little bit later. The initial title of the slide was "What are Design-Basis Documents." There is really a lot of confusion about terminology.

If you look at 10 CFR 50.2, there is a definition for design basis, which includes system functions and ranges of controlling parameters as reference bounds for design. This definition has generally been interpreted by people in the industry to be equivalent to the term "design input".

Therefore, to be more general and not to confuse people with design-basis documents as we perceive them and as you perceive them, we just took the word "basis" out of the title and referred only to design documents.

I have defined design documents as documents to which you can refer to verify that structures, systems, and components have been designed to perform their identified function. That is a lot more encompassing than the definition of design basis in 10 CFR 50.2. What we are trying to get across is that the term design document really encompasses three types of documents.

First of all, it encompasses the design inputs and design bases. Those are made up of the the kind of information a designer would need when he starts with a clean piece of paper to design a plant. Obviously, you need to know what the system is supposed to do. You have to define the system function, which is a design basis.

Licensing commitments are also design bases. NRC regulations are design bases, design inputs. There is another term under the category of design basis, which is good engineering practice. That is really a design input too because there are a lot of industry standards, corporate standards, AE design standards, that are used to design plants. These engineering practices are not mentioned in the FSAR and are not licensing commitments, but it is obvious that the plant cannot be designed without adhering to them.

In terms of soft findings, which Stu Ebneter talked about before. I am digressing a little bit. However, many times we will go out and do inspections and find things that we do not like. For example, we do not think the calculations are done right, we do not agree with the assumptions; these are not necessarily a violation of a regulatory commitment or regulation, but they give us an uneasy feeling. Typically these items are classified as unresolved items and we try to follow up on these, but they are not violations or deviations.

To continue on my original path, design documents. You have design inputs and design bases. That is one category. The next category of design documents is the analysis. Once you have the design input, you need to examine it, and that is the analysis. It is what you do with the inputs to get out the final product, which is design output documents. You have three categories of documents: inputs, analyses, and design outputs.

Design output documents are facility drawings, purchase specifications, Q lists, valve lists, et cetera. Basically they are the documents that people need to construct and operate the plant.

Next slide *[Figure 2]*.

Why are design-basis documents necessary, or why are design documents necessary? First of all, they form the basis for future plant modifications. You need to have a starting point before you modify the plant to know exactly, as the second bullet indicates, what the margins are.

The design document calculations, et cetera, are the normal starting point for making the modifications so that, when you change the plant, you can assess the effect of the change on the facility. Obviously, once you know the margins and have defined the operating envelope, you have the basis for the 50.59 evaluation.

The third reason design documents are necessary is because they form a living record of the as-configured plant. That is really important so that you, as an owner, know what you have in your facility, why it is there, what it is doing, and how it was designed. We have seen a lot of plants—Stu Ebneter was mentioning Sequoyah before—that is one such plant, Sequoyah, where they really did not have a good idea of what they had in the facility. That was one of their major problems: they had lost track of the design basis over the years.

Design documents are also necessary because they provide a technical basis for continued operation. I think that probably a large impetus driving the regeneration of design-basis documentation is life extension of the plants. That issue has not been addressed yet, but people in the Office of Research are working on a rule. We are working with them to factor in the experience we are getting from our site visits.

We became aware of a lot of well-intentioned utilities spending a lot of dollars trying to reconstitute design-basis documents *[Figure 3]*. We felt that, in trying to be responsible regulators, we at least owed the industry some guidance as to what final product should be, before they went out and spent all this money. While we may be a little late in developing this guidance, we are doing it. Hopefully, we will not have any major adverse effects on what people have done.

[Figure 4]

We have decided that before we can put out any meaningful guidance, we needed to go out and talk to utilities. We are doing it on an informal basis. We may visit up to 10 plants. Whether we do that many is doubtful at this time, but we are going to visit enough utilities so that we can feel comfortable with what the status of the industry is in terms of design documents and design control.

We tried to take a cross section of plants: we picked plants that are old plants, some plants that are new, some plants that have gone through SEP, to try and get an overall cross section of where the industry stands. We are collecting information, basically myself and three consultants, one in mechanical systems and operations, one electrical and I&C, and another fellow that looks at piping and seismic analysis. We talk to both the engineering people and the plant people to get both perspectives. I think the operating people also certainly have input into what we are trying to do.

We are trying to first of all determine the availability of design documents: we need to know the types of documents people have and the types of calculations that are available for people to use as a basis for modifications. The first plant we went to was Robinson. Because they are an old plant and probably started sometime before Appendix B, they do not have a large calculational base, but they do have a DBD [design-basis document] reconstitution program. Other and newer plants we have gone to, are PP&L [Pennsylvania Power and Light Co.] and PG&E [Pacific Gas and Electric Co.]. Because they are relatively new or have gone through an extensive review, they have a real good set of calculations. We want the whole gamut. We want to define the types of documents people should have to define their design.

We are also looking into the design-change control process. We are trying to look at a modification, or several modifications, and go from cradle to grave, from initiation of the modification through the design process to how it is installed and how it is declared operational. Basically, we want to understand how you utilities do business when you change a design.

We are looking at not only the engineering, but the interfaces between engineering, maintenance, operations, training, and licensing. We felt that, to really understand the engineering modification process, we needed to look at not only the engineering group but at all the people that they interface with.

We started out trying to define what design-basis documents should be and how they should be controlled. However, we are really getting into the configuration management area and it is hard to draw a box around just design-basis reconstitution. It is all configuration management. To me, design-basis documents are really the cornerstone. If you have an adequate set of design-basis documents, you really have pretty much the key to a good configuration management program.

The other thing we are trying to assess is the utilities design-basis document reconstitution programs. We are going to understand what they are doing and define the strengths and weaknesses of the different programs.

How is this going to be accomplished? We intend to issue a NUREG and it is going to define what we would term "good practice." It is not going to contain mandatory requirements; we are just trying to publish our views.

We primarily want to address the types of documentation that should be controlled and maintained as configured. Just to make that a little bit clearer, all documents that affect safety-related systems should be controlled and probably are. But all utilities do not necessarily maintain all the documents or drawings as configured. In other words, every time you make a modification, you do not necessarily roll it in and redraft the drawing.

There is obviously a certain set of drawings that are required for plant operation that are in the control room and every time you make a modification you probably should be updating the drawings. In some cases, you might not want to revise a drawing every time a modification is made. Some people are doing that and that is probably okay. Again we are trying to get a feel for what different people are doing in industry so we can try and provide at least some guidelines as to what you should and should not be updating all the time.

To the best of my recollection, in the three plants we have surveyed so far, they do maintain all the drawings as configured. In other words, every time they make a modification, they revise the affected drawings. In some utilities this occurs between 60 and 90 days or 120 days, depending on the level of importance of the drawing.

The other thing, as I said before, is that we are looking at circumstances and the time frame in which design-basis documents should be created, if at all. I guess "if at all" is the operating phrase there. We do not expect a plant that is an old plant to go back and regenerate every calculation that was ever done in the design of its facility. For older plants, that would probably cost them more to do than it cost to build the plant initially. But clearly, there are some design documents that you people should have. We hope to come up with guidance to help you decide which types of documents you should have and which type of documents you do not need to recreate, except if you modify that part of the system or structure or component.

We are going to talk about the strengths and weaknesses of utility-initiated design-basis-document reconstitution programs.

To date, Robinson is the only plant, of the ones we visited, that has had a DBD program in place. We expect to look at more utilities that have those types of programs in place. We intend to not criticize any or praise any particular utility's program, but just try and list what we think a good DBD program should have and the types of things that may not be necessary or could detract.

Finally, we are going to try and address the adequacy of the current NRC regulations and industry standards in this area, in configuration management. The definition of design basis needs to be revisited sometime, and we are going to look at that and other things to see what other types of NRC guidance need to be added or amended. We have not really done that yet.

Every licensee we visit gives us a new outlook and a different perspective. I am sure that there are no two utilities that are doing things exactly the same. It is really, for us and for me personally, a real education to go out and talk to different people.

We expect that the guidance we are going to issue is going to be as nonprescriptive as possible and still be of some use. In other words, every utility has their own needs and their own way of doing business, and what is good for Carolina Power & Light is not necessarily good for PG&E and vice versa. However, there are some basic things that everybody should be doing. We are going to try and craft the guidance in such a way as to have it be useful so that it does not necessarily negate anything you have done or cause the money you have spent to have been spent in vain.

We have not really reached conclusions yet. We have really only visited three plants. As I said before, we expect to issue a NUREG; hopefully, it will be out sometime next spring. However, do not hold me to that because I think we have taken on a big task, maybe more than we can handle, but we are going to try and get through it.

Next slide *[Figure 5]*.

I just wanted to talk a little bit about design authority. After the OL is issued, the operating organization generally drives the modifications and maintenance, as it should be. However, the engineering organization really needs to be responsible for controlling the plant design. It is my own personal view, that utilities should have a strong centralized organization, engineering organization, to control a design. I really think that is the key to configuration management. It has been my experience in industry over the years that people tend to cut corners on engineering. I think, being an engineer, that engineering is a wise investment. You have a multibillion-dollar facility, engineering is such a small fraction of the cost of operating it, and to nickel and dime engineering is penny wise and dollar foolish.

I think too, just as it is important for engineering to understand the design basis, the operating plant staff also needs to understand the design basis and the design considerations. Not necessarily so that plant staff can make design changes, because they probably should not be doing that, but there are things that operating people can do in terms of modifications and maintenance that can violate the design bases, and they can do this unknowingly. For example, changing set points. That is really a design change, and it probably should go back to engineering. Changing the type of grease in a motor-operated valve is a design-basis question really because you are affecting the environmental qualification. Perhaps some people in maintenance want to go out and move some instrument tubing, well, there are high-energy line break considerations that can be affected by that. Several changes can be made in a plant that really affect the design basis of the plant and operations people should be at least aware of what the design considerations are so that they do not inadvertently change things that will cause some problem.

Just like operations, engineering also needs to be responsive to the plant operating considerations. Engineers cannot work in a vacuum. They need to go out there when they do a modification, to walk down the system, to understand that the operations people have to live with it for maybe the next 20 years, and they have to do something that is reasonable from the operations perspective too. There really has to be mutual respect and cooperation between the plant staff and engineering.

Final slide *[Figure 6]*, level of design documentation.

As an interim position, you should have sufficient design documentation available to support any future modification you make to the plant. This has not been true in the past, and I am sure this is going to require regeneration of missing documentation. However, at least for the future, modifications that you intend to do should have sufficient design basis or design documentation available so that, if we come out and do an SSFI or another type of inspection, we can understand, or a knowledgeable person could understand, what the bases are and what the margins are.

Just some final thoughts before I answer some questions.

First of all, the question, are DBDs necessary?

I guess, I do not really know now. I think, for some utilities that are older utilities, they are probably necessary and may be essential. For plants that are newer, that have almost a 100-percent calculational base and all the design documents and they know how to use them, maybe they are not necessary. In any case, I think they are beneficial for everybody. I think everybody should think about creating DBDs. However, DBDs are not a substitute for competent experienced engineers; they are not a substitute for a well-controlled and retrievable set of design documents, an effective design processor, and certainly you need to have the personnel trained to know where to get the information. A DBD is not going to be the answer to everybody's question or problems. It can be a roadmap document, it can take a lot of forms.

I think that concludes what I [illegible] to say for now.

General Questions/Answers

Mr. Imbro:

There was one question that I received before and I will try to answer it as best I can. It is from Mr. Gill of Duke Power, if he is still here.

> *QUESTION:* The design-basis reconstitution program will identify many issues that may be reportable, have operability questions, may involve potential enforcement action. What can be done to balance keeping the NRC informed yet not burdening limited resources with extensive LER reporting and responding to violations, enforcement actions, et cetera?

ANSWER: I will take a shot at that. Charlie talked before a little bit about the new enforcement policy. Basically I think it says that anything up to a Level III violation can be, I guess the civil penalty can be waived if you can demonstrate that you would not have found this—that first of all it was found by a self-initiated program and secondly that you could not have found it in any of your normal surveillances or other testing or checks that you do.

As far as the reportability question goes, it is a tough one to answer.

We talked about it a little bit with Carolina Power & Light. The discussion we had there—well, as you are going about recreating design basis documentation, you may come to a point where you have a partial picture and at that point you think something is wrong. However, as you progress and get the rest of the information, you find that you really did not have a problem at all. Should you report at the time that you thought you had a problem? I would say probably not. However, if you think you have a problem—I guess what I said to Carolina Power & Light, I guess I will say here—you probably should inform the region and on an expedited basis determine whether or not it is a real problem or not. If it turns out to be a real problem, you have to report it, and if it turns out that the problem goes away, then obviously you do not. At least you should give NRC a heads up as to the fact that you have identified some concern and you are working on it.

Did I answer that question?

Mr. Haughney:

I want to add something to this.

Mr. Imbro:

Okay, Charlie.

Mr. Haughney:

I am hardly a reportability expert. However, I can tell you, we have not changed a single word in 10 CFR 50.72 or 50.73. That is not to say we will not do that someday, but we have not changed them yet. This is a very tough issue, and I do not want to dismiss it. I think you have to be very cautious about using an elaborate, well-executed design-basis reconstitution program as a potential excuse for not reporting something. That is my own view.

I would avoid getting wrapped up in all the administrative bells and whistles, but keep the NRC informed of what is happening at your station. My own personal perspective is that the ostrich approach to nuclear power will not work: You have to bring the issues to the surface.

Yes, sir.

Voice:

I think you may have misinterpreted the question.

Mr. Haughney:

You may be right.

Voice:

I believe that the [illegible]tion, my question also, is that once something is identified through a design-basis reconstitution and reports are made and NRC starts this almost self-perpetuating inspection, more resources are devoted to enforcement conferences and preparing [illegible] . . . .

Mr. Haughney:

I think we are in fact miscommunicating.

First of all, on the issue of reportability, you have to talk to some people on the staff that know far more about it than I do. I see a bunch of them here in this room, some from headquarters, and some from the regional office. Wayne Lanning, if he can raise his hand, is with the Operating and Events Analysis Branch. He can talk to you about it from the headquarters perspective. John Jodonce, Regional Deputy Division Director from Region IV. Bill Hehl, a Deputy Division Director from Region II is in the back of the room. They can give you their views on 50.72 and 50.73 better than I can.

But, I will tell you again, take a look at 10 CFR Part 2, Appendix C, read it for yourself. I have not read it in about three months. Talk to your corporate legal staff and your licensing staff. There is a window of opportunity there to soften the regulatory hammer for these well-intentioned, aggressively pursued, very appropriate and effective self-assessment programs. Whether that language is perfected or not, I am not about to debate it with you, but I think it is a start. We will keep looking at it.

Incidentally, one other thing. We have started a dialogue with NUMARC on this design-basis reconstitution issue. It is just beginning and, as you can hear from Gene's presentation, we are still thinking about this whole issue. So this is hardly the end of this whole story. We would appreciate your feedback.

Mr. Gillespie:

I think you will find that several utilities have embarked on very, very intensive programs in this area and they have come up with things. I do not think you will find anyone in the NRC devoted to going in and beating you over your head with your own effort. You will be applauded versus beaten to death. I would ask that you give our regional administrators more credit than that. They are not going to drag you into enforcement conferences over a self-initiated effort; truly, we are giving you credit for it.

I had one question and one comment.

Mr. Hehl:

We have recently had some experience within Region II dealing with findings from the design-basis reconstitution efforts. Specifically, we have had some dealings with Duke on this subject, with Carolina Power & Light.

I think by and large as long as the issues are communicated clearly, in the evaluation stage, and at a point where the engineering group says, "hey, we have a problem," you promptly report that, take prompt corrective action to mitigate that issue. Then, we will probably have an enforcement conference because Appendix 2 does require that to take place. If it reaches a level, severe Level III, under the new enforcement policy, there is a provision for no issuance of a civil penalty on the basis that this issue came out of a design-basis type of program.

We do have examples. We have a track record that is being established to demonstrate that, in fact, we are taking these findings from these programs and softening the blow of regulatory process. On the other hand, there are examples where the NRC feels that corrective action was not prompt and complete and effective. In those cases, we have gone in and taken enforcement action.

Mr. Gillespie:

One question. Stu Ebneter, are you hiding in the back?

Mr. Ebneter:

Yes.

Mr. Gillespie:

Stu, let me ask you to answer this question from a regional administrator's point of view.

> *QUESTION:* In using past performance for mitigating or escalating the violation penalty, how many years back does the NRC consider?

Mr. Ebneter:

ANSWER: Two years. The policy says the last inspection or two years, whichever is greater.

Mr. Gillespie:

I think we could probably add on to that. If there was a significant change in management, which contributed to the violation in that 2-year period, consideration would probably be given to how it happened.

Mr. Ebneter:

Well, it says you consider it. It does not say that it absolutely drives the decision. I would expect that we would use some judgment in that. If you go back 2 years, you find the utility has had five recurrent enforcement actions, or three Level III enforcement actions, it does not take much on the part of my judgment to say the licensee has not done too well in that 2 year period.

You know, if you only have one, you cannot overemphasize the importance of taking the past performance and putting it into perspective. Random events, I think I mentioned before, if it truly is random and you are a good performer, you are bound to have some random situations occur. They will appear in your history as more or less random events. If you are a poor performer, it will show up in the sequence.

Mr. Gillespie:

One more question. Charlie has a question.

Mr. Haughney:

This reminds me of a presidential press conference, except that I have got all of the followup questions on both sides of this card. This is an excellent series of questions. Unfortunately to talk about them in any detail will take quite awhile, but let me try to go through them quickly

QUESTION: Are the safety system functional inspections based upon plant-specific design basis?

ANSWER: The answer is, shortly, yes, among many other things. The followup to that is a statement: "Many reports that I have read," and of course we send the reports to everybody, "seem to identify concerns and recommendations that go beyond the specific licensing basis for the plant." I would agree with that. I would want to caution you that there is a considerable difference between the licensing basis and the design basis. I would rather not go into all of that here. You can talk to Gene Imbro, or myself, or a number of other people in this room from both the NRC and other utilities on that topic.

In parentheses after that statement, "That is applying design concepts of the new plants to the older ones." That is really a different issue, and I will give you one example: Should check valves be considered passive or active devices for design basis? That is an issue that we have been wrestling with on a number of plants, and I do not want to debate it here today. But just in general, it gets back to what Gene was referring to as a good engineering practice. If that check valve has to reposition to perform its safety function, then its testing and design basis ought to consider it as an active device as far as I am concerned. Now I am not a designer, but I have spent a lot of time operating different plants with a lot of curies in the core. If that check valve has got to perform some function, I better be confident that it is going to work. That goes from design to testing to operations to maintenance. Otherwise, the thing is useless and may get me into trouble.

There may be a concept that has evolved and improved in later designs that was not even considered in an older plant. If you want to address it meaningfully, you could be talking many megabucks; I know that. That is not an issue. When we describe it in our reports, we say that you must change the design basis for 357 check valves, we will put it on the table for your consideration.

I will be honest with you. We do not have universal agreement within NRR about that particular issue. But from my standpoint, it is an operational issue that cannot be ignored.

The final question is into regulatory space. Does the team consider the requirements of the "backfit rule" prior to issuing the SSFI report? The answer is yes, in that we try to carefully describe the findings such as active versus passive check valves or other different kinds of code growth issues, so that they are in fact described and put on the table in a technical viewpoint. However, we do not end up the closing sentences of the paragraphs with "we think that you must," or "this is a potential enforcement issue," or that sort of stuff. We are very careful about the wording of those last few sentences to avoid getting into a backfit space.

If you disagree with us, 10 CFR 50.109, I think that is the right number, is a two-way street. However, I would suggest to you that you think about my viewpoint on this issue. We are all after the same goal, safe plants. The real question is, is that design issue worthy of change, and not necessarily should we get into some elaborate backfit analysis and protracted litigation about whether or not this particular item should be changed at facility X. I hope that helps answer that very complex and excellent question in a nutshell.

Mr. Imbro:

I just would like to add something to that.

Mr. Haughney:

Yes.

Mr. Imbro:

When we go out to do a design inspection, we start with the FSAR. Whatever we find, we just verify it against the FSAR. We are not really out there to backfit or propose new regulations on you or to bring you up to a standard above which you are licensed. If you think that we are backfitting, please let us know and let the team leader know when he is out there. But it is not our intention to do that.

Mr. Haughney:

Incidentally, I have never had that brought up as an issue in the middle of one of our inspections that we have done in the last two years.

Mr. Gillespie:

If there are no other questions, most of the people here will be available at 5:00 at what I will call the Diet Coke session. In accordance with the fitness-for-duty rule, there is no alcohol at our sessions.

7 SESSION 6: CURRENT TECHNICAL ISSUES

Mr. Lawrence Shao:

Before I start the session, I would like to make one announcement. The meeting of 10 CFR 50.59 will take place at 2:00 p.m. at the North Carolina Room. For those who do not know, it is on the second floor.

I am Larry Shao. Director of the Division of Engineering and Systems Technology in the Office of Nuclear Reactor Regulation. As noted on your program, I am the chairman of this afternoon's session entitled "Current Technical Issues."

For those who may not know us, the Division of Engineering and Systems Technology is the technical division that tackles many issues in the area of mechanical engineering, materials engineering, chemical engineering, structural engineering, and geosciences, reactor systems, plant systems, electrical systems, and I&C systems.

Today, we have experts here to discuss many important issues. However, as you can see, this podium is small; we cannot have all the speakers up here at one time. Therefore, this presentation will be given by two separate panels. The first panel is chaired by Jim Richardson. Jim is the Assistant Director for Engineering. This panel will discuss five technical subjects that have been around for awhile, but they are still ongoing. The second panel will be chaired by Ashok Thadani who is the Assistant Director for Systems. His panel will discuss five of the more recent issues.

Because there are so many speakers here, altogether 13, the presentations will be very brief. However, time has been made available for questions at the end of the presentations for each panel.

Now, I want to turn the session over to our first panel chairman, Jim Richardson.

First Panel: Status of Past Issues

Mr. James Richardson:

Thank you, Larry. My name is Jim Richardson. I am the Assistant Director for Engineering. This session is entitled "Status of Past Issues."

There are certainly issues that have been around in the past. By no means should we infer from that that they are issues that have been concluded. I am sure you will agree with me that the subjects to be discussed are very current and, I am sure, near and dear to many of your hearts. I think that one of the things that you will see, though, is that in many cases, the staff is taking a different approach at bringing these issues to resolution. That is one of the principal focuses that will be emphasized in these talks. I think this change in the way that we go about doing our business has been reflected by what you have heard earlier in this conference; that is, the NRC is looking more and more to the industry, to the utilities, to take on more responsibility for the safety of its plants. It is, again, a matter of mutual trust and professionalism, both on the part of the staff and the utility, that would make this a successful approach.

This session will be the same as past sessions. As questions come into your mind, write them on the cards. If you would just raise your hands, collectors will come around and pick up the questions. After the first five papers, we will have a 15 minute session of answering your questions.

So with that, I will introduce our first speaker, Ted Sullivan, who is a section leader in the Mechanical Engineering Branch. Ted will be talking about inservice testing.

Inservice Testing

Mr. Edmund Sullivan, Jr.:

Inservice testing of pumps and va[illegible] was first explicitly required in the regulations in 197[illegible], in a revision to 10 CFR 50.55a, codes and standards.

[Figure 1]

In 1976 and in 1978, the staff issued generic guidance on inservice testing; this generic guidance was in the areas of format, content and, to some extent scope of inservice testing programs. Up until a couple of weeks ago, the staff had not issued any other generic guidance on inservice testing.

[Figure 2]

On April 3rd of this year, we issued Generic Letter 89-04, which is entitled "Guidance on Developing Acceptable Inservice Testing Programs." The codes and standards rule requires that inservice testing be performed in accordance with Section XI of the ASME Code. However, Section XI was written in a time after many of the basic plant designs were completed and it was written in a very general way, not written in such a way as to accommodate plant-specific design features. Thus, the writers of the current codes and standards rule recognized that it would be appropriate for the staff to grant relief to requests for deviations from the Code. However, the flood of relief requests far exceeded, I think, the original expectations of the rule makers

Every IST [inservice testing] program contains anywhere from 3[illegible] relief requests. The codes and standards rule req[illegible]es that each program be updated every 10 years, which amounts to approximately one program coming into our branch every month. In addition, licensees frequently revise the programs one or more times during the year interval. The net result has been a tremendous amount of effort on our part in trying to keep up with this stream of relief requests. We have, at times, applied tremendous amounts of resources to this work and we still have a backlog.

One of the main purposes of Generic Letter 89-04 was to address this problem. The other principal purpose was to address programmatic technical weaknesses that we have identified from doing reviews of programs and doing inspections at plants. The generic letter contains 11 positions that are attached to it. They deal with Code interpretations, technical specification interpretations that interface with inservice testing, and what we call, acceptable alternatives to inservice testing to that required by the Code Interpretations and acceptable alternatives are what we have used in the past when doing plant-specific reviews. However, we felt it would be appropriate to put this information out in a generic way.

There are three groups of plants addressed in the generic letter. The first group is plants that have an SER issued against their current program. These plants are specifically identified in the generic letter, and they do not need to respond to the generic letter. The second group are also identified, and these are plants where the staff has nearly completed work on the SER and it will be issued in the near future. These plants, likewise, do not need to respond to the generic letter. The third group of plants, however, are expected to send in a confirmation letter stating that their programs will, within 6 months, conform with the generic letter.

This is basically a mechanism that we are using to approve relief requests that have not been individually acted upon by the staff up until this time. All plants, regardless of their category, are expected to review the generic letter and ensure that their plant procedures are consistent with the positions in the generic letter.

In May and June of this year, we are planning to go to each region to hold meetings with licensees to discuss the generic letter and to respond to questions. We hope the net effect of the generic letter is going to save us some resources so that we will be able to turn to other issues and initiatives that we feel need our attention.

The third slide *[Figure 3]*.

One initiative that we have under way is a symposium on inservice testing that we are working on. It is a jointly sponsored symposium with ASME. It is to be held August 1 through August 3 at the Hyatt Regency Hotel in Washington, D.C. We are going to be discussing issues that are both technical and regulatory in nature. The format for the symposium will basically be presentation of groups of papers followed by panel sessions. We are hoping that licensees will send both working level personnel and management personnel.

I have two other initiatives that I would like to touch on briefly. We are considering the development of a second generic letter. The second generic letter would be aimed at addressing a number of shortcomings that we see in the way IST is currently implemented. The types of issues that we would like to deal with are basically scope and method. An example of a scope issue that we are concerned with is that the codes and standards rule deals explicitly with ASME Code Class pumps and valves, whereas, there are a lot of other safety-related pumps and valves that are not necessarily folded in under that program. An example of a method issue that we are concerned about has to do with miniflow testing of pumps. This type of testing gives little information on pump operability in the range of interest and may damage pumps.

The third initiative that I would like to talk about is that we are considering rulemaking. The current rule is written in the framework of negotiating individual relief requests. We feel, based on our experience, that this method is unworkable and needs to be revamped. We feel that an integral part of trying to revamp the rule would be to issue a regulatory guide that would have a fair amount of detail defining what we consider to be acceptable testing practices and acceptable deviations from the Code.

In conclusion, I would like to characterize Generic Letter 89-04 as a significant step in addressing frequently encountered programmatic weaknesses and in providing a mechanism for closing out pending relief requests. We feel that the other initiatives will put IST on a permanently improved basis for assessing the operational readiness of pumps and valves.

Thank you.

Mr. Richardson:

Thank you, Ted. Our next paper is by C. Y. Cheng who is the Chief of the Materials Engineering Branch. C.Y. will be talking about inservice inspection.

Inservice Inspection

Mr. Ching-Yao Cheng:

Thank you, Jim. I was told I have only 10 minutes. So I am going to run through this very quickly and briefly discuss the inservice inspection activities within the NRC.

I would like to discuss the regulatory area of interest and concerns first and then discuss where we were before in terms of ISI activity, where we are today, and where we are going from here.

[Figure 1]

In the ISI activity, we are involved in two areas: the programmatic and technical. In the programmatic area, a concern of the staff is resources for reviewing the ISI program and the relief requests. Both the NRC and industry spend a lot of resources in this particular area since the major revision to regulation was made in 1976. Originally, the division required that every 40 months the utility had to submit the updated ISI program. We reviewed those programs, and, obviously, at that time, we had only a small number of operating plants, compared to today, almost a factor of two difference. We and the industry have spent lots of resources in that particular area.

We have encountered many relief requests as a result of a utility using its ISI program during a regular outage and then finding out that it could not meet the Code requirement. The utility then would send in lots of relief requests, and some of them were rush items. We would have to evaluate the requests on a rush basis, which would consume other resources within NRC.

Another area that uses a lot of resources is when the utilities send in the 10-year ISI program. We perform the review, which, of course, takes some time. However, before we complete the review, the utility may revise its 10-year ISI program. We then have to review the revised program. Sometimes the utility may revise the program two or three times during the course of review. Again, this takes a lot of time.

The second programmatic area that I show on the viewgraph is implementation. We have a concern right now with ASME Section XI. In 1988, the ASME members adopted Appendix 7 to ASME Section XI, and, I think, Appendix 8, will come out sometime next year. These appendices address the personnel and procedure qualification for UT [ultrasonic testing]. Our concern is that the utilities may not be sufficiently prepared to implement those appendices in the future. I think we ought to consider this particular area now.

In the technical area, I want to briefly discuss four items. First is the need for additional information to Generic Letter 88-01, which involves the BWR IGSCC [intergranular stress corrosion cracking] issues. The generic letter was issued last year, and many of you have responded to that generic letter. The staff has requested additional information from BWR licensees with standard and plant-specific questions primarily to facilitate the review, instead of going through a plant-by-plant specific review. We want you to answer the standard questions to verify certain areas so that we can save some resources in reviewing individual plant responses.

We also have a problem with regard to the number of the overlays in the IGSCC area. Some plants have a very high percentage of recirculation piping welds overlayed. We are encouraging the utility to consider the ultimate replacement of the piping. Somewhere between 70–80 percent of the recirculation piping for some plants have been overlayed. That is an area of concern.

Another area is the hydrogen addition in mitigating the IGSCC in BWRs. The recent experience from operating plants indicates that perhaps the hydrogen addition may not be as effective as we originally thought. We are evaluating the effectiveness of hydrogen additions to mitigate IGSCC.

The next issue is the reactor vessel examinations. By the way, because of the first three technical issues, it may sound like only BWRs have problems. Actually, PWRs have their own problems, too. The requirements for each interval of reactor vessel examination, which involves both BWRs and PWRs, has been changed. The ASME Code changed last year to indicate that the 10-year ISI will require all BWRs and PWRs to perform a 100-percent inspection for each interval. Right now only the first 10-year examination requires a 100-percent inspection; the second, third, and fourth 10-year intervals only require you to inspect one circumferential weld and one axial weld.

The next slide please *[Figure 2]*.

On this slide, I have given you some background as to where we were before in terms of the ISI activities. 10 CFR 50.55a(g) was first published in 1971 and required each facility to have an ISI program for its plant. As I mentioned briefly before, there was a major change to the regulation in 1976, which required the utility to update its ISI program every 40 months to meet whatever the applicable edition and addenda of the Code, Section XI, was at that time. The utility had to update the program, and we had to review those programs. Obviously, it required a lot of resources to review those programs. In 1979, we changed the regulation again. Instead of requiring an update every 40 months, we changed it to every 10 years. That is the standard today, every 10 years the utility has to update its ISI program. Another improvement in this area is that we separated the ISI and IST so that we could speed up our review of the ISI program.

I will now discuss where we are going. I have indicated what we are currently doing in terms of ISI program review. Of course, we review to make sure that the utility is using the correct Code edition and addenda and that it is proposing the correct sampling in its program. That is, during every inspection period, 40-month period, you have to examine a certain percentage of the welds.

We also review to make sure you have correctly used the exemption criteria in the Code. Sometimes you may misinterpret the exemption criteria and not include in your ISI program a certain category of the welds that should be included in the program. Those are areas we review. In addition, during the course of the years, if you have committed to an augmented inspection to meet certain requirements or regulations, we want to make sure those augmented inspections are included in the program; we review that too.

Where are we going from here? We are thinking perhaps in the future that we are going to turn the review of the ISI program over to the utilities. We are not going to review all the program, nor the ISI relief requests. We want you people to keep those documents at the plant site. Of course, in order to do that, we have to make a regulation change. We also have to provide acceptance criteria, guidance and criteria for particular relief requests—is it okay or not okay. You take up that review responsibility and decide what you are going to do. Keep the review documentation at the plant site, and we will audit it. You will have to certify that you are meeting the applicable edition and addenda of the Code and the requirements of the current regulation. We will select and audit some plants to see if you are indeed complying with those requirements.

Essentially, we are adopting the certification and audit approach. Certification has to come from upper utility management and should indicate that the Code edition and addenda are correct and that the requirements of the regulation have been met.

Thank you.

Mr. Richardson:

Thank you, C.Y. If once and a while you notice some movement up here, I am playing hardball with them and making them keep their talks to 10 minutes. So, I am having to play the heavy.

Our next speaker is Conrad McCracken, who is Chief of the Chemical Engineering Branch. Conrad will be talking on the subject of pipe erosion/corrosion.

Pipe Erosion/Corrosion

Mr. Conrad E. McCracken:

Erosion/corrosion is an area that both the industry and the NRC have been looking at for a long period of time. EPRI had developed a program in the early 1980's; the NRC had evaluated this problem repeatedly before that. As late as the mid 1980's, we had concluded that it was primarily an operating concern because the majority of erosion/corrosion problems occurred in two-phase systems. These problems were not catastrophic failures although they did result in outages. They were not complicating events; erosion/corrosion failures typically did not cause any consequence to safety-related systems at that time.

[Figure 1]

In late 1986, there was an erosion/corrosion event at the Surry Station in which a catastrophic rupture of an 18-inch single-phase line occurred. When that occurred, there were fatalities and injuries to people and safety-related systems were affected. The fire suppression systems were set off. This resulted in carbon dioxide entering the control room. There were electrical systems affected; the key card security system was disabled, which made it very difficult for operators to go from place to place and perform their duties. Consequently, both industry and the NRC decided to reassess the issue of erosion/corrosion. We looked at several other events that occurred: a couple are listed on the slide and there are additional ones given in the paper.

[Figure 2]

The conclusion was that we needed to assess the status of single-phase piping systems at utilities. Additionally, we needed to look at two-phase piping systems at a slower pace. When we started looking into the systems, we had a cooperative program going that was formed by NUMARC, EPRI, INPO, and NRC. The intent of the program was to make a determination as to how widespread the problem was and to get inspections conducted, if they needed to be conducted, and establish repair criteria or criteria to permit plants to continue to operate.

The program, as it developed, was established under the sponsorship of the Nuclear Management and Resources Council. It took the lead for industry, ensuring that all plants would look at the program and would make a determination as to whether they had an erosion/corrosion problem. In addition, NUMARC would try to convince these utilities that they needed to have a long-term program for examination of erosion/corrosion.

We did make a decision early on that we would look first at single-phase piping and then go back and reassess two-phase piping. There already were programs in place at most utilities to address two-phase piping although they were not coordinated, they were not standardized, and people were trying to conduct repairs or examinations to different criteria. We felt that standardization would probably be useful.

The Electric Power Research Institute set about developing a means of standardizing the program. It developed a computer code that basically took the factors affecting erosion/corrosion and developed a method to inspect for erosion/corrosion. Using the computer code, a utility could make an assessment of the various locations in its plant that are susceptible to erosion/corrosion and prioritize those that are the most susceptible, thereby reducing the amount of inservice inspection that had to be conducted to get to the locations of concern. That program has subsequently been developed further and it now includes two-phase systems. EPRI issued that part of the program this month.

The Institute of Nuclear Power Operations (INPO) program, it issued an INPO SOER [significant operating event report], which is the basis for continuing audits through INPO. INPO is investigating and examining each utility as it goes out to see what the licensee's inspection program looks like: the corrective action the licensee is using, what kind of criteria, and what the licensee is doing to ensure against ruptures in both single- and two-phase systems.

The NRC's role, in the majority of this process, was to review what was being done by industry. We did that on an expedited basis. We reviewed whatever industry would provide. We had numerous meetings with them to ensure that they knew they were taking a direction that we agreed with. We would address this simply by written documentation as we went through each stage of the process, stating that we reviewed this and we concurred—we think it is adequate to do the job. This way industry knew that they had NRC concurrence, and we were not going to come to the back door later on to second guess them.

The next viewgraph *[Figure 3]* provides a summary of how this program worked. Basically, from January 1987 until February 1989, all plants did conduct examinations of single-phase, and in most cases, also, two-phase systems. They used a program similar to the one developed by EPRI and NUMARC, or a program that they themselves felt was equivalent to that.

The guidelines that were put in place did show that there was significant erosion/corrosion. Consequently, we issued a bulletin in July 1987, in which we requested all licensees to report to us the results of their examinations for erosion/corrosion. The responses basically provided past results, which gave us an idea of how widespread the problem was. By this time, probably 80 percent of the plants had conducted some type of examination.

The bulletin results were reported in an information notice in April 1988. It basically concluded that all plants had reported erosion/corrosion in two-phase systems, and a significant portion of the plants were reporting erosion/corrosion in single-phase systems. Therefore, we believed that it was a long-term problem that would continue to exist because the system conditions that existed were not going to change shortly. To get rid of the problem would require design changes to the piping, materials changes that would be long term. There are some chemistry changes that have been implemented that could improve the system, but it is not something that will go away by a simple change. It is going to be with us for a long time.

A particular concern is that erosion/corrosion is very susceptible to chemistry conditions, and some people are in the process of changing chemistry. However, you may be good today, but if you make a chemistry change tomorrow, you could be in trouble 18 months from now. We felt that on that basis, we had to look a little further at the individual plants.

We conducted an inspection of 10 different plants. This was an audit-type inspection. We did not do what the NRC would typically have done in the past, which was require everybody to respond and then review the paper. We decided we would be better off reviewing the plants.

With regard to the 10 plants that we inspected, we were satisfied that they had done an outstanding job in implementing the program the first time around. The first look, the first assessment, the first attempt at repairs, everybody had done an outstanding job. What we did not find was documentation to support continuation of the process. We found that in most cases, somebody had done the work. There was normally one engineer who had been assigned the lead, and that individual had told people how to do it. He had procedures that he knew should be used, and they were being used. The first round of examinations were great, but if that person happened to leave, you would have lost a lot of the corporate history. In many cases, you would not know what your new baseline should be from the last examinations you conducted.

There were about five plants that were in the process of a plan to develop long-term programs. Those utilities were going to put in long-term programs of their own volition that would have assured continued examination. However, the other ones did not have plans for a long-term program. We audited by telephone a few additional plants and again found the same thing: sort of a mixed bag, that some people did or did not plan to put in long-term written procedures.

We decided, based on the lack of commitment across industry, that something was needed to have long-term, written procedures. The evidence shows that erosion/corrosion is going to be a long-term problem that must be addressed, we needed to do something as an agency to ensure that all plants would do that. Therefore, we prepared a generic letter that would require all plants to submit a document stating that they have, in fact, implemented such a program. It will either meet the NUMARC guidelines or will be equivalent to the NUMARC guidelines and that program will be in place by such-and-such date. That particular document has been reviewed internally. It is prepared for issue. It will be issued very early next month. The only thing delaying it is simply me getting the paper work out of the way.

I would like to thank you for your attention, and prepare for the next speaker.

ATWS Implementation

Mr. Scott Newberry:

Thank you, James.

Anticipated transients without scram. I was just asking Ashok Thadani what his recollection was for the age of this issue. His recollection is that it was identified in approximately 1968. I believe that makes it about the same age as the engineer that prepared these viewgraphs, so it has been around for a while.

I am briefly going to go through a little bit of the background and focus a little bit on the status of implementation as we understand it: How far the industry is going in actually putting systems in the plants. I will then talk about a few issues that remain to be worked on. The goal really is to have operable, reliable systems in all the plants in accordance with the rule, 10 CFR 50.62. That is the objective of this program.

Just a quick reminder of the requirements of the ATWS, which are shown on this viewgraph *[Figure 1]*. For boiling water reactors, the automatic [alternate] rod insertion (ARI) system, recirculation pump trip, and an upgrade for the standby electric control system are required. CE [Combustion Engineering] and B&W [Babcock & Wilcox] plants are required to have a diverse scram system installed as well as diverse actuation of auxiliary feedwater and actuation of turbine trip. In Westinghouse plants, diverse actuation of auxiliary feedwater and turbine trip, commonly called AMSAC, is required.

Just to reflect a second on the chronology here to put things in perspective *[Figure 2]*. The rule was issued in the summer of 1984; and, of course, the QA guidance talking about maintenance and quality assurance of these systems was issued shortly after that.

Considerable resources were assigned by the industry to design these systems. Topical reports were submitted in the 1985-1986 time frame. NRC reviews for Westinghouse began in the 1986 time frame. The BWR Owner's Group review—the B&W Owner's Group kept that review from being completed, primarily because of a technical issue on power supply independence along with a large effort on B&W reassessment. However, the review was finally completed last June. Some of the CE arguments on adequate diversity for auxiliary feedwater actuation were actually rejected by the staff back in 1986.

We have come a long way on the plant-specific reviews. As of right now, the number is approximately 82 complete; we are just about done with the plant-specific reviews. I expect them to be done within the next few months. A temporary instruction was issued in February of 1987 to provide inspection guidance. About 30 inspections have been done to date. We will be inspecting every plant; every ATWS system will be looked at by an NRC inspector.

I would like to make two additional points here on this viewgraph: You can see a lot of progress has been made in terms of the reviews; on the other hand, a lot of time has passed; the issue has been around for a long time. It has now been five years since the rule was published, and before I get into implementation, we are getting to the point where there is a potential for delaying implementation to resolve technical issues. That is, in some cases implementation may be held up awaiting issuance of a safety evaluation from headquarters. If that is a problem, you should be talking to us because we are tending to take a pretty hard line now in terms of getting the systems in the plant.

Let me go to the next slide *[Figure 3]* and talk about actual implementation; the progress that has been made.

I have a lot of abbreviations on here. I think they are self-explanatory. The numbers that you see there represent systems that either have been installed under the "done" column or commitments, as we understand them, to have the systems installed at all the plants under the appropriate year the commitment has been made.

I think some of the figures under CE and B&W may not be correct because of the work that is ongoing. However, you can see that the industry is about halfway done with putting these systems in plants. By the end of this year, we are going to be approaching three-quarters of the way done. We are almost going to meet the goal we had set up about a year and a half ago of being complete in the calendar year 1990. I think it will be about 85 to 90 percent complete.

There are a few plants in the 1991 plus column that we are concerned about. The implementation is lagging a little bit. There may be a good reason for it, but that is really where my concern is right now. If you are one of those plants and you have not been contacted yet, you will be getting contacted to discuss potential schedule improvements at your plant.

Let me go to the next slide *[Figure 4]*.

I have identified four issues that stand out from the others. About half of the boiling water reactors, in our view, do not have sufficient diversity right now. The BWRs have gone a long way and actually lead the industry in terms of having these systems installed and operational. However, many of the plants, about half the plants, have transmitter trip units that we think have a diversity problem. We have made that view clear to the Owner's Group and, I believe, to all the licensees of those plants. I think those plants that have the ATTUs [ATWS transmitter trip units] in both the all-rod insertion and reactor trip systems will be contacted, or have been contacted, about identifying a plant-specific schedule to resolve that issue.

We are currently working with CE to put the AMSAC [ATWS mitigating system actuation circuitry] diversity question behind us. We recently rejected three exemption requests, and I see that problem moving along now.

Inspection findings, like I said, we are going to be looking at all plants. We are—just three points there: Be careful about compromising the reactor trip system. There are some interface issues you need to be careful of and we have seen some problems with respect to cable separation.

The last issue is operability and surveillance. There is a Commission policy statement on technical specifications. I have an issue right now with regard to whether there should be technical specifications for these ATWS systems. There is an overwhelming agreement in the industry that there definitely should not be. I am not sure it is that clear. We are going to be making a policy decision on whether there need to be ATWS technical specifications or not.

Regardless of how that comes out, I think there are still two questions: How often should you test these systems, and, if they are found to be not operable, what should the plant do? What sort of action statement would you have? It is my view that it needs a harder look. In fact, I would challenge the industry to do a little better job in that area to help us out.

That is all I have. Thank you.

Mr. Richardson:

Thank you, Scott.

The last speaker for this half of the session is Goutam Bagchi.

Goutam is the Chief of the Structural and Geosciences Engineering Branch. Goutam will be talking about external events.

External Events for Severe Accidents

Mr. Goutam Bagchi:

My topic is external events for severe accidents. As opposed to other speakers, I will be talking to you about something that is being worked on currently.

In terms of background *[Figure 1]*, the Commission's severe accident policy statement does not distinguish between internal and external initiators, and external initiators do need to be looked at and worked on.

Treatment of external events with regard to the severe accident policy statement was clarified in SECY-86-162, published May 22, 1986. In this paper it was pointed out that the internal and external events could be treated separately, which is pretty much how we are treating them now.

The external events work shop was held in 1987. At this workshop, the results of various PRAs [probabilistic risk assessments] of external events were discussed.

The integration plan for closure of severe accident issues was presented in May of 1988. In that paper, the

Commission laid out in detail the regulatory and research type of activities that are going to be completed on this issue.

The individual plant examination for severe accident vulnerabilities came out in Generic Letter 8?-19 [correction: Generic Letter 88-20].

The focus of my talk really is to indicate the future need for individual plant examination of how to treat external events.

Organizationally *[Figure 2]*, inside the NRC, we have set up external events steering group under the chairmanship of Mr. Larry Shao. This steering group has subdivided its work into three subcommittees: the seismic subcommittee; the fire subcommittee; and high wind, flood, and others subcommittee.

On the industry side, NUMARC is handling the external events under the leadership of Mr. William Rasin. They have set up two groups: The seismic issues working group is exclusive in dealing with seismic issues and the severe accident working group will be dealing with fire and other external initiating events.

The key external events *[Figure 3]* that we need to consider are earthquake, fire, high wind, floods, and transportation-type accidents.

Basically there are two methods for individual plant examination of external events *[Figure 4]*: the probabilistic risk assessment methods and other simplified methods. In the traditional way, the probabilistic risk assessment methods would look at hazard, determine the plant damage, outlay the core damage frequencies, and estimate the probability of loss of containment. In the simplified methods, both simplified probabilistic and deterministic methods are available. In the deterministic method, one establishes, assumes, a success path by making sure that everything will withstand or resist those external initiating events.

For earthquakes, both methods are feasible. For fire, the PRA method is acceptable. However, other simplified methods are feasible and currently there is some work going on to develop the simplified methods.

For other external events, which are rather plant-specific, a progressive screening type of plant examination is feasible. For example, if the initiating event itself has very low likelihood, that event could be eliminated for that given plant purely on the basis of likelihood. If the event could not be eliminated, then maybe the resistance of the plant to that particular event could be done on a realistic basis. If not, then one would have to go on to the consequences. Sometimes consequences of these external initiators will not be something that the plant would have to be backfitted to. Based on previous PRA results *[Figure 5]*, we note that earthquake, for example, contributes anywhere from 1 to 68 percent to overall core damage frequency. Fire somewhere between 3 percent and 55 percent. As I mentioned earlier for other events *[Figure 6]*, the results are rather plant-specific, it depends on the weakness of the plant. As a result of the individual plant examination [IPE], we expect that there will be a thorough familiarity of the plant layout and plant physical characteristics by the operators and personnel of the plant. A detailed plant walkdown will be performed and true plant weaknesses will be identified, and meaningless discussions about core damage frequencies will be avoided.

By the implementation of individual plant examination for external events, we would have an opportunity to integrate a number of generic safety issues. I should mention a few: the systems interaction, Unresolved Safety Issue A-17; seismic design criteria, Unresolved Safety Issue A-40; residual heat removal requirements, Unresolved Safety Issue A-45; and seismic qualification of equipment in operating plants, Unresolved Safety Issue A-46. Another important issue, the Eastern U.S. seismicity issue, as you know, is the issue of the Charleston-type earthquake, which, because of a lack of information about the initiating geological features for that particular earthquake, could occur anywhere within the eastern seaboard.

Finally, when these individual examinations are done, the results will be reviewed by the NRC. Should there be any need for a backfit, that will be determined on the basis of the backfit rule, 10 CFR 50.109. As I pointed out, we are working on this issue. The developments of criteria have not emerged yet. We need to gather information from the industry and get active participation to make crucial decisions at this time so that we can have a meaningful examination of the individual plants.

Thank you.

Mr. Richardson:

Thank you, Goutam.

That is the end of this first half of the session in which we are talking about past issues. I suggest we all stand up and at least stretch. You might want to jot your questions down and we will be glad to attempt to answer them.

I am going to start down to my right, your left, with Goutam Bagchi. If he would read the question and then give his answer.

General Questions/Answers – First Panel

Mr. Bagchi.

QUESTION: Is it not agreed that the internal flooding is an external event for IPE? If not, why not?

ANSWER: I do not want to answer this question. It is clearly supposed to be covered by the IPE for internal events.

Mr. Newberry:

This is one question I did expect, it has been asked twice.

QUESTION: Please discuss the rationale for ATWS technical specifications in the context of the technical specification improvement program criteria.

ANSWER: That is a good question. We are bound by the policy statement just like the industry; that is what I meant by taking a look at the issue from a policy standpoint. The decision will be based on an understanding of what is in the Commission policy statement. There is a criterion on risk significance. ATWS is a risk-based rule. I want to make sure that a reason judgment is made explicitly by NRR on whether there needs to be ATWS technical specifications.

We are definitely aware of the criterion in the Commission policy statement in terms of what should be in the technical specifications, and we will be looking at that.

Mr. Richardson:

Conrad, do you have a question?

Mr. McCracken:

I had a question passed on to me, which was addressed to C.Y. Cheng's presentation.

QUESTION: What specific information do you have that leads you to believe that hydrogen water chemistry is not as effective as once thought?

ANSWER: The last ISI examination at Dresden-2 showed a large number of new cracks in the piping at Dresden-2. Dresden had been on hydrogen water chemistry for longer than any other plant. Therefore, there is concern as to what caused that. It has not been fully evaluated. We have not made a determination because some of the instrumentation was out for hydrogen water chemistry and it may be that it was not maintained the way it should have been. Nonetheless, there is at least a concern that a plant running on hydrogen water chemistry is, in fact, experiencing additional cracking in its primary piping system.

So as long as that concern exists, we cannot say it is not as effective as we thought, but there are certainly some issues that need to be addressed now. It does not look quite as good as it may have looked a few months ago.

Mr. Richardson:

The next question is for Ted Sullivan.

Mr. Sullivan:

QUESTION: With regard to the generic letter on IST, PMs have been requesting licensees to voluntarily withdraw their IST technical specification change request, many of which are in excess of 10 years old. What is the reason and basis for that request?

ANSWER: I am not very familiar with IST technical specification change requests. I have seen a couple that we have looked at in the past couple of weeks, somewhat coincidentally, not connected with the IST generic letter.

In those cases, the reasons why we were reluctant to process the amendment were either not related to IST or because of some sort of significant departure from current thinking in standard technical specifications.

In this specific instance I would need more information on the technical specification amendment to respond. However, I will be happy to look into this with the PM of this plant.

Mr. Cheng:

I have two questions here.

FIRST QUESTION: Is the NRC giving consideration to ISI change because of the license renewal or extension?

ANSWER: My answer is that, right now, what we are considering is not because of the license renewal extension. Certainly this will be part of the consideration. However, our thinking is prompted by the resource problem so that we can concentrate more on the operation event. That is my answer.

SECOND QUESTION: What is the staff's/Commission's timetable for implementation of Section IEEE of the code?

ANSWER: That is a containment inspection. I cannot give you the exact timetable, but right now, I think we are in the process of endorsing the IEEE. So once this is endorsed by the Commission, say, maybe sometime this year or early next year, then we will have to implement it right away because the commitment of the regulation becomes effective.

Mr. Richardson:

Are there any other questions to be submitted? We will entertain any questions from the floor. We will take questions from the floor verbally if you will go to a microphone and identify yourself and ask your question.

Mr. Rhome:

My name is Rhome, United Engineers. Maybe my question got lost.

I do not know how many of you attended the three-day IPE workshop in Dallas at which Mr. Beckjord and his team expanded on the very first question to Mr. Cratham that the internal flooding as a part of internal . . . NUREG-1335 currently says it is an internal event. NRC is not so sure.

By June of this year, hopefully, they will decide. I was hoping that there would have been more coordination between this meeting and the one we had in Dallas. As of now it is really up in the air. So it is just a clarification based on my understanding.

In NUREG-1335, the final draft should finalize that. There was one editorial comment, unless NRC issued two generic letters that I am not aware of, the severe accident generic letter is 88-20 and not 88-19.

Thank you.

Mr. Shao:

I thought we just answered the question, that internal flooding is an internal event.

Mr. Thadani:

I think you are quite correct; this issue did come up at the Fort Worth workshop on IPE. We indicated on the very first day at the meeting that the internal floods issue was considered an internal event and had been considered an internal event during our deliberations of the IPE and the scope of internal events.

In fact, that was an understanding we had with IDCOR [Industry Degraded Core Rulemaking Program]. I was not there the last two days, but we did say at the workshop that we would take all comments and carefully consider each comment and respond in writing. We would to this issue as well. So, in that sense you are quite correct.

Mr. Shao:

If there are no more questions, we are going to start the second panel. One more.

Mr. Bagchi:

QUESTION: Are you coordinating your work on external events with the research IPE?

ANSWER: Yes, the external events steering group has members from the Office of Research. It is a multi-office group that is looking into IPE for internal as well as external events. We fully expect it to be coordinated.

Mr. Shao:

Let us start the second panel; we have a set of new speakers coming to the table.

Second Panel: Recent Issues

Mr. Ashok Thadani:

Good afternoon. My name is Ashok Thadani. I am Assistant Director for Systems in the Office of Nuclear Reactor Regulation.

The format of this panel will be identical to that used for the previous panel. We have five speakers. Each speaker will present material on a specific subject for 10 minutes. At the conclusion of all presentations, we have allotted 15 minutes for questions.

Before we get started, let me give you my sense of the message for this set of papers.

There are three key elements. The first element is that these are very important safety issues and they range, in terms of the aspects that they cover, from hardware issues to operations issues, an example being mid-loop operation.

The second element is the need to be very efficient in the use of our resources. From the previous panel discussion, you get the sense issues have been hanging around, and it is critical that we develop some efficient mechanisms for conserving our resources as well as yours. To that extent, it is important for us to define the scope and depth of our involvement up front. What do I mean by scope and depth? I mean that there are many issues in which, perhaps, it is unnecessary for us to be involved; there is perhaps no need for us to review any material—for example, the instrument air systems presentation.

Another way we can conserve resources is to work with you, the industry, up front: to be very, very specific about what the intended requirement is and to develop guidance and criteria that we jointly agree and understand is really what was intended by the requirement.

I think this is an important element. If we do follow up on that, I expect it will not only save you resources, it will, of course, save ours as well.

This leads to the third element. It is probably the most important one. That is, we want to find ways to make sure that there are no undue delays in implementation. Many times what we have found from our past experience is that problems develop, and there seems to be a lack of decision making—at least we have seen that in some cases. Our intention now is, if problems do develop, to have them surface, to move them up to the right level of management so that decisions are made fairly quickly.

Why are we so concerned about that? Let me use Scott Newberry's presentation on the ATWS issue as an example. The ATWS rule was issued in June of 1984, I think it was, and as he pointed out, that five years later about half the plants have not yet implemented the requirements of the rule. This is not just a criticism of industry; it is also self-criticism, in fact. I think we want to find ways to change that so that we do not find ourselves five years from now saying the same thing about important issues like station blackout. The message, that I hope will come through, is that we want to work with you, work with you up front to try to get these issues resolved fairly quickly.

Without saying very much, let me go on to the first speaker, Jim Knight, who is Section Chief of the Electrical Systems Branch. He is going to discuss station blackout. Jim.

Station Blackout Implementation

Mr. James E. Knight:

For the benefit of those who are not too familiar with the station blackout (SBO) issue, I would like to go over a little background.

May I have the first slide *[Figure 1]*.

First of all, what is the concern for station blackout? Well, a prolonged loss of ac power has unacceptable consequences. It ultimately leads to core melt and containment failure. There have been a lot of total and partial losses of offsite power over the years. There have been many diesel generator failures. Many of you are well aware of this. In some cases, there have been a total loss of ac power, but only for a short period of time and with no serious consequences. As a result of this concern, the station blackout rule was promulgated because the station blackout has been shown to be a significant contributor to core melt.

Early on, as far back as the WASH-1400 study back in 1975—speaking of long-lived issues—it was found to be safety significant. The more recent document, NUREG-1032, which deals with the issue itself, also showed it to be a significant contributor.

What is a station blackout, according to the rule? First of all, it is a loss of offsite power and that means a loss of all offsite power to the site—not just to an individual unit at a site. Diesel generators are also unavailable as a result of maintenance or failure of some sort. Alternate current, through battery supply of inverters, is available as long as the batteries are available. In addition, there is no single failure included in this event, other than the ones that are already taken as a result of station blackout. There is no concurrent design-basis accident. Beyond the minimum redundancy requirements for safe shutdo[illegible] ac sources can be considered as candidates for an a[illegible]te ac source.

May I have the second slide *[Figure 2]* please.

Primary requirement, of the station blackout rule requirements, is that each plant be able to withstand a station blackout for a specified duration and recover from that event. The specified duration of the event is to be based on the redundancy of the onsite ac sources, the emergency power sources—which have to do with the configuration of emergency sources compared to the number that are needed—and the reliability of those sources. Another factor is the reliability of the offsite system, that is, the expected frequency of loss of offsite power, which has to do with the weather and configuration of the system. The next factor is the time needed to restore offsite power.

The next requirement of the rule is that a coping analysis is required to show that the plant can cope with that duration. This means that you have to be able to maintain the plant in hot standby or hot shutdown condition as the case warrants. That would mean you would have to provide the water, batteries, environmental cooling, instrumentation and control, and the decay heat removal for the duration of the station blackout.

Now, an alternative way of satisfying the rule is to provide an alternate ac source. These sources are beyond those that are used to establish the station blackout duration. One way is with a source that can be made operable to provide power to the bus within 1 hour. In that case you would have to do a 1-hour coping analysis. If you have a source that you can get going in 10 minu[illegible] then no coping analysis is required. That is ve[illegible] advantageous to the licensee because it would not have to do all that work to show ability to cope.

Each of these sources has to satisfy the criteria that is spelled out in Regulatory Guide 1.155.

May I have the next slide *[Figure 3]*.

Some of the documents associated with this are of course the regulatory guide, which was carried right along with the rule. It is the guidance document for implementation of the station blackout rule. It addresses the process to determine the required plant-specific station blackout duration, which can be anywhere from 2 to 16 hours. It covers maintaining diesel generator reliability. It provides the basic elements of a diesel generator reliability program. It also gives you the guidance on how to establish the target reliability, be it at .95 or .975. There is some latitude in the number that you choose, but not for all cases.

The guide also covers procedures and training for restoring ac power, both on site and off site. How to handle a station blackout event, in effect. It also provides some guidance on QA and specifications for non-safety-related equipment that is taking credit to satisfy the station blackout rule.

The licensees must do one of the following: It has to show that the plant can cope for the required duration and recover. Initially you would start out with a decay heat based on 100 days of operation at 100 percent power. And, of course, you have to keep the core cool, remove decay heat, and take care of the equipment and environmental considerations. Or, the licensee may use the alternate ac source, which has to meet the requirements of the regulatory guide. If you go to the alternate ac source, then in either case, you have to meet one of these—coping capability or AAC source—if you cannot meet either one of them, then you have to perform modifications to do either of them.

In the early stages of this thing we had a lot of interaction with NUMARC. The purpose of that, of course, was to try to cut down the use of staff's and utilities' resources that would be needed to respond to this issue. We had many meetings with them. We reviewed their 8700 document, which provides a step by step process for responding to the rule. NUMARC also developed the standardized response format.

We hope that these efforts will work together to help reduce the resource burden.

Could I have the last slide *[Figure 4]* please.

Everybody is supposed to send in their response within the next couple of days. In the beginning stages, we plan to prioritize the plants according to risk. We plan to do the highest risk plants first so that we can get the most reduction of risk at the front end of this review.

We will do the review and produce an SER. We will look at the required station blackout duration basis. We will be looking at the coping analysis and other alternatives, and we will be looking at the modifications.

We will not be looking at the diesel generator, the reliability program, unless at some later date we find a utility cannot maintain diesel generator reliability.

We may perform site visits, as necessary, to resolve questions rather than do a lot of turnaround questions, handwritten questions to you. There will be regional inspections using a temporary instruction that has been issued. You can expect some action from the regions.

We expect to complete these reviews by early 1991 and, hopefully, the major modifications can be completed by 1994.

Thank you.

Mr. Thadani:

Thank you, Jim.

Our next speaker is Bob Jones, who is Section Chief of the Reactor Systems Branch. He is going to discuss the shutdown decay heat removal issue. Bob.

Shutdown Decay Heat Removal

Mr. Robert C. Jones:

I want to discuss the shutdown decay heat removal issue that has had a lot of action over the last, roughly year, year and a half.

Slide please *[Figure 1]*.

I guess the first thing is, why are we here? Why is this an issue? In a sense it is an issue because the industry did not jump on it by themselves many years ago.

Losses of decay heat removal have occurred, have continued to occur for many, many years. In 1987, Diablo Canyon had a fairly serious loss of decay heat removal event, and an AIT [augmented inspection team] was dispatched to investigate the event. As a result of that investigation, we found several concerns. One is the deficiencies in procedures, hardware, and training related to causing losses of decay heat removal as well as to responding to those events.

We have recently got PRA insights, which indicate that core damage frequencies could occur on the order of 10 to the minus 5 with 85 percent of the risk occurring during mid-loop operations when the plant has containment open many times. If you had a core damage event during that time, you could have a direct release to the public.

All of these reasons led us to conclude that we needed to take some action now to respond to this issue.

Next slide *[Figure 2]* please.

Following the Diablo event, we had several discussions with industry. We issued Generic Letter 87-12 to determine the status of industry for responding to a loss of decay heat removal event. As a result, we came up with Generic Letter 88-17, which provides recommendations for dealing with the issue of a loss of RHR [residual heat removal] while the reactor coolant system is partially filled. That is the most risk-significant portion of the concern.

The generic letter is broken down into two parts. There were a series of expeditious actions that were oriented primarily toward mitigating an offsite release by showing that containment closure could be accomplished before a core melt could occur. In addition, there were practical actions that we felt could be implemented readily—readily implemented at the plants—to mitigate a loss of decay heat removal, should one occur.

Those actions, however, do not get to the root cause of the problem. Thus we came up with a series of what we called program enhancements. Program enhancements are actions to be taken over roughly the next two years to respond to improved instrumentation and procedures and to ensure a defense-in-depth philosophy for responding to loss of decay heat removal. That is, to prevent it in the first place with proper operations, control, and instrumentation as well as to provide procedures for responding to an event, should one occur, and to have adequate equipment available, and, as a last resort, to have the containment available to contain any core damage event in the unlikely event that one would occur.

To emphasize the safety significance of this issue, the Director of NRR sent to each chief executive officer of the utilities a letter to raise their attention to this issue. Letters also were sent to each operator in recognition of their very important role in responding to these types of events.

Now that we have the generic letter and the industry is looking at it and implementing and responding, what is the staff going to do with it *[Figure 3]*? First off, we are auditing the responses as they come in. Right now, we are basically looking at the expeditious actions. We are auditing the responses to determine if they address all the major issues and recommendations that were provided in the generic letter. If we find areas in which the responses appeared not to address one of the recommendations, we are highlighting that to the individual utilities.

We intend to do an implementation audit at the plants with regional personnel, such as resident inspectors and maybe regional inspectors. For some plants in which we feel that the responses appear to be weak, we intend to perform detailed inspections at the plant. We expect to do this within about five plants.

Next slide *[Figure 4]* please.

The findings from our audit review basically fell into three major areas that seem to be generic in all the responses.

One, we have some concerns with regard to the containment closure issue. Many of the responses do not address what kind of administrative controls will be employed to control penetrations to the environment; nor do they address whether they are just controlling direct paths to the environment—from the containment to the outside environment—or controlling indirect paths as well, such as from the containment to the auxiliary building. When we were discussing this issue, we had some utilities who said that they did not have to control this penetration because it goes to the auxiliary building. Sorry people, but that path can ultimately go to the environment. We also want those paths to be controlled and closed, to ensure containment closure.

We recognized and provided relief from the typical containment closure requirements, from containment isolation-type provisions, by allowing you, for example, on the equipment hatch, to just ensure that the matting surfaces are touching. You do not have to install every bolt in the door. However, at this time, some utilities have responded and said they will put in four bolts. We do not know whether that is good enough; we assume you do. We are suggesting that you should check and make sure that the number of bolts, whatever it is that you believe is necessary, does indeed meet the closure requirements that we have outlined.

With regard to instrumentation, there is still going to be tygon tubing used in the short term. Perform walkdowns of it immediately before you put them in use. It is those types of things, like draping tygon kinks, that have caused losses of DHR. Check them before you use them, and check them daily. We have had instances in which maintenance personnel just pick up the tubing, move it, and drape it. You have the same problem and you do not have an accurate instrument.

Finally, discuss operating experience with all personnel, including maintenance personnel. Just for the very reasons we have discussed, such as moving tygon tubes. They can affect the plant when in this mode.

In summary *[Figure 5]*, we have expended a lot of effort since the Diablo Canyon event. We understand the various issues much better, and we think we have a set of recommendations that reflect just simply good operational practices and control of the shutdown activities. We do not view this as an overly burdensome requirement to the industry, and we have had feedback from some utilities that are in agreement.

We do recognize, however, that there are some modifications and expenses involved. We encourage you to look at these recommendations for all modes of shutdown heat removal. The generic letter simply addresses a partially drained reactor coolant system. You can have a loss of RHR when you are full. You should ensure you have backup equipment; for example, you should ensure you can have adequate containment closure capabilities at that time. We encourage you to look into that.

Thank you.

Mr. Thadani:

The next speaker is Ledyard Marsh. Tad is Chief of the Mechanical Engineering Branch and he is going to discuss the thermal fatigue issue.

Thermal Stresses and Fatigue in PWR Coolant System Piping

Mr. Ledyard B. Marsh:

Thank you Ashok.

First slide *[Figure 1]* please.

I would like to begin by just drawing your attention to the fact, as I am sure you are aware, that PWR primary Class 1 piping systems are designed as they are because we heavily rely on them from a safety perspective. The standards, the ASME Code, inspection, the construction criteria are all geared around making sure that that part of the pressure boundary is of the highest quality.

It is designed to account for differential expansion, for thermal transients, and for thermal fatigue. Nonetheless, there have been three recent events in PWRs in which we have seen some thermal effects that have not previously been accounted for and that have resulted in primary piping integrity being compromised. These transients have involved thermal fatigue as a result of intermittent flow of different temperature fluids and thermal stresses and fatigue as a result of stratified flow.

We have issued several information notices and bulletins. The industry is hard at work looking into these. Nonetheless, these are concerns to us.

I would like to describe each one in a little more detail.

Next slide *[Figure 2]* please.

A problem occurred at a U.S. plant and a foreign plant as a result of intermittent safety injection flow. A crack occurred at a 6-inch, schedule 140, safety injection Class 1 piping. It was in an unisolable section of that system.

The problem resulted from leaking of a boron injection tank bypass valve such that the safety injection piping was pressurized. When that piping pressure reached in excess of the reactor coolant system pressure, the check valve swung open, the cold injection fluid then flowed into the reactor coolant system. The pressure then dropped in the charging safety injection header and the intermittent flow of cold fluid, while restraining the hot flow from coming back up again; this caused thermal fatigue, bending, eventual cracking, and failure of a weld in that piping system.

It is interesting because this involved the Class 1 section of piping, but it was started by a Class 2 section of piping. That is, the safety injection Class 1 piping that was eventually affected, was initially caused by a problem in a small bypass line of the boron injection tank that was neither tested nor surveilled in any way.

Next slide *[Figure 3]* please.

The next problem is more complicated. It involves intermittent leakage out of the reactor coolant system and into the containment. Bulletin 88-03, Supplement 3, was recently issued to the industry to explain this problem.

Rather than going through this slide, I am going to go to the next slide *[Figure 4]* because the sequence of events is better understood by using this slide.

Let me start on the upper right-hand part of the drawing, which shows the reactor coolant system hot leg. The section of the drop line in the RHR system shows the RHR isolation valves, and the drawing also shows the remainder of the system going outside of containment to the RHR pumps.

The initial condition shows that the single wedge disk gate valve, which is the valve shown, has leakage. This leakage, which causes stratified flow in the drop line itself, allows hot fluid from the hot leg to flow down, out past the seat, out the stem, and into a monitored path to the pressurizer relief tank.

When I say, "monitored," the system that was used to monitor the path was an unisolated section of piping with a thermal monitor in it. The system would heat up—the hot fluid flow would heat the disk—the disk would expand, the leakage would stop. Once the leakage stopped, the flow would stop, the piping would then cool, the disk would cool, the disk would then contract, and the system would start over again and continually cycle in this way.

A small amount of leakage, not a lot, in the order of a tenth of a gallon per minute. The net effect was, again, thermal fatigue of this Class 1 section of piping. The flow is out the stem and out the packing into a monitored path, in that, it was a directed flow. It was not directly onto the containment floor. However, it was monitored in such a way that the temperature effects were not sensed. The pipe flow was unlagged, cooled by the environments. Any amount of hot fluid that would flow out did not cause that temperature sensor to sense the problem.

The plant was able to accomplish a safe shutdown. Eventually they found the cracks in an elbow in the upstream piping; there was extensive cracking. It was on weld and on based metal. It went through-wall, circumferential on the pipe to weld—excuse me—pipe elbow weld upstream. There was also cracking, about 200 degrees worth, on the pipe-to-valve weld as well. So there were extensive problems.

There was also evidence of continual leakage, and there was rust and other debris in the stem.

A contributing factor to this problem was that this plant closed this valve by a limit switch; it did not close this valve by torque. Most of our plants accomplish closure by torque, which ensures a better seating capability of these valves. So, that was a contributing problem.

Let me go on to the last problem.

Next slide *[Figure 5]* please.

The surge line stratification issue deals with a problem that was found, again in a U.S. operating plant, on a 14-inch, schedule 140, surge line. It is the subject of Bulletin 88-11. You have it in your handouts; we will find it in just a second.

This problem was discovered by an inspection, a normal routine inspection of the surge line during an outage. At the time of the inspection, the licensee noticed that the pipe whip restraint shims, which are small devices held within the whip restraint to keep the pipe centered, were crushed.

Normally the shims are placed in such a configuration that when the system is hot, that is when it is up to full system temperature, the pipe is shimmed. The thought being that when the pipe is fully expanded, its largest movement, condition, it will shim to the place where we would expect it to be hot. In the cold condition, there should not be anymore contact, if there was contact. In other words, during the cold condition, the contracted condition, the pipe should be loose in its whip restraint.

At this plant they found the shims crushed. There was damage to the pipe itself, plastic was deformed. The concern arose, how did this happen? We have never seen this happen before.

Through subsequent analysis we found a phenomenon that had not been found before and that was that the surge line itself—when the reactor coolant system is in a startup condition—has stratified flow. Stratified flow is hot on the top, cold on the bottom, to the extent that there is a 250° to a 300°F differential top-to-bottom temperature. We found the systems are not designed for that. It causes large bending stresses; it can cause large movement; and in this particular plant, it caused damage to the pipe itself. Although the integrity of the system was maintained at this condition, there was a lot of plastic deformation. The piping integrity had to be found acceptable through subsequent evaluation. The important parameters to examine are the length of the pipe itself, the slope of the pipe—which determines how widely spread the stratified layer is—the differential temperature, and the support configuration.

There are ways to minimize the stratification and that is how quickly the plant is ready to start up—how long the differential temperature between the pressurizer and the reactor coolant system is held at its maximum value.

Last slide *[Figure 6]* please.

In conclusion, there have been newly discovered thermally induced phenomena that can have, and have had, significant effects on piping integrity.

The design margins for the code and for ANSI Standard B-31 and other criteria may not in some cases account for these phenomena. Remedial actions have been and continue to be taken. Bulletins have been issued. But I think it is important for the industry to not look at each one of these bulletins individually. Although they are addressed individually for each one of these events, it is important to look at the underlying symptom for each event. Each one of these problems was caused not by the piping under code, per se, but by a connecting system that had a problem, with the exception of the surge line.

The problem was caused by a bit valve problem. The RHR system problem was caused by a stem leakage that was unmonitored. The surge line problem was caused by its own phenomenon, which we think is better understood at this point.

Although there are bulletins and information notices out, industry needs to look at these things collectively for each of the plants and determine what phenomena that have not been thought of before, like valve leakage, can affect primary Class 1 piping.

Thank you.

Mr. Thadani:

Thank you, Pat.

The next speaker is Jerry Wermiel. Jerry is the Acting Chief of the Plant Systems Branch and he is going to discuss concerns with instrument air systems.

Instrument Air System

Mr. Jared S. Wermiel:

I will be discussing in a brief fashion what the staff has done in recent years with regard to instrument air and how we have gotten to where we are today.

[Figure 1]

The instrument air system is designed and intended to provide clean, dry, oil-free air for both safety-related and non-safety-related equipment in operation during normal power runs and during post-accident safe shutdown.

The design of the system varies somewhat from plant to plant, but primarily consists of compressors, air dryers, air accumulators and air receivers, and the distribution system. The system is in almost every case a non-safety-related system although it serves safety-related components. The reason this can be found acceptable, and has been by the staff, is because the safety-related components that are served for the most part are designed to fail in a safe way when the instrument air system is lost during a design-basis event.

Those components that are intended to function following the event, must have additional support that is safety related. They are usually fit with some sort of a backup capability. This may consist of safety-related air accumulators, or other air systems with seismically qualified compressors or something of that sort in order to ensure post-accident operability and the safety-related function that is intended to be provided.

Next slide *[Figure 2]*.

Following the TMI-2 accident, the staff realized that a number of systems in the plant had been overlooked in large part because they were not considered safety related or did not seem to fall into the traditional accident evaluations that the staff was reviewing. These systems needed to be looked at in more detail because they appeared to play a roll in plant safety. This recognition resulted in a number of staff studies by various people.

With regard to the instrument air system in particular, the Office of Analysis and Evaluation of Operational Data began a study of the instrument air system and events that involved instrument air system problems. This study resulted in the recent publication of NUREG-1275, Volume 2, which was distributed throughout the industry by Information Notice 87-28, Supplement 2. In the information notice, the staff pointed out a number of events that it considered significant because of instrument air system problems. These problems involved to maintenance errors, design errors, and other issues in which the staff was concerned that the industry had overlooked something that needed to be considered more specifically.

The AEOD study did have a number of recommendations in it. Those recommendations concerned the need to improve air quality, the adequacy of procedures and training, and the adequacy of the design backup air accumulators, as well as the need to perform a test to confirm the systems function in a gradual loss-of-air situation.

Concurrent with the AEOD work, the staff had under way a similar study of instrument air systems as a generic issue. Generic Issue 43 was intended to specifically address the need for new criteria or changes in existing criteria in order to ensure the proper functioning of the instrument air system. This generic issue was handled by the Office of Research. They recently resolved the issue. The research staff concluded that the existing staff criteria that is specifically contained in the *Standard Review Plan,* Section 9.3.1, was sufficient to ensure that the instrument air system functions were performed as intended; therefore, no new criteria were needed. This conclusion was based on the risk impact that the instrument air system had to overall core melt risk and plant performance.

However, the Office of Research also recommended in its resolution of Generic Issue 43 that Generic Issue

B-56, which is still under review by the staff, include in its study of diesel generator reliability issues the instrument air's contribution to diesel generator reliability specifically.

The result of the instrument air system studies I have mentioned, as I believe you all are aware, led to the issuance of Generic Letter 88-14, which specifically addresses the staff's perception of the problems with the instrument air system and actions necessary by licensees to correct these problems. The generic letter incorporates the staff's recommendations for improvement in the instrument air system. The primary focus of the generic letter is to have the industry perform a design-basis verification of the capability of the instrument air system to perform as it was intended.

Specifically, it asks for a test to confirm that air quality to safety-related components is what the manufacturer had specified was needed to ensure that the equipment works properly. Secondly, maintenance, training, and other procedures regarding the function of the instrument air system were to be reviewed and determined to be adequate, again with regard to the intended function. The industry also was to look at the design of pneumatic accumulators and to ensure by test that their capability was as intended. Finally, the industry was to perform a review of failure modes for valves that are not provided with air accumulators to ensure that their failure position was correct and proper for the function intended.

To date, the staff has been reviewing a number of the responses to the generic letter and, we have noted that our initial perception of the problems with instrument air was indeed correct. The responses indicate that the industry seems to have begun in recent years to take action on its own. A number of the responses indicated that licensees were already pursuing upgrades to their air system by additional capacity, seismic capability, or functional capability.

The generic letter responses have also pointed out that certain problems that were being uncovered by licensees had implications to other plants; were generic in nature. These findings resulted in the staff recently issuing Information Notice 89-26. This notice specifically pointed out, for boiling-water reactor plants, two instances in which the intended function of the instrument air system indeed would not have been performed by the air system as it was designed. That information was made available to the industry in the information notice.

In conclusion, the staff believes that the generic letter had the desired effect; it focused industry's attention on the importance of the instrument air system. We believe that initially a large part of the industry may have overlooked the importance of the air system to plant safety, which we view to be significant given the function that it does provide.

Mr. Thadani:

Thank you, Jerry.

The next speaker is Larry Phillips. Larry is Section Chief of the Reactor Systems Branch and he is going to discuss intersystem LOCA.

Intersystem Loss-of-Coolant Accident

Mr. Lawrence E. Phillips:

Again, this is an old issue with a new twist.

The slide *[Figure 1]* please.

The issue was identified in the 1975 *Reactor Safety Study*, WASH-1400, as a V event, which consists of a configuration of two check valves in series with an open motor-operated valve. The concern is that there will be loss of the isolation capability between interfacing high pressure, low pressure systems with potential rupture of the low pressure system, which gives you bypass of containment. To carry the scenario one step further, it could also result in damage to safety injection systems, which could result in a core damage event or even core melt. There is low probability of this happening, but very severe consequences if it did. The study also showed that periodic testing of check valves is an effective way of reducing risk.

Next slide *[Figure 2]* please.

The staff took actions to identify and require testing of the Event V valves by sending orders in 1981 to 34 reactor licensees that have been licensed before the TMI-2 accident. The staff further required technical specifications for periodic testing of newly licensed plants, licensed after the TMI-2 accident.

This included pressure isolation valves that were not considered for the V event. In other words, not just check valves but motor-operated valves as well. We also considered whether this should be done to pre-TMI-2 licensed plants and opened Generic Issue 105 to evaluate backfitting of test requirements for all pressure isolation valves on the pre-TMI-2 plants.

Brookhaven is performing a study for us, which is nearing completion. The study included at least the evaluation of three PWRs and three BWRs as they were nearing licensing completion. This evaluation indicates that a test program for the valves versus no testing improves the core damage frequency considerably, up to two orders of magnitude. Other study findings regarding plant vulnerability, some of which are pretty interesting, are discussed in the paper—not all the findings, but some of the more significant ones.

Next slide *[Figure 3]* please.

NRR recently has assigned high priority to resolution of this issue in regard to testing of all the pressure isolation valves and has developed an action plan. We plan this summer to perform a pilot inspection program on six additional plants. This would complement the study already performed in Generic Issue 105 and expand the scope somewhat. The plants selected will likely be all PWRs. The scope will include human error, which we have discovered to be a major factor in most of the precursors to this event. Human error has been found in maintenance, which can lead to causing an event, and in operator response to failures; these have been significant factors.

Additionally, procedures will be evaluated. We have found that in many instances there are no procedures for depressurization of the low pressure systems; if the isolation is lost, the operator ends up winging it.

All of the pressure isolation valves in the high/low pressure configurations will be evaluated, not just the Event V.

PRA techniques will be used to aid in the identification and evaluation of the most serious consequences, or sequences.

Next slide *[Figure 4]* please.

On the basis of the results of the pilot inspections and other studies, new generic actions will be considered and recommended, if needed, to achieve the intersystem LOCA goal. We want to achieve a high confidence that the probability of intersystem LOCA with unisolable LOCA outside containment is 10 to the minus 6 per reactor year for each plant.

Some of the candidate actions are listed. They include improved operating procedures; improved maintenance procedures and training; and correction of designer testing vulnerabilities that are discovered in the study.

Finally, we expect to upgrade our inspection techniques to evaluate the capability of each plant, and as a result of the pilot studies we plan to perform inspections of all plants, if necessary, to ensure that our goal is achieved.

Thank you.

General Questions/Answers—Second Panel

Mr. Thadani:

Thank you, Larry.

Before we entertain questions from the floor, let me make an announcement. Beginning at 5:00 p.m., there will be a reception in the State Room which I am told is across the hallway. We have already received some questions. Jim, please state the question, before you provide your response.

Mr. Knight:

> *QUESTION:* What is the current position relative to the resolution of the station-blackout-related issue of the reactor coolant pump seal integrity?

ANSWER: I do not know. There is a generic issue on that. I do not know what the status is.

Does anyone here know?

Mr. Thadani:

Yes. In fact there is a generic issue on the reactor coolant pump seal.

My understanding is that the proposed resolution will be available in the fall of this year, at which time it will go to CRGR, and we expect final resolution sometime next year.

That is the way I recall it.

Mr. Knight:

Do you want me to take care of all the questions here first?

Mr. Thadani:

Please, yes.

Mr. Knight:

> *QUESTION:* What is the NRC doing with respect to increasing starting time for diesel generators? Ten seconds does not appear to be necessary to meet emergency requirements, and is therefore unnecessarily taxing the equipment involved, which, in turn, has an effect upon reliability. Also, is the NRC reviewing frequency, duration, and types of diesel generator tests?

ANSWER: It looks like there are a couple parts to this question.

One part of the question has to do with what are we doing with respect to diesel generator testing in general.

Generic Letter 84-15 was sent out in 1984. Many licensees have taken advantage of the reduced testing from the normal testing, which is described in the current regulation, Regulatory Guide 1.108. The generic letter reduces the testing that you have to perform when you have diesel generator failure: You used to have to test all the diesel generators, now you only have to test the diesel generator that has failed, which reduces considerably the amount of testing to be done. It has also reduced it from the standpoint of how you can do the tests. You are only required to do a fast start once every 6 months. In addition, the frequency of the test is once every 3 days instead of once every 24 hours.

With regard to the other part of the question, which has to do with the design basis for the diesel generators, I do not know of any work that is going on in terms of assessing the need for diesel generator tests when it has to do with the large break LOCA. That is where that 10 seconds, or roughly 10 seconds, comes from.

I would expect that we would entertain something on the part of the utilities to show that it is not necessary to have the diesel generator start in that short period of time. But as yet, outside of a few instances where we have extended it for a few seconds, I do not know of any activity going on in that area.

Mr. Thadani:

Jim, how many more questions do you have?

Mr. Knight: I have one more question.

QUESTION: Assuming a two-unit site whose response to the blackout issue is cross connection of normally independent electrical systems, what type of periodic crosstie capability would be required considering potential problems that could be introduced into this configuration

ANSWER: Crosstie capability is already allowed by the regulations, with certain controls over those things—administrative controls, with two breakers in between. So I do not see that this represents a problem, from my point of view, anyway.

Okay, that is all I have.

Mr. Phillips:

QUESTION: Have the results of Generic Issue 105 studies been introduced or incorporated into Generic Letter 89-04, which, I believe, is inservice testing?

ANSWER: The answer is no because the results of Generic Issue 105 really are just now becoming available.

Mr. Jones: I have two questions.

QUESTION: Will guidance for relief from containment closure be issued if a plant demonstrates that all of the Generic Letter 88-17 requirements have been met?

ANSWER: I will make the assumption that this question is addressed toward the program enhancements in which we have significantly reduced the probability of a loss of RHR going to a core melt.

The answer is, at this point, we are not particularly planning to come up with guidance in this area. If somebody has a particular concern, we said up front that we would be flexible and would consider it.

I think part of this would be rapid shutdowns and excursions into mid-loop with some sort of compensatory action, which would be something we would probably need in order to grant some sort of closure. We do intend to keep a containment closure requirement even in the long term as part of an overall defense-in-depth philosophy.

QUESTION: As noted in the shutdown decay heat removal presentation, core damage could occur within 1 hour. Are there any station blackout concerns in the station blackout rule concerning station blackout at mid-loop operation?

ANSWER: The short and simple answer is no; we are not combining station blackout with the shutdown decay heat removal issue.

The instances related to core damage events within an hour, we think, can be mitigated with proper procedures in general and proper operational controls so that the time frame indeed would be extended.

In addition, as part of outage planning, we would hope that you consider, before taking out things like diesels, the appropriate time to do something. For example, you would take the diesels out later in the outage when decay heats are down so that a loss of decay heat removal could be tolerated for a much longer period of time; you would not try to frontload your emergency power supply because if you had a loss of offsite power you almost have a given that you would have a station blackout, with a single failure of some sort.

In other words, we are hoping that those types of outage planning activities, as we said, good practices in this area, would essentially make this an incredible event that we need not consider.

Mr. Thadani:

There is a question addressed to the whole panel. Let me take a crack at it.

QUESTION: What is the relationship between resolution of A-45, USI A-45, an IPE program, versus what you explained?

ANSWER: What you explained refers, I believe, to what Bob Jones said. Let me go back and briefly state the scope of these studies. The scope of Unresolved Safety Issue A-45 included everything except large LOCAs and ATWS. That is the very broad scope of the unresolved safety issue. If you recall, the scope of the IPE is, in fact, to focus attention only on those issues that might develop during power operation.

The biggest focus of the shutdown decay heat removal issue that Bob Jones presented was, in fact, operation in a different mode—not at power, particularly during lowered inventory. Therefore, I believe, there is a fairly good definition and proposed mechanism for resolving the issue Bob Jones discussed and that it is clearly separate from the scope of IPE.

So now let me go on to Jerry Wermiel.

Mr. Wermiel:

I have two questions here. One I can address pretty straightforward. For the other one, I will have to ask the questioner to identify himself.

Let me do the one I can handle first.

QUESTION: It is in two parts. It says: How many utilities met the deadline for 88-14? I assume that is submittal of response to 88-14. The second part says: How extensive were the responses? Were they one or two pages or a many-page report?

ANSWER: The answer to the first question I do not have. I do not know by a count whether all licensees responded to the generic letter per the deadline that was specified. I do know that we believe most licensees have responded.

The second part, the answer is that the responses vary from licensee to licensee. Some licensee responses do give a fair amount of detail and are relatively extensive. Others, on the other hand, are only a page or two and indicate that they have done, or intend to do, per a prescribed schedule, what is indicated in the generic letter. As would be expected, I believe, the responses do vary.

QUESTION: The second question that was passed to me was originally addressed to Bob Jones. I cannot decipher it. I need a little help from the person that asked it. It was asked by a fellow from Connecticut Yankee, and it concerns the spent fuel pool building. If that person would identify himself and would not mind going to a microphone and reasking the question, I think we could understand it better.

Voice:

My comment was, we worry too much about decay heat removal. What about if we have the whole core in the spent fuel pool?

Mr. Wermiel:

You are asking the question from the standpoint of containment integrity?

Voice:

No, loss of decay heat removal.

Mr. Wermiel:

Oh, from the standpoint of decay heat removal.

Voice:

If you take all the fuel in the core, move it into the spent fuel building, do the same requirements that Bob just talked about in decay heat removal still apply to loss of spent fuel pool cooling?

Mr. Wermiel:

Maybe Bob has an answer. But off the top of my head I would say probably not.

Mr. Jones:

No.

Mr. Wermiel:

An easier answer.

Mr. Sullivan:

Let me first comment, there was a question earlier that dealt with Generic Letter 89-04 on IST and Generic Issue 105.

QUESTION: To what extent have the results of Generic Issue 105 been factored into the Generic Letter 89-04 on IST?

ANSWER: The answer was right. It said it has not been because the findings are just emerging. However, there are very important Event V considerations in the IST Generic Letter 89-04.

One problem we have found in the course of reviewing IST programs and doing IST inspections is that there are a lot of Event V valves that are in technical specifications with regard to licensees having to test differential pressure. They have taps in their system that enable them to do that differential pressure test, but they are not doing the test. So, the generic letter says that if you have the taps, test those valves, individually, not in sequence. We have seen cases where plants think they are testing individual Event V valves, individually testing them, when, in fact, they are testing a series of them. Again, the generic letter says if you have a tap, do them individually.

The other question that I have in addition to this one that I wanted to comment on related to the surge line stratification.

> *QUESTION:* Have you examined operation strategies to resolve surge line stratification problems? For example, pressurizer spray in modest capacity to draw a steady flow through the surge line.

ANSWER: We have looked at operational strategies to minimize the effect of stratification in the surge line.

In general, anything that you can do operationally that restricts the differential temperature between the pressurizer and the hot leg is going to improve stratification. Anything that can be done either to minimize the magnitude or the duration of time when you are in that differential temperature regime. That means that if you can raise the reactor coolant system pressure to a lower value, that is, draw the pressurizer bubble at a lower temperature so the differential temperature between the pressurized and the hot leg is less, that improves stratification. If the pressurizer can be pressurized with nitrogen or air in some way that enables starting of the reactor coolant pump without drawing steam in the pressurizer, that enables stratification. That improves stratification.

Other things that are being looked at, and answers are not yet available, are what are the effects of reactor coolant pump start? What are the effects of letdown flow, varying letdown flow?

We know there is some change with the stratified layer within the surge line depending upon the amount of letdown flow that is going on. To some extent, the answers are not clear.

We see cases in which the stratified layer is very sharp, it is a very discrete gradient at one moment and the next moment it will have a more linear profile to it. The answers are not clear on why it does that, why it shifts from a sharp gradient to a more linear gradient.

The other suggestion here dealt with a possible pressurizer spray. I am not sure that would work. The reason I am not sure it would work is because the amount of spray that could be introduced into the pressurizer to cause flow through the surge lines so that mixing would occur—so that you would not get stratified layer—would, I think, be too great and would cause too much of a reduction in pressure in the first place.

This event occurs because there is low flow in the surge line, on the order of 1 to 2 feet per second; it does not occur at high flows when you have a transient going on. If you start to spray into the pressurizer at such a rate that you could initiate mixing in the surge line itself, my thought is that it would be too great a rate. You would be losing too much pressure in the system.

Remember too, this gradient problem is worst during startup and shutdowns, when you have the biggest differential temperature in the system.

The gradient is there. Any time you have subcooling in the system, for example, in normal operation when you have a differential temperature, the gradient is there. However, the effects are not as great as when you are shut down and you have the big gradient.

I would be glad to speak with you some more about that, too, Rick, after, if you like.

Mr. Thadani:

There is another question.

> *QUESTION:* What is NRR's role in the IPE program?

ANSWER: Let me give you a little background first.

Tom Murley, Director of NRR, has taken, as some of you probably know, a very active interest in severe accident issues. In fact, he proposed actions that need to be taken to finally bring to closure the issue of severe accidents.

IPE is one element in that program, a very important element. NRR has been very actively involved up front in the definition of the IPE program in terms of its scope, in terms of the methodology that would be used and in the schedules that have to be considered in coming to closure of this element of the program.

NRR would also be involved in the review process. Right now we are thinking about forming teams, from research as well as from NRR. So the sense you ought to get from this is that NRR is very actively involved both in the definition, the scope, and the review of this program.

Further, the generic letter that was issued on IPE only considered internal events and indicated that work is ongoing on external events. As you heard earlier, there is an external events working group chaired by Larry Shao; Larry, of course, is with NRR, and Research participates in that.

This whole program has very active participation by both the Offices of Research and of Nuclear Reactor Regulation.

Are there any more questions before we bring this final discussion to closure?

[No response.]

Mr. Thadani:

Thank you very much.

Mr. Shao:

I am very surprised that we finished on schedule. I would like to thank you very much.

8 SESSION 7: HUMAN FACTORS/OPERATOR LICENSING

Mr. Jack W. Roe:

Good morning, ladies and gentlemen. I would like to welcome you to the morning session. I am Jack Roe and this session involves human factors and operator licensing issues.

Before we get into the particulars of our session, I would like to make a few administrative remarks. With respect to this session, the speakers have agreed to take a few questions immediately following their presentation. Additional questions will be taken at the end of the session. We would suggest that you use the three-by-five cards to write them on. We will have staff members circulate through the room, passing out the cards and picking them up at the end.

For those questions that come from the floor at the end of the presentation, we request that you do come forward and use the microphone for two purposes: First, so that we are able to obtain those questions on the record of this particular session; and second, so that those people who are in the audience behind you can hear the question and then understand more fully the answer to the question.

As you are aware, today's lunch is at your own option. It is a short time period. The next session starts at one o'clock.

I wish to stress the importance of being back for that very important afternoon session.

I would like to take the opportunity now to give you a little bit of an overview of our perspective of human factors.

We ask the question, what is human factors? In summary, it can be considered a broad, operationally focused area that is interested in obtaining and maintaining a professional relationship with the licensed industry. It is broad. It touches many subject areas. Some of these are, operator licensing, simulators, training and qualification, management and organization, man-machine interface, the safety parameter display system, detailed control room design, emergency operating procedures, fitness for duty, plant performance evaluation, the systematic assessment of licensee performance, maintenance, quality assurance, diagnostic inspections and special team inspections.

Human factors, in its broad scope, touches many organizations. It touches the Office of Nuclear Reactor Regulation, our regional offices, our resident inspectors. It touches the Office of Analysis and Evaluation of Operational Data and our Office of Nuclear Regulatory Research. Most importantly, it touches each and every nuclear utility and nuclear power plant.

Human factors is an operationally focused, performance-based concept. For example, our new requalification program is one under which a test is given that is open book, content valid, and operational in nature. You will hear more about that program from Ken Perkins.

It is operationally focused and performance based as exemplified in our emergency operating procedure reviews in which the NRC actually conducts a test to determine if you, the utility, the nuclear power plant staff, can actually carry out your emergency operating procedures in the plant by using the simulator and by walking through those procedures in the actual plant. It is also operationally focused by using an NRC staff that has walked in your shoes or has watched you walk in your shoes at the facility.

We have people that have experiences in many of the following categories: senior resident inspectors, resident inspectors, engineers with degrees on our staff who hold current SRO [senior reactor operator] licenses from operating plants like Dwayne Arnold, engineers with degrees who have RO licenses, individuals that are Navy nuclear power program veterans, and people who have worked at actual nuclear power plant sites. These people are not only in the regions, but they are at headquarters, and they give us an operational view.

The human factors program also promotes a professional relationship with the licensed industry. We have done that by endorsing accreditation of training by INPO, by significantly revising our requalification program for licensed operators in coordination with the NUMARC organization, and by holding workshops on numerous subjects with the industry. These include workshops on emergency operating procedures, which are currently planned for the near future; systematic appraisal of licensee performance, which was recently conducted in Region I; and maintenance, which was held in this very hotel late last year.

I believe that we all realize that human factors is a very important part of safe operation of nuclear power plants.

This morning we have four presentations that are selected topics in the human factors broad area. The first of those is on operating licensing by Ken Perkins, Chief of the Operator Licensing Branch in the Office of Nuclear Reactor Regulation. Ken is responsible for the broad program overview and for policy development.

Operator Licensing

Mr. Kenneth E. Perkins:

Good morning. I would like to provide you all this morning with a situation report of where we are in operator licensing.

As Jack has mentioned to you, we have made some revisions in the area of our requalification program and I would like to start with that program.

The first slide *[Figure 1]* please.

As a result of industry feedback and the staff's ongoing review to upgrade its operator licensing program, a revision to the requalification examination program was implemented October 1, 1988.

The revised program examination requirements, outlined in Examiner Standard 601, were developed based on systems approach to training. It provides the staff with an assessment of both individual licensed operator ability and operator training program effectiveness. Since implementation of the program, requalification examinations have been conducted at 10 facilities.

The experience gained from the examinations conducted to date has been convincing. The revised program has enhanced the NRC's ability to assess both licensed operators' performance and training programs' effectiveness.

Each NRC requalification examination is based on the facility's requalification programs, and its learning objectives are derived from specific job task analysis.

The examination is composed of an operating test and a written examination. The operating test consists of a plant-specific simulator demonstration and a facility walk-through evaluation. The written examination consists of a two-section open-book examination. Maximum use of the plant's simulator to assess time-critical and team-dependent behaviors has contributed to a realistic environment for testing performance.

The walk-through examination, conducted in the plant, evaluates operator knowledge of specific systems required for safe plant operation.

Before the operating test was administered, both the NRC and facility personnel clearly defined the critical tasks that must be performed satisfactorily in order to pass the examination.

The significant contributor to the effectiveness of the revised program is the expertise provided by the examination team assigned to develop and administer the examination. Each examination is developed by a team consisting of NRC examiners and experienced facility representatives. This approach has resulted in a technically sound and an operationally oriented examination. In addition, co-evaluation of operator performance by the NRC and the facility has enhanced the staff's ability to assess both individual performance and program effectiveness.

Facility licensees are continuing to improve the materials used to develop the examination. In addition, the quality of open-reference and job-performance measure examination questions require continued improvement. Examination teams are spending a great deal of the preparation time modifying and developing new questions that test the operator's ability to address real-life or potential operational problems rather than just testing their ability to look up correct answers. The effort expended in this area should decrease as facilities continue with their upgrade and their examination question banks.

Feedback from the examinations conducted to date indicate that no significant programmatic changes are required. The staff is continuing to evaluate the feedback from examinations administered to fine tune and improve the program.

Next, I would like to talk to you about our plans and our work with regard to the generic fundamentals examination. May I have the second slide *[Figure 2]* please.

The NRC has developed and pilot tested a generic fundamentals examination (GFE) for BWR facilities. This pilot examination was administered on September 21, 1988, to 209 candidates from 19 different facilities across the country. One examination was administered to test both reactor operator and senior reactor operator generic fundamentals knowledge. The fundamentals examination proved to be a successful modification to the NRC initial licensing examination process.

The 50-question, multiple-choice examination was graded using an optical scanner that allowed for both rapid grading and automatic generation of item statistics for each question.

The passing criteria was maintained at 70 percent to be consistent with the current fundamental section of the licensing examination passing criteria. Ninety-five percent of the people who took the examination passed it. The item statistics indicated that the majority of the questions asked discriminated between good and poor performers. Those questions that did not discriminate adequately will either be deleted or revised before their re-use.

The next and last pilot examination will be administered on June 28 of this year for both BWR and PWR license candidates.

Questions are being developed, reviewed, and validated by the NRC, INPO, and other testing experts.

The NRC will have approximately 1,000 questions developed for each reactor type. Because of the pilot nature of these examinations, the decision has been made that if an individual taking one of these pilot examinations were to fail, he would not be penalized for this failure and would be allowed to take the regularly scheduled complete examination including fundamentals during the plant-specific licensing examination. When we implement the generic fundamentals examination, the staff intends that individuals will be required to have completed this examination before taking the site-specific examination.

Only those individuals enrolled in a licensed training program will be allowed to take the fundamentals examination. In addition, once an operator successfully completes the fundamentals examination, he or she will not have to take this examination again upon relicensing to an SRO level or upon transferring and relicensing at another facility of the same reactor type, that is BWR or PWR.

The NRC staff believes that the second pilot examination will confirm that the fundamentals examination is a successful revision to the initial examination program.

Phased program implementation is scheduled to begin in October 1 of this year. Following October 1, we anticipate that three examinations per reactor type will be given annually. The resources saved from administering this type of examination will be applied to the effort to develop highly reliable plant-specific examinations. Feedback from future fundamentals examinations will be used on a continuing basis to upgrade the initial licensing examination process.

Next, I would like to speak to you of our national examination schedule. Third slide *[Figure 3]* please.

Generic Letter 88-13, issued August 8, 1988, solicited the examination need for each facility through fiscal year 1992, and stated that the NRC intended to implement a national examination schedule beginning October 1, 1989. The agency's goal is to provide a predictable environment for scheduling examiner resources and for facilities to better plan their training efforts. Generic Letter 89-03 has been issued and it schedules the examination needs requested for fiscal year 1990.

Semi-annual examination site visits were scheduled for each facility. Initial and requalification examinations, as well as any re-takes, will be administered during each site visit on the designated month, unless documentable extenuating circumstances warrant a change to that schedule. In conjunction with this, the Operator Licensing Branch is working toward a phased implementation plan to incorporate the lessons learned from the requalification program into the initial examinations. During this period when the staff is evaluating the feasibility of combining the requalification program lessons learned into the initial examination schedule, adjustments to the requalification examination schedule will be negotiated with the regional offices.

The staff is confident that the national examination schedule will provide the NRC and each facility with the necessary planning required to efficiently schedule valuable resources.

Next, I would like to speak to you about our simulator facility evaluation program. May I have the fourth slide *[Figure 4]* please.

The simulation facility evaluation program is the NRC's program of implementation of 10 CFR 55.45(b). Simulation facilities, which must be available by March 1991, may be either certified by the facility licensee to meet the guidance of ANSI 3.5 or approved by the NRC. While NRC review is not required, the staff intends to perform a desk-top audit of selected certification submittals to identify any major problems and to conduct onsite inspections when required, based on either major problems identified in the desk-top review or on fidelity problems identified during the examination process.

If an unsatisfactory simulation facility is identified, it has the potential of halting the licensing examination process until the problem is corrected.

With regard to approval of approaches different from ANSI 3.5, the NRC continues to work on a case-by-case basis with those few facilities without plant simulators that have submitted alternative plans.

Slide five *[Figure 5]*.

The intent of the regulation requiring a certified or an approved simulation facility was to allow licensed candidates to be trained and evaluated on their performance as well as their knowledge in a setting that was as realistic as possible.

In addition to the obvious benefits gained by such an improvement in the examination process, the facility licensees will also be allowed to omit certain details and documentation of an operator license applicant's qualifications when the utility has a certified or approved simulation facility and an accredited training program, including requalification program based on a systems approach to training.

With the ongoing upgrade activities currently being implemented for the initial license examination and requalification program evaluations, the staff has determined that the success of these activities is largely dependent on the initiative facility licensees take toward upgrading their simulators for certification. Justifications for extensions in compliance with the implementation date are very unlikely.

Next let me talk about the proposed revisions or the revisions that we are working on in the initial examination program.

The NRC is planning to incorporate the applicable good examination techniques developed from the revised requalification program into its initial examination program. As previously mentioned, the implementation of the generic fundamentals examination will allow the regional examiner staff to concentrate on the safety significance of plant-specific system operation during initial examination development.

The ongoing work each facility is doing to upgrade its written examination bank and the continuing development of safety significant job performance measures will identify the core examination criteria used for future licensing and requalification examinations.

The similarities identified to test importance, knowledge, and abilities will be incorporated into all examinations. Identification of initially required general knowledge versus experienced licensed operator knowledge will differentiate between test items used to measure performance for each examination administered. The written examinations will have some sections that are very similar. The operating tests for initial licensing will be modeled after the techniques developed for requalification examinations.

Critical tasks will be developed and agreed to by both the NRC and the facility before administering the plant-specific simulator examination.

Job performance measures will be identified by each facility, submitted as part of the reference material requirement and used to develop plant walk-through examinations.

The staff's goal is to be prepared to administer either an initial or a requalification examination, including any retakes, during each site visit, that is, every 6 months. With the implementation of the upgrade programs for the generic fundamentals examination and the national examination schedule and the modification of the initial licensing examination, we believe the goal is achievable.

The NRC is sensitive to the limited amount of experienced resources that are available to support both the industry initiative for training and development of licensed operators and the examiner resources required to conduct content-valid examinations. The efforts to combine and upgrade the initial examination program and requalification program will reduce the redundant resources expenditure. This will allow the facility licensees and the NRC to better use the valuable resources available for training and examination process.

Our schedule for initiating the phased implementation of this program is 12 to 18 months.

To follow up, the NRC is committed to ensuring that each nuclear facility is operated as safely as possible. The operating licensing program is one of the most important inspection functions provided by our staff.

That each licensed operator is fully qualified and responsible to operate the controls of that reactor is expected by the public, the NRC, and each facility licensee. Operators and senior operators must realize the safety significance of the job demands placed upon them. Senior facility representatives must support both industry and NRC initiatives to upgrade the programs used to train and evaluate license applicants.

The requalification program developed to maintain operator proficiency must be informative, performance based, and realistically achievable.

Facilities need to take seriously the opportunity for pre-examination review. We are providing the opportunity to review these examinations for validity before they are administered. Better examinations will result from a thorough pre-examination review. Post-examination comments generally will be considered as evidence of a superficial pre-examination review.

The NRC regional office will evaluate the results of initial and requalification examinations. Increased inspection efforts will occur for those facilities whose examination results indicate that license applicants were not adequately prepared to take licensing examinations. In addition, the regional operator licensing staff will continue to evaluate the quality of the training material submitted for examination preparation. Examinations may be postponed or cancelled if the material submitted is inadequate to develop a content-valid examination.

The NRC has endorsed the industry systems approach for developing initial and requalification training programs and will monitor the results of operator performance through the operator licensing program. The NRC will continue to fine tune its policy and procedures based on feedback from the regional examiners' staff and through information obtained from industry initiatives.

The intent of this situation report presented today is to outline the activities currently in progress to upgrade the efficiency and effectiveness of the license examination process. The staff is confident that once these upgrades are fully implemented, the quality and reliability of the operator licensing program will be further enhanced.

That concludes my remarks. I understand that if there are any questions that I may take a couple of questions. Are there any questions?

Voice:

I am Morris McIntosh. My question really came from my training folks. I understand that you held meetings here in Washington annually so that the utilities and the regulators could get together and talk about the examinations and the process to be sure that everyone was tuned in to that process and up to speed on any new initiatives the NRC might have concerning those examinations. I understand those meetings have been discontinued. My question is, do you plan to reinstitute those meetings? If not, I would ask that you reconsider having those meetings.

Mr. Perkins:

There are no immediate plans for reinstituting those meetings. We would be happy to consider it based on an expression of need. Are there any other questions?

If not, I thank you very much. I turn it back over to Jack.

Mr. Roe:

Thank you, Ken. We do have some additional questions that have been passed up and we will address those at the end of the session.

Our next speaker is John Zwolinski. John is the Deputy Director of the Division of Licensee Performance and Quality Evaluation in our Office of Nuclear Reactor Regulation. John is going to speak on the subject of the man-machine interface.

Man-Machine Interface

Mr. John A. Zwolinski:

Thank you, Jack. Before beginning my presentation, I would like to acknowledge the efforts of two staff, Dick Akenrode and Claire Goodman, as far as presenting information contained in your handout.

[Figure 1]

The terminology "man-machine interface" has been used by the staff for some time to capture the initiatives following TMI in the area of upgrades to the control room and the requirement that evolved for the safety parameter display system.

[Figure 2]

I am going to give you a status report on where we stand with these two initiatives and talk about the future of human factors to some extent.

As many of you are aware, the events at TMI did bring into sharp focus the need for numerous improvements in control rooms in the area of human factors, numerous improvements in the area of training, overall, a wide variety of areas associated with the human factors discipline.

Over time we have become increasingly aware of the need to focus on human performance as it relates to operational events and root-cause analysis; what, indeed, are people doing to contribute or not contribute to operational events as they may evolve.

NRC's focus in seeking to upgrade control rooms was to provide assurance not only to ourselves but to the industry and the public that accurate, reliable information was being conveyed to operators. Operators could, in turn, have reliable procedures that could be exercised—whether they be emergency operating procedures, abnormal procedures, or just plant procedures. The need for information that one could trust was of paramount importance to the staff.

Concurrently, emphasis was placed on bringing a lot of information together in a central location through our safety parameters display system. The thrust being to focus on the overall plant status as far as safety was concerned.

So there were two initiatives that were identified early on. Both were of the nature to enhance safety for the entire power plant revolving about the actual operator and his/her interface with current control rooms and this new instrument called the safety parameters display system.

Over time, our DCRDR, detailed control room design review process, has evolved and taken a course that, looking back over 10 years, one could question much of what the staff has done and how we have gotten to where we are today.

I would like to give a little bit of a historical perspective bringing you up to today's time frame.

Following the accident, we issued NUREG-0737. It contained such issues in the human factors area as DCRDR and SPDS [safety parameter display system]. More importantly though, in December of 1982, the staff chose to take a harder look at emergency response capability, and within that context, we identified the need to expand the area of DCRDR and SPDS with more specific guidance and requirements.

Much of what was done in these two areas was confirmed by order in March of 1983. In the area of DCRDR we confirmed that the industry would provide the staff with a summary report *[Figure 3]*. That summary report was to contain human engineering discrepancies (HEDs) as identified by you, the licensees. At that time, we did not state explicitly to highlight those of greatest importance or medium importance or lower importance. However, over time, our guidance to our project management staff has been to continue to focus, or push, on bringing closure to the more significant or truly important human engineering discrepancies that you have identified, thus bringing closure to this issue.

I think that is a very important point, that the industry has had quite a bit of time to work with our staff in developing an implementation schedule to make enhancements or modifications to the control room.

I think the bottom line thrust, whether it was communicated accurately or effectively from the staff, was certainly to do the important things first, get those behind us, and then look at the less significant human engineering discrepancies.

The next slide *[Figure 4]* is an overall status or the marks earned by industry to date.

I think it is important to note that about half of the industry has either completed or has on its schedule the actual implementation of resolution to these human engineering discrepancies. The other half have not.

About a third of the industry have one or more important HEDs to be corrected. We feel these are the kinds of areas—or actions or initiatives—that, in working with the staff by a telephone conference call, or perhaps a meeting face to face, can be moved off the plate. We can declare victory with many of these open items. The concept being, let us get on with the licensing process expeditiously.

Those at the bottom of the barrel, the bottom 10 or 15 percent, are far more troublesome to the staff. In some cases summary reports have not been received from the industry. A concern exists that some utilities did not take this particular effort as seriously as others. On one hand, many licensees have actually completed this task. Others are at the very beginning or the infancy of the task. For the bottom 10 to 15 percent, we would envision modifying our licensing review process by undertaking onsite audits.

I would envision these audits to be two to three days at your site working with you; coming to grips with what the significant HEDs truly are and what kind of a schedule can you propose to make upgrades to control rooms to come into conformance with this particular requirement.

So I think the bottom line to DCRDR is that the staff wants to be as innovative and creative as possible in doing a first class review or onsite inspection to bring closure to this issue as quickly as possible within the context of the accident at TMI having occurred over 10 years ago.

The report card leaving essentially half of the industry open is not good for us and it is not good for you.

I would like to move on to SPDS *[Figure 5]*. I have some news to share—at least, it may be news to some of you. Once again in Supplement 1 to NUREG-0737, we highlighted the need to bring a selected amount of information to a central location so that an individual could assess the safety status of the plant quickly—take the broad overview and help direct shift operations. Just recently the staff has taken a very hard look at the success to date in performing licensing reviews in the area of the safety parameter display system. The report card is certainly not one that is very good.

We do recognize that much of the industry has tried early on to install a safety parameter display system. For one reason or another, they became very unreliable. Many of you had to essentially take them back out of your control room. Others of you have actually implemented the SPDS very successfully. I have the entire gamut to span as far as success and lack of success in actually getting on with bringing closure to this particular issue.

I think the bottom line is that we felt that we are really getting nowhere. We were spinning our wheels as far as doing licensing technical reviews.

It brings into question what our role really should be in reviewing such things as the safety parameter display system. We have chosen—I think you have heard this in other sessions over the last couple of days—to get licensees more involved. That increased involvement is manifested through something called certification. I do not believe that is a strange word to be using; we are passing the burden to the utilities to certify the status of your particular plant to the regulator. In other words, put the burden of proof back on the industry rather than putting it on the regulator.

We are trying to re-establish a balance as to who is responsible for what at these power plants. This is a very recent occurrence; in fact the document describing this is dated April 12. We have issued a generic letter that sponsors this concept of certification. You should be aware that it contains a NUREG document, NUREG-1342, which contains a great deal of information the staff has gained over the years from doing on the order of 50 to 60 technical reviews of safety parameter display systems. The NUREG presents information that we found acceptable and designs and concepts that we found to be acceptable, as well as information that we found to be not acceptable. It is targeted for you as a licensee to be able to use, rack up your system against much of what we have done, things that we have found acceptable in the past.

The generic letter requests that you respond, under 10 CFR 50.54(f), to the staff in one of three ways.

The first would be to compare your system with the information provided in this particular document [NUREG-1342] and you may find that your system indeed is fully operational and in compliance with regulatory requirements. You would simply certify to us that your system meets our requirements; that is option one, and you are done.

The second alternative would be to state that it is your intention to be in full compliance with requirements that the regulator has sponsored; however, your system is not fully operational to date. We would ask you to provide a date by which time you would envision your system to be fully operational.

The third alternative would be an option that is less attractive. It is more along the lines that if you feel that you cannot conform to the information that is being sponsored by the NRC in Supplement 1 of the generic letter, the information contained in NUREG-1342, you would provide other information to the staff as to why you are not certifying compliance.

What would evolve out of the responses to that generic letter are three bins of information: one, two, and three. Those that have essentially certified that they are in compliance, bin one. Those that have given a date when they would be in compliance, bin two. And, the third bin would be for the ones that we would probably want to take a look at. When I say, "take a look at," I am targeting staff to get out and kick the tires so to speak, really take a look at what you have.

Once again, I am back to talking about onsite audits versus in-house technical reviews.

The bottom line to this particular generic letter is that we are not imposing new requirements. We are simply attempting to get a better handle on those designs that are in conformance with the regulatory requirements and those that are not. With that information, we can focus our resources to the licensees that we should really target and not just go helter-skelter to the root of safety parameter display systems.

While I have discussed DCRDR and I have discussed the SPDS, I guess the bottom line to these two topics is that we envision work that still needs to be done. We recognize much of the industry has tried hard in this area. We are all in the same boat, so to speak. There are pressures being brought to bear, so let us bring closure to these long-standing TMI action plan issues.

Our staff stands prepared to work closely with you—whether it is to talk over the telephone or to meet with you. It is our intention to move expeditiously to bring closure to both of these issues.

I would like to take just a couple of minutes to talk about some future initiatives that might be a little bit more fun and get us off of the TMI action plan.

[Figure 6]

What is the future of human factors for our agency? Many of the speakers have touched upon human performance. I was taken by Chairman Zech's remarks at lunch the other day. Many of the issues that the Chairman raised are right in our division. The human performance aspect is clearly an area which the Commission is very sensitive to.

In that regard, we are in the process of developing a very limited-scope inspection procedure that could be used by a wide variety of professionals to take a very quick glance at you as a licensee, or at a particular plant, in the area of human factors, generally speaking.

We also see the human factors protocol evolving so that it will be of assistance to our AITs or IITs [augmented inspection or incident investigation teams]. The role of the human factors protocol is being more integrated into the entire agency's activities. We see that in response to events as they occur.

We also envision doing a much better job looking to the future building upon operational events of the day. In many cases, licensees submit licensee event reports that attribute the root cause to human error and it stops short. One of the things that we are going to take a harder look at over the next year or two is questioning: Should we look harder at what the real human performance issue was in a given event?

Any number of examples would evolve. Just off of the top, if procedures continue to be a troublesome point with the industry, and they are the root of many of the human performance issues, obviously the agency would need to do something in that area. For example, a generic communication in which we state that we find procedures are really at the root and resulting in a lot of errors, can be tied into your maintenance activity or tied back to operational events, surveillances being pulled. If there are truly roots to the human performance issues, or the bottom line ends up being people, we want to get a better handle on this from an operational perspective.

So the principal thrust is for the staff to do better in its inspections, incorporating human factors. We envision, and we have seen by the way, a large number of the licensees taking a more concerted effort to integrate human factors into their efforts. We have seen this to be a very positive initiative. It is more one of bringing a common knowledge base to the industry versus working individually on plants.

Another area, speaking to the future, would be our recognition that many licensees are beginning to use advanced computer systems, advanced technologies. We are working with some of the vendors on their advanced control room designs. The staff feels it is very important for us to get into a position to understand how good these systems are, how well are these new systems being integrated or backfitted into current day control rooms. For example, if an advanced display is being placed in a current-day control room, have you, as the licensee, thought through the impact it will have on your operational staff, training, the operator interface, tieback to procedures, all of the integration that takes place within the human factors arena?

The bottom line—I touched on it—the ever changing role of the reactor operator in context with upgrades or modifications to your control rooms using advanced display techniques.

Thus with these comments and remarks, I feel like I have kicked you a little bit in the areas of safety parameter display system and DCRDR.

We do recognize that there have been mixed signals over the years. It is our agency's position, it is time to get on with it, and we sincerely want to work diligently with you in bringing closure. We are also asking the staff to take a hard look at new innovative means to bring closure to these long standing licensing issues.

I wanted to reemphasize that particular point. I appreciate your time. Thank you. Any questions? Can you come to the "mike"?

Voice:

I have one question, John. I note that the Office of Research has what appears to be a pretty large effort in the human factors. How is the NRR activity providing input in shaping that research program?

Mr. Zwolinski:

The process is fairly uniform regardless of subject. Much of what Research sponsors is based on user needs developed from NRR and other offices such as NMSS or AEOD. The user need is sent to Research. The research staff will attempt to accommodate our request for research in a given area. They will evaluate the subject in the context of other work they are doing. We would like to think, in the area of human factors especially, we are in the process of developing an agency human factors program plan.

We will propose that to the Commission. The responsibility of staffing the program belongs with the Office of Research. NRR will concur in that program. We work fairly closely with Research in identifying research needs and in bringing resolution to research issues associated with human factors.

We also attempt to have the research staff participate with our staff in undertaking selected inspections, trying to bring a more hands-on approach in the research of the human factors area.

Any other questions from the floor? Thank you.

Mr. Roe:

Our next presentation is on a very important topic and the presenter is Loren Bush. Loren is Chief of the Program Development and Review Section in the Reactor Safeguards Branch.

Fitness-for-Duty Rule

Mr. Loren L. Bush:

Thank you, Jack. Good morning. Before I start my remarks this morning, I would like to share some of the credit for the development of the fitness-for-duty rule with a few of the happy faces in the audience: Gene McPeek who works directly for me and does a lot of running around with my whip in hand. Seated right next to him is Valerie Barnes, Dr. Valerie Barnes from the Human Affairs Research Center in Battelle. Over there is Dr. Jon Olson. Dr. Barnes and Dr. Olson have a very sizeable staff that have done extensive research work on all of the technical issues associated with fitness for duty. You will see some significant things as we get, later on, to some of the products of their work.

Some general remarks to start out. The NRC believes that its licensees should ensure that nuclear power plant personnel perform their tasks in a reliable and trustworthy manner and that they are mentally and physically fit to perform their duties safely and competently. That is a very broad definition, if you will, of fitness for duty.

Furthermore nuclear power plant personnel should not be under the influence of any substance, legal or illegal, which adversely affects their ability to perform their jobs. Consistent with this policy, the NRC believes that there is a need to ensure that the work place is drug free as well as free of the effects of such substances.

By way of a little background, on August 4, 1986, the Commission issued a policy statement to encourage utilities operating nuclear power reactors to implement fitness-for-duty programs.

Following a December 1987 briefing by the NRC staff and representatives of power reactor licensees, the Commission determined that a rule was desirable and directed the NRC staff to prepare a proposed rule. This proposed rule was published for public comment on September 22, 1988. The Commission was briefed on the staff's proposed rule on February 8, 1989, and the staff paper was made publicly available at that time. The Commission has subsequently voted to issue the final rule with some modifications to the staff proposals.

Let me interject right here that one very common question is, what is the status of the rule? When are we going to see the rule in the *Federal Register?* I can report to you that the rule package was delivered to the Commission yesterday for their final affirmation before publication in the *Federal Register*. I would guess, and it is strictly a crystal ball guess, that there is a reasonable possibility that we will have it published in the *Federal Register* by the middle of May.

[Figure 1]

In response to the proposed rule, there were a total of 3079 comments. Almost 3000 of these, 2800 or 2900, were in writing by 378 responders. A 188 additional comments were made during a public meeting in October of 1988. Compilation of all similar comments resulted in a total of 632 comments that were addressed by the staff. A detailed summary and analysis are contained in NUREG-1354 and that will be published hopefully about the time that the rule is published.

I have the final draft of that NUREG on my desk. As soon as the commission affirms the rule, we will have a final rule and NUREG sent to the publisher.

The NRC staff, assisted by Pacific Northwest Laboratory in Battelle's research centers, gathered and analyzed the information on the technical issues, which are summarized in NUREG/CR-5227 and in Supplement 1 to that NUREG. Supplement 1 should also be published some time within the next few weeks.

Next slide *[Figure 2]* please.

Some key provisions of the proposed rule are that it takes into account the many positive aspects of existing licensee programs while providing for minimum program standards with due regard for both public and worker safety and the rights of individuals.

Let me emphasize that point, the rights of individuals. It has caused a lot of thinking on the part of the entire Commission staff, to achieve the proper balance between rights of individuals and safety. In appropriate areas, the experience gained from, and the standards established for, the Federal Government's testing program also serve as a basis for the rule. There are several key provisions that I will describe briefly.

First of all is the scope. The rule will require each licensee authorized to operate and construct a nuclear power reactor to implement a fitness-for-duty program. With limited exceptions, such as NRC representatives, law enforcement personnel, and offsite emergency fire and medical response personnel, the rule will apply to all individuals granted unescorted access to protected areas of the plant as well as to known licensee or contractor personnel required to physically report in an emergency to licensee emergency facilities.

NRC personnel will be subject to the NRC's drug testing program, which will be implemented in response to the executive order.

Another key point here is that licensees must implement the program within 180 days of the effective date of the rule.

The rule will require certain elements intended to ensure proper management of the fitness-for-duty program.

[Figure 3]

These include establishment of written policies and procedures by licensees to ensure that all persons subject to the program clearly understand what is expected of them and what consequences may result from violations of the fitness-for-duty programs. The rule will require collection and analysis of data, audits, and actions to correct problems subsequently identified. Employee-assistance programs and appeal procedures are also required. Additionally each licensee will be required to inform the Commission promptly of significant fitness-for-duty events.

[Figure 4]

A very key area of the program is training, which must be provided to ensure that persons subject to the program—and this is primarily licensee and contractor employees—understand the program and their responsibility in its implementation as well as the hazards associated with substance abuse. Supervisors and other key personnel will be trained in techniques for recognizing drugs and indications of the use, sale, or possession of drugs, and in behavioral observation techniques for detecting impairment and related conditions.

[Figure 5]

Testing is the area that causes the most interest, I guess. To provide a means to deter and detect drug abuse, the licensee will be required to implement certain chemical testing programs for alcohol and drugs for persons subject to the rule. These provisions are testing within 60 days before the initial granting of unescorted access to protected areas or assignment to activities within the scope of the rule. The second general category of testing is the random tests, which are unannounced tests imposed in a random manner at a rate equal to 100 percent of the population, administered, at a minimum, on a nominal weekly basis.

The third area is the testing for cause. That should be conducted as soon as possible following three specific occurrences. The first is observed behavior indicating possible substance abuse. The second is after accidents. There is a lot of words in the rule that try to fine tune and characterize that so that you are not testing everytime you have to put on a band aid. The last area is after receiving credible information that an individual is abusing drugs or alcohol. The last area is the followup testing, which is conducted on an unannounced basis to verify continued abstention from the use of prescribed substances.

The standards developed by the Department of Health and Human Services for drug testing programs for Federal employees have been adopted and modified as NRC standards for the collection and testing of urine specimens and tests for blood alcohol content.

NRC testing standards require the use of HHS-certified testing laboratories and other procedures to provide considerable protection against wrongly identifying a person as a user of drugs. In the testing guidelines, there are five drugs that are specified. They are the same drugs that are specified in the HHS guidelines, and we have also added alcohol. We also specified cutoff levels that are consistent with those that are in the HHS guidelines.

Those two areas have been a very significant issue with the Commission and the industry, and we will see how we end up. I think what I have just said is how we are going to end up.

As for quality assurance features, there are a lot of QA specifications in the NRC guidelines. Basically the use of HHS-certified laboratories is a key point. The administrative process of the testing, the chain of custody, and how the specimens are collected and shipped to the laboratory are important QA features. An area that we have included in the guidelines for quality assurance is measures to prevent the subversion of the testing program and obviously the security for the facility itself.

We are concerned about the quality of personnel who conduct, perform, testing and so forth.

Probably, the biggest aspect of the quality assurance feature is the medical review officer (MRO). Many licensees currently have a licensed physician on staff that review test results, but you should be very careful when you get into this and make sure that he has the right background and does all of the things that are spelled out, not only in the testing guidelines but in the MRO's handbook.

Another key point is certainly that the licensees may use more stringent standards than those that are specified in the rule.

[Figure 6]

The rule prescribes specific minimum sanctions when persons test positive for illegal drugs. Persons having the first confirmed positive test must be denied unescorted access for a minimum of 14 days. During that period, appropriate counseling and development of treatment, followup, and future employment plans must be undertaken. Before return to duty, a determination of fitness will be required. A second confirmed positive test will result in denial of unescorted access and exclusion from certain other duties for a minimum period of 3 years. Persons determined to have been involved in the sale, use, or possession of illegal drugs within the protected area will be subject to these same sanctions for a minimum of 5 years.

Reinstatement of persons will require medical assurance of abstinence for 3 years, assurance of fitness, and random tests at least once every 3 months for a 3-year period. That is slightly incorrect. It is at least once a month for the first 4 months.

Any subsequent involvement with illegal drugs must result in permanent removal. Refusal to provide a specimen and resignation before removal for violating the fitness-for-duty policy must be recorded as removals for cause.

Offsite sale or possession of drugs or offsite use of drugs are matters that usually result in law enforcement actions and are handled by the criminal justice system.

The Commission expects the licensee's personnel policies will address these matters. Additionally licensees are expected to determine if offsite activities once identified indicate questions concerning an individual's reliability, trustworthiness, and fitness for duty.

Next slide *[Figure 7]* please.

As a minimum, the licensee's written policy must prohibit the consumption of alcohol preceding and during any scheduled working tour. Licensees must have a call-in procedure that will ensure that persons called in to perform an unscheduled working tour are fit to perform the tasks assigned. The person should be required to state whether alcohol was consumed during the period before being called in. If alcohol had been consumed, the licensee would determine the fitness and establish appropriate controlled conditions under which the person can perform work.

Disciplinary actions would be inappropriate for a person called in for unscheduled work. For confirmed misuse of alcohol, valid prescription, and over-the-counter drugs, licensee's sanctions must be sufficient to deter abuse of these legally obtainable substances as a substitute for abuse of proscribed drugs.

Whenever a person is tested for drugs, the test for alcohol is also required. A blood alcohol content of 0.04 percent or greater is considered positive. Tests for alcohol must be by breath analysis. Both screening and confirmatory tests must be administered with an evidential grade breath measurement device that conforms to National Highway Traffic Safety Administration standards. Should further confirmation be demanded by the person being tested, the test must be a gas chromatography analysis of blood.

[Figure 8]

Licensee management will be required to conduct a suitable inquiry before granting unescorted access and to maintain records that will help to determine if a person being considered for unescorted access was ever removed or denied unescorted access as a result of not being fit for duty.

Licensees will be required to retain records to support the tracking system and to disclose that information upon inquiry to any licensee or its contractor falling under the scope of the rule.

[Figure 9]

Contractor personnel will be subject to a fitness-for-duty program. Furthermore, contractors will not be permitted to assign any personnel previously removed from any other nuclear power plant for fitness-for-duty related problems without the knowledge and consent of the licensee.

Licensees are required to report significant fitness-for-duty events to the NRC operations center by telephone within 24 hours. These include any sale, use, or possession of illegal drugs within the protected area and any acts by the licensed operator or supervisory personnel on or off the site with illegal drugs, confirmed positive tests on such persons, use of alcohol within the protected area, or determination of unfitness for scheduled work as the result of the consumption of alcohol.

In conclusion, the NRC has done extensive studies to understand and resolve the technical issues. The rule is designed to build upon existing licensee programs and to establish uniform minimum standards in those areas for which none exist.

The Commission will require the industry to follow many of the same standards for protection of the individual that are being applied to the Federal Government.

The NRC intention is to provide additional assurance of safety by creating an environment that is free of drugs and free of the effects of drugs. Do you have any questions? I answered the only question you had. Yes?

Voice:

Are there any actions required subsequent to a negative test following the initial positive? That is if somebody tested positive and went back and had another test later and it came back negative, is there any subsequent actions involved?

Mr. Bush:

When you say he tested positive, are we talking about a presumptive positive on an initial screening test or are we talking about a confirmed positive test result?

Voice:

Just the very first test. I take it by confirmed you mean a backup test?

Mr. Bush:

Well, the testing process is normally that the specimen is taken and an initial screening test is performed. That is a presumptive positive.

Voice:

Then the following one.

Mr. Bush:

If the confirmatory test comes back negative. . . .

Voice:

No, that came back positive. He went on to a private physician and had a second series of tests.

Mr. Bush:

The problem is, if an individual goes off to a private physician, then the collection of the specimen and its testing really does not meet forensic standards in how it is collected and how it is controlled and protected. So we would not consider that a valid test result.

Voice:

So the end result of that process was that he has had one confirmed positive test?

Mr Bush:

That is correct.

Mr. Roe:

Our next presentation will be on the emergency operating procedure program. The presenter is Bill Regan. He is Chief of the Human Factors Assessment Branch. He's going to tell us a story of a program that has evolved significantly over a period of time, one that was previously focused on paper review and now is operationally focused on site with actual tests of how you conduct your EOPs.

Emergency Operating Procedure Inspection Program

Mr. William H. Regan:

Good morning. In May of 1980 the TMI Action Plan [NUREG-0737] was issued. Item I.C. dealt the issue of operating procedures. The objective of that item was well stated and bears repeating now. It is the underpinning of the tremendous effort that was subsequently taken by the nuclear industry and the NRC to "improve the quality of procedures to provide greater assurance that the operator and staff actions are technically correct, explicit, and easily understood."

In response to this item, the owner's groups, the reactor vendors, the NRC, and the individual licensees and utilities initiated an effort to improve operating procedures that is continuing even now, 10 years after the accident at TMI.

The lessons that we learned at TMI regarding procedures can be put into two major categories: technical content issues and human factors issues.

[Figure 1]

It was obvious after the accident that there were events that were possible, if not probable, that were not addressed by the existing generation of emergency procedures.

The industry responded to this shortcoming by reanalyzing transients and accidents, taking into account multiple failures including operator errors.

Much effort has gone into redeveloping the technical basis for the EOPs. Vendors and owners' groups have collaborated to develop generic technical guidelines and licensees have developed plant-specific technical guidelines.

This initial effort to improve the technical content of the EOPs is drawing to a close; with the industry's cooperation, the NRC hopes to close out its review of generic technical guidelines by the end of 1990. Thereafter, it is expected that there will be no need for major revisions to the generic technical guidance and, therefore, no need for NRC approval. Following performance of the safety review required by 10 CFR 50.59, each licensee may incorporate any new information gained from refined analytical techniques or data from the operating experience into its plant-specific technical guidance and its EOPs without pre-approval by the NRC.

[Figure 2]

The other major lesson learned at TMI regarding procedures was that they were poorly designed from the operator's point of view. They relied very heavily on operator training and experience, using general or ambiguous wording that put an unnecessary burden on the operator's memory.

They were riddled with logic flaws, "If A and B or C, then do X or Y and Z." Additionally, the conceptual format of designing a separate procedure for each postulated event, required that operators successfully diagnose the correct event before the procedure could be executed. This event-based format also did not provide a prioritized safety function monitoring task. As a result, the operators at TMI, after failing to diagnose the event correctly, took actions that worsened the event. In addition, they lost track of certain critical safety functions, such as core cooling and heat removal, causing the worst accident in the history of the American nuclear industry.

At the same time that technical improvements were being developed for EOPs, attention was also focused on improving the usability of the EOPs—the human factors issues. The NRC and industry agreed that the EOPs should take a new form that would not require diagnosis. This new form was called function-based or symptom-based EOPs.

Function-based EOPs do not require event diagnosis for execution of mitigative actions. They *do* require continual monitoring and maintenance of the critical safety functions for the plant, such as reactivity, core cooling and heat removal, reactor coolant system integrity, radioactivity control, and containment conditions.

If diagnosis is possible, event-based procedures may be used to provide a quicker, optimal response to an event. However, the basic concept is that the operators orientation should be towards monitoring plant safety functions and maintaining them by whatever means possible to prevent breaches in the barriers to radioactive releases

In addition to the changes in the conceptual orientation of the EOPs, other improvements to usability were identified by the industry and the NRC.

In 1982 the NRC issued NUREG-0899, *Guidelines for the Preparation of Emergency Operating Procedures*, to provide a description of an acceptable EOP design process as well as some basic human factors principles that could be applied to improve the understandability of EOPs. By the time NUREG-0899 was issued, the agency had already seen significant progress by the owners' groups in developing generic technical guidelines. A parallel effort was now needed to ensure that plant-specific issues including human factors were appropriately addressed. Therefore, NUREG-0899 focused on what the staff considered to be the necessary elements of the EOP development and implementation program.

It was felt that licensees needed to formalize the implementation process, and in doing so would accomplish two things. First, it would add rigor to the EOP writing process, which had, before TMI, often been a one-man show, a task delegated to the operations department, based as often on intuition and limited operational experience as analytical data and broader industry experience. This process that had rarely been subjected to independent peer review. Second, it was hoped that it would allow the NRC to step out of the critical path and allow quicker implementation of the improvements. Unfortunately, neither of these goals has been fully accomplished.

[Figure 3]

Later in 1982, Supplement 1 to NUREG-0737 was issued as an enclosure to Generic Letter 82-33. Supplement 1 described the essential emergency response capabilities that would be required of licensees after they submitted a plant-specific schedule.

The basic requirements for emergency operating procedures were included in Supplement 1. Supplement 1 directed each licensee to submit to the NRC a procedures generation package (PGP) that included:

(1) Plant-specific technical guidelines or the method to be used to develop plant-specific guidelines from the generic technical guidelines including plant-specific information.

(2) A plant-specific writer's guide for preparation of the EOPs.

(3) A description of the program to be used for verification and validation of the upgraded EOPs.

(4) A description of the training program for the upgraded EOPs.

Using this PGP, the licensees were to develop functional or symptom-based EOPs that would provide the operator with the ability to mitigate consequences for a broad range of accidents and multiple equipment failures.

[Figure 4]

These upgraded EOPs were to be developed using human factors principles. The NRC staff's earlier reviews of the licensees' EOP programs and procedures generation packages identified potential concerns with their implementation. In response to these findings, the NRC staff conducted inspections at four plants to monitor the industry's procedure upgrade programs.

During these inspections, a number of problems were identified. As a result, Information Notice 86-64 was issued in August 1986 to alert licensees to the specific problems found during these inspections.

The staff inspected six more plants over the course of the next year with similar results. Information Notice 86-64, Supplement 1, was issued on April 20, 1987, to describe further problems with EOPs and PGPs and to inform the industry that the inspection effort would be intensified.

[Figure 5]

In late 1987, the NRC developed and implemented an accelerated pilot inspection program. The program incorporated a detailed performance-based inspection of EOPs, in contrast to past inspections and audits, and it emphasized a review of programs and supporting documents.

The primary focus of the pilot inspection program, which has now been extended to all operating reactors in the United States, is to assess the adequacy of the EOPs themselves and, as a secondary issue, to establish that the supporting programs and documents are sufficient to ensure the integrity and continued adequacy of the EOPs.

NRC Temporary Instruction 2515/92 was issued in April 1988 and specifically defines the objectives of the inspection. A sample of 16 plants representing the four vendor groups were selected for the pilot phase (EOP-1) of the inspection program.

The first of these inspections began on March 14, 1988. Soon after EOP-1 began, a second phase of inspections called EOP-2 under the leadership of the Division of Reactor Inspection and Safeguards was initiated at all boiling water reactors with Mark I containments with special focus on containment venting procedures. The third inspection phase, called EOP-3, is in progress now and will include inspections at all plants not included in EOP-1 and EOP-2, and any followup inspections that are deemed necessary.

[Figure 6]

The great majority of EOP problems that were identified by the EOP inspections, thus far, resulted from inadequate or incomplete implementation of EOP upgrade programs. Although the inspections focused on the EOPs themselves, the kinds of problems that were identified led to an examination of the programmatic weaknesses that caused those problems and allowed them to go uncorrected.

One major cause of the widespread program weaknesses is that the licensees have generally not followed the published guidance regarding the upgrade of EOPs. It appears from the inspection findings that, rather than intentional disregard, there is a lack of understanding on the part of the industry of the principals included in the staff's guidance. The most significant programmatic problems are:

(1) Lack of multidisciplinary team approach, especially a lack of human factors expertise.

(2) Lack of an independent review to ensure that the EOPs are correct and can be performed.

(3) Lack of a systematic process for ensuring that the quality of the EOPs does not degrade over time.

(4) Lack of adequate management commitment and sufficiently high priority for the EOP program within the licensee organization.

[Figure 7]

With regard to the multidisciplinary approach to the EOP development, what is needed? We need teams with backgrounds in engineering, operations, training, human factors, and technical writing at a minimum. We found in the inspections that backgrounds were often limited to engineering and/or operations and, again, sometimes it was a one-person operation.

[Figure 8]

With regard to the independent review or the verification and validation program (V&V), what was needed was fresh eyes and brains to look at the EOPs and follow them through the plant, including a desk-top review, control room and plant walkthrough, operating team review, and simulator exercises? What we found in the inspection program was lack of independence. Often the same person, or organization, who performed the EOP preparation carried out the V&V program. In addition, there was pervasive evidence of lack of verification and validation. There were incorrect, missing, or unnecessary steps. References to equipment, instrumentation, and procedures no longer in use, and necessary in-plant tools, access aids, jumpers, and local information needs missing.

[Figure 9]

With regard to the EOP maintenance revision, what was intended and what is needed is a formal program for maintenance and revisions, controlled basis documents, the writer's guide and the plant-specific technical guidelines; adequate documentation of changes; a revision frequency commensurate with reasonable change request backlog; and training on changes before they are put in place. What we found during the inspections were missing or incomplete programs; basis documents that were incomplete or incorrect; generally poor or missing documentation of changes; and backlogs of as many as 50 or 100 changes. In some cases, these were several months old and equipment modifications were not reflected. In addition, we found inadequate training or no training, on changes and insufficient resources to support an adequate program.

[Figure 10]

With regard to management commitment, what is needed is to have a high priority placed on quality procedures and an adequate resource allocation to make sure this is carried out. Management needs to be involved with the program on a continuing basis, and quality assurance controls need to be in place and operating. We found little or no management involvement in many cases; EOP development and maintenance were sometimes turned over to contractors, with little or no involvement of an independent review committee or QA organization; and there was a lack of staffing and resources.

[Figure 11]

To correct the general problems that have been identified, the NRC intends to take action to further clarify its expectations of licensees and to assist licensees in meeting these expectations in addition to continuing, as I have indicated, the inspection program.

In addition to today's presentation, meetings have been held with appropriate representatives from each of the owners' groups—usually the operations subcommittee or the equivalent—to discuss the inspection findings so far and the generic implications for each of the groups.

To provide licensees with the opportunity for further clarification, workshops are also being planned by NUMARC. The workshops will allow for a two-way communication between the industry and the NRC. They are tentatively planned for the latter part of June—I believe it is the last week of June.

At least six weeks before the workshops, hopefully next week, the NRC will issue and distribute to all licensees NUREG-1358, *Lessons Learned from the Special Inspection Program for Emergency Operating Procedures Conducted from March to October in 1988.* This document will form the foundation for the dialogue to take place at the workshops.

These efforts should enhance the industry's understanding of the issues and of the potential means for improvement.

To provide licensees with a complete review of the EOP programs, the NRC staff has accelerated the review of the procedure generation packages submitted by licensees in response to Generic Letter 82-33. Review comments are being forwarded to the licensees as soon as possible. The staff does not plan to request further information from the licensees. Adequacy of implementation of the PGP commitments will be assessed through onsite inspections, rather than further paper review.

As I have said before, the EOP inspection program will continue in a very similar mode to that used thus far. The program will include all remaining plants and return visits to any plants with identified problems in implementation of appropriate corrective actions. Our goal is to complete this final round of inspections by October 1, 1990. The staff expects that these actions will result in both immediate and long-term improvements to EOP upgrade programs and to the EOPs themselves.

In summary, as we look on the efforts of the last 10 years, we can congratulate ourselves for some successes in the area of emergency operating procedures, especially in the development of approved technical content and a function-based accident mitigation strategy.

However, in other areas, such as human factors and procedure validation, we need to apply more resources to solve continuing problems of EOP usability. A special responsibility falls on the shoulders of plant management to oversee the EOP development and revision processes and to ensure that adequate personnel and resources are available to allow their staff to improve the quality of procedures, to provide greater assurance that operator and staff actions are technically correct—explicit and easily understood now and throughout the life of the plant.

Thank you. Are there any questions?

General Questions/Answers

Mr. Roe:

Now we will answer questions that have been provided by the audience. I would like Ken Perkins to go first and select several questions. We will then continue around the table having each one of the presenters answer several of the questions in turn until we run out of questions or come to the end.

Mr. Perkins:

I will read the first question.

> *QUESTION:* Where will the generic fundamentals examination be held?

ANSWER: The generic fundamentals examinations that are scheduled for this June are being arranged in each region. Each region is setting up a location to conduct the fundamentals examination. It will be at five different locations, and I suggest that you check with your region to get the specific location.

> *QUESTION:* Does the NRC intend to administer both initial and requalification examinations during the same visit in 1990, if requested by the utility?

ANSWER: By 1990, that is fiscal year 1990 I assume. I do not anticipate that we will have the initial examination program completely revised. It may be that if it is late in 1990 we would be in a position to pilot test a revision. I cannot make the categorical statement that we would be prepared to do that as two similar examinations.

I suggest that whoever it was that has this interest stay in touch with their region and if they are interested in participating in a pilot test of two similar examinations, we would be glad to do it.

In the event that we do not, and you have both initial license applicants and requalification individuals, we will consider doing those two examinations at the same time in 1990.

> *QUESTION:* What process is used to select operators to take a given requalification examination?

ANSWER: By definition it is random—but random may not be a totally valid word. It is random to the extent that the facility identifies those individuals to us who are—at the time that we schedule to come and conduct the examination—available to us to conduct the examination. That is, they are not standing shift at that particular point in time. We then make the selection from those individuals as to who would take the examination.

I may not understand this next question. If I do not, please elaborate.

> *QUESTION:* Will utilities be asked to provide an examination bank to the NRC for use?

ANSWER: We are currently using facility provided questions in our requalification program. I anticipate that when we revise and upgrade the initial examination, that we will use a similar technique and continue to use facility-provided questions.

The next question is a very fair question and I would like to have the opportunity to address it.

> *QUESTION:* What is a desk-top audit?

ANSWER: I threw the term out assuming it was as familiar to you as it was to us who have been throwing it back and forth in the office.

Desk-top audit, by that we mean that the desk-top audits that we were talking about doing on simulator certification will be an in-office review of the simulation facility package that is submitted as your certification package. The initial look at it will be to determine whether the documentation is complete enough to support a statement that it is certified.

In doing that kind of review, we may identify potential simulation facility problems. If we identify those potential problems, we will provide that as a flag, a red flag to the region. If the region concurs or has information—I should better describe it this way: If the region has information based on their examination experience that, yes, there is a fidelity problem or there is some simulation problem at that facility, then based on the significance of that problem, we may determine to do an inspection.

I hope that gives you a better understanding of what an audit is.

> *QUESTION:* What plans do you have for simulation examination in the few cases where plant simulators are still under construction?

ANSWER: In those cases, the generic simulators are being used for training. First, we will be looking for completion by the implementation date in the regulation. In the interim, we will be looking to see if you had an adequate arrangement or setup for using a generic simulator so that we may use it to examine your operators, that process will continue until the point at which your new simulation facility is implemented.

Jack, I an. going to beg off because I have not had a chance to read the last question. I will come back to it.

Mr. Roe:

John, you now have an opportunity to address some questions.

Mr. Zwolinski:

> *QUESTION:* Regarding safety parameter display system, does the licensee certification mean that we meet what is in the NUREG, and I assume that is the 1342 document that is being sent out, or does it mean that we meet the requirements specified in NUREG-0737, Supplement 1?

ANSWER: Good question. The two documents are certainly not exclusive. They are complementary, and you will need NUREG-0737, Supplement 1.

> *QUESTION:* Is the NUREG an informative document or is it a document?

ANSWER: I had to think about this a little bit. I feel it is both. It contains a great deal of information, which I believe will certainly provide not just information but some guidance to you who have not made decisions about the direction you intend to take with your safety parameter display system.

> *QUESTION:* What is done to ensure reliability of maintenance personnel who take apart and rebuild the plant?

ANSWER: If I understand the question correctly, I think it is targeted at what is done to ensure reliability of maintenance workers.

It falls into two areas in my mind, and if you want to follow up, I will be more than happy to discuss this.

One issue is certainly fitness for duty. The other issue would relate to the facilities training program. As many of you are aware, INPO has indeed sponsored training in the area of maintenance for plant staff. So, I think, both of those touch on this issue.

> *QUESTION:* Does the staff plan to use the INPO HPES, the human forms evaluation system, program as a model for your human performance, human error program speaking to the future?

ANSWER: We have had very limited contact with INPO in this area. What we have seen seems fairly interesting and appropriate for the regulator to be aware of; that is, about where the program stands currently. I believe we would probably work through our Memorandum of Understanding with INPO to pursue the HPES any further than we have right now. But it is a good thought.

> *QUESTION:* From LERs and other data, what is the frequency of human factor contribution versus equipment failure or other causes?

ANSWER: It is out understanding in the causal codes when evaluated, personnel error equates to about 40 to 50 percent of the problems that are actually the bottom line cause code as communicated in the current LER reporting system.

Unfortunately it says, "human error" and stops right there. Going down another tier would give us a much better handle on what the human performance issue truly is.

> *QUESTION:* Do you have an advanced computer network that ties all plant processed computers to a central display and super computer accessible to USNRC for online processing and review?

ANSWER: At one time the agency was considering a nuclear data link in which much of the information available at plant sites would be automatically transmitted to our operations center here in Washington.

We currently do not have online processing capability. As Bill Regan mentioned earlier, in our operations center, we do have a wide telephone networking system to all facilities.

In fact, Ken was the individual responsible for setting much of that program.

Mr. Roe:

John, I think it would be important for people to know that the NRC's initiatives in this area are going to be addressed by Ed Jordan, the Director of AEOD, in this afternoon's session under the title "Emergency Response Data Systems."

So whoever is interested in that particular question, the NRC's initiatives and obtaining emergency data will be addressed then.

Mr. Zwolinski:

The last question.

QUESTION: Root cause is explanatory, PRA is predicted; is there any effort under way to correlate results from these two methodologies?

ANSWER: In short, the answer is yes, and the principal tie of these two particular aspects of agency interest are being conducted by our Office of Research.

We are doing a very limited amount in our risk assessment area. I prefer not to comment any further. I would probably get in over my head. Thank you.

Mr. Bush:

I have 15 questions here and I would gather from the time that I might not be able to get to all of them.

QUESTION: Is it clear that the rule preempts all state laws regarding drug tests in the work place?

ANSWER: The statement of considerations that accompanies the rule in the discussion under the legal issues has a very lengthy dissertation on that subject.

Very basically the Federal Government has the right, it is a standard generic right, if you would, that a Federal rule or law preempts a state law.

Now where our rule is silent, then, if there is a state rule, the state rule would obviously prevail. But this rule gets into a lot of specifics and covers the areas that are important to us for proper implementation of the rule.

In fact, one of the bases for having the rule in the first place was that there were some state laws that were on the books and looked like they might be enacted by the various state legislation that would in some manner impede implementation of a proper fitness-for-duty program.

QUESTION: Does the fitness-for-duty rule apply to construction before issuance of an operating license?

ANSWER: The answer to that is, yes.

QUESTION: Would fitness-for-duty testing apply to state and county emergency workers, officials—not enforcement—who report to the emergency operations facility?

ANSWER: Yes. If a state official, for example,is to be granted unescorted access to the protected area, then they must be subject to a fitness-for-duty program.

Now the licensee has the option of examining a state program and determining that it is equivalent to the program that is expected by the rule. As long as that state employee is subject to a fitness-for-duty program administered by the state that kis comparable, then he can accept the state program.

Otherwise, in order to have unescorted access—maybe I should rephrase that: The fundamental expectation is that everybody granted unescorted access will have a fitness-for-duty program that they are subject to.

QUESTION: How do you justify a different rule or standard for NRC personnel and contractors than for utility personnel?

ANSWER: As I just stated, everybody who has unescorted access to the facility will be subject to a fitness-for-duty rule. And, as I stated during my presentation, NRC employees will be subject to the fitness-for-duty program for all NRC personnel.

The primary reason, I guess I should say, for NRC personnel not being subjected to the program by the licensee is that there can be a perception by the public that the licensee could intimidate the NRC from performing its responsibilities properly. We certainly do not want to leave that implication.

QUESTION: Will the NRC's fitness-for-duty program have the same requirements as the industry rule?

ANSWER: There may be some subtle differences in a few places, but essentially the two programs will be very similar.

QUESTION: Does or will, the NRC require all NRC personnel who are or may be called upon in the event of a major nuc[illegible] accident to meet the fitness-for-duty rule lir[illegible]

ANSWER: Yes. The NRC rule requires that anybody who would participate in responding to our operations

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IMAGE EVALUATION TEST TARGET (MT-3)

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center during an emergency be covered by the rule or by our NRC program, internal program.

QUESTION: Is a call-in refusal to respond by an off-duty operator because of alcohol consumption a 24-hour reportable event?

ANSWER: No.

QUESTION: When you say contractors will not be permitted to assign any personnel previously removed et cetera, is it safe to assume this is the plant licensee's responsibility?

ANSWER: The fundamental responsibility for implementation of the rule is the licensee's. I think what we expect in this particular area, is that, in the contract, there would be a condition that would require the contractors to notify the licensee, whenever they wish to assign somebody to work at that facility, as to whether or not there has been any history of a fitness-for-duty problem. Then, it is up to the licensee to make the decision as to whether that problem has been corrected and this person can be permitted to work on the facility or afforded unescorted access.

QUESTION: Will the rule require licensees to ensure that an employee-assistance program is available to contractor employees as well as its own employees? Particularly of concern are the small independent contractors and vendors.

ANSWER: The rule only requires that the licensees provide an employee-assistance program to their employees. The rule also permits the licensees to accept a contractor's fitness-for-duty program that is equivalent to the provisions of the rule.

What that says is that if the licensee accepts a contractor's fitness-for-duty program, it must include an employee-assistance program provided by the contractor. And, of course, that program is audited by the licensee.

In the case of very small contractors, it could be that the licensee would provide the fitness-for-duty program administration, the training and testing and all of that, but they are not required to provide employee-assistance programs for contractors whether they are large or small.

QUESTION: Regarding the random, unannounced tests for alcohol and drugs, how much time will be allowed to perform tests on 100 percent of the population?

ANSWER: The rule states a rate equivalent to 100 percent. What that means is an annual rate of 100 percent. If you have 1200 people, that means 100 tests a month.

Typically, we find that several licensees test about 2 percent a week, which works out to be 104 percent per year, giving them a little bit of a cushion. It permits a fairly stable testing basis, if you would, throughout the year.

QUESTION: Has the Commission definitely eliminated the 300-percent option for the random drug testing rule?

ANSWER: As I stated, the rule that is before the Commission, and what the Commission has indicated to the staff, is that we will have a 100-percent rate.

We might see some adjustments in that rate as we go down the road and gain some experience. Whether it will go up or down, I cannot predict.

I would hazard a guess, if I could at this point, that it is unlikely that we will see the 300-percent testing rate at least in the near future.

QUESTION: At present there are few HHS-certified laboratories. The proposal requires test results within the specified time frame. Has the NRC considered the effect that the required use of certified laboratories will have on the ability of the licensees to meet the time constraints of the rule with the volume of tests going to a few certified laboratories?

ANSWER: First, frequent delays were encountered with fingerprint results when that rule was implemented.

Yes, we have looked at the laboratories and have had several conversations with the National Institute on Drug Abuse, which is in the process of certifying testing laboratories. There are a number of laboratories that are currently approved and the institute plans on adding more to them. The institute anticipates, I do not know that this is what we are going to end up with, but it anticipates having something on the order of 50 certified laboratories throughout the country by the end of this year.

The National Institute on Drug Abuse has stated that it feels it would take only a few of these laboratories to meet all of the anticipated capacity from the nuclear industry. So there is plenty of excess capacity for not only the NRC but the Department of Transportation and the rest of the Federal Government.

QUESTION: Do you, the NRC, intend to encourage certification of more laboratories to perform drug testing?

ANSWER: I think we have had those discussions.

> *QUESTION:* Why 24 hours for reporting drug activity? This implies the NRC will be taking some action on the report.

ANSWER: We require what we regard to be significant events to be reported within 24 hours. The reason is, first of all, because they are significant. Second of all, we may very well take some sort of action. We will most certainly discuss the event with the licensee to make sure we understand the full nature of it.

It could be that, in some cases, you will see a reactive effort by the region to come out and visit your facility and look at how the particular event was handled.

> *QUESTION:* Please explain the indication of discharge for cause, only an individual's access to another site other than the site from which he or she was discharged.

ANSWER: I am not sure what the question is. Basically, if somebody is removed for cause, well, the context in which we talked about a person being removed for cause was if they refused to submit a specimen or resign.

If somebody has been removed for cause because of a fitness-for-duty problem at one facility, then the purpose of the tracking system is to obtain that information from the previous employer. Basically, as the Commission said some time ago, their purpose really was to prevent a person from having several bites out of the apple, to move from one facility to the other and keep getting a first positive test result but never getting the second.

So, if a person had tested positive at one facility and moved on to the next, the second facility should pick up that information, make the decision whether they want to hire this individual and grant them unescorted access.

If they do, then they would treat him as if he had, or they should treat him as if he had been an employee and had tested positive as an employee before they hired him as far as how they administer their program.

I think I have taken up enough time.

Mr. Regan:

> *QUESTION:* At what point in the NRC does the technical content and the human factors issues come together, i.e., is this at the branch, division, or office level?

ANSWER: With time this coordination has changed. At one time a couple of organizations ago, coordination was at the branch level. In other words, both the technical and human factors aspects were within one branch. Later on, coordination took place at the division level. Currently it is within the associate director or technical programs; it is within another division.

However, as a practical matter, coordination is extremely close. Wayne Hodges, who is Chief of the Reactor Assistance Branch, has responsibility for the technical guideline review and works very closely with me on emergency operating procedures. So, as a practical matter, coordination is excellent.

Mr. Perkins:

The question that I received before that I had not had an opportunity to read asked for some detail on our plans for revision on initial examination.

I am forecasting to you that we plan to revise the initial examination program. The details are not all worked out.

The questioner was interested in knowledge and ability and job performance measures and how they would be developing.

We will try to parallel requalification to the extent that it is appropriate, recognizing that we are dealing with an initially licensed individual as opposed to an individual who has been at a site and has some operational experience over a period of time. There will be some differences in the expectations.

On the operating examination, I do foresee that we will use a dynamic simulator portion of the operating examination. The difference from the requalification program would be that it would be inappropriate to place the same emphasis on crew performance for an initial examination as we place on crew performance in a requalification examination.

In the walk-through, we will identify the appropriate job performance measures, working with facilities, for a person being initially licensed.

Now I think that we will have to wait for any further details on what the program is going to look like until the staff has had a chance to develop some kind of a straw man. Then we will be happy to give you more detail.

Mr. Roe:

Thank you, Ken. We have one final question, clarification. Brian Grimes, who is the Director of the Division of Reactor Inspection and Safeguards, has some comments on fitness for duty.

Mr. Grimes:

As Loren said, anybody with access to the protected area is going to have to be under a fitness-for-duty program. With regard to most state and local people who respond to emergencies, I cannot think of any instance where anybody would be absolutely required to come inside the protected area in an emergency.

So for the most part, we are going to be reporting to the emergency operations facility, which is outside the protected area. Although we would like to see people who are assigned to go to that facility covered by the rule, state and local people will not be covered.

The other aspect is that some states have residents and they may be reluctant to come under a licensee's fitness-for-duty program. I think, if you have a case where a state has a resident at your site who is reluctant to come under the fitness-for-duty rule, the NRC would be willing to work with you and the state to make some arrangement to cover that person under the NRC rule.

Just one other thought, when the rule is published, there will be a notice in the *Federal Register* that will summarize responses to public comments. A NUREG document will also be issued that will have in detail all the comments and responses.

Mr. Roe:

Thank you, Brian. That brings to conclusion our formal question-and-answer session. Panel members will remain here for a while if you have informal questions. Thank you very much for your attendance.

9 SESSION 8: ENFORCEMENT AND INVESTIGATIONS

Mr. Steven A. Varga:

Good morning. My name is Steve Varga, and I am the chairman for this session on Enforcement and Investigations. I think this is going to be a very interesting session based upon some of the comments that I have received. I look forward to a lot of discussion about the two subjects that we are going to be discussing.

We are fortunate to have Jim Lieberman, the Director of the Office of Enforcement, who will be speaking about enforcement policy. We have Bill Russell, the Regional Administrator of Region I, who will be discussing the implementation of enforcement. We have Ben Hayes, Director of the Office of Investigation, and Bob Martin, the Regional Administrator of Region IV, who will be discussing allegations from the regional perspective.

So what we would like to do is present each one of the discussions rather succinctly, and entertain a question or two after each speaker concludes. However, I would encourage you all to write your questions on the little cards that are included in your brochures, indicate the speaker to whom the question is directed, and we will collect those. At the end of the four speakers' presentations, we will rotate a round-robin session answering those questions.

I might point out that there is a plenary session this afternoon at 3:15 where further opportunity for questions may arise.

So without any further elaboration, let me get right to the heart of the matter, and I will have Jim Lieberman to head the discussion on enforcement.

Enforcement Policy

Mr. James Lieberman:

Thank you, Steve. I appreciate the opportunity to be here today to discuss the NRC enforcement program.

My goal is to provide an overview of the NRC enforcement program so that if you are subject to an NRC enforcement action, you will have an understanding of the policy and where NRC is coming from.

Following my talk, Bill Russell will be discussing some applications of the policy.

There is much discussion within the nuclear industry of seeking excellence. Chairman Zech has emphasized that even the best licensee can do more to improve safety and performance. The focus of enforcement is not on the failure to achieve excellence but rather on assuring that the minimum regulatory requirements established to protect the public health and safety are met.

We recognize that there will be some noncompliance in enterprises as large and complex as nuclear power reactors. However, neither the NRC nor the utilities can tolerate failures that may have the potential to affect the public health and safety. I use the term "potential" because that is the threshold of emphasis in the enforcement program. A direct impact on safety, such as an offsite release, or an over exposure, is not necessary before we have a significant regulatory concern.

The fundamental goal of the enforcement program, which I am sure is shared by all of us, is to emphasize that failures of equipment, systems, and human performance need to be identified and corrected before there is an impact on the public, including the workers at a nuclear facility.

The NRC enforcement program is based on "The General Statement of Policy and Procedure for NRC Enforcement Actions," which is found in 10 CFR Part 2, Appendix C, of the Commission's regulations. The purpose of NRC enforcement actions is to promote and protect the public health and safety by (1) ensuring compliance with NRC requirements, (2) obtaining prompt correction of violations and adverse conditions that can affect safety, (3) deterring future violations, and (4) encouraging improvement in licensee performance.

Some have questioned the need for enforcement actions with a negative impact on licensees who, for the most part, are trying hard to comply with the many requirements of the Commission. Licensees, it is recognized, have an inherent incentive to safely operate their facilities. No one wants another TMI, or worse. Extended shutdowns for performance failures have significant economic costs. Nevertheless, notwithstanding these incentives, there are failures to meet regulatory requirements.

Let me give a few examples. Designs have not always assured that safety systems function as intended. Technical specifications are not always followed. Supervisors and licensed operators are not always attentive to duties. Maintenance is not always correctly performed. Deficiencies are not always identified, and when identified, are not always properly corrected. Proper radiation surveys are not conducted, and persons have been discriminated against for raising safety issues.

The enforcement program is designed to provide additional incentives to avoid these and other failures and to emphasize the need for meticulous attention to detail and to maintain the high standards of compliance that both the Commission and the public expect from NRC licensees.

Before getting into the policy, it may be helpful to understand some of the NRC internal processes used in developing enforcement actions. The Office of Enforcement, which reports to the Executive Director for Operations through the Deputy Executive Director for Nuclear Materials Safety, Safeguards and Operations Support, is responsible for developing the Commission's enforcement program and for overseeing its implementation.

Enforcement is, however, primarily a regionally driven program. The regions initiate and issue most notices of violations including those involving proposed civil penalties. The regions generate and process more than 90 percent of the enforcement actions without involvement from the Office of Enforcement. My office becomes involved in cases once the region decides to hold an enforcement conference.

Cases that involve violations characterized as Severity Levels I, II, and III are called escalated cases and are required to be approved by the Office of Enforcement and the Deputy Executive Director. This approval process may include reviews by the Office of General Counsel and, in the case of reactors, by the Office of Nuclear Reactor Regulation. This process, which is often time-consuming, is conducted so that escalated actions reflect agency-wide positions.

With that background, let me now focus on the enforcement policy. Recognizing that violations have varying degrees of significance, a graded enforcement process is used to distinguish between minor and significant violations of regulatory requirements. The three basic enforcement tools are notices of violations, civil penalties, and orders.

The first step in the process of determining whether to initiate an enforcement action is to determine the severity of the violation. Five severity levels are used, Severity Level I being the most significant and Severity Level V being of minor concern. A Severity Level III violation is defined as a violation of significant regulatory concern.

The policy provides for examples in characterizing violations in eight supplements for different areas of licensed activities. These include examples for reactor operations, safeguards, radiation protection, transportation, and miscellaneous matters. This last category includes examples for failure to provide complete and accurate information and discrimination against employees for being involved with the protected activities. Discrimination here refers to taking action against employees for raising safety issues to either their management or the NRC. Licensees found to have discriminated against their employees may be subject not only to remedial action by the Department of Labor to compensate the employee, but also subject to NRC enforcement action.

It is important to note that the examples in the supplements for the severity levels are only guidance. They are neither exhaustive nor controlling. Judgment is used in determining the severity level best suited for the circumstances of the particular case. The characterization process considers not only the individual safety significance of the violation viewed in isolation, but also the circumstances surrounding the violation including its root causes.

In the October 1988 revision to the enforcement policy, a number of significant changes were made to the examples in the supplements. Let me highlight a few.

Supplement I, "Reactor Operations," was changed to emphasize that a licensee who violates 10 CFR 50.59 and operates in an unanalyzed condition may be subject to a Severity Level III violation even if after-the-fact analysis shows that an unreviewed safety question or a conflict with a technical specification did not exist. This provision is intended to capture the circumstances where a reasonable engineer would need to perform an evaluation before concluding that an unreviewed safety question or a conflict with a technical specification did not exist and an evaluation was not performed.

Extensive changes were also made to Supplement III, "Safeguards," to provide more flexibility to address the significance of safeguards violations, particularly in the area of access controls. This area has resulted in a number of escalated cases and has been the subject of controversy both within and outside the safeguards community. The key issue here is that the significance of an access control violation is the function of the ease of exploitation. The policy has been changed to consider the predictability, the identifiability, and ease of passage demonstrated by the violation in determining the severity level of an access control violation.

Returning to the process, the next step after characterizing the severity level is to determine the type of enforcement action to be taken. Usually, all violations result in notices of violations. However, in order to encourage licensee actions to identify and correct violations, certain Severity Level IV violations and Severity Level V violations would not result in a notice of violation. These are those violations that are documented in an inspection report; licensee identified; reported to the NRC, if required; corrected within a reasonable time; and are not repetitive or recurring.

The October revision also allows not citing for Severity Level V violations that are isolated and corrected before the inspection ends, regardless of who identifies the violation.

If the violation involves a Severity Level I, II, or III violation, or a recurring Severity Level IV violation, an enforcement conference is normally held. To me, this is the most important step in the escalation process. There are two purposes for holding an enforcement conference. First, the conference is used to ensure that the licensee understands the NRC's views concerning the significance of the violations and the need to take effective corrective action. The second purpose is to provide the licensee an opportunity to bring up factual differences in the understanding of the violation, any extenuating circumstances, the licensee's views on the safety significance of the violation, the licensee's corrective actions, and the licensee's views on the application of the escalating and mitigating factors in the enforcement policy.

The conference is not a meeting to debate and negotiate the sanction. The NRC will discuss the facts and the issues, but not severity levels or the amounts of a possible penalty. It is important that when a licensee leaves a conference, it has understood the NRC's concerns and the licensee has presented its views on the matter. For the enforcement conference to be useful, the exchange of NRC's and licensee's viewpoints should occur. In the past, some licensees have not effectively used the enforcement conference to communicate their understanding of the violation and the associated safety significance, root causes, actions to correct the situation and those steps taken to avoid future violations. Poor preparation and grasp of the facts and issues by the licensee's managers do not present a positive reflection of the licensee's attitudes towards safety. Detailed handouts with the licensee's position are helpful for conducting the conference, as well as in the review of the licensee's position. My concern is not on the quality of the presentation but whether the root causes and effective corrective actions have or are being developed.

Let me assure you that the NRC staff evaluates the information presented during the enforcement conference, our minds are not made up and finalized before the conference has ended.

Following the conference, the regional evaluation of the case is completed. If it is determined that no violation occurred, or that the violation is a Severity Level IV matter to be treated by a notice of violation, the region proceeds. If, on the other hand, the region believes the matter involves (1) a Severity Level IV violation deserving of a civil penalty, (2) a violation that should be categorized as a Severity Level IV but fits an example of a Severity Level III problem, (3) a violation at any severity level involving willfulness, or (4) a Severity Level I, II, or III violation, the case is referred to my office for headquarters coordination and approval.

Let me now focus on Severity Level I, II, or III violations. These are by definition violations of significant regulatory concern and are never acceptable. Consequently, civil penalties are frequently used to emphasize our concern and to (1) encourage effective and lasting corrective action by the licensee involved, as well as other similarly situated licensees, for the purpose of deterring future significant violations and (2) to encourage licensees to which significant violations have occurred to identify, report, and correct them. In my view, the desire to avoid civil penalties with their attendant negative impact contributes to improved performance. Licensees should recognize that while civil penalties are not the only indicator of poor performance, those who are repeatedly subject to civil penalties are frequently considered poor performers. Such licensees need to clearly examine their past performance and management controls to take effective actions to avoid more stringent sanctions.

Therefore, to provide added incentives to identify and correct significant violations when a Severity Level I, II, or III violation occurs, the staff considers civil penalties. There are six factors that are considered in arriving at a civil penalty determination. Application of those factors is intended to provide messages to the licensee in the interest of improving performance. Balancing these factors may result in no civil penalty and, conversely, may result in civil penalties even if a licensee identifies and corrects a violation. In some cases, notwithstanding the factors, the staff, to increase incentives for identification and corrective actions, may exercise discretion and not issue civil penalties.

If the decision is to consider civil penalties, the first step is to establish a base civil penalty value from Table 1 of the Enforcement Policy. For example, $50,000 is a base civil penalty for a Severity Level III reactor violation.

There are six assessment factors that are then considered. These factors are identification and reporting, quality of corrective action, previous past performance, prior notice, multiple examples, and duration.

Because of the recent changes in the policy, I will focus on two of the factors. First, identification and reporting. To encourage self-identification, a penalty may be decreased if the licensee identifies a violation. To provide an additional incentive for licensees to identify violations, a penalty may now be increased if NRC identifies a violation. Given the number of licensees' employees, the limited number of NRC inspectors, the audit nature of NRC inspections, Severity Levels I, II, and III violations should be identified first by licensees. NRC should not need to be identifying significant violations. Therefore, it is appropriate in our view to increase a penalty if NRC identifies the violation.

The prior notice factor was also substantially changed. A penalty may be increased if a licensee had prior notice of a potential problem by its own actions, its responsible employees, industry, or the NRC, and did not take effective action. This factor provides an incentive to respond to notices of safety issues.

It is important to note that this factor applies where there is notice arising out of activities of a licensee at other facilities it controls. If a licensee is aware of a significant issue at one of its facilities that needs corrective action, it should consider the application of corrective action at all other facilities that it controls. This factor should provide additional incentives for the licensee on its own to identify and correct problems at all of its facilities. The licensee should not be dependent on the NRC to identify a violation once the licensee has had reasonable notice of a potential problem. This does not mean that every similar violation at another facility of the licensee will be cause for escalation. However, escalation may occur if it was reasonable to expect the licensee to consider the need for corrective action at its other facilities.

In addition to the six factors, a penalty may be increased because of willfulness or significant breakdowns in management controls.

Now, let me turn to situations in which discretion may be exercised not to issue civil penalties for Severity Level III violations for the purpose of providing incentives for licensees to identify, report, and correct violations on their own initiatives. There are five cases set out in the policy, but whether to exercise this discretion is dependent on the circumstances of each case.

The first example involves plants that are in an extended shutdown because of poor performance. Additional action in the form of civil penalties may provide disincentives to some employees who are trying to identify additional violations that occurred before the shutdown.

The second case involves licensee-identified and -corrected violations where the violation was not reasonably preventable by licensee action in response to a previous regulatory concern or prior notice of a problem. This case is intended to avoid penalizing the licensee whose current performance is consistent with the objectives of the policy, that is, the licensee is identifying, reporting, and correcting violations.

The third case involves past violations that are not likely to be identified during routine activities of a licensee. Many licensees are embarking on major voluntary efforts to review past activities such as having an SSFI [safety system functional inspection] or a design-basis reconstitution program. From a safety perspective, clearly there are benefits for both the licensee and the public to have past problems—such as those involving engineering, design, or installation—identified, reported, and corrected before a system with deficiencies is called upon to operate. In these cases, discretion may be exercised if the licensee is aggressively pursuing a formal program to identify and correct past problems.

The fourth case involves additional occurrences of a violation for which enforcement action has already been taken. This change is to encourage the licensee, as part of corrective actions, to identify additional violations with the same root cause without the concern that it may be penalized.

The final case requires prior Commission approval and allows the exercise of discretion where application of the normal policy is not warranted.

Application of the civil penalty factors and discretion have resulted—for power reactors for 1988—in 91 civil penalty cases, including the 33 civil penalties issued to the Peach Bottom operators, and 17 escalated cases without civil penalties.

In addition to civil penalties, orders may be issued. Orders are relatively infrequent. Confirmatory action letters are a more frequent action. This is a formal agreement of a licensee to take or refrain from some action. Be aware that while a confirmatory action letter is not directly enforceable, the failure to meet a commitment in it is a significant concern. The staff is prepared to issue orders to ensure that those commitments are met.

Let me turn to actions against individuals. In the past year, the Commission for the first time has issued civil penalties to licensed operators. Notices of violations and letters of reprimand have also been issued to operators. Orders have been issued to remove both licensed and non-licensed individuals from licensed activities. The 1988 revisions to the Enforcement Policy made it clear that enforcement action may be taken against an individual's license or against a corporate license that may affect an individual if the person's conduct places into question NRC's reasonable assurance that licensed activities will be properly conducted. I would expect that this is an area that will be getting more attention in the future.

I have been discussing the civil enforcement program under the Atomic Energy Act. There are also criminal sanctions available for willful violations of Commission requirements. In that regard, the NRC and the Department of Justice recently completed a Memorandum of Understanding that should provide a framework to better coordinate civil and criminal cases.

Ben Hayes will shortly be discussing the investigational process that may lead up to a criminal referral.

In closing, let me emphasize that escalated enforcement actions are considered significant regulatory actions. I encourage you to review the actions taken at other facilities, learn the lessons from them, and take the necessary actions to avoid similar problems at your facilities. You can obtain a compilation of past escalated cases by subscribing to NUREG–0940, which is published quarterly. In sum, it is our intent to have a tough-but-fair enforcement program that encourages good performance and penalizes poor performance.

I look forward to your questions later on, unless we have some now.

Mr. Varga:

Perhaps we could take a question or two, if there is a question or two. Why not use the microphone that is right there behind you, Jack.

QUESTION: You gave us some statistics on enforcement actions in the most recent year. Do you trend enforcement actions, have there been more in the last two or three years than there were in the early 1980's, or something along that line?

Mr. Lieberman:

It varies from year to year. I have the statistics for each year. This year it was a little more than the last year, but in 1986, it was more than in 1987. I think it is just a function of what licensees are doing. We certainly do not have any scheduled goal that we are trying to meet. If that answers your question.

Mr. Varga:

Any other questions that we could take now? Then I encourage you to put any questions that you may think of on the cards, and we will collect them and address them after we are through with the speakers.

The next speaker now will be Bill Russell who will discuss from the regional viewpoint the enforcement policy.

Mr. Lieberman:

If you are interested in specific data on the number of civil penalties that we have given for the last few years on reactors: in 1984 we had 35 civil penalties, in 1985 we had 39, in 1986 we had 52, in 1987 we had 46, and in 1988 we had 58, not counting the Peach Bottom operators.

NRC Enforcement Trends

Mr. William T. Russell:

Good morning. I am going to start out a little bit differently. Jim has described the policy we use, and he characterized that that policy was used for cases where NRC regulatory requirements were not met. It is clearly a licensee's responsibility to meet those requirements. But I think it is also important to realize that if you substantially exceed those requirements, the number of times that you get close to or that you fall below NRC minimums is smaller. It is very important to encourage that excellence. As a result, I identified, in the paper, the things that I think are most significant to a licensee's organization to improve performance and increase the margin between where we would be discussing an enforcement action and your current performance level.

I think these are equivalent to seeking excellence in operation. They are pretty straightforward. I used a dollar sign ($) to highlight them rather than a list of bullets because I think it is a way that you can save money. Let me go through them:

($) Use the best possible equipment, and assure that the criteria for safe operation and maintenance of the equipment are met.

($) Hire well-qualified personnel; train them properly; equip them with good procedures and administrative controls; communicate the basis for the procedures and the administrative requirements; and demand procedural adherence.

($) Clearly delineate personnel responsibilities; demand and reward good performance; discipline poor performance; and communicate to others the lessons learned.

($) Create and foster a safety attitude and culture within your organization, and quickly identify problems, assess them, and correct them.

($) Create an atmosphere of teamwork and communication where personnel recognize that individual and department goals exist only to foster the overall goals of the organization.

($) Expect all managers from the chief executive officer down to the first line supervisor to be aware of, involved in, and support safety activities and quality assurance activities.

($) Periodically perform critical self-assessments of all aspects of plant performance.

Now, I have taken the time to discuss that because I want to go through and give some examples later in the talk where utilities that met those attributes, even though they had violations that would otherwise result in civil penalties, had the civil penalties completely mitigated.

Jim has discussed the role of enforcement. A lot of times we focus on the size of the civil penalty or the action or what gets into the newspaper, but more importantly, in my view, is the quality of the corrective action that is taken by the utility and whether that corrective action has a lasting effect or not.

If a problem or violation is repeated, and we come back to discuss it at another enforcement conference, that in my opinion is a significant failure and is one of the reasons that the policy provides for escalation.

At the same time, we wish to encourage performance by specific licensees. We recognize that from time to time, violations may occur and where that does happen, if the licensee has been effective in identifying and reporting the problem, takes prompt corrective action, has a good prior history, and if it was an event that the licensee did not have a reasonable basis to identify earlier, if there were not multiple examples, and if it was of a relatively short duration, in cases where those factors are met, it is the staff's intention to reward that licensee by potentially fully mitigating the civil penalty.

Similarly, as Jim identified, there are plants in extended shutdowns where there has been, as a result of licensee initiative, an identification of problems; there has been a comprehensive corrective action program put in place; the issues identified and corrected were timely and were not normally more severe than a Level III. In those instances, we can also fully mitigate and, in some cases, not cite as a violation the items identified by the utility.

I intend to give some examples of each type, as well as some examples in which we have increased the size of the civil penalty or taken other action where there has been poor performance. In want to provide a balance through examples to show that we are intending to use the enforcement policy to reward good performance in identifying, solving, and correcting problems and, at the same time, to escalate or become more severe in those cases where the requirements are not followed.

Because I am more familiar with cases from Region I, I intend to use those cases. And because I think that it is appropriate where a utility, even though it has had a problem, has done well, I will identify the facilities that were involved.

The first example I would like to talk about is an event that occurred at Beaver Valley, Duquesne Light Company. The licensee had a situation where two of four channels of containment spray and containment isolation were bypassed during operation. The licensee identified the situation through its normal surveillance program and promptly corrected it. A very extensive root-cause analysis was performed. Essentially, it was discovered that, while there were no individual violations of the procedures, there were conflicts between procedures. The surveillance procedure called for the component to be put in either bypass or normal operation, depending on the mode of operation of the plant at the time. However, this occurred during a plant startup while plant operation was in a changing mode. This resulted in two channels being bypassed and two other channels being operational—the two procedures somewhat overlapped in time.

We felt that because of the prior performance of the licensee, the quality of the root-cause analysis, and the actions that were subsequently taken, this was an example where full mitigation of a civil penalty was appropriate even though it was a Severity Level III violation.

A second example that I think is quite significant, occurred at Yankee Row. In this instance, the licensee was in the process of doing an upgrade of the nuclear instrumentation—shifting from the old mag/amp style nuclear instruments—when it discovered that over the course of years, the fine-gain adjustment on the nuclear instruments had been improperly controlled and it was possible that periods of time of operation, the instrument gains, were such that they were outside the safety limits of the facility.

Again, this was identified by the licensee. There was a prompt and effective evaluation of the problem; it was reported in a timely manner; and the facility had a good prior operating history. In this case too, although the violation was identified as a Severity Level III, the civil penalty was fully mitigated.

Jim mentioned an example of a facility in an extended outage that was being held down for other problems, that is the Pilgrim facility. In this instance, the licensee identified problems with fire-barrier penetrations and seals. Through its own efforts, the licensee identified some 4000 penetration seals that had not been found to meet the acceptance criteria of its own program. The licensee promptly put compensatory measures into effect and upgraded the seals. As a result of this significant activity on the part of the licensee during an outage that was for other reasons, we concluded that it was not appropriate to cite the licensee or take enforcement action.

Let me shift to the other end of the spectrum and give you some examples where the staff has escalated civil penalties significantly because of continuing poor performance and prior problems. The first example is one that most of you are probably familiar with: the Peach Bottom shutdown order and civil penalty action that was taken. We issued a civil penalty of $1,250,000 and some felt that it could have been even more severe.

The history of past performance at that facility showed that there had been six civil penalties and one order in the past four years. We had had the utility in for 14 enforcement conferences. We had issued four confirmatory action letters covering such issues as violations of technical specifications, radiation protection requirements, fire protection security programs, and discriminatory practices. We had had enhancement programs, betterment programs, and upgrade programs. In general, we found that the activities on the part of the licensee, even with the various enforcement tools we had used, were not effective in turning around performance. As a result, we issued the largest civil penalty that the agency has ever issued to a facility.

Another example of what I will characterize as "escalating enforcement" relates to Nine Mile Point, Unit 1. We had concerns with this facility related to the ability of management to identify problems and follow up on them. We issued, in one instance, a civil penalty of $50,000 because of a violation that essentially had that root cause. Shortly thereafter, additional problems were identified in another area, inservice inspection, that had the same fundamental root cause. That is, problems were known to the organization, but were not being acted upon appropriately by management. We escalated that civil penalty to $100,000.

Later, as a result of reviews of this continuing trend of performance, at a senior management meeting in the summer of 1988, we concluded that this facility's performance was one that merited close agency-wide monitoring, and we put this plant on the—sometimes referred to in the industry's jargon—agency's problem-plant list.

Through the confirmatory action letter process, we are having the utility evaluate its overall performance problems, identify the root causes, and propose to us activities that will turn around performance because the trend, up to that time, was one in which the licensee's previous programs and responses had not turned around performance.

I think it is important to recognize, and I believe, that the staff has been consistently using the policy. I personally believe that the revisions to the policy, which provide recognition for a utility's self-assessment, identification of problems, and timely corrective action, are a step in the right direction. We intend to continue to use it.

Thank you very much.

Mr. Varga:

Are there any questions that we could take for the moment?

If not, be sure you fill out your cards so that we can have Bill answer whatever questions you may have.

The next speaker is Ben Hayes, but I would like to take just a moment and give you a personal perception of mine.

Some time ago, although at the time I did not think it was that, I was fortunate enough to be involved in a field investigation that the Office of Investigations was conducting. Up to that time, OI people in my view—and I had had very little interaction with them—were thought of in terms of tax appraisers, IRS customs agents, that sort of thing. I was asked to participate as a technical consultant to a rather complex investigation that was taking place.

I spent about three days in various cities and was involved with other governmental agencies and the interfaces that were required. I was truly impressed with the professionalism—observing this from a rather safe haven since I was just a technical consultant—the dedication, the meticulous observance of rights, not only for the alleger but for the allegee. My thought, after talking with Ben and Bill Hutchinson and his people, was that we could learn a lot about root-cause evaluation from the way that OI evaluates and objectively comes to its conclusions.

So with that remark, let me introduce Ben Hayes.

Investigations Procedures

Mr. Ben B. Hayes:

Thank you, Steve. I did not know you really cared.

I have not even spoken, and there is already a question up here for me. He has already got a question for me, so let me get to it.

Usually when I speak, I speak for approximately ten minutes and then answer questions for a period of three hours after that. What I would like to do is just briefly go over the Office of Investigations, what we do, how we do it, what we consider our mission to be, the capabilities of our staff, my staff, the results of our investigations, and what we do with those results when we interface with Jim Lieberman and the staff.

As most of you already know, we are the investigative arm of the Commission. We are the investigators that investigate the alleged wrongdoing by licensees, their contractors, vendors, and what have you.

Wrongdoing, a basic general definition would be that of a violation of the Commission's rules or regulations by other than mistake or error. Some indication that the staff senses or sees that a violation has occurred either by willfully avoiding or evading the Commission's rules, some willfulness, some intent, something there that keys the staff to refer the matter to my office.

I will not get too much into allegations and tracking or what have you because Bob Martin is going to address that. Let me just say that the sources of our cases are from the regional administrators and from a majority of the Commission. I think you should take note of that: a single Commissioner cannot request an investigation; it takes a majority of the Commission to do so. The EDO can request an investigation or whomever is in the chair as Director of OI has the authority to self-initiate investigations.

The capability of the OI staff, I think that we have accumulated some of the most capable men and women in any investigative body that I am aware of. We have agents who served many years in the FBI, IRS, DEA, ATF, and Naval Investigative Service, Army CID, what have you. We have yet to accept a green recruit as you might call one. We look for very experienced agents and coach and counsel them in the ways of NRC and 10 CFR and what have you. Our staff usually has a very strong—very strong—investigative experience before accepting positions with us.

When we do get an allegation, we are charged with looking at that allegation to determine whether or not, in our view—even though it came from the EDO or a regional administrator—whether or not that particular allegation warrants investigation. That is usually done at the regional level. If we get allegations in the headquarters office, in my office, I dispatch those to the region because I strongly encourage a day-to-day relationship between the regional administrators and the Directors of the Office of Investigations in the regions. The allegations are basically evaluated there.

The investigation is started normally on the basis of what we call an inquiry. That is a real quick look-see at the allegation. We would probably contact the alleger, get the alleger to tell us a little bit more about who, when, where, why, and how, and try to understand the motives of the alleger. We would then interface with the technical staff to determine if, in fact, this allegation is true, do we have a violation; is it a violation of some rule or regulation; and what is the safety significance of that violation or that allegation.

Once we have accepted a matter to be investigated, after the inquiry stage, which usually lasts 40 to 60 hours on the case—it is a quick look-see—the matter then goes into what we call a full-scale investigation. A full-scale investigation usually entails interviewing all of the witnesses in the case that we feel necessary to either prove or disprove the allegation. And let me say here that as far as the Office of Investigations is concerned, we really do not have a dog in the fight as it were. Our job is to prepare a factual package of information and give it to the appropriate decisionmaker, which is usually the regional administrator, the Commission or Vic Stello, the EDO. We do not participate in enforcement conferences. We do not review Jim Lieberman's notices of violations in terms of whether we agree or disagree with the severity of that particular call. We do assist Jim and the region in understanding the facts of the case as we have developed the case.

Another important thing is that during our investigations, should we encounter or even suspect any safety issue, that matter is brought immediately to the staff for their review to determine whether or not a licensee should be notified right then and there to take some appropriate corrective action. Also, our investigations obviously entail a technical violation of some type, and we get support from the regional offices. Most of our investigations are done by a member of my staff and a member of the technical staff working as a team. Steve just briefly noted that he was the technical advisor on one particular case, and he learned how to spell the word "cocaine," in that particular case. It was a dope case that we were working on involving a particular licensee. Steve's function was to be there during the interview process so that, as we asked questions, Steve was able to ask technical questions. This happened to be in the QA area to again assess the technical significance and make a determination as to whether or not that licensee should be notified and corrective action taken immediately.

As we progress through an investigation, at that particular point, or at a particular point—when the investigator feels as though he or she has reached the end of the investigation, has looked at all the significant documents, interviewed all the significant witnesses in the case, then that particular individual sits down and makes an assessment as to whether or not, in their view, the particular allegation was proven or disproven. If, in fact, it was proven, then we are required by the Commission to make a call as to willfulness and intent. As to whether or not in our view the particular allegation was, in fact, committed and, in fact, was done intentionally or willfully.

The first call is made by the investigator in the field. I feel very strongly that each investigator should have the independence to make that call notwithstanding the review by their immediate supervisor or manager, or by my headquarters staff's review or by me, personally.

Let me say that if the investigator feels as though the investigation does not indicate willfulness. Then our directors in the field, or my directors in the field, at each of the regional offices has the authority to sign that particular case out over their signature. That is, they write it up, they say that the allegation may have been true but that they do not feel it was done willfully, intentionally, and it is issued at the regional office level.

If, on the other hand, the investigation indicates that there is some willfulness and intent involved in the violation or the allegation, then the investigator draws that conclusion in the written report. You will find that that is basically the only place in our reports where there is a conclusion. The report is reviewed by that particular agent's immediate supervisor. If there is agreement with the agent, then it is forwarded to the headquarters office. The director of OI, me, personally, signs off on all cases where there is a substantiation of a willfulness call.

When the case comes into my headquarters office, I have other investigators that have worked with me, and they do a QA/QC review of that entire report and make a recommendation to me through the Deputy Director. If we feel as though the case crosses the threshold of criminality, then the matter is referred to the Department of Justice for their continuing investigation. The report is issued out of my office to the staff or to the requesting person.

Let me address one of the questions that came up, at least a partial question. My office does not investigate to the level where we can say a criminal act was committed. My office investigates to the point where we feel as though the particular decisionmaker, the staff, has sufficient information to make a regulatory call, a civil call. At no time am I aware of any referral to the Department of Justice that was given to a grand jury and indicted just on the information we had provided to them. It is a suspicion of a criminal action. Usually a grand jury is impaneled and the investigation goes forward to meet the particular indictment criteria.

We do not, let me emphasize, we do not investigate to that criteria. Therefore, the matters that we refer to the Department of Justice if they elect not to pursue the matter, then they do not have the FBI or whomever continue the investigation. In many instances, they elect to do so and will write to us and ask for our investigative support, which in the past, we have been able to give them. They also will ask for technical support. As everyone in this room is well aware, the rules and regulations of the Commission are somewhat technically oriented and we provide engineers and support personnel to the grand jury to move those cases along.

I have statistics, so I will finish up here with some broad statistics for you in a few moments.

If a field office agent feels as though there has been a call or an act of willfulness and it comes to the headquarters staff and I look at it and I say, no, I do not think so—and there have been some disagreements between me and the agents in the field—we have developed a check and balance system. I will take that particular case and forward it to three other regional OI offices, and not allow them to communicate with each other, and elicit their views. The bottom line is that I have the 51 percent. But the file is well documented as to the views of everyone, and sometimes I accept it, and sometimes I do not. That is just the way it is.

Let me touch a little bit on some statistics. We have initiated in excess of 1000 cases so far in the history of OI, from January 1980 through March 31, 1989. But OI came into being I believe in July of 1982, if I am not mistaken, and I came aboard in February of 1983. To date, we have forwarded to the Department of Justice in excess of 100 matters for their consideration, which have resulted in 16 convictions so far. Seventy of the 112 have been returned to us in which they elected not to pursue the matter criminally through additional investigation or what have you. We have two indictments right now pending, two trials, and 21 cases are under review by the Department of Justice now to determine whether or not they want to go forward with those cases.

We also have some pending indictments coming out probably in the next 60 days by region, possibly in Region IV, hopefully in the next 90 days in Region V, we are working with the Department of Justice in some of those matters.

Let me touch a little bit, as a sideline issue, on some vendor matters that have concerned us and occupied a lot of our resources in the last twelve months or so. We have and are required to maintain liaison with other Federal agencies. In doing so, a year or so ago, we started to get information concerning product substitution of material coming in where the certifications were falsified. Material that was just not up to the quality and standards that are required in this industry. We are investigating approximately 20 cases around the country involving circuit breakers, valves, flanges, pipe, et cetera.

The reason I mention this issue is because it is of major concern to us. It is requiring a lot of our resources. For the most part, in fact, I know of no instance today where I can stand here and say that there is any culpability on the part of our licensees, the power reactors; in most instances those particular people involved have been very cooperative and are facilitating our investigations. We are trying to identify and trying to, basically, bring to the bar on the criminal side of the house those particular vendors that have taken it upon themselves to falsify documents or material. So we are actively involved with that.

If any of my staff approach you on these particular investigations, I would elicit your cooperation. I think it is best for all of us.

With that, I will sit down, Steve, and entertain questions.

Mr. Varga:

Are there any questions we could take for the moment? Please step to the microphone if you have one.

Mr. Hayes:

Pat McDonald always has a question.

Mr. McDonald:

I have a question; I do not have a microphone.

Mr. Varga:

Well, let me see if we can hear you, Pat, and if we cannot, I will repeat the question.

Mr. McDonald:

Do you have any authority to investigate fraudulent commercial-grade procurements? That is, if it is a non-safety-related item and does not have a specified safety-related QA, do you have any authority to investigate an apparent fraudulent component?

Mr. Hayes:

Yes, we do and we are. The basis for that is, at least in my view and possibly it is shared, that a particular vendor that would produce a fraudulent commercial item, would be subject to investigation. We would go out to that vendor and get its customer list, look at their QA standards along with the staff, and try to determine whether or not that particular vendor has sold any product to any NRC licensee, including the power reactors. As you well know, we have 7000 other licensees out there.

We try to determine whether or not any of that bad product has in fact infiltrated into the nuclear system. So we do it in that vein, Pat.

Mr. McDonald:

But there is no question of your authority to go to a vendor who for all we know does not sell safety-related materials? You have no problem with going to a vendor of any kind?

Mr. Hayes:

Well, I do not know about of any kind. I have to have a basis to suspect that a vendor has, in fact, provided faulty products. My role is to determine, along with the staff, whether or not that vendor supplied faulty products to any of our licensees.

Note some of the bulletins that the staff has put out identifying vendors. I think we raided a half a dozen places not too long ago on the West Coast, and the purpose of that was to get in and get their—maybe I better not talk about that—but we were trying to identify any utility—and it is usually unbeknownst to the utility—that had accepted and installed any of that particular faulty equipment.

Our job, just as any gentleman at the NRC will tell you, is public health and safety. Until we are convinced that that material has not infiltrated the system, we are going to do what we have to do, Pat.

Any other questions before I sit down?

Mr. Varga:

Thank you, Ben.

Next, we will hear from Bob Martin, Regional Administrator of Region IV, who will discuss allegations from the regional perspective.

Handling Allegations

Mr. Robert D. Martin:

I did not expect to be able to get up here this early. I am wondering why some of my predecessors did not get flooded by a larger number of questions before I reached the podium.

Mr. Varga:

They did, they did.

Mr. Martin:

Oh, they are coming.

Mr. Varga:

Yes, the best is yet to come.

Mr. Martin:

What I would like to describe is the general process for handling allegations that we attempt to follow in the NRC. I will say the "general process and "attempt to follow," because there are so many degrees of freedom that can be introduced into this very human process.

The handling of information and concerns from a wide range of people who are in a wide range of emotional states of anger, fear, other things, introduce so many degrees of freedom, that I will try to talk in some generalities about how we attempt to process these things. I think more importantly is to perhaps offer a few digressions and some personal observations on the nature of the process, the things that are not institutionalized yet, but that represent the experience that I have gained through observation and, in some cases, through attempts to improve on the process over the last 15 years or so.

So, basically, we are going to be discussing, in the main, a process. It is an expensive process. It is expensive in terms of resources, be it requiring the use of the Office of Investigations or just straight technical resources. One could argue that the amount of inspection effort, review effort, evaluation effort per allegation compared to normal inspection activities is a rather expensive process. It is a resource-intensive process.

But right at the outset, we have to recognize that—using the way we count numbers and in my experience—roughly 15 percent of all allegations turn out to be safety significant and often represent information and knowledge about conditions that we never would have been able to obtain in any other fashion. That yield, that fact, makes it incumbent on us to continue to pursue allegations, evaluate them, judge them, and follow up on them.

May I have the slide *[Figure 1]* please.

When forming a judgment about a licensee's activities, be it at a power reactor or any other facility, there are the usual sources of information. There are the direct NRC reviews or inspections or evaluations or special team assessments that go out. We do those and that is one of our information sources. There is, obviously, the large amount of information that we call upon the licensee to provide.

Then there is that third element that I alluded to in my general opening comments: the information that comes in through allegations. Now, basically, an allegation is an expression of concern by an individual. Allegations often come from individual contacts. I am speaking of those allegations that are received by the NRC, or those that we become aware of. They are usually individual contacts, often by telephone, occasionally by mail, sometimes by catching an inspector or any other NRC staff member when they may be at the facility, near the facility, at the motel in the general area, in a restaurant having a cocktail before dinner . . . we have received allegations through the full spectrum.

Usually, allegations originate from an individual contact of some sort in which the opportunity for a dialogue with the individual occurs. Occasionally, they come through the news media. Sometimes they are claims that are just made in newspaper articles, which assert information that we did not know before. We will pursue these claims, try to find out who made the assertions: sometimes it is quoted, sometimes there is an affirmation to the statement, sometimes there is not. In any event, we try to pursue it.

A lesser number of allegations, occasionally, will come from some members of the media who want to verify information that they have received or believed they have received from a source of theirs. Sometimes that places the news reporter in an intermediary role, which we try to get him out of, if possible, if there is significant information there. Sometimes the news reporters, the more responsible ones, will check with us for an independent confirmation and we will suddenly be aware that we are discussing information we have not heard before, or a perspective we have not heard before—we now have an allegation that we will then attempt to pursue.

Occasionally, we get allegations from local congressional offices—occasionally from their Washington offices. But I would say they usually come in from the local offices in the area where the activity is going on. The allegations will be referred to us by staff from the congressional office. We will look at them. Occasionally, the congressional staffers will serve as the intermediary but, in the main, they will attempt to form some mechanism to assist us to make direct contact with the alleger.

We can get notification and a number through other governmental agencies. Now, in the main, these are usually Department of Labor cases where employees of the company, the utility, whatever the organization may be, have filed a complaint with the Department of Labor for discrimination under the appropriate section of the Atomic Energy Act. In those cases, copies of those complaints are sent to the local regional office from the local Department of Labor offices where the complaints are filed. We have a starting point in that regard.

As you can see, if there is a method of human communication, we usually find a way to—or there is usually a use of that method of communication—to provide us an allegation.

[Figure 2] please.

We also have to recognize that under that provision of information, we then have the degrees of freedom by which people may or may not identify themselves—allegations may come in anonymously. If allegers identify themselves, they may rise to the level of wanting a grant of confidentiality. In general, we always handle the identity of the alleger as discretely as we can. However, a pledge of confidentiality rises to a much higher standard in which the responsibilities that are placed upon us in protecting alleger identity are much more onerous. No matter how that word "confidential" has been used interchangeably or indiscriminately over the past 20 years or so, this agency has really only had a process for handling confidential sources of information for about two, two and a half years, maybe three years. As I get more mature, time slips in terms of accuracy, but it has only been a matter of a few years.

Now, the process for handling allegations, once received, is fairly well spelled out in manual chapters, in agency policies. Basically, it addresses the collection of the allegation, the evaluation of the allegation, and the resolution of the allegation. The manual chapter, as most manual chapters would be involved, is a fairly detailed document covering a wide range of subjects.

I will not presume to go through that document in any fashion now. However, let me talk about a couple of highlights associated with that process. Fundamentally, dealing with the individual is to be done courteously, if you have the opportunity to have direct contact, which you do not always have.

The "need to know" principle generally applies in the handling of the information associated with the alleger. Even if a pledge of confidentiality has not been granted, the general process used by the region—and I think I speak for all, but certainly in our region—the general process followed is to not discuss the identity of the alleger except on a "need to know" kind of basis.

In fact, the information about the allegation is also handled carefully because the nature of the allegation can very often identify who the alleger is. This is particularly true with small licensees. It is less likely with a utility, unless the alleger holds a very unique position or function. But, if it is a small radiographer in the middle of Wyoming and there are only three people in the organization, it is not too difficult to identify, from the nature of the allegation, who the alleger might possibly be. Therefore, in some of those cases, it becomes a little bit more difficult to handle, but we still attempt to do that.

The process calls for always screening the allegation for safety significance. Then you inspect or investigate, or both, based on a priority schedule, which is driven by the safety significance of the issue. Usually, we use the criterion, "if the allegation is true, what is the safety significance." There are some exceptions to this and I will talk about those. However, during the evaluation, in order to make the first priority cut, the safety significance of the allegation must be assessed.

We try to provide basic feedback to the alleger after the agency's action is concluded. On some issues that may drag out over a long period of time for a variety of reasons, we try to contact the allegers periodically to let them know we have not forgotten them, we are still working on the allegation. We do not provide them updates or technical status however, but, rather, an acknowledgment that we have not forgotten them and the case is still being worked.

As a general premise, all allegations, "all" underlined—I hate "all-inclusive" adjectives because they always get me in trouble—all allegations are evaluated. Not all allegations are followed up. There are a number of reasons that they may be screened out.

The first screening out basically occurs because they are not under our jurisdiction: there may be a plumber who is terribly concerned about the quality of the pipe used in the toilets in the facility. That is not something that rises to our level. We will explain those concerns. We might suggest other people he might want to talk to, but we will not follow up on an allegation of that sort.

There are some allegations that are too vague. We get a lot of allegations that come in that are anonymous allegations, for example, "Plant X is all screwed up," signed, anonymous. We cannot follow up on something like that. It may be a true statement, but unfortunately we cannot follow up on that premise alone, which is one of the reasons we try so hard to obtain the identity of the individual, to be able to pursue it.

A third reason might be that the allegation really is rather crisp, rather well-focused, well-articulated, and happens to be in an area where we have just done extensive inspection or evaluation—we have formed a judgment, we have a good knowledge base of what that activity is. Either we already knew the information or we have solid reason to believe that the allegation is not correct. Under those conditions, we would not necessarily expend resources just to continue to follow up on the same issue that we have just formed a conclusion about.

Finally, the absurd. I see some of you have the proceedings open. I gave one classic example I can recall. If it was not in the region that I am in, it was during a previous assignment at another region. Literally, the allegation, a woman called in the middle of the night complaining that her husband glowed blue every time they had sex. We would not proceed to follow up on an allegation of that kind. We do get the patently absurd from time to time, and we do not follow up on them.

We do look at all of them. We also look at the number of them, the style of them, the focus of them. Now, some of these allegations may not warrant a follow up of and by themselves, but if we have a particular utility in which we have a flood of allegations come in, broad numbers of people very upset, very angry, very distressed, very distraught, there is a message in that cluster, a pattern, a grouping of allegations that is worth paying attention to. The individual technical allegations may not have much substance, but what is it that suddenly triggered a large number of that utility's or organization's employees to start flooding us with allegations of concerns? You cannot fail to pay attention to the pattern as well as the content. All of those are introduced into the basic process.

This is one of the areas where I would like to digress for a moment, offer some comments based on my experience.

All of our technical staff in the regional offices are trained in the basic process of handling allegations. They are all trained in that process because you never know when somebody is going to call and you are going to be dealing with that person in the context of handling an allegation. So we try to train everybody in the process.

I am sure you can speculate about it, and I can assure you, by the same token, that a large fraction of our staff are not very good at handling allegations. As a general rule, technical people are pretty bad at handling that kind of a circumstance. The most prevalent flaw that they demonstrate when an individual comes in with a concern is they try to answer the concern right then and there. That is to me, from my perspective, a fatal flaw in dealing with an alleger. Because, if he says, "I'm worried about such and such because so and so is no good," and you say, "well, it really is. . ." you are putting him down. You are essentially running the risk that he is going to feel put down about his concern. Now, he is not going to give you concern number two because he is not going to get embarrassed about concern number two, or three, or four, and that might be the "nugget" that is really worth looking at.

When we have the opportunity to get one on one with an alleger, we need to use somebody who has a broad enough technical background to be able to ask reasonable questions, to elicit information, and be able to write down the right kind of notes—to at least understand what area it is that may require further follow up.

The first criterion is the interviewer learns how to listen, as opposed to being inclined to talk. The second is to keep the number of people involved in the interview fairly small. I believe it is a serious error to interview an alleger with a team of four or five people, four or five technical people. I have seen it occur over and over. These technical people listen to the allegation and they say, "gee, Fred"—and Fred is not the alleger, Fred is another technical member—"If that's really true, there could be a problem about x, y, and z." "Yeah, it could be." They start a dialogue back and forth. Now, these technical people are involved with developing what might be the safety significant consequences of the allegation. The alleger now takes ownership. He says, "yeah, and that bothers me too!" We now have a new allegation from the alleger—he has been generating new concerns based on the dialogue between the technical staff.

We really have to keep it fairly small and comfortable between the interviewer and the alleger. Because if we are going to provide feedback back to the alleger, we want to provide feedback on *their* concerns. The fact that, as a consequence of the knowledge we have, we generate new concerns—technical concerns, staff concerns—that is basically our business, and we should follow up on them. But, allowing our concerns to be personally claimed by the alleger burdens our process, if we are not careful. We have to select people carefully and hold the numbers down, in my view.

There is a numbering exercise that we go into, which is troublesome at times, if we allow it to become more troublesome than it is. Sometimes we will become aware of certain types of allegations and we will decide to cluster them together, sort them, stack them, arrange them. We start worrying about how to define terms. Is this one allegation consisting of four concerns for which there are three examples each: Do you have 13, or do you have 5, or do you only have 1 allegation?

We get trapped within our numbering system because we start believing that our numbers have to match somebody else's numbers. That is unfortunate. That occurs periodically when some of these issues get thrown into a public arena. What we really have to be sure of is that we are dealing with all the same issues that someone else is dealing with. Do we have all the issues and are all the issues getting resolved. The numbering system is less important.

May I have the next slide *[Figure 3]* please.

As a related issue for the utilities, I believe they would be well advised, in my view, to make sure, perhaps during their general employee training, that they inform their staff of the distinct difference between an inspection and an investigation. We find utility employees, at all levels in the organization, including executive management, who do not understand the fundamental difference between an inspection and an investigation.

Many people claim that we have drawn that distinction when there is not a difference. That is not true. The philosophical underpinning of an inspection presumes that we are going out and we are going to confirm that things are what they should be. Now, clearly, lots of times we do not find that to be the case. But, if you study the inspection program, if you look at the methodology that is used, the strategy that is followed, the fundamental philosophical underpinning is that we are going to confirm that the things that are supposed to be there are there. Then, if we find out they are not there, we are still dealing with the first premise, which is that they are not there because of error, because of omission.

When we go to an investigation, probably through inspection or by other mechanisms, we have already reached the level of presuming that what is there is not right and it is not right intentionally—not by error, but by design, by overt act. Therefore, the strategies have to change very dramatically. The burden that is placed on OI in trying to search out such things is the presumption that something wrong has been done and was done intentionally. The finding of that is a far more complex process.

I am amazed, when investigation is under way—when Ben or his people decide to identify it—or when we come in and do an entrance interview and talk about an inspection, at the lack of understanding between those two.

Now let me talk about allegations that are turned over to licensees. Do we ever do that? After the screening and evaluation process, we come up with a number of allegations that we have to decide whether or not we should turn over any to the licensee for them to do and for us to monitor. Being a resource-intensive process and being a frugal regulator, I have decided if I can use your resources to do my work, that suits me just fine. So, I see if I can to turn them over to you.

There are a series of criteria laid out to determine under what conditions that can be done. Let me go over a very brief synopsis of the essentials.

The criteria are our conviction that the utility, the company, the organization, has the ability to follow up on such an allegation. That usually means they are a large enough organization, they have the sophistication, they have had the interaction with us to provide us with a confidence that they have the capability to look into the changes. A mom-and-pop organization, a radiographer consisting of two people. . .if there is an allegation against the owner of the company, it would be hard for us to turn over the allegation to the owner to look into the charges against himself. So clearly, there are some limits to this; but within a broader framework, there are many organizations that are capable of doing it.

The next is our ability to protect the alleger's identity because that aspect is still inherent in the process. We have to be able to transfer over the information without identifying the alleger because we will not turn over the identity of the alleger. We will turn over the issue that needs to be looked into. The issue itself might identify the alleger.

The cooperation of the alleger is another factor. There is clearly—rarely, but it occurs—the issue of the alleger's safety. Once in a while, fortunately we do not get them very often, but once in a while, we get an allegation under a set of circumstances and involving personalities in which there is a serious concern about the ability to protect the safety of the alleger. That places us in a difficult area because we do not have authority, under whatever legislation exists, to afford allegers "witness protection"—kind of physical protection. Those cases occasionally stress our system pretty severely in terms of how we can do that. Fortunately, in the main, most allegations do not involve an alleger's safety.

Our experience, given this criteria we have used and the screening we do before we turn them over to utilities or other companies, has been good. In general, the companies have done well in following up the allegations that we have given to them. In general, they have looked at them in terms of the broad implications and have done pretty well. There have been a few times we had to re-index the system, but generally speaking, they have done well.

Let me talk a little bit about licensee concern programs. In Region IV, roughly half of our utilities have some sort of system in place—some far more complex, sophisticated, broader in scope than others, but nonetheless, about half of our utilities have a formal system of a sort for collecting concerns from employees, members of the public—for the purpose of essentially following a process quite similar to what I have just described.

We look at those programs. We acknowledge the fact that they are not a required program. We certainly have urged, on many occasions—NRC as an agency and certainly in Region IV as a specific region—we have urged a lot of utilities to put in such programs for finding such difficulties, resolving them, and finding out if there is merit to them, to improve their own operations. However, it clearly is not a required activity. We look at those programs periodically to make sure that any issues have been handled appropriately from the standpoint of informing NRC, if NRC has to be informed, or for fixing any quality programs. The companies have been very cooperative with us in letting us see how their program is working and how they have been dealing with the issues. Our experience with the technical issues that are identified is really quite good. I think, in the main, we have been more than just comfortable with the resolution of technical issues.

However, when we get into the area of a wrongdoing type of allegation, we have a more mixed result. Some companies deal with them with a certain vigor and others will tend to try to not pursue them at all, if they possibly can. They will very narrowly define what the technical issue is and take the wrongdoing issue and just set it aside. So we have a less uniformly good feeling about the handling of wrong doing issues by these utility programs. I think we would certainly feel better if both the technical and the wrongdoing issues were handled with about the same vigor. We do not see that uniformly occurring.

May I have the next slide *[Figure 4]* please.

This is a quick rundown of results over about an 18-month period in Region IV. In Region IV, we had 98 allegations over this 18-month period. Roughly half of them were substantiated. About 35 percent of the ones that were substantiated, turned out to be safety significant, which makes it roughly about 15 percent overall.

I did a lot of rounding; the data is not good enough to carry it to anything more than maybe one significant figure, possibly two with luck. But about 35 percent of the substantiated allegations turned out to be safety significant, which means the others may very well be truthful statements, they were concerns, but they do not enter our jurisdiction or really have any safety significance.

Roughly half of those allegations over that period of time were technicians or craft personnel. In general, the technical/craft personnel-type allegations tend more to focus on procedural, that is, did they do the things that they were supposed to do, or their boss told them to do—something that violated procedures. There was usually a procedural component, procedural adherence, or procedure ignoring element to the majority of those. Again, these are broad generalities. About 25 percent of the allegations were from private citizens. About 10 percent from professional employees. The ones from the professional employees are the most complex. They are not necessarily the most safety significant but they are usually the most complex. We then get about ten percent from all others.

In summary, I think it is the third item [value of the results worth the expenditure] that I think remains the bottom line, that keeps us continuing to look at allegations and expending the resources that are needed. We still find a substantive amount of information, although difficult to obtain at times, that we would not have obtained in any other fashion. Therefore, we cannot afford not to continue to follow up on those allegations.

Thank you.

Mr. Varga:

Are there any questions that Bob could take at this time?

I see one.

Questioner:

Rick Anderson from Pacific Gas and Electric Company. We have had a great deal of experience with allegations and we certainly definitely appreciate the need to keep them anonymous and to protect the alleger from any kind of retaliation. On the other hand, it is very difficult for us to operate as engineers in an environment that suddenly is quite different than we are used to. We are used to open controversy, we are used to disagreements, particularly technical disagreements, and we think that good designs and good solutions come out of that. All of a sudden, we only see our part of this story and we do not see the other part.

Now my question is, is there some time limit, is there some way that we could see the other part after sufficient time has passed and after there is no opportunity or no concern about retaliation, that we could at least learn from that, from historical records of what the whole story was, so that we could perhaps gain from that and improve our way of operating with people? Is there some kind of time limit that we could have access to transcripts or investigation records that we currently do not have access to now?

Mr. Martin:

Let me respond. I think you are dealing less in an area of policy because I do not think we have really established any sort of policy in this area, except, except if there is a confidentiality agreement between the alleger and the agency. Then such a request would clearly fly in the face of that confidentiality agreement. We would have to be released from the confidentiality agreement with the alleger, by the alleger, before we could do that. Now, that is for the confidential ones.

I am not sure, under the actions of the Freedom of Information Act for allegations, how that would be dealt with in the event that the allegation has now been demonstrated, it has now been proven or disproven, whatever the case is, and the agency handling of the issue is done and over with it.

I think you raise an interesting point, which would be worth pursuing, but I do not know the answer to it at this point.

Mr. Hayes:

If I could add something to that, Bob.

With respect to the OI investigations, once the civil enforcement action's been taken, as well as any possible criminal action if there is criminal action, that particular report is available under the Freedom of Information process, exclusive of the privacy and the confidentiality safeguards. But those reports and those exhibits are available.

Mr. Varga:

Any other questions?

I think it would be appropriate if we were to take about a ten-minute break before questions. We have about 20 some questions that are very interesting. I have reviewed them all. So let us take a break and meet back here in about ten minutes.

General Questions/Answers

Mr. Varga:

We are going to start the question and answer session. We have about 25 to 28 questions. All of them are very pithy and very penetrating and we will see how far we get. We will start the way the presentations were. We will limit the questions for the first round to about three or so, so everyone gets a chance, and then we will recycle as time permits.

Many of the questions that I looked at perhaps would have more than one of the speakers who would have some input to it, so there may be an answer that will require more than one of the speakers.

We will start off now with Jim Lieberman. The procedure we should follow is to read the question and then to answer it.

Mr. Lieberman:

Okay.

QUESTION: At what point would the NRC find it important to contact a nonoperating owner regarding an enforcement action?

ANSWER: I think the basic view here is that we deal with the operating owner. So in an enforcement case, we would not deal directly with the nonoperating owner.

The second question is two different questions but they are related.

QUESTION: What do we do with the proceeds from civil penalties?

ANSWER: The NRC does not keep the proceeds from civil penalties. I have often said that if we did, we would have a stronger program. But the civil penalties go to the general treasury and it does not affect our appropriations in any way.

The followup question.

QUESTION: What agency sets the maximum civil penalty and how often is the maximum level readjusted?

ANSWER: If we are talking about other agencies here, I do not know what other Federal agencies have higher civil penalties. I do know that I have seen in the press that OSHA has given multi-million dollar civil penalties and so has FAA. As to how often levels are adjusted, Tom Gangiak initially came out with a civil penalty authority in 1969. At that time it was $5,000 for any one violation with a cap of $25,000 for all violations in a 30-day period. It was adjusted in 1980 for the $100,000 civil penalty authority and there was a bill introduced in the last session of Congress and reintroduced this session that would adjust the amounts of civil penalties to reflect inflation. I do not know where that is going.

Mr. Russell:

I have a question related to industrial safety violations.

> *QUESTION:* Please furnish examples of recent poor industrial safety practices and the penalties awarded; and then there was a request for various types.

ANSWER: Recently, the NRC has entered into a Memorandum of Agreement with OSHA, Operational Safety and Health Administration. Some examples, we have not gotten, NRC does not impose civil penalties for OSHA violations. Those are done by OSHA, but we cooperate with OSHA. We identify instances that may be violations of OSHA standards. We pass that information to the appropriate office, and we have had participation by OSHA representatives in meetings with licensees and we have provided support.

Some examples that have occurred, we have had two instances of falls, one into a reactor vessel, one into a refueling area when hydrolyzing was going on. We have had some cases where individuals have been overcome by heat when they were fully dressed in anti-contamination clothing and wearing respiratory equipment. We have also had one recent fatality associated with a diving event.

So industrial safety accidents do occur. It is a difficult line to draw when you are in a radiological health and safety area of concern that is regulated by NRC and when it is a clean line as to an OSHA-type concern. We are providing some training for our inspectors to be able to recognize these kinds of problems. We encourage that they be brought to the attention of management so that management can correct them. But, in fact, it is an area of responsibility for OSHA and not the NRC.

> *QUESTION:* Enforcement is based upon meeting minimum regulatory requirements, yet lower SALP ratings result in increased inspection. Increased inspection results in more violations, and more violations result in higher levels of enforcement. Doesn't this mean, in fact, that you are regulating and enforcing on the basis of performance excellence?

ANSWER: I could create the scenario in the converse. That is, the utility that performs well gets less inspection if they identify their own problems and bring them to our attention, we mitigate the civil penalties. Yes, we do tend to focus on both ends of the spectrum: those that perform poorly get more inspection, and we tend to find more issues by the NRC, rather than by the utility. I think that is appropriate, and that is indeed what we are doing.

So I think the question was more a statement of fact, that is what we are currently pursuing.

Mr. Hayes:

There are three cards with basically the same question.

> *QUESTION:* Has OI or the NRC staff ever considered or investigated an individual and/or organization who may have deliberately initiated an exercise to make allegations in an attempt to influence or impede the licensing application, restart, et cetera? What enforcement action or recourse does the NRC provide to applicants and/or licensees if such a situation would occur, and is there an opportunity for damages, et cetera?

ANSWER: I do not know. That is a legal question. Basically, what we do, at least from the OI perspective, is more often than not, we place an alleger under oath early in the investigation. If you will remember my prior address, I said that we usually go out during the inquiry stage and discuss the matter with the alleger, that is usually under oath, a transcript is kept. Should, during the course of our investigation, we find that any individual, any individual, has willfully misled us or lied to us in any fashion, then that particular individual would probably be referred for criminal consideration, whether it is an alleger or a licensee employee. In my view, there is no difference. The purpose of our investigation is to uncover the facts and the truth, as to the best we possibly can, and that also includes the allegers.

There have been some instances when we have looked at allegers. Obviously, I mean, we are not so dumb that we do not realize that there are motives behind allegations. We look at those particular motives. We look at the alleger in terms of: Is that individual in a professional status even capable of knowing about the allegation? What evidence do they have to support the allegation? There is a litany of criteria that we exercise to determine whether or not this investigation should go forward.

One of those criterion is, basically, to determine if this particular individual is telling us the truth. So the answer is yes, we screen those very closely. We are certainly cognizant, aware of that potential. Should we be able to prove any willfulness or intent under oath or otherwise, then we would take the appropriate recourse against that individual.

> *QUESTION:* What is the average length of an OI investigation to the report completion stage?

Does OI take into consideration the impact of publicity on the personal and professional lives of "targets?"

ANSWER: As you may know, I am under investigation now, as a matter of fact. I am being investigated by the FBI as the Director of OI, and I think there are three internal investigations on me, personally. So I can certainly appreciate this.

We have more investigations ongoing or docketed than we have resources to investigate promptly. What we have done over the past two years, I believe, is we have closed out investigations for administrative purposes, for lack of resources. We do not have enough investigators, and rather than hold these particular investigations in an open status, we have basically just stamped it closed for lack of resources, and given it back to the Regional Administrator, these two gentlemen sitting here, and then in working with Jim Lieberman, they may do a special inspection or take what we have and go with it.

But I do appreciate that particular situation. I do not know what else we can do to resolve that. Our investigations—this is something I did not cover that I think is very important—when OI receives an allegation and a request, it is prioritized from a safety-significant standpoint. On a quarterly basis, on a national basis, Jim Lieberman, myself, the regional administrators, Hugh Thompson, NRR, we get together and we review almost all ongoing investigations on a nationwide basis. If necessary, we re-establish on a nationwide basis the priority of those investigations, recognizing the health and safety impact of those cases. Some go to the bottom of the list. Those that go to the bottom of the list then become candidates for closure for lack of resources. That is the method that we are currently using to try to move our cases faster.

Shall I take one more, Steve?

Mr. Varga:

Okay, take one more.

Mr. Hayes:

QUESTION: When is a licensee informed that it is being investigated by OI?

ANSWER: Usually when we go through the gate and ask to interview someone. I would hope it would not be any sooner than that. If necessary, we will do interviews outside the licensee's premises if we think that is appropriate. We do not send letters, nor have opening conferences, nor discuss what we are doing or what have you. Usually the first notification is probably the guard at the gate says that Ben Hayes' staff is out here and they want to see Mr. Sam Jones or Sally Smith.

I have one easy one here, Steve.

Mr. Varga:

All right.

Mr. Hayes:

QUESTION: What is OI policy concerning investigators carrying firearms?

ANSWER: We are not authorized to carry firearms. We do not carry firearms. It goes along with my previous statement to you ladies and gentlemen, that is, we do a civil investigation. It does not rise to the criminal indictment stage during our investigation. An issue has to be further investigated to rise to that particular level. So, obviously, we do not arrest, we do not serve search warrants. We will go along with United States marshals, and we have done that, in executing search warrants, but without that particular criminal authority, there are a lot of things that we cannot do. I am not suggesting that we should not do them. I am just suggesting that we cannot do them.

Mr. Martin:

All right, I will take a few.

QUESTION: With regard to allegations, how big is the problem today?

ANSWER: I gather with respect to the number of hours spent.

In recent history, it is basically an up-and-down process. It is feast or famine as a general rule. One could probably go back and look over history. There is, however, I would say, a declining trend. I think there are two fundamental reasons for that declining trend in the amount of resources spent on allegations.

The major source of allegations in terms of time frame in a utility's or a facility's life usually is during the construction, more often focused towards late stage construction phase, of a project. There are less projects under construction; therefore, the number numerically has gone down. I think that is one contributor.

The second contributor, I think, is that many of the plants over the last several years in mid- to late-phase construction have instituted their own programs, and a very large fraction of allegations that would have been coming to the NRC are now being dispositioned by the licensees themselves. So I would say, in general, there has been a decline for the nuclear power industry.

In the materials area, I would say it is more consistent, has not substantially changed. It is a fairly stable workload.

> *QUESTION:* Is not the root cause of some allegations poor morale or a lack of respect for the individual and, if so, should not the point be that management should focus on how to prevent versus how to handle?

ANSWER: That is a very true issue. There are a large number of allegations that become interpersonal conflicts between individuals and their supervisors. Sometimes the supervisor is wrong; sometimes the individual is wrong. Sometimes it is a lack of communication, nobody is wrong but it is not working. Clearly, what management should do, what we look for management to do, what we expect from them is corrective action, which is really geared towards the nature of the problem. The kind of general comment made here is quite appropriate.

> *QUESTION:* How does NRC view a plant that has an unusually large number of allegations either all of a sudden or consistently?

ANSWER: I think I tried to allude to that before. If you get a sudden flood of allegations at a particular facility that has been relatively quiet, there are two things that are significant. One is the number, that that has not been a continuous problem. The other is the nature. We look at both the number and the nature of the allegations. Clearly, it is indicative that some dynamic has taken place that has caused this to occur.

By the same token, there may be the persistent, continuous, never ending, never changing allegations that come out of a particular facility. That also has its own indications. Remember, this is, again in many respects, a judgmental process.

Every so often, you narrow down to a specific technical item, a piece of hardware, a piece of gear, a broken procedure, but in the main, much of this is judgmental. There are a great deal of interpersonal interactions and you have to start reaching towards: is it a managerial problem, is it a supervisory problem, is it a morale problem?

In some cases, we have found it has been a severe training problem. People just were not trained to know what they were doing or why they were doing it. Once they were informed about why they were told, "look, do it or else," and they understood why they were supposed to do it or else, they did it, and they stopped griping about it.

So there are a wide range of possible solutions to the kind of interactions that take place.

Mr. Lieberman:

> *QUESTION:* Please estimate what percentage of civil penalties are: one, reduced as a result of a licensee's self-identification; two, are escalated as a result of NRC identification, and three, receive the base penalty.

ANSWER: This will be just an estimation because I do not have that data in front of me. I would estimate about 25 percent of the cases are reduced because licensees have identified the violations and about 25 percent are escalated because we have identified them, and that is only since October 1988 when the policy was changed. About 50 percent of the cases are neither escalated nor mitigated on identification.

Identification includes more than just who identifies the violation; it includes whether the identification was timely and whether corrective action was taken once the violation was identified, and if a report was made. A licensee may have identified the violation but not done anything with it; we are not going to give that licensee credit for identification.

The second question had to do with a revision of the policy concerning 10 CFR 50.59.

> *QUESTION:* If you are going to have a severity Level III civil penalty when the condition was later evaluated and determined not to be representing an unreviewed safety question or a technical specification conflict, this appears to be in conflict with the definition of a Level III violation. This seems to represent an error of judgment as to whether a safety evaluation was required and it would seemed to be more focused on whether staff approval was necessary or that staff approval is more important than the safety violation at issue.

ANSWER: It is a long question. I will just condense that a little bit. The real issue here is that we do not want situations to occur where it is gratuitous that a licensee is in compliance with the FSAR in the licensing basis. If a licensee makes a change to the facility and does not realize it has an impact on safety, and the licensee just lucks out that it does not present a problem, we do not find that as an acceptable situation. If reasonable people differ as to whether or not an evaluation was necessary, or you do an evaluation and reasonable people differ as to the outcome, that is not what we are talking about here. We are talking about a case in which it is clear that you would have to do an evaluation to determine whether you did have an unreviewed safety question and no evaluation was done. That we think is a significant concern.

QUESTION: Since a breakdown in QA is such a significant statement to make about a licensee's program, do you think the NRC has established sufficient guidance to both the licensee's and its inspectors as to what the NRC inspector must establish as a burden of proof before pursuing this type of violation?

ANSWER: We do not issue citations for breakdowns in quality assurance programs. We issue citations for the failure to meet a criterion in Appendix B to 10 CFR Part 50. The violation is a violation of Appendix B, not this overall breakdown in QA. This is a judgment call that, like in many aspects of what we do, we could have better guidance. I do not think anyone could disagree there. However, it is a judgment call that many people are involved in when we reach a conclusion of a breakdown, and it is obviously a very significant statement to make.

I have another question here that Ben asked me to respond to. It relates to several years ago. An investigation occurred concerning a material false statement in the Appendix R area to 10 CFR Part 50 of D.C. Cook. That particular case went down to the engineer's level and the questioner asks:

QUESTION: What is the status of that case?

ANSWER: In that case, American Electric Power Company and an engineer for that company was indicted for making a false statement to the agency concerning the status of the fire protection program and not having the modifications required by Appendix R to be completed on schedule. The district court threw out the indictment on the basis of exceeding the statute of limitations.

The case was appealed to the sixth circuit and just recently, about two weeks ago, the circuit court offered its opinion and stated that the Government could proceed on the false statement issue, but dismissed the remainder of the charges. Both the Government and the licensee are in the process of deciding whether to appeal that case.

The only message I would give to the industry on that, because the decision of the court is somewhat complicated, is that if NRC says you have to implement something by a given date, we also mean following that date, we expect you to continue having the component operable. You have to do more than just meet the requirement on a given date.

Mr. Russell:

QUESTION: NRC appears to be expanding from a compliance orientation to one that continues to recognize the need for regulatory compliance and envelopes compliance by encouraging good practices to manage risk. What do you see as the key management challenges facing the NRC in implementing these changes in areas such as implementation of consistent management philosophy, use of processes originally intended to assess compliance, and management level communications between licensees and NRC?

ANSWER: We have already heard in this conference some of the processes we are using, such as the senior management meeting activities to assure an agency-wide perspective and consistency as it relates to problem facilities, whether or not there have been violations of regulatory requirements at those facilities. We also, during those meetings, do have discussions that focus on good practices and which utilities are performing well, although the bias is more to those which are having difficulty. But it is important to have that consistency, and we are doing a number of things by way of exchanging personnel between regions, participating in SALP board activities in other regions, et cetera.

The second is using a process originally intended to assess compliance. We have made revisions in the inspection program, the core program. We have modules now which directly evaluate the ability of the utility to assess itself, find its own problems. We are putting more emphasis on that, and we think that the changes in the inspection program will allow us to assess some of those areas better.

The third area is management level communication between licensees and NRC. In Region I—and I am aware that some of the other regions are encouraging utilities to come in and make presentations on what their programs and plans are—the philosophy that we use is very simple: the utility should tell us first what they are going to do, and then the NRC through its inspection program will see if that has been done or not. If it has, we find that reinforces our understanding of what they are doing. If they tell us they are going to do something and then they do not carry through and achieve that, that gives us another message about the utility.

It requires some degree of risk-taking on the part of the utility to describe up front what it is they are going to do. But I certainly encourage that and, particularly, in planning for major outages or other corrective action programs.

So I think we recognize that there are changes. We do expect people to have programs that exceed the minimums. That is clearly embodied within the SALP evaluation process. I think that we are moving in the area of being able to handle these on a consistent basis across the United States.

Mr. Varga:

Ben, did you have any further questions?

Mr. Hayes:

I have a few here. Save the hard ones to last, Steve. This is a good question.

> *QUESTION:* What is your view on licensee investigations conducted in parallel with the Office of Investigations?

ANSWER: Early on, I was an advocate and today I am still an advocate of having each licensee have the capability of conducting an investigation as the Commission does. But we have looked at some of those particular programs and for the most part we have found them very deficient. That is to say, I have very little—it gives me no great sense of credibility, I guess, when I see those particular products.

As an example, I have yet to see a licensee write us and say they willfully did something. I have yet to see a licensee send something to the Department of Justice and say they think one of their employees ought to be criminally prosecuted for violating the Commission's rules and regulations.

But at the risk of maybe eating my words later on, there is one utility that has done a pretty good job in this area, and they have hired an independent outside investigative organization to do that. That is GPU. GPU for the last three or four years found it necessary to do investigations, and they went outside their organization and gave that particular association the independence to do a job that we have looked at, most recently we have looked at an Oyster Creek event. We had also done an investigation, and the results were basically the same. I hope I do not have to eat my words on that later on down the road, but that is one utility that has done that.

The next question is one that is a very interesting and current topic with us.

> *QUESTION:* Are the rights and obligations of interviewees outlined anywhere? Is it publicly available?

ANSWER: I think the question is probably from an attorney, and the answer is, I think the rights and obligations are available. Our investigative procedures manual is available in the public document room. There is a section in that particular manual that deals with interviewing and it may address this particular question.

Another attorney-type question:

> *QUESTION:* When will the final sequestration rule be published? Is it substantially the same as the proposed rule?

ANSWER: My answer to both questions is I do not know.

This next question is very very difficult to answer, but of a current topic.

> *QUESTION:* Much OI documentation, that is, OI investigation leaks into the press and other entities, licensees are generally barred from access. What is being done to address this situation? How do you hold allegers accountable?

I think I addressed that.

Let me read on:

> *QUESTION:* Many if not most allegations are not substantiated.

ANSWER: That is correct.

> *QUESTION:* Many are malicious; and yet the perception is that you are guilty until proven innocent. How does this square with the traditional sense of U.S. justice?

ANSWER: Being constantly under investigation myself, I can assure you I share some of those frustrations. But let me say this about the leaks and what have you: As I sit here today before you, ladies and gentlemen, I am unaware of any leak of an OI investigation or facts that leaked out before a report was written. I am unaware of any such event. That is to say, from the day we received the allegation from the staff, conducted the appropriate investigation, wrote up the results and the appropriate conclusion. We generate a product, and that particular product is distributed. I mean, there is a distribution list within the agency, and it goes outside the Office of Investigation.

As I am sure that each of you are aware that we get requests from various oversight committees for investigative products. Obviously the more people that see something and know something, the higher the potential for leaks. I am unaware of anyone on my staff that has intentionally leaked any investigative information during that process. But our reports go everywhere, and I too share the frustration of reading about a particular investigation in the press because, for the most part, it may or may not be accurate. I have experienced the same situation when I am under investigation and things get out. I do not know what else that we can do that we have not already done, except to continue to be vigilant in the area, and possibly re-examine our distribution pattern, decrease it. We even number it, I mean, we number our reports, we try to do everything to preclude duplication and what have you. But, obviously, that has not always been the case.

Let me see, there is one question here.

QUESTION: Are there plans for screening referred matters to the Department of Justice by an attorney before referral? That is to say that once we have concluded that there is a suspicion of a potential criminal act here, and we elect to refer it, do we have an attorney view it?

ANSWER: Well, the Department of Justice is full of attorneys that in fact do review it. That is their job. All we are doing is basically giving them the opportunity to determine whether or not they wish to pursue the matter criminally. In any event, we do send our transmittal letter to the Office of General Counsel before it goes to the Department of Justice. The Office of General Counsel looks at the transmittal letter and gives us their views. They do not look at the evidence or the body of the report or what have you, but we do elicit their views as to whether or not, given these facts, does this rise to a potential criminal matter, and they say yes or no or give us their views on that.

Mr. Martin:

I have a few more.

This one is always an interesting one. It is as interesting to my staff as it is, I am sure, to licensees.

QUESTION: You mentioned that some of the allegations may be made over dinner to the resident or other inspectors. Can any statements of concern in just talking language be considered an allegation or does the person have to clearly say that I have a concern which I want NRC to handle?

ANSWER: I have as much difficulty training my own staff, at times, as I do trying to inform people in the industry that basically the staff is never off the record. Therefore, if they get a concern they have to recognize that it is a concern, whether or not the person wanted to just sort of gripe off the record a little bit, or well, "gee, you know, I'm really mad about this but I don't want you to do anything." By the same token, I will have an inspector come back and say, well, "boy this guy was really dumping on me, but he didn't say he was making an allegation." To that, I would say, that is not the point. There is a concern. There is an assertion that something is wrong, and until we are comfortable that it is right, we will deal with it." QED, we have an allegation.

Therefore, no, nobody is off the record. Nobody can just sort of generally lob one across our bow. We will pick it up and we will do something with it.

QUESTION: Are licensees ever made aware that the NRC receives the "plant X is all screwed up" allegation?

ANSWER: That is a judgment call. I mean, it depends on what we know about the alleger, what were the circumstances under which we received it, what knowledge do we have about the circumstances, was it singular or are they in the midst of a major layoff. I am not sure that I would necessarily pass on to a utility or to a company that I received one telephone call under a certain set of dynamics that had that kind of a comment in it. If I received 400 of them, then I might very well pass that on because that is a different flavor. Now, we are back to the number versus the character.

Mr. Lieberman:

QUESTION: You termed the enforcement conference the most important step in the escalation process, the key opportunity for licensee input. You note that an inspection report, in most cases, has already been issued. Where an OI investigation is the basis for a potential enforcement action, how is the conference a meaningful opportunity for licensee responses and inputs if the NRC will not provide a copy of the OI report with a detailed basis for its findings?

ANSWER: In most cases, when we are going to have an enforcement conference based on an OI investigation, the primary reason for not providing the report before that time is because there is also a referral to the Department of Justice. However, once that process is completed and the Department of Justice has declined, we are going to go forward with a civil enforcement action and hold an enforcement conference, the reports are available. We always provide the synopsis, and we leave it up to the licensee to ask for the report.

In some cases, the licensee does not want the report because the report, if we give it to the licensee, will also be placed in the PDR.

There have been some cases where we have not given the OI report out. I can think of one where we were having an additional investigation, and we did not want to have certain information provided but, in that case, the licensee also had substantial information of the interviews because their attorneys attended some of the interviews.

Mr. Russell:

There is also a piece of that question that I think is important and it goes along with the following scenario: There is a combination of technical violations and also a referral to OI on a matter that has potential willful connotations and the OI investigation may or may not yet be even complete. The staff elects to proceed with an enforcement conference on the technical issues so that we can get timely correction of those items to get the plant back into conformance with the rules and regulations. We will have to make a judgment, at that point, as to whether we proceed with the enforcement conference to seek resolution from a corrective action standpoint of the technical issues while the OI matters are continuing.

So in some cases, you see a two-step process with the technical issues being treated first, and then the willfulness issues coming later. In some instances, we will actually make a determination, if the safety issue has been resolved, to defer both and wait for the OI investigation to be completed.

Mr. Hayes:

This is my personal opinion. I have resisted and Jim and I have had a lot of discussions about this, turning over an OI report for an enforcement conference. It is not my call; Jim has the 51 percent on that. But I look at it this way: We do provide the synopsis and that synopsis is written specifically for PDR distribution to the licensee.

It seems to me that if a licensee comes to an enforcement conference—and again this is my view—they should already know pretty much what the situation is, what the allegation is, what the technical violation is. I mean, I am sure that the licensee just does not sit there mute and wait for the staff, to see what they have. I mean, my view is that if the licensee is aggressively pursuing this and making the corrective actions on an ongoing daily basis, then they know as much as we do and probably more.

I am here to tell you that probably my investigations are not totally 100 percent complete with all the facts surrounding any given instance. The licensee is in the best position, in my view, to get more of the facts quickly. They are the licensee's employees, the licensee's contractors, the licensee's vendors, or whatever. My view is that there is a legal process that says, if you disagree with the Commission's notice of violation, then let us exercise that process—and in the discovery process we get and you get.

But to give you the farm, as it were, on the first go around, I am opposed to that. To me it seems like utility management has an obligation to do their own look see and their own examination and their own root-cause analysis, to be able to present to the staff an account of what the situation was and what corrective actions have been taken and what the root cause was, as well as some assurance that that particular violation will not occur in the future.

That is Ben Hayes' personal view though.

Mr. Lieberman:

Next question.

> *QUESTION:* You remarked that the purpose of enforcement is to punish licensees. . . Let me stop here and say, I do not view civil action as punishing but rather to provide emphasis and to encourage and give attention to issues for improvement. But, as the question goes. . .is to punish licensees who fail to meet minimum regulatory requirements, as opposed to enforcement of excellence. Yet, the proposed maintenance rule embodies as a regulatory standard, the concept of even more stringent requirements. While rising standards are certainly an excellent management practice, a rule that is based upon rising standards would seem to imply future enforcement of a subjective nature. Please comment.

ANSWER: When I use the term "excellence," I am referring to action by licensees going beyond regulatory requirements. If the maintenance rule becomes an actual rule or a requirement, then achieving compliance with that rule becomes the minimum level necessary.

As to subjective issues, I have another question here that is similar, talking about EQ, environmental qualification.

> *QUESTION:* Environmental qualification enforcement has caused much heartburn in the industry in dealing with subjective issues. Has the NRC rethought this approach to encourage issue

resolution, or might we expect unique enforcement policies in dealing with future issues?

ANSWER: As to subjective matters, I do not think we should be taking enforcement action for subjective interpretations of requirements. I think it is only fair to licensees that we have a specific requirement that we are enforcing. In the environmental qualification area, I have to say, because I look at all these enforcement actions, reasonable people must differ as to what the requirements are. The Commission established the standard, and in hindsight, I wish we had a different phraseology for that standard. Clearly it should have known that what the licensee was required to do in the EQ area was known to the industry before the deadline, November 30, 1985, so that we could avoid these subjective issues.

In the fire protection area, we also had problems with meeting requirements. We clarified those requirements, and we based our enforcement actions on the clarified requirements. This is an important issue; it is a difficult issue. When we establish new requirements, we must make sure that we are clear on what we expect and that licensees know what they have to do to comply with requirements.

As to future issues, I would expect changes in the enforcement policy to address those issues. EQ, again, was an action taken by the Commission because, I think, they were frustrated with the state of compliance by the industry and they wanted to do something more to emphasize the need to comply. I can think back to the 1982 period with regard to emergency planning, when the agency was concerned with the progress in getting the proper notification systems in place, and we had a special policy for that to encourage a faster compliance. So, in time, I would think there may be other cases where we have to have special policies.

The last question I have is a very interesting question. I am sure Bill, Bob, and others may have some thoughts.

QUESTION: In earlier sessions, we have heard about significant improvements in most aspects of plant operations. How do you reconcile marked improvements in plant safety with the near doubling in civil penalties from 1984 to 1988?

ANSWER: In my view, the industry is improving in performance, but enforcement, as I said in my talk, focuses on potential problems as well as actual problems. There are potential problems out there, and we need to stop those issues, correct those issues before they become significant events. So that is one reason why enforcement may be increasing.

Another reason, I think, is that we are looking harder, giving more attention to the licensees that have more concerns with poor performance. If we look harder, we may find more problems. I think our inspectors and investigators are doing a better job in searching out more problems. I think the whole agency is focusing more on operational issues. With that type focus, I would expect to find more violations and some of those may be significant and worthy of escalated action.

Bob and Bill, do you have something?

Mr. Martin:

There is one feature I would like to add. There are a number of conclusions being inferred by that question: that somehow we should be looking askance, "gee, if the plant's performing better, maybe we shouldn't be having so many civil penalties." I think that is a misuse of data. By the same token, I could urge: "If the plants are getting better with increased civil penalties, let's open up the gates and really start pounding civil penalties, and you'll have outstanding performance everywhere." That also would be an illogical absurdity to draw from the data.

Look at the number of plants that have been shut down for years. There is virtually no dollar amount associated with that. But to a great extent, what kind of nexus do we draw there. That is clearly an element of enforcement, or it has been an element of industry cooperation in the case of some plants. I think it is very dangerous and not the way we should approach issues: to try to take two sets of data and because they both apply to power plants, try to draw a correlation between the two sets, without a full look at all the various ramifications.

I think this almost ties, to some extent, to a question that Bill is going to handle expertly for all of us, because I have read it, and I have decided to let him handle it. But there is a real factor, I think there is a danger associated with drawing the wrong nexus between two sets of data. There is a relationship but it is not a one on one.

I have no trouble at all as a regulator dealing with the technical issues and the enforcement issues that come across my desk. Dealing with them as promptly and as fairly and as firmly as I believe the policy calls for me to do. Still, I also recognize that thankfully the plants in my region are performing better this year than they had a few years ago—mainly through their efforts and their commitment to try to do better. I have no problem bringing a resolution to that because I think the two issues reflect that everybody is working harder to do their safety job better.

And, in that regard, I find the data quite consistent with each other.

Mr. Russell:

Well, that kind of leads in to the last question.

> *QUESTION:* Is the current emphasis on excellence and subjective evaluation of a utility's attitudes and atmosphere, safety culture, et cetera, really an intimidation tactic that requires brown nosing to stay on the good side of the regulators? This seems inappropriate. Certainly we would not condone or institutionalize to this degree activities by traffic police, food inspectors, or IRS auditors. Please note that there is also a large potential for bribery or kick backs to the NRC as a result of the large dollars involved in shutdown orders, SALPS, fines, bad plant lists, et cetera. . .The person closed with. . .I realize that this question and observation is probably viewed as indicative of a bad attitude.

ANSWER: Let me point out, I think, and some of the utilities from Region I I hope would agree, that one of the things that I find most disturbing is a utility that rolls over if it feels that it has been wronged by the NRC. I enjoy technical debate and dialogue. I think that enforcement conferences should be a two-way conversation. SALP board meetings or SALP meetings with utilities ought to be a two-way conversation.

If you feel that you have been done in and you do not speak up, you have no one to blame but yourself. We maintain a very much arms-length approach to enforcement. It is a very structured process. We do not have meetings in closed rooms, et cetera. We let the chips fall where they may. If you are deserving, I would hope that you would agree that the process results in about what you expected. I do not, in many cases, find when I talk to utility senior management, when we finally are giving them the news, that they are terribly surprised by what we are doing.

I think it is a fair process. It is one in which we intend to encourage quality performance. That was, in fact, the thrust of the presentation that I made. We do not want you to work to minimums. If you work to minimums, you are going to find that often you will drop below the line. If you have some margin above minimums and you do not always meet your own expectations, hopefully when you have missteps they will not cause you to drop below regulatory minimums—you can rely on that margin.

That margin comes about through excellence in operations. The simplest approach is to lay out your own standards, have some margin in those standards, pay attention to the detail, be rigorous in your approach, and follow your own procedures and guidance. Tell us what you are going to do and then do it. Then we would not have to meet at enforcement conferences, and that would be my objective.

Mr. Lieberman:

If I could add to that, Bill. You mentioned the structure and the process, and some people think we have too much structure and it takes too long. But one of the things we do do is we look at the history of the performance of the licensee, we value the regional recommendations. I have my own staff that looks at these things. We deal with NRR, both on the project side and on the technical side, to get input. From time to time, I may discuss issues with another region to get input. So we are trying to take enforcement actions that are truly agency-wide actions in their objective. They are not based on the subjective views of any one of us in the agency toward the licensee and how the licensee responds to enforcement action. What I mean by that is just saying the right things without performance. We are looking for results and not just how licensees say they are going to do things.

Another point in this area is that licensees do need to challenge us from time to time. Sometimes, I think, the better licensees are those who do question what we are doing because we do make mistakes—not very often, but we do. We have reduced civil penalties, we have withdrawn a number of civil penalties, and we have withdrawn violations if we have erred.

Recently, there was a licensee who, through its attorneys, said, "boy, we'd really like to challenge this case but we're really afraid of what the agency's reactions are going to be to the challenge." We told the attorneys to challenge it. The last thing we want to do is take an action that is wrong; that does not serve the purpose of anybody.

Now, at the same time, when you do challenge a case, I think you should be right. What I mean by that is, we do not want foolish arguments just to make a case. I contrast the responses I see in response to civil penalties compared to responses I see in litigation when every point on an issue is challenged whether there is real meat behind it or not. That type of challenging serves no purpose. In fact, it may even serve a negative purpose for the licensee.

We have seen some responses from time to time that are so off base that we say to ourselves, "hey, does this licensee really understand what the issues are? And are they making arguments for the sake of arguments?" In those cases, we bring the licensee in for a conference to make sure that we have a meeting of the minds.

Mr. Varga:

Well, that brings to a conclusion this session. I want to particularly thank you all for your attention and your participation. As chairman, I sure want to thank the panel with such forceful and vigorous personalities, there are no shrinking violets here. It sure makes the panel chairman's job very easy. So thank you all.

10 AFTERNOON PLENARY SESSION: SEVERE ACCIDENT ISSUES

Mr. Frank J. Congel:

We are ready to begin the last session of this three-day seminar. On the afternoon of the last day there is certainly a tendency for us all to be letting down a little, but I believe the topic of this afternoon's session is one of great interest to all of us.

We have a panel of very well-known, recognized individuals in our agency that are responsible for carrying out some of the various aspects of our severe accident program. I want to say first off that there is one substitution. Ed Jordan, who was scheduled to speak today, was called to Vienna, Austria. In his place he has Gary Zech. No relationship that I am aware of with our Chairman. He is Branch Chief of the Incident Response Branch. He will be presenting Ed Jordan's talk this afternoon.

I would like to say a few words before we get into the session, I think, to set the tone somewhat. The fact that nuclear power plant accidents with substantial consequences, are possible has been recognized from the beginning of the nuclear industry. The earliest designs were produced with the intention of having defense in depth that was sufficient to prevent accidents that would result in any offsite releases of large amounts of radioactivity.

However, even though our earliest positions were that no accidents with severe consequences were credible, it was recognized that the production and the containment of megacurie quantities of radioactivity required special care and consideration.

Over the last 25 to 35 years, our understanding of mechanisms that could lead to large releases and potential consequences has steadily improved.

WASH-1400 was the first principal document to describe severe accident consequences. Since then, we have developed numerous technical documents that describe the many severe accident mechanisms and their probability of occurrence. These scenarios have been hypothesized to develop potential offsite consequences.

As we are all acutely aware, the accident that happened at TMI, which was 10 long years ago, and then the Chernobyl accident, which was only 3 years ago, brought the reality of accidents to us, from analysts' computers, as well as to the general public.

During this afternoon's session, we will have four senior members of the NRC management describe their respective responsibilities and program areas in the NRC, all in the area of severe accidents.

We will lead off this afternoon's session with Tom Murley. You have heard from Tom at least twice that I am aware of during these past three days. He is going to describe NRR's program to integrate severe accident issues for operating reactors and the plan that will lead, presumably, hopefully, to the ultimate resolution and the closure of these issues.

We also have with us Eric Beckjord, who is the Director of the Office of Research. He is going to describe his office's research program, which provides the complex technical bases for the severe accident program elements that will be carried out in part by NRR.

Themis Speis, who is the Deputy Office Director of the Office of Research, will describe the procedures and bases that are planned for reviewing and evaluating industry-produced individual plant examinations. These reviews will be performed by technical staff members of both the Office of Research as well as the Office of Nuclear Reactor Regulation.

Now, I mention Gary Zech last only because his talk is a little out of the sequence that I have just described. His office's responsibility, among others, is to develop the Commission's capability in the area of responding to accidents. I would like to put that last simply because we hope that we never have to make use of the facilities that he has so well developed. But the emergency response data system is something that the NRC would be very, very dependent upon should another accident occur.

The manner in which we are going to carry out this afternoon's session is that each talk will last on the order of 20 to 25 minutes with time for questions after each. Depending on the overall timing of all four talks, we can have an exchange session at the end.

Without any further ado, I would like to present Dr. Murley.

Integrated Severe Accident Program

Dr. Thomas E. Murley:

Thank you, Frank. I think that does quite well to set the stage for this last session of this conference.

As I mentioned in my opening talk, the theme of the whole conference has been on improving operational safety.

I think we in the NRC have been generally successful in getting the staff, particularly the headquarters staff, to focus on operations as opposed to hardware. We have done that to a large degree. Both the headquarters and regional staffs of the NRC, I think, have shifted attitudes in the last 5 years or so, maybe 10 years, but certainly in the last few yeacrs, from strict focus on strict compliance to focus on the safety significance of things.

Those two kinds of shifts, together, have been healthy and have been clearly in the right direction for improving safety.

One of the concomitant responsibilities of the NRC staff, it seems to me, is to reduce the distractions to utilities that could detract from operational safety. This has been happening, although I do not know that you would notice it specifically. However, I can tell you that internally there are discussions that rage among the staff about doing something that might detract from the focus on operational safety.

One discussion in particular I recall that was going on about a year ago inside NRR, had to do with whether a particular class of containment penetrations had been strictly qualified to meet the requirements of the rule. There were discussions on one side and discussions on another. Had we concluded that the containment penetrations had to be ripped out, or the plants stopped, the effect on the utilities would have been great.

I kept asking my staff: "What does it mean with regard to safety? What is the safety significance of it?" As we moved toward that goal, I think we finally concluded that, yes, it was an issue that had to be dealt with. It was a regulatory issue, but it was not an overriding safety issue; therefore, it could be dealt with in proper time and not have a big impact. I only mention this to tell you that we are aware of the responsibility that we have not to distract you by issues that do not have to be settled immediately.

I can assure you that my staff, particularly the engineering staff, Frank Miraglia and Larry Shao and Ashok Thadani and Jim Richardson, spend a lot of time focusing on these kinds of issues.

There is one distraction, however, that is unavoidable. It is the last residual issue from the TMI-2 accident that has not been settled in a regulatory sense, the issue of severe accidents *[Figure 1]*. The issue, which I have tried to frame in as simple language as I can, is: All the currently operating plants were not designed with core-melt accidents as part of the original design basis.

As you know, there were a number of design-basis accidents, the most serious of which was thought to be a large break of the largest cooling pipe, a large break LOCA.

I do not see that we can avoid this issue. The question that arises is what additional features or procedures, if any, are required for safety systems and containments to provide reasonable assurance of protection against the risks of core-melt accidents?

We have known ever since TMI-2 that we had to address core-melt accidents. Actions were under way. For instance, at one time, in 1981, we had rulemaking for degraded-core cooling. This now has been taken off the books in favor of a policy statement.

However, the Chernobyl accident occurred in 1986, and that, to some extent, reraised the question. In this sense: clearly, Chernobyl was a severe accident that had a big impact in Europe—much more than it did here.

The question that arose was whether this could happen here. Our response to Congress, as agreed with by the industry, was that a Chernobyl-type accident could not happen in the United States. First of all, the design of the Chernobyl reactor is different. We have different procedures and rules in place. But most important, our reactors have containments, we certainly can take credit for that. However, are these containments designed to withstand and to function in the face of a core-melt accident? The answer is no, they are not.

We have to be honest with ourselves. We cannot have it both ways: We cannot take credit for having containments and telling the public that severe accidents of the Chernobyl type cannot happen and at the same time refuse to examine our containments to see whether there are particular vulnerabilities that might cause the containment to fail under serious accident conditions.

The Commission issued a policy statement in August of 1985 that was developed over several years *[Figure 2]*. The essence of the statement is that the agency concluded that existing plants posed no undue risk to the public health and safety and that there was no basis for immediate action on regulatory changes because of severe accident risk. However, at the same time, we recognize that there could be vulnerabilities to severe accidents that might not be known because a detailed examination of each plant has not taken place. That is, there may be plant-specific vulnerabilities that need to be looked at. Therefore, in the policy statement, the

Commission concluded that an examination of each plant had to be done.

I should mention also that in an attempt to have some regulatory stability, the Commission, in the policy statement, said that the issue of severe accidents could not be litigated in individual hearings. This was tested just recently in the case of Limerick, which has been in the courts for several years. The court of appeals, I think it was for the third circuit, although I am not sure, recently issued a ruling that, in fact, we do have to litigate severe accidents in the case of Limerick. The court further went on to say that the policy statement had no legal standing. That is to say, absent a rule, a policy statement is not a sufficient legal basis for that finding. The Commission is appealing the decision and the outcome is not known.

All I can conclude is that this is another aspect of facing up to the severe-accident issue, which I think we need to do.

The plan that is shown on the slide *[Figure 3]* was put together in the last couple years. There is not sufficient time to go over it in detail. However, those of you who have seen it and studied it know what it means.

Basically, we tried to pull together all the disparate functions and programs in the NRC and the industry that were dealing with severe accidents, and possibly add some new programs and functions to create a coherent picture of the actions necessary to lead to what we call closure of the severe accident issue.

[Figure 4]

Generally, there are three major areas: (1) to improve plant operations, (2) to look for plant-specific vulnerabilities—Dr. Speis is going to talk about the so-called independent plant evaluation (IPE) program in some detail later on—and (3) to look specifically at containments.

This program was presented to the Commission a year or so ago. All elements of the program are well under way.

One could argue whether improved technical specifications belongs in here. But, in fact, it is a means of improving operations by making the operator's job easier—less onerous.

Another element is accident management. I am going to spend a fair amount of time on this and then Dr. Speis will talk about individual plant and containment. We are going to examine each type of containment separately.

I think I have just described the main objectives. However, there are other related efforts in the NRC such as the safety goal effort and the probabilistic risk assessment (PRA) methodology. The staff has just sent to the Commission the latest version of a new draft of NUREG-1150.

We are looking at future plants, in particular future light-water reactors, so-called evolutionary light-water reactors, to see what features should be considered for these plants to deal with severe accidents.

We are looking at external events, which I will talk about. Eric Beckjord will talk about the long-term severe accident research program later.

External events includes earthquakes, fires, high winds, floods, and even particular aspects of transportation accidents. These are going to be added to the IPE effort, hopefully toward the end of this year, with the purpose of looking for particular vulnerabilities in the plant. For example, an external event not only causing the accident, but wiping out the safety systems and perhaps even the containment that are normally used to mitigate such an accident.

We would prefer not to have to develop brand new state-of-the-art methodology, but to use simple, common sense methodology. Our plan is to use our reasonable assurance standard with regard to external events. Specifically, we are not going to insist on a numerical risk standard that has to be met to deal with seismic events and fires and so forth. Because these areas are subject to such uncertainty in estimating the frequency of the initiating event, I do not think we would get anywhere if we tried to deal with a numerical risk standard.

With regard to implementation of the external event studies, we would prefer the industry develop the methodology, through NUMARC of course, and we are working very closely with NUMARC to do that. We recognize that in some cases industry methods are not available or would take too long to develop. Now that we are on the path with regard to the independent plant evaluations, it is quite important to get moving and not have the development of this methodology delayed.

If industry methods are not readily available, I think it might move things along faster if the NRC presented a proposal as a starting point. After all, we do have some thoughts and we have been working in this area for many years now; I think the staff could fairly readily put together a proposal. We will probably do that.

We are going to be working very closely with NUMARC in the next month to see if we can come up with an approach that will lead us to methodology for examining external events.

My goal, and I am talking with my staff about the feasibility of reaching it, is to see if we can get the guidance out by the end of this year and maybe even sooner. However, it is important that we do it right. It is important that we do not act prematurely because we always get into trouble when we do not take the time to really know and understand what we want to do.

Let me turn now to accident management *[Figure 5]*. The goal is to return the plant to a controlled state. Accident management deals with the actions to be taken when the plant is considered to be in a severe-accident condition, that is, degraded cooling of the core, the beginning of heatup, probable zirconium oxidation, very high temperatures, no additional cooling, and so forth.

We think from a safety aspect that it is very important to give the operators the tools, the information, and the methods for dealing with a severe accident no matter at what stage.

Through my talks with those of you in the industry, I think we agree that this is where we ought to put our emphasis, rather than building bigger and bigger containment structures.

Accident management has two aspects: prevention and mitigation *[Figure 6]*. Prevention deals with actions that the operators can take after the plant has gone beyond the design basis, but before the core has fully melted. Mitigation deals with the actions that can still be taken after some fuel damage, even fuel melting, and perhaps vessel penetration to limit the offsite releases. For example, there are sources of water and power that are not safety grade, but that nonetheless can be used to improve the situation.

Our goal, therefore, is to have each licensee implement a plan that provides a framework for using the information derived from the IPE program, or other programs or developed by the NRC, to prepare severe-accident operating procedures, to train the operators in their use, and to implement those procedures *[Figure 7]*.

In addition to the elements of this accident management framework that I have just talked about, there has to be some guidance on computational aids. For example, certain computational aids should be available in the technical support center so that they can be used by the technical support staff during an accident. Some instrumentation and even some special hardware might be needed for accident management *[Figure 8]*.

I think the NRC and the industry, working with NUMARC, are in close agreement with regard to the goals of accident management. We do not want to become too prescriptive. Now that we are in the general agreement, we should work closely with NUMARC and the industry to nurture this process and not overburden it with restrictions and details, even though I know, quite frankly, that the NRC staff has a tendency to become very prescriptive and very detailed.

With regard to containment performance *[Figure 9]*, the staff is performing generic analyses of various classes of containments. Where we see ways to improve containment integrity, and where we judge these ways to be cost effective, we are going to recommend that some changes and improvements be made.

Because of the intense interest in containments after the Chernobyl accident, in particular by the BWR Mark I, we focused our attention on generic improvements for that type of containment *[Figure 10]*. Immense resources were brought to bear by the NRC and its contractors on this question—resources that I do not think any individual utility could afford. We concluded that there were ways to improve the mitigation capability of the Mark I containment. These improvements would also enhance the prevention aspects of accident management. We also found that the cost of these improvements would be modest.

We also found that the licensee of one plant, the Pilgrim plant, had implemented these changes, and more, on its own initiative before we made our recommendations. Some of the licensee's analyses were first class and we based many of our conclusions on those analyses. Pilgrim's effort substantiates the fact that this work can be done at a relatively modest cost.

We are recommending that other types of containments such as BWR Mark IIs, ice condensers, Mark IIIs, and large, dry containments (including subelements) be evaluated.

As the next slide shows *[Figure 11]*, there are some generic areas for potential containment improvements. Clearly, these are just common sense areas that we, in conjunction with NUMARC and the industry, will be examining.

With regard to hydrogen control, we will be looking at venting capability for all types of containments as well as alternate water supplies and enhanced power supplies for containment sprays. In addition, we plan to enhance the emergency procedure guidelines (EPGs) so that licensees can use improved methodology to handle these kinds of accidents.

Although I recognize the issue of severe accidents is a major distraction to the daily focus on operational safety, it must be dealt with. Like a powder keg or a time bomb, it cannot be improved if an accident were to occur, even at a foreign plant, the urgency of this issue might be greater and we might be forced to deal with it on a hurried schedule—in a way that might not be of our choosing.

I think what we are suggesting here is a common sense logical program that the staff has already worked on for the last year and a half in framing our actions and philosophy to lead to the closure of this issue. As I told the Commission, closure is a process by which we are going to assess each plant against the general areas of operations, vulnerabilities, containment performance, and so forth. Once we are satisfied that each plant has examined these areas and that it has determined its vulnerabilities with regard to severe accidents, then we will consider the severe-accident issue for this generation of plants to be closed.

As I said, the Limerick case is causing the agency to reevaluate what it should do. To date, the Commission has not decided what action to take.

I talked yesterday with a special working group about license renewal. I told the group that I think it is inconceivable that we contemplate extending the licenses for this series of plants for another 20 years without having resolved the issue of severe accidents in a regulatory sense. We may end up resolving this issue during the license renewal process with a rule. Even though I do not think that is the best way, it may be the only way. We have a good working relationship with NUMARC and with the industry on this matter. I encourage you to continue working with us to resolve this issue.

Thank you.

Mr. Congel:

We have a few minutes for some questions. Well, if that is the case, we will move on.

Severe Accident Research

Mr. Eric S. Beckjord:

Hi. Thank you, Frank.

I am glad to be here, ladies and gentlemen, to speak before you today. Severe accident research is the subject of my talk and I am going to talk about the background and progress to date. I will then describe the key elements of severe accident research plans and show how these elements relate to resolution of severe accident safety issues.

I think you have a written paper; I have modified it a little bit in this version, but in substance, it is much the same.

First, I will talk about the background. Important decisions in the early days of the nuclear power industry took the possibility of severe accidents into consideration. In 1950, the Advisory Committee on Reactor Safeguards recommended that the West Milton test reactor be enclosed in a steel containment sphere. Since then, all U.S. light-water reactors have had containment buildings. The rationale for containment was defense in depth, to provide a backup in the event that there would be an accident and a failure of engineered safety systems to prevent its progression or to mitigate it.

Designers focused on the definition and analysis of design basis accidents. In 1966—and some of you who are here today will remember that well—the Atomic Energy Commission established a task force on core cooling to look into double-ended rupture of the reactor coolant system piping. Shortly thereafter, the decision was made to augment the capacity of emergency core cooling systems for all second generation commercial plants. The goal was to prevent severe fuel damage and thereby block the threat of a core meltdown to containment for this larger design-basis accident.

In 1975, WASH-1400 introduced probablistic risk assessment of nuclear plants, and found that the loss-of-coolant accidents from small pipe breaks could lead to severe core damage. WASH-1400 also pointed out that severe core damage could lead to failure of containment and leakage of radioactivity to the environment. The result was to focus attention on small-break loss-of-coolant accidents considered to be more likely than large breaks.

In 1979, the Three Mile Island accident resulted from a stuck-open pressurizer relief valve, the equivalent of a small break. Through a series of errors in both equipment and training, an anticipated event, the loss of main boiler feed pumps, turned into a severe accident with more than a quarter of the core melting and relocating to the bottom of the reactor vessel. Fortunately, the melt was quenched within the reactor vessel. I think that is a point of some significance to accident management as they work on it now—it did not threaten the integrity of the containment. The TMI accident confronted the industry and the regulators with the fact that core damage accidents were not as remote as previously supposed and gave impetus to expanded study of, and research on, the initiation and consequences of severe accidents—on their prevention and mitigation.

I will speak a bit now about the severe accident research conducted from 1980 to 1987 *[Figure 1]*. During this period, a broad research effort explored several areas.

The first area is dominant accident sequences at operating plants. With the aid of PRA, these studies identified the most important potential accidents at a number of operating plants and determined the range of consequences. The important sequences included loss of coolant accidents, ATWS, loss of feedwater, and station blackout. The dominant sequences vary from one plant to another because of differences in the configuration of safety systems and in design detail; the robustness of support systems required, such as instruments and control; electrical supply and heat removal systems; and also because of differences in the balance-of-plant. The studies also considered operator actions and errors to assess the potential for accident management.

The second area was damaged fuel behavior within the reactor vessel. The objective of this work was to analyze severe core damage accidents within the reactor vessel. Experiments at the Power Burst and LOFT facilities in Idaho, at the Annular Core Research Reactor at Sandia and at the Canadian National Research Universal Reactor, and also out-of-pile experiments in combination with analysis and computer code development, provided extensive information on severe transients, fuel melting, metal-water reaction, and neutron-absorbing control rod failure and melting. Codes such as SCDAP/RELAP5 and VICTORIA made it possible to begin prediction of the progression of fuel damage and the release of hydrogen and fission products.

The third area was the ex-vessel phenomena. In the event of a reactor core meltdown and reactor vessel failure, the molten mass of fuel and structural materials would come into contact with the containment concrete base mat, causing ablation of concrete, chemical reactions at high temperature, and releases of gases and aerosols. These phenomena could contribute in a number of ways to the course of the accident, including additional pressure loading on the containment, direct loss of integrity by ablation through the base mat, and adding to the fission product source term. The computer codes CORCON and VANESSA are useful for calculating concrete ablation and fission product aerosol generation from molten-core concrete interactions. The NRC carried out molten-core concrete interaction experiments in the United States, as did the KFK at Karlsruhe in the Federal Republic of Germany.

The fourth area was fission product release, transport, and source term composition. Source term is one of the most important of severe accident parameters because it is the basis for determining radiological consequences of a severe accident in the event of containment leakage or failure. The source term is extremely difficult to predict because it varies greatly depending on the accident sequence, the temperature, the form of melting fuel, the reactions with water, the manner of failure of the primary system, the transport of fission products to the containment, and the chemical reactions, condensation and revaporization that take place. Experiments in codes such as VICTORIA, CORCON, VANESSA, and CONTAIN have greatly improved the ability to quantify the source term, but large uncertainty still remains. Containment performance is a particularly important factor. If containment keeps its integrity for a day after release of core material to the containment, the source term will decrease by a factor of about a hundred.

The fifth area was hydrogen generation and burning. The rate of hydrogen generation and whether it can burn or detonate is of special importance because of the ensuing pressure load on containment. As a result of this consideration, regulations have changed over time to require the Mark I dry-well area to be inert and provide for igniters in ice condenser in Mark III containments. Melt progression and the amounts of water or steam present make the rate of hydrogen generation highly uncertain. However, research has yielded good understanding and ability to predict threats to containment from hydrogen combustion.

The sixth area of research was containment structural performance. Scale models of containments—1/8th scale in the case of steel shells and 1/6th scale in the case of reinforced concrete with liner—have been tested to failure at Sandia. The architect engineer designers used ASME Codes and the builders used the practices of actual containment construction. The tests have confirmed a factor of safety in excess of 4 over design pressure for the steel shell model and in excess of 3 over design pressure for the reinforced concrete model.

The seventh area was reactor risk. The knowledge from the preceding six areas provided the technical basis for the Draft NUREG-1150 two years ago, "Reactor Risk Reference Document" which incorporated improvements in both data and methods since WASH-1400. Now, Draft NUREG-1150 has received three peer reviews and it will soon be published and peer reviewed again under the title of "Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants." In fact, we delivered the copy that will go to the printers to the Commission on Monday of this week. The findings in NUREG-1150 are that risks are somewhat lower than in WASH-1400. An important factor in this result is the fact that vulnerabilities that were uncovered in the course of the study and corrected by means of equipment and some procedural changes made the difference. At the same time, NUREG-1150 explicitly examined uncertainties in severe accident phenomena, and they were greater than suggested in WASH-1400.

The knowledge accumulated from the entire program has made it possible to identify the important accident sequences and to rank them according to risk. Severe accident issues that arise are the ones that are addressed in the revised severe accident research program.

The integration plan for closure of severe accident issues is another major input to the severe accident research plan. And Tom has already outlined this to you in his presentation. I emphasize that the revised plan will provide the additional technical base for three of the six elements that he described in the closure plan. The containment performance improvements (CIPs), including the GE Mark I containment recommendations already presented to the Commission, the accident management program, and the individual plant examinations, which Dr. Speis will talk about shortly.

I am going to talk now briefly about the research plan itself. If this seems to you a heavy subject, it seems also to me. I think of it as a rather large grapefruit, impossible to swallow and not readily digested if you manage to swallow it. But if you cut it into pieces, I am convinced that we can and will be able to deal with it, and so I will go on to some of the pieces.

There are four program goals *[Figure 2]*: first, provide new knowledge for assessing containment performance; second, evaluate the effectiveness of the containment performance improvements; third, support development of generic accident management methods; and fourth, assess fission product behavior and release.

I will go on to the near-term research *[Figure 3]*, there being a near-term element in this program and a long-term element. Near-term research will focus on the accident sequences that can lead to early containment failure. That is direct containment heating, Mark I containment melt through, molten fuel-coolant interactions in BWR Mark II and Mark III containments and hydrogen detonation in BWR Mark III and ice condenser containments.

First, the direct containment heating—DCH in PWRs is a high-pressure, core-melting sequence that could arise from a station blackout. Essentially, it would be a bleed sequence without the ability to feed the primary system. The reactor coolant system would lose water through pressurizer relief valves at high pressure, with eventual uncovering and melting of the core, as occurred at TMI-2. Without emergency power to add water, the core would become dry and melt, and molten core and structural material would relocate to the bottom of the vessel, eventually causing failure possibly at a bottom head instrument penetration. High pressure in the reactor coolant system would expel the molten material into the reactor cavity, causing heat of the containment—remember this is going to be going out at extremely high velocities and spreading throughout containment. Metal-water reactions could produce more hydrogen and even higher containment pressure. DCH, then, could threaten containment.

However, this is not a foregone conclusion. Theoretical calculations show that natural circulation of gases within the vessel before vessel failure would occur and could carry heat from the core and cause heating of the piping in the primary system at some time before the failure of the reactor vessel. Even though the evidence at TMI does not point in this direction, we are still pursuing it. In particular, the failure could occur in the pressurizer surge line, thereby relieving the pressure in the containment. This would not necessarily prevent reactor vessel failure, but it would prevent DCH.

Primary system failure could occur in a more serious way in steam generator tubes. The result would be a containment bypass sequence through the secondary side relief valves and release of radioactivity. A third possibility here would be the decision to depressurize the primary system through relief valves taken by operators in order to prevent DCH and containment bypass. Active depressurization would have a down side to be considered, an increased rate of water loss, possibly, and a hastening of core melting.

Research on DCH and depressurization will aim to answer the following questions: What is the risk of early containment failure from DCH? Does natural circulation prevent DCH? What is the risk of failure of the steam generator tubes? Is operator controlled depressurization preferable to spontaneous depressurization?

I will go on to BWR Mark I containment shell melt-through now. PRA shows that BWR Mark I dominant sequences are station blackout and ATWS. A core melt could cause vessel failure and then relocation of molten material to the confined floor area below the reactor. This material would react with concrete structures and, in the absence of a strong mechanism for cooling, spread across the floor, then coming into contact with the steel shell that is the containment membrane in the drywell. Failure of the shell would create a path for leakage to the reactor building and eventually to the environment.

There are significant differences between the BWR and PWR core melting. BWRs contain more zirconium than PWRs because of the channel boxes. On the one hand, BWR core structure may permit molten material to flow continuously downward so that a crucible would not form as, in fact, it did at TMI Unit 2. I call your attention to the critical role that the crucible at TMI played in limiting the amount of core melt that relocated to the bottom of the vessel. In the case of BWRs, it is possible that the control rod drive structures in the lower part of the vessel with their large heat capacity could delay and affect the mode of failure of the vessel.

Research on Mark I containments then will focus on these questions: How would melting core material relocate? What would be the effect of control rod structures on the relocation? What would be the mode of vessel failure? How would water from drywell sprays affect cooling and spreading of core melt and also molten core concrete interactions? Finally, under what conditions would containment shell failure occur and under what conditions would it not occur?

BWR Mark IIIs and PWR ice condensers, these containments do not have the pressure capability of large, dry containments and they do not have inert atmospheres as do Mark Is and Mark IIs. They do have igniters for controlled hydrogen burning. However, the injection of high-pressure hydrogen from a melting core into already existing mixtures of hydrogen and steam is not well understood. Research will seek to determine the likely mode of hydrogen burning and to establish deflagration and detonation limits for hydrogen associated with PCH. The potential exists for molten core material leaving the vessel to mix with water in the suppression pool that could lead possibly to steam explosions. Whether such an interaction is sufficiently energetic to cause containment failure is the subject of some further research.

The next element here is accident management support. Severe accident management in general means adding water to the reactor vessel. Clearly, this is the right thing to do, but there are some important questions to answer: What are the consequences of adding water to a severely damaged core? How can control room operators assess the condition of the core? Should operators limit cooling water flow when containment pressure is high? Is there an important conflict between adding water and delaying excessive containment pressure? What potential is there for BWR recriticality in the event that control rod absorbers have melted and relocated below the core?

The answers to these questions may lead to some qualification of the general principle of pouring on water. We are sure that accident management development is on a useful path with the best likelihood of success.

Just a few words about long-range research *[Figure 4]*. In 1987, a panel of five experts including people from overseas, chaired by Dr. Herbert Kouts, performed and published a "Review of Research on Uncertainties in Estimates of Source Terms From Severe Accidents in Nuclear Power Plants." The panel reviewed information from NRC research and cooperative international severe accident programs and evaluated the uncertainties and their risk significance. The report is the starting point for long-term research in this program. There is also some more recent input to this in the latest NUREG-1150.

There are six areas included in the long-term research. The first of these is severe accident modeling. Because severe accident experiments are so expensive, research has undertaken to develop and validate complex mechanistic codes for purposes of analysis, the SCDAP/RELAP, MELPROG/TRAC. There are practical limits to this approach and we propose to develop alternatives, that is bounding analysis and stochastic codes, such as MELCOR, for resolution of some severe accident issues.

The second area is core melt progression. The late phase of core melt progression is not well understood, including questions about thermal attack on the reactor vessel and structures by core material, fission product release, aerosol generation and transport. Different considerations apply, as I have said, to BWRs and PWRs, but the important questions include: how water addition affects in-vessel structures; how water addition affects core relocation; how it affects hydrogen generation; and how it might affect vessel failure and the release of molten material from the vessel.

Small-scale experiments, experiments at the CORA facility, and the Federal Republic of Germany, NRU fuel melting tests, and further study of TMI-2 data will be used. The goal of this work will be to reduce uncertainties or to establish bounds needed to resolve the open questions.

The third area is steam explosions. Molten fuel coming into contact with water could cause a range of results from very energetic alpha mode steam explosions in-vessel that could give early containment failure to less energetic events that could change the accident sequence or the source term. The Kouts review judged the former to have a low probability, but the range of events needs further research attention. Experiments and analyses will be done on basic questions of premixing, triggering, and fragmentation for purposes of confirmation and to assure that no significant events have been overlooked. The effects of adding water to a debris bed and of molten material falling into a water suppression pool will also be assessed.

The fourth area is molten core-concrete interaction. Additional work is needed in this area to establish cooling rates and debris spreading for a pool of core material flooded with water. The long-term coolability of initially molten corium pools interacting with concrete and flooded with water and the spreading and relocation of melt will be assessed for accident management use.

The fifth area is fission product behavior. NUREG-1150 expert elicitations show that the most important source term uncertainties now relate to late release of iodine in core melt, fission product revolatilization and release during core-concrete interaction and aerosol generation. Research will seek to narrow the uncertainties or to bound the risk important issues.

The sixth area, finally, is fundamental data. There is a lack of fundamental data in some areas, particularly material, thermal, and chemical properties, high-temperature properties, generally. The lack of these data gives a problem in interpreting core melt experiments and in making predictions from the experiments. So a review is under way to identify and go forth to get the data.

In conclusion, I have talked briefly about the background of severe accident research, the accomplishments since the TMI-2 accident, and I have described the essential role that the severe accident research program plays in supporting the resolution of important regulatory issues that arise from consideration of severe accidents and their effect on containment performance and how research is expected to provide sound scientific and engineering basis for accident management.

The plan is oriented to the risk-significant issues in the near term and to confirmatory research in the long term. I have high expectations for this program to play an important role in the resolution of severe accident issues.

Thank you. I thank you for your attention.

Mr. Congel:

Are there any questions?

[No response.]

Individual Plant Evaluation

Dr. Themis Speis:

There is a quiet crowd this afternoon. Ladies and gentlemen, I am glad to be here. I am happy that Frank put me third so I can go home earlier. Again, it is always good to follow your leaders because most of the things that I wanted to say have been said already. So I will only abuse you for about 15 minutes or so.

As the program indicates, I will focus my remarks on the individual plant examination program. As Tom already said, the IPEs represent a key element in the Commission's overall approach to addressing severe accident issues for existing plants. The other important issues were shown on Tom Murley's diagram. I also have a picture of that diagram, but I will be able to dispense with it.

The other two areas that are crucial to closure of severe accident issues for existing plants are the accident management program that Tom dwelled on for a while and the generic improvements to the various containment types utilized in the United States.

Let me go to the first viewgraph *[Figure 1]* please.

Basically the IPE program is the outcome of the Commission's Severe Accident Policy Statement which was issued on August 8, 1985. Some of the other things on this viewgraph have been said already.

The key thing here is that based on NRC and industry PRA and other systematic analysis and experience, the Commission felt that systematic examinations would be extremely beneficial in identifying plant-specific vulnerabilities for severe accidents from which further safety improvements may be appropriate. And, of course, that is the essence of the individual plant examination program.

Now, we have been working with the industry for the last few years, since the Commission issued its policy statement, and we have resolved a number of issues and problems. By the end of last year, we were ready to issue the generic letter, which all of you have received by now.

The generic letter, which was issued on November 23, 1988, and which requested the licensees to perform an individual plant examination, contains the NRC guidance concerning the objective and scope of the IPEs and specifies approved methods of examination.

The IPE is directed to two areas of severe accidents: core damage prevention as well as mitigation of the radioactive source term. Again, in a broader sense, the purpose of the IPE is for each utility to develop an appreciation of severe accident behavior, how severe accidents develop, how they evolve, and how they can evolve to the point of challenging the containment and to understand the most likely severe accident sequences that could occur at plant. A further purpose is for each utility to gain a more qualitative understanding of overall probabilities of core damage and fission product release and, if necessary, reduce the overall probabilities of core damage and fission product releases by modifying, where appropriate, hardware and procedures. One of the important things that will come from the IPE is insight that can be translated into plant-specific procedures, which Tom talked about, the so-called accident management part of the severe accident program.

On my next slide *[Figure 2]* I have indicated the elements of the plan. I can dispense with it because Tom has explained it already.

Before I go a little bit deeper into the IPE, I would like to provide just a few minutes of context, how does the severe accident program fit into all the other things. Again, the previous speakers have touched on this to some extent. But, as all of us know, the safety approach utilized in the design and licensing of commercial nuclear power plants in the United States is based on the concept of defense-in-depth, which of course involves the use of multiple successive barriers to the escape of radioactivity and the assurance that these barriers are not compromised as a result of transients and accidents. All the things that we do are to assure that this indeed happens, that these barriers are not compromised.

[Figure 3]

The hierarchy of defenses involves prevention, protection, and mitigation. The mitigation element, as Tom very well described, involves only design-basis accidents, the limiting one being the LOCA; even though we also arbitrarily dump a radioactive source term into the containment, and then proceed to evaluate the leakage of the containment. The only problem with that is that the large radioactive source term that is dumped into the containment, even though it comes from a severe accident, does not have the pressures and temperatures associated with a severe accident. These are the two elements that have been missing. When you consider them, then you really have a more complete consideration of the severe accident challenge that we are talking about.

After TMI, things have changed substantially. The regulatory approach was modified extensively by considering multifailure considerations versus the single failures that were the essence of the effort before. All of you, that is, utilities, put into place symptom-oriented emergency procedures. These procedures, in some cases, for some plants, even went beyond loss of inadequate core cooling and extended into severe accident regimes, again, only for some plants and for some containment types.

Extensive efforts have been made in personnel training. We also made an effort to go further into the severe accident area by considering large amounts of hydrogen released beyond the original LOCA-related produced hydrogen. In order to accommodate the consequences of that, some containments were either inerted or included burning of the hydrogen to make sure that the hydrogen does not accumulate and harm or deteriorate, leading into unacceptable consequences—I am referring to the hydrogen control systems in Mark IIIs and ice condensers.

A fourth line of defense was added, the emergency planning. The severe accident source term of that is addressed in NUREG-0396—even though some people consider the fourth line of defense the symptom-oriented emergency procedures.

Another element that has received attention has been continuous assessment of operating experience. As a result of it, we here have put a few rules into place, for example, the station blackout rule.

One of the most important areas, of course, is the continuing effort to make sure that improved plant operations receives the highest attention of you people, the utilities, and the regulators as well. Among these are the SALP process that we have in place, regular reviews of problem plants by senior NRC managers, team inspections, regulatory actions to improve operational performance, and continuing improvements in areas of operating procedures.

Now we come into the areas of severe accident considerations: we are talking about consideration of the complete spectrum of severe accidents versus the more bounded considerations following the TMI accident that led to the hydrogen rules.

[Figure 4]

Earlier, I said that the thing that led to the individual plant examination was the extensive experience from PRA and other knowledge, which indicated that the only way to understand your plan and to look for vulnerabilities is to really look at your plant specifically.

I have listed examples of vulnerabilities that have been identified by PRAs in a number of areas. In support systems, dominant accident initiators, human errors. So this area is very rich, at least generically. This is the area that will be further enriched by doing the individual plant examinations in which you will identify areas that further improvements can be made either in the design or in the operation of the plants. Most risk contributors are plant specific, excluding some of the more generic vulnerabilities.

Now, going to the next viewgraph *[Figure 5]*, I want to be more specific about severe accident considerations, and again, Tom talked about it to some extent already.

We are talking about existing plants. A key issue is: what are the margins in existing plants to severe accident challenges? The next question is: what practical improvements can be made to the existing plants? These improvements can be made either in the area of prevention or accident management, as well as mitigation. This is the so-called balance approach that we recommended to the Commission for Mark I improvements.

The plants we are talking about are, of course, already built. The good thing, though, is that the existing containments—even though they were designed for design-basis accidents, and as Tom said, let us not say that they are able to accommodate everything having to do with severe accidents—luckily, are able to accommodate a lot of abuse, even when it comes to the severe accident arena.

Based on analysis and experiments of scale models, as Eric already said, some of these containments have capabilities that go well above their design basis. One of the things that we want to make sure happens is that this capability is exploited. So we look at this severe accident program as kind of a pragmatic exploitation of the present containment capabilities.

I will give you an example, large dry containments, if you take 100 percent of the core and you dump it into a pool of water, the pressurization that will ensue as a result of the cooling can be accommodated by that containment based on a realistic evaluation of its capability. But, again, there are some severe accident loads that can challenge the containment: it is very important that those loads are understood. There are things, however, that can be done to further reduce the probability of those challenges and/or improve the containment performance against those challenges.

[Figure 6]

Getting now to the IPE a little bit more. We spent three days at the end of February this year in Texas discussing this whole program with representatives of the utilities. Maybe some of you people were there. We went through the process in some great detail.

The generic letter itself describes all this. In addition to the generic letter, we have put out another "thin" document, NUREG-1335, which tries to further explain some of the things that possibly were not as clear in the generic letter itself. At the Texas workshop, we had a good dialogue, we had many questions; we are in the process of revising NUREG-1335 to address the questions and the concerns that you people raised. The revised NUREG-1335 will be out in the next month and a half or so.

Getting back to this information that I have on this viewgraph, again, the quality and comprehensiveness of the IPE results will depend on the utilities' commitment to the IPE intent.

We believe that the maximum benefit from the IPEs would be realized if the licensees' staffs are involved in all aspects of the examination. Knowledge gained from the IPE should become an integral part of plant procedures and training.

We hope that you will use, as much as possible, your in-house resources. I understand that a number of questions have been raised by utilities that already have PRAs. We know that a number of you have already done quite a bit of what is intended in the IPE letter and, also, about some other elements of the severe accident program.

You know, when we put out a generic letter or regulation, it is for all of you. Utilities that choose to use an existing PRA or possibly adopt some of the PRAs in NUREG-1150 or some similar analysis, should certify that their PRAs meet the intent of the generic letter. Certify that it reflects the current plant design and operation. Then, do the things that we expect all of you to do. Make sure that you go through your PRA, you understand what it is telling you about your plant, see how you can utilize the insights of the PRA and translate its findings into fine tuning existing procedures—and/or putting into place new ones. These are the types of things that one does when one goes through an examination process of this sort.

A lot of questions have been raised about the examination of the containment itself. And I want to say a few more things about that.

[Figure 7]

As I said earlier, the containments likely are very much more robust than needed for design-basis events so it is important to understand that margin and be able to exploit it. But, again, there are challenges that can lead to early or late containment failure, depending on the accident scenarios and containment types.

The IPE generic letter discusses some of the important severe accident phenomena, which affect containment performance, and provides some guidance for containment system performance evaluation.

There is nothing mysterious about the containment performance. A number of you people have already performed outstanding PRAs even with less guidance than exists in the letter itself. So, we are saying, make use of past guidance on containment performance and bring past guidance up to date using more recent information. We give you many references on that.

We are also saying, do not dismiss possible severe accident outcomes because of uncertainties in phenomena. At the same time, we are also saying, do not make major containment or other changes as a result of one or two phenomena that are still being debated: Eric mentioned direct containment heating and liner Mark I failure.

I think, even in these two areas, there is a lot of information that can be valuable. For example, in the area of potential liner failure for Mark I containments, we have a lot of information that tells us that if you are able to dump water on the cavity, even if you cannot quantify whether the failure probability is high or low, the corium flow towards the liner will be retarded; it will most probably delay liner failure. During that time, the suppression pool can be utilized to clean substantial amounts of fission products; therefore, if you vent the containment, you are taking credit of the suppression pool's filtering capability.

So, there is a lot of information even in some areas where uncertainties exist—that is what we are talking about.

Again, the big point is the goal is to understand how the containment could be challenged so one can understand what could happen and what actions could be taken to mitigate the consequences of a severe accident. Of course, as we have been saying, the results of the evaluation should ultimately result in development of accident management procedures that would both prevent and ameliorate the consequences of some of the more risk-significant challenges to the containment.

I think I can skip the next viewgraph *[Figure 8]*; it is kind of the same. If you will go to the next *[Figure 9]*.

I have listed some of the things that I mentioned two or three times already about the robustness of the containments in severe accidents. These are based on analysis and experiments. We have listed here the containment design pressures and their best estimate capability. These are the type of analysis that we are not going to expect you to do in the severe accident programs that we are asking you to undertake. This is information that you can use and adapt to your specific plant analysis.

On this next viewgraph *[Figure 10]*, I have listed, based on our total understanding that we have accumulated over the last 5 or 10 years, a hierarchy of the most important containment failure modes. This is for a Mark I containment, and the "yes" on the right hand column indicates the most risk significant one. We feel that these are the ones that you can put in place in the accident management procedures so that the challenge to the containment from those failure modes can be substantially lessened.

Let me go to the last viewgraph *[Figure 11]*, the summary. I guess because of the time constraints, I have had to race through some of these things. However, most of the things that I have summarized, we have talked about extensively at the Texas IPE workshop and in other arenas. I think that we have enough information and knowledge available to us now to develop and implement technical solutions to a broad spectrum of severe accident issues. We do not understand everything, but I think the existing information is robust enough to begin the implementation process.

We are hoping that the IPE should provide the basis for the utilities' appreciation of severe accident behavior: how the containment could be challenged and what actions could be taken to reduce the probability and/or mitigate the consequences of a severe accident.

As Eric indicated, research in support of outstanding issues in generic accident management strategies will continue, but again, the bottom line is that we have information to start the process now. We feel very confident that we will be successful, all of us. Thank you.

Mr. Congel:

Any questions?

[No response.]

Emergency Response Data System

Mr. Gary G. Zech:

Good afternoon. I am very pleased to be here this afternoon. Ed Jordan, as Frank mentioned, is on travel. He is sorry he could not be here and he does send his regrets.

I guess being the last presentation has its advantages to some extent. At least, hopefully, you will remember what I say a little bit longer. Since ERDS is a volunteer program, that has its advantages as well.

What I would like to do is give you some background for ERDS, the emergency response data system, some of the bases of our thinking that went into the system, and then a description of the system itself and how it fits into the NRC response program.

The Incident Response Branch in AEOD has the day-to-day responsibility for the NRC's response to all radiological events. The subject this afternoon, severe accidents, is clearly, above all else, why the response center exists and why it is there to be available to NRC management.

A little background *[Figure 1]*. Everybody gears their thinking to Three Mile Island, with good reason. Following Three Mile Island, the Commission examined its role during a nuclear emergency, including information it needs to support that role in the event of an accident, and any changes that the Commission felt were needed to respond as far as its authority was concerned to those emergencies. They recognized the need for improved response capabilities, not only in the NRC but for the licensees, other Federal agencies and the state and local governments as well. NUREG-0654, which you are all familiar with, I am sure, is just one of many NUREGs and documents that came out of that post-accident environment.

The NRC itself responded by looking at its response capabilities and NUREG-0728 assigns responsibilities to the staff for the functions and decisions that need to be made by the NRC during a response to an accident. Among other things, we moved our response center to a dedicated facility in the Maryland National Bank Building in Bethesda, Maryland, back in February of 1985. We have dedicated operations or duty officers on watch there 24 hours a day, seven days a week. They respond to all calls that come in, 4000 plus per year. Obviously most of those are not of the significance that would rise to a response, but nevertheless there is a lot of traffic that comes into the response center related to events at nuclear power plants.

Perhaps most importantly, what was recognized by the post-Three Mile Island review was the need for accurate real time data during emergencies and the need to substantially improve the NRC's ability to acquire that data. One of the first steps that was made after TMI was to provide for a single dedicated telephone line, the "red phone" or the emergency notification system, from the control rooms of the plants in the country into the operations center. You pick it up and it rings at the duty officer's desk there.

A little bit of review of the roles. Obviously, the licensees have the primary and the ultimate responsibility for the onsite response to an accident: both the prevention of that accident the mitigation of it should it occur. State and local officials, likewise, have the offsite responsibility for the protection of the public.

The NRC as the government agency with the lead technical responsibility for the response to radiological events at the power plants, has a number of roles *[Figure 2]*. One of the most important ones that we continue on a day-to-day basis is a monitoring role. In addition, we would monitor during an accident to ensure that appropriate protective action recommendations are being made to the offsite officials. This is primarily a passive role where we gather information and we assess the information as it comes into the operations center. We also support offsite authorities, including the confirmation of licensee's recommendations to the offsite authorities both if requested or if the need is seen as being necessary. We work with other Federal agencies in this regard: FEMA, DOE, and EPA, among many others. We support the licensee during our response role through technical analysis and logistic support that we can provide. We keep the other Federal agencies, such as FEMA, and also the Congress and the White House informed of the status of the incident. We keep the media and the public informed of our knowledge of the event, and also coordinate with other public affairs groups including the licensee, state, and Federal agencies.

Obviously, information is needed for all of these activities *[Figure 3]*. It is especially important in the early stages of an event when the accident would be followed by the NRC in Bethesda, Maryland, and information at that location is needed to evaluate and to determine what the proper NRC response should be. Typically between the initial activation mode, when headquarters has the lead for the agency, and the expanded activation role, when the regional team again takes over, there are about 6 to 8 or even 10 hours in which headquarters continues to have the lead for the agency. Plant information is very important during that period of time.

In our review of the ERDS program or system, we basically broke the data needs out into four different groups: the core and coolant system data, containment building data, radioactivity release rates, and the meteorological data at the plant. These are shown on the next slide *[Figure 4]*, as they are broken out into PWR and BWR parameters. I have mentioned, this was looked at quite closely by the staff when this program was being reviewed. The intent was to not receive so much data, or so many parameters, that the system would be flooded with information into the operations center, but to have enough information to do what we needed to do to fulfill our functions.

To correct the data problems and to provide for the information needs, ERDS was developed *[Figure 5]*. ERDS would be a direct electronic transmission of information from the plant process computer or SPDS. This data stream would be real time. It would be transmitted only during emergencies, by that I mean, at a declared Alert or above. To put that in perspective, we have received over the last four or five years, approximately nine alerts per year in the operations center.

Now, the same information or a subset of the information that is sent to the TSC [technical support center] and the EOF [emergency operations facility] is what we would expect to receive on the ERDS transmission. So, it is information that is already there, information that with a port on the process computer, would be transmitted to the operations center in Bethesda, and it would be licensee activated. It would not be automatically activated, but would be activated by an action on the part of a licensee individual at an Alert declaration.

In looking at the systems out there, we recognized that not all utilities or plants would have the parameters that our list would call for, so we made a decision not to require or ask for any parameter backfit.

That information that we could not receive from the parameter list, we would ask to be supplemented by voice transmission over the ENS [emergency notification system] telephone. Again, an output port would be required and software for the acquisition of the data on site and the transmission of that information to the operations center.

The telephone lines, or the lines that would transmit this information, would be NRC-funded, dial-up telephone lines, that we would arrange for.

Now, we have tested this in the last three or four years during various opportunities. Back in July of 1984 at the McGuire plant, we tested about 69 parameters during a limited experiment at that plant. Also, at LaSalle in August of 1985, and probably the best demonstration of this concept was during the Federal field exercise at Zion in June of 1987.

In all of these instances, we found that there was great value to be provided to the NRC response during the transmission of this data because the teams and the response center were much more efficient in performing their duties. They were able to focus on significant factors of the event. Any voice communications over the ENS line were primarily of a supplemental nature only; therefore, they were much less than we would expect or normally experience during a normal or real event. Also, it would be limited to projected or updated status of equipment that was out of service.

The next schematic *[Figure 6]* is hard to read on the slide, I realize, but it is in your paper. It is a schematic that basically shows the information flow from the plant on the far left-hand side there, either multiplexed or single feeder, through a telephone line into a switching network at the operations center. That is the middle square. It is a redundant system with two DEC MicroVAX 3600 minicomputers, one of which is normally on line and the other is a 100-percent backup unit. In either case, we would have the capability of receiving and storing four simultaneous plant data streams into the operations center.

The far right-hand side shows PC terminals that would be in the operations center for displaying the data and to show trending of information from the database that would be stored on tape. Also on the far left, it shows other transmissions out of the operations center to the region office for the plant that may be affected and also to our training center in Chattanooga.

The next slide *[Figure 7]* provides some information about the implementation of the ERDS. We conducted a survey through a contractor back in 1986–1987, which indicated that of the 92 units and 59 sites we visited, approximately 80 percent of the parameters that we were looking for would be available.

Looking at the costs that would be associated at that time with work necessary, we estimated then that the software would be between \$20,000 and \$50,000, depending on whether or not a licensee was able to do it in house. Hardware costs varied. In many cases, or most cases, no hardware changes were necessary or would be necessary. And in very few cases some output ports may be required or necessary to install, but in most of those cases, we learned that the utilities were already planning to do some upgrades to their in-plant process computer.

NRC costs have been estimated and a contract has been let for \$2.6 million. That contract has been awarded to E.I. International. It was let in 1988 and runs through early 1993. Again, it is a MicroVAX design with Compaq PC terminal displays for our use. The software preliminary designs are in final review. In fact, our contractor is proceeding along with that work right now.

As I mentioned, and as I think you are well aware, this is a voluntary program at this point. We are proceeding with software and systems development with the initial volunteers that have stepped forward. We have a generic letter that has gone through the concurrence chain and we hope will be issued within the next few weeks that will solicit participation from other utilities that have not yet volunteered.

We will have points of contact mentioned in that letter, as it is in the paper that you have. Once you do volunteer, we would expect that a questionnaire would be sent to you that would either update the survey that was conducted a couple of years ago or ask that you provide additional information or initial information that we do not have. We would then meet with you and work out a schedule to start the software development for your system.

As an aside, the staff is pursuing approval—we do not have it yet—to go to rulemaking in this area. The main reason for that is to ensure 100-percent participation. We are fairly confident from our dealings with NUMARC, with whom we have worked very closely, that the utilities in general are very favorably inclined toward volunteering. Again, with our efforts through NUMARC and the initial licensees, we have worked out answers to a number of questions that have come up regarding the ERDS system, and those Q&As [questions and answers] are provided as an enclosure to the paper you have.

We are available for any questions that you may have. John Jolicoeur and Ray Priebe of my branch are here today. John's telephone number is in the paper that you have. Any question that you may have regarding the program, before the generic letter comes out, we would be more than happy to try to answer.

Thank you very much.

General Questions/Answers

Mr. Congel:

That concludes the formal presentation this afternoon.

We did not have, during the talks, any questions from the floor directly. We do have a number of questions that were submitted in writing. The manner in which I plan to handle these is to go through them in the same order in which the speakers gave their presentations. Some of the questions branch between one or two of the speakers. In that case, we will have one answer provided, and the other speaker can enhance the answer himself.

Tom, will you start out with responses.

Dr. Murley:

> *QUESTION:* What is the status of the staff recommendations to the Commission on the Mark I improvements?

ANSWER: We expect to get some guidance from the Commission in the next couple weeks. We have just recently answered, our prepared answers—I think they have gone to the Commission—on some questions that were sent down from the Commission to clarify some aspects of our recommendation. So, we expect to hear from the Commission in a couple weeks.

> *QUESTION:* What is the relationship between the emerging accident management program and the existing emergency preparedness program?

ANSWER: Right now there is no connection. We have placed our main focus in accident management on expanding the capabilities of the onshift staff to cope with core damage accidents. This means better procedures, better hardware, better training, and so forth. But, clearly, it has application for the staff in the TSC, as I said, and even, perhaps, the offsite response capability and the emergency operations facility.

Rather than try to do everything at once, I think we have tried to focus on where the major payoff is initially. I think we want to start thinking about whether there are areas where we can apply the insights from the IPEs, or any other analysis that we get, to the kind of information that experts have in the TSC. Perhaps we would consider something like a severe accident handbook so that operations will know how their plant is likely to behave in a core meltdown situation. Obviously, they do not have that now in the TSC.

> *QUESTION:* What is the nature of the NRC review of the IPE? Why perform licensing review? Why not do an audit by the regional inspection staff?

ANSWER: Our plan is now, when the IPEs are sent to us, we will have found a team of research staff, NRR staff, and some contractor help to look at each submittal. The purpose of that will be to see how thoroughly the IPE was done and the quality of it. Most important, in the spirit of really trying to look for vulnerabilities, we will look at what did the licensee find and what is he proposing to do about the vulnerabilities.

Ultimately, of course, there is a licensing decision that has to be made; that is, what backfits, if any, are needed as a result of the IPE. We would hope that these would be proposed by the utility themselves. If we reach a different conclusion, we would have to decide what vulnerabilities need to be fixed. We may have to prepare our own backfit package. However, the nature of the review is, as I said, to look over the quality and to come to our own independent conclusions. We hope that we will be working with you so that our review will not be totally adversarial.

> *QUESTION:* The question is the timing of closure.

ANSWER: We have been saying that we think closure should occur in three to five years. Three years would apply to the earliest plants, those that have done most or all of a PRA, who have thought about accident management, who are close to implementing an accident management plan, and who have taken steps to improve their containments. This could conceivably occur as early as a couple years, but most likely, three. On the other hand, it could extend all the way to five years—we hope not more. We would not like to see it extended further.

> *QUESTION*: Do you have an operational definition of a reasonable assurance standard as a basis for making decisions in this area?

ANSWER: I know I used the phrase in the context of external events. However, I do not have a good operational definition. We make reasonable assurance judgments all the time—every time I sign a license. In effect, I am saying that we have reasonable assurance that this plant can be operated safely.

In the area of external events, what I meant was that we are not going to insist on a numerical standard and we are not going to insist on detailed numerical PRAs to show that you have met that standard. Rather, we are going to use qualitative assessment. How did you go about assessing your plant for its vulnerability to floods, let us say. That is the context in which I used reasonable assurance. The staff is going to be reasonable, let us put it that way.

> *QUESTION*: The final question that I had here, Frank, was the scope of the IPE. Why has NRC expanded it from the initial scope of internal flooding only to now consider external events like winds and so forth, seismic events?

ANSWER: We have always contemplated both internal flooding and external events, but we made a decision about a year and a half or two ago to decouple the external events from this initial phase of the IPE. The reason was that we could see ourselves getting bogged down in our arguments over the methodology to use for external events. We said, let us not get bogged down on the whole thing if we can get started on 90 percent of it now. We decided to do that. That is the path we are following. Looking back, I think it was a wise decision. We have not begun to focus on external events. A separate group under the lead of Larry Shao of my staff is looking at it now. We are going to start putting intense focus on external events in the hope that we can come up with guidance by the end of the year.

I am sorry if there has been any misunderstanding. In fact, there has not been a change in policy. We always did contemplate external events.

Mr. Congel:

Thank you, Tom. Eric?

Mr. Beckjord:

There are several questions here.

> *QUESTION*: Will your efforts—this is on severe accident research—will your efforts be completed in time to complement NRR initiatives or will this be a living process?

ANSWER: I would like to go back to the diagram that Tom put up during his talk, showing the various elements of the program for severe accident resolution, and to my slide which referred to the near-term issues. The items listed on the near-term issues are keyed in to that diagram that Tom showed. It is our intent to complete the work on those on the schedule necessary to complete our evaluation of severe accidents. We will be doing this.

There are a number of things that feed into this decision, one of which is the latest work on NUREG-1150, which tells us a great deal about risk importance. Also, one thing that I did not mention is that there is very recent information on severe accidents that is incorporated in NUREG-1150. It is basically through about last summer, the information that was available through last summer, has been factored into NUREG-1150. That gives us—when it is completed and reviewed—we will have a good basis for making decisions in that area.

Then I referred to long-term issues and long-term research. Those are on issues that we knew we could not complete—the research work—that we could not complete before many of these other decisions are going to be made. I view that as confirmatory research, the purpose of which will be attempt to confirm the basis for our technical decisions.

The second question, living process, I hope I addressed that one. In other words the plan, the near-term and the long-term issues are keyed in with the diagram.

> *QUESTION*: Do you plan to use NRC's severe accident simulation codes to help identify and evaluate potential improvements to severe accident operating procedures that come out of plant-specific IPEs?

ANSWER: As I understand the question, the answer is yes, we do intend to use it; but I interpret it a little differently. We want to get the severe accident knowledge and codes in at the front end of the process. Tom talked a lot about accident management—development of the concept of accident management—and we are gearing our research on accident management in the near-term to provide the answers that will support the decisions that will be taken there. As I showed it on the slide, those are near-term research issues.

QUESTION: Assuming that research determines that the degree or damage can be increased at high rates of water injection, do you envision any practical way of telling operators to reduce their water addition while extreme thermal conditions exists?

ANSWER: I guess my answer to that is that what we are looking at late core damage in relation to accident management. I think obviously before a core has started to degrade, you can put water on it, and there is no question about rates. As it becomes more and more degraded—I think the first answer, the starting point is, yes, you put water on it. I mean, water is either on or it is off, and the best situation is going to be that it can be on. I think, what we are looking at, is to determine, in the late phase of core damage, if it will be necessary to put some limits on the rate of water addition. As I say, I think it is desirable not to limit that for obvious reasons. If we find out that there are problems, then we will deal with those.

QUESTION: The final question, not on the water reactors, it was a question to Tom originally. Have you looked at the modular HDGR [high-density gas reactor] in regard to severe accidents?

ANSWER: I am sure that many of you are aware of the work that DOE is doing on the HDGR development and probably also the review, the safety evaluation report, that NRC had been working on, doing on that concept, now for a couple of years. That work is on hold right now as of last fall because of the question that came up over containment. As you know, the modular HDGR for commercial application does not have a conventional containment. The containment is the triso coated fuel. We were looking at that entire concept. I should say the proposal, the concept, is an interesting one because there is not a containment and no evacuation would be needed in the event of severe transients.

We were studying that when the DOE announced its conclusion on the NPR [new production reactor], which it announced would have a containment. We wanted to understand the basis for the difference between these two positions. Our work on it has been put on hold until DOE comes back to us in June with some further studies and evaluations that they are making at this point on this question of containment and also their look into possible improvements in the residual heat removal system.

I am saying that the Commission has not made any decision on it. I can tell you what my own opinion is, and it certainly will not be any surprise. I think that the concept that they are developing is an interesting one. Obviously the high heat capacity of the core has an advantage in regard to severe accidents and in the ability to ride out severe transients and also in providing much more time for operator decisions and actions.

It does seem to me, under the concept that was originally advanced, the critical question becomes the integrity of the fuel coating. It seems to me that that would have to be a very important element of a future R&D program, both to prove that the triso coating can act as a containment and also to show that you can depend on it in the course of manufacturing new fuel and that type of thing.

QUESTION: There are also questions related to the requirements for prototype reactors: whether a complete prototype should be required, whether that prototype should be sited remotely, and whether it should have a containment.

ANSWER: These questions I think are all ones that the Commission will be considering, probably late this year after we have gotten back and restarted that review and completed it.

Mr. Congel:

Eric, there is one thing I wanted to add in response to the first question dealing with the living portion of the severe accident plan. It is our intention that the accident management portion of the severe accident plan have, what we call, a living component. So if the long-term research indicates anything new, they have the capability existing at each plant to be able to incorporate that into their overall severe accident plan. So, if confirmatory research comes up with the results that we anticipate, that is one thing, but new lessons are always intended to be incorporated as part of the overall operational base.

Dr. Speis:

If I may add something to your statement on external events, you said, of course, that we had decoupled the external from internal events. One of the basic reasons has been to make sure that we work with you people to come up with a methodology that makes sense and is not very complex and we can apply it very effectively.

There were some other reasons that I would like to mention. One of them, I think, is an important one. One of them was to identify weak external events. A plant should be assessed again in this system module examination. The reason for that is that we feel that as part of the licensing of the plant, a number of external events have been adequately considered that span the so-called design basis. So we do not want to repeat those external events again.

Another reason was the existence of a number of programs dealing with external events that we want to make sure are properly integrated and properly considered, so that we do not have to ask you people to do things twice. Once in awhile we do that, I guess.

Getting back to some of the questions here, I see some of them have been answered by Tom, but one of them says:

QUESTION: Can licensees provide detailed descriptions of their IPE process and get written acceptance from NRC of the approach?

ANSWER: Well, we hope that this document, NUREG-1335, that I mentioned earlier, will make it clear. However, if someone [a licensee] still has any difficulties or worries that he might undertake something and then the staff would say, you pursued the wrong approach, I do not think there will be any difficulty in coming to meet with us.

Tom, maybe you can say more about this.

Dr Murley:

I think we would encourage that. Come on in and talk. Once you are ready to talk, I think the more communication the better.

Dr. Speis:

QUESTION: When do you expect to issue final guidance on performing the IPs?

ANSWER: We hope to do that sometime in mid-June or so; then you have two months following that to start the clock.

QUESTION: How soon do you expect utilities submissions?

ANSWER: I think we say in the letter, within three years. Licensees are expected to submit the IP results within three years. However, if some utilities with no PRA experience, for example, want to do a more complete PRA and need more time, there will be no difficulty in talking this thing over with us. We say that in the letter also.

QUESTION: Basically, the other question has to do with reasonableness, what type of criteria or numerical standards are to be used to evaluate the IPE.

ANSWER: As we say, for the PRA, there are no hard-and-fast standards; the criteria will be both qualitative and quantitative. As Tom said already, he applies the standard of reasonableness. However, if we do not agree and we think that something else has to be done, you know our process, you know the backfit rules.

I think that covers the questions.

Mr. Zech:

Frank, I have two that came in, both basically relate to the same question.

QUESTION: Have you looked at the feasibility of extending the EDS to a continuous mode using an advanced computer that will tie together process computers and go on line continuously? The other was basically the same. Is this similar to the nuclear data link that was in the Commission's budget back in the early 1980's?

ANSWER: The answer to the second one: It is probably an outgrowth from the nuclear data link that you may be aware of or familiar with, but it definitely is not a continuous flow of data, nor will it ever be, as far as we are concerned, a system that would have a continuous feed of information into the operations center. As I mentioned, it would be activated as we perceive it at the alert stage. Information below that level we do not feel is necessary for our response function.

Mr. Congel:

So that the chairman does not feel left out, I did get one question.

QUESTION: Do you have any preliminary thoughts on potential regulatory and research needs that may develop from near-term application of electrochemically induced fusion, if it is, in fact, proven to be a valid technology?

ANSWER: No, but our bureaucratic brethren at DOE are clearly very interested and will be sponsoring, I am certain, a good deal of the early research that will be necessary to even demonstrate if it is working like the claims indicate it is.

Only when we have it well under way, a proven technology, will we think of ways to write new regulatory guides and rules.

Dr. Murley:

If it is fusion that does not give off radiation, maybe regulatory rules will not be needed.

Mr. Congel:

It gives off neutrons. We are within five minutes of our closing time. I would like to thank you all for attending and thank the speakers for their presentations.

11 CLOSING PANEL

Mr. James M. Taylor:

I would like to ask everyone to take their seats. This reminds me of my last period in high school on a sunny spring day when there were very few of us left to go to class.

We are going to conclude the conference in a little different way with some questions to the panel. Before doing that I wanted to make one or two comments.

First, for those of you who are still here and who have been participating in this conference, certainly from the NRC's side I would like to thank you for attending. We hope it has been beneficial.

I would also like to note that the final topic on the conference agenda was severe accidents. There are some of us in this room who have been to two locations of the most severe accidents in commercial nuclear power, not only Three Mile Island but at Chernobyl. There are some of us who were there and have been working with the Soviet Union on an agreement; we know that the devastation and effect of that accident in the Soviet Union is nothing short of phenomenal.

Of interest to you, there was a NUREG just published with regard to this trip, NUREG-1348, which is a report of the United States visit led by the Chairman of the agency. If you ever wanted to understand the importance of operational safety in nuclear reactors, I wish I could transplant each and every one of you to spend a day or so at Chernobyl as we did. We were not only in the environment of Chernobyl, the abandoned city of Pripyat, we were in the sarcophagus, we were the first non-Soviets allowed in there. We were able to view just above the damaged core; we could see the awesome destruction and the devastation. We were actually able to peer through fluoroscopes through sarcophagus walls into and on top of the core.

We are going to learn from the Chernobyl accident, we hope—not only within the Soviet Union, but for lessons learned that may be appropriately applied in the United States. I mention this because we talked a lot about safety of operating reactors and I want to remind everybody of that theme. Tom mentioned this at the very opening of the conference, with regard to operational safety.

We just received a get-well plan from a utility that is having some operating problems; it makes a big point of management wanting to know about problems. The attendance at this conference is made up of managers, or others who have influence in this industry, and I want to tell you that concentrating on the day-to-day problems, as onerous as it gets, is all very much a part of operational safety. And who knows, you may—by correcting a problem—you may correct a condition that might have been part of the sequence for the next nuclear accident. You are never going to know, when you fix something, whether that item might have been the dominant sequence or path to a nuclear accident.

I urge each and every one of you to look for the problems. It is my mode in life to say that a technology as complex as this is full of problems and even at the best plant, there are problems. It is kind of a dark look, but it is true and I can tell you every day, every single day, reports of problems come in. Some of them are rather awesome, telling us of things that are not satisfactory at plants across the country. In many cases, they are being identified by licensees themselves and that is a credit to them.

I just want to encourage people to continue to look for the failures not only on the part of the operators themselves, but the maintenance failures. Just as important, as you heard as part of this conference, are the engineering and design failures because some of those are showing up and they do bother me no end. We owe it to the operators to make sure those kind of problems are found and fixed before they cause an event at two o'clock in the morning.

Again, from my view point in closing the conference on operational safety, I say to you, keep looking for the problems. I do not think we are in a condition where we can feel secure. Operations are better in the United States, but we are a long way from feeling secure that an accident will not occur at one of the plants across the country.

I would like to leave you with that thought as you leave here. I think another accident would be a very, very devastating situation here and also, frankly, if one should occur overseas.

I would now like to go to our concluding part. We have the panel of major people who have participated from the NRC side in parts of this conference.

We have asked several of the utility people—and NUMARC is participating—to pose questions to the panel.

First is Jack Brons who is Executive Vice President of the New York Power Authority. Jack.

Mr. J. C. Brons:

Well, I have several sheets of paper. I do not intend to give a speech. Some of the questions that I have, I think, have to be put in some context.

First of all I would like to thank you for the opportunity and applaud the effort your theme was to try and communicate in this new age of operating experience. It approached excellence

I would like to assure you that I think all of us here feel strongly the need for effective regulation in this industry.

I think all of us also recognize the awesome power in a reactor core. Hopefully with your understanding of our recognition of that, or at least mine, you will interpret my remarks and questions as critical but constructive.

We have heard remarks and opinions and sometimes conflicting opinions on safety culture, importance and scope of inspections, SALP process, performance indicators, increasing emphasis on subjectivity. We heard two regional administrators tell us that executives in their regions pursued or told them that they wanted SALP once but that the reactions did not always match. I would like to offer an answer to the why, perhaps behind that question, and then go to the first of my questions.

The utilities represented here made a training investment over the last several years that amounts to billions of dollars. Each of us is spending about $5 million a year per plant in direct O and M [operations and maintenance] costs and training, and in an additional amount of training time. But training is no longer a SALP category.

Performance indicators were reported to us to be generally up. Enforcement actions are also up. And these things are in areas that are in absence of new regulation that indicate perhaps the fact that the SALP ratings are going down, that we are seeing over the last couple of years a sliding or an unregulated standing.

We are in business. We are also humans and subject to reward and recognition. We have a fiduciary responsibility to stock and bond holders and rate payers. We have a public trust for safety and reliability.

My first two questions, which I would not ask for an immediate response, but perhaps an overall reaction when we are finished, are: First, will the NRC acknowledge achievements, collective achievements of this industry, publicly? Second, will the NRC recognize that investment without return cannot be sustained?

We have also heard some comments on the theme based on a question asked on the first day of the conference, which basically was: "when is enough, enough?" There was a reaction that was rather strong and I believe heartfelt, but, I think, there was also a failure to communicate.

I think that we all agree that reactor safety requires constant vigilance. I think, perhaps the theme behind that question of "when is enough, enough" might be dealing with our feeling of a need for setting practical and realistic safety goals firmly—an end to some of the churning on process and procedures, regulatory stability and time for consolidation of gains, an end to elegance in engineering.

I personally fear that preoccupation with performance under rare event circumstances may be missing the boat as far as reliability in day-to-day operating conditions. Indeed, it could lead to an increased probability of accidents. It certainly has the probability of one, of increased person rem in installing it.

My third question and next to last is: Will the NRC sincerely commit to realistic assessment of cost versus benefit, risk versus reward?

Much has also been said about excellence. This has led to the development of broad, nonprescriptive regulation.

We have also heard in this conference of development of good practice in NUREGs. In some sense, I find this approach intellectually very appealing. When I look at the results of compliance inspections focusing on nonprescriptive regulation, I have some severe reservations.

Policy of regulating excellence without significant and extraordinary management and full assessment of the many, often conflicting priorities that must be evaluated by individual utilities is an invitation to economic strangulation.

Inspectors in the field lack the objectivity, experience, and judgment that you gentlemen represent in many cases. They lack that objectivity that the framers and the intenders of nonprescriptive policy or regulation have. Without some restraint, such policy is bounded only by their imagination.

In my view regulation to excellence is a contradiction in terms—particularly so when excellence is confused with elegance.

To risk, nuclear power cannot be regulated to zero, and so my final question is: Is the NRC willing to accept the traditional role of a regulator?

Mr. Taylor:

Thank you, Jack. Let me see, those are some good questions. Tom, do you want to start? That is known as the executive privilege of duck.

Dr. Murley:

Yes, I will start and acknowledge that these are very tough questions. I also will acknowledge that there is a lot of judgment involved in these questions. My staff and I and the regional administrators and Vic Stello and Jim Taylor kick these issues around a lot amongst ourselves.

Starting with the last question, can NRC accept traditional role of regulation? We have heard this kind of theme throughout a lot of the questions at this conference.

The issue of regulating to the standards, let me call them the minimum standards of our regulations, gets to some of the other points that Jack made about the policy of regulating excellence, which in a way can be dangerous.

We have people out there doing the inspecting who are not perfect. Perhaps they do not have the breadth and the perspective that we who set the policies have. I understand that comment. However, I do not think that we are going to go back to the old ways of just inspecting for compliance and accepting mere minimal compliance with our regulations.

Maybe I am starting this a little too starkly, but I think we have to encourage performance that is higher than our minimal standards. As we have seen time and again, if you aim for minimal standards, you are going to slip below them and that becomes a safety concern for us.

We are not so smart as to think that we can fashion regulations so well and so finally that if you just barely meet them, you are going to be safe under all conditions.

We recognize the role of INPO in this area as well. We invite INPO to strive for standards higher than ours and to inspect and do team evaluations to even higher standards than we have. I think there is a role for both organizations, and we are going to continue striving for better performance.

I will reiterate my statement at the opening session and I realize it is a heartfelt cry: When are you guys going to acknowledge that enough is enough?

I probably should have made a distinction between hardware and operations because I think we are close to saying that we have gone about as far as we can go in hardware. Once we get some of these severe accident issues and station blackout issues behind us, I, at least for one, think that there is not a lot to be gained in safety by demanding more hardware at the plants.

In terms of operations however, I fear that if we do not keep striving for real excellence, and even aiming for excellence, we are going to fall into complacency. Nonetheless, we will be reasonable. We also recognize that we are placing, to some extent, a burden on our inspection staff by aiming for excellence in operations.

I guess I will let some others on the panel here talk about some of the other questions. I will phrase them as I heard them, Jim.

One question is: Do we have a sliding scale of perfection in achievements and are we going to acknowledge that there have been, in fact, gains nationwide?

Another question, which was kind of rhetorical, I am not sure how we can answer it, but: recognize that investment without return is not sustainable in the long run.

Mr. Taylor:

I would like to add just one thought to what Tom said earlier. That is that in my view in a regulatory sense the management of the agency is deeply trying to concentrate on problems in performance so that we hopefully can head off the forced shutdown conditions that numbers of plants have undergone in the past few years.

These have occurred for various reasons and you all know what they are. I think it is prudent for us to act if we have the view that plant performance is sliding, that events are occurring that indicate bad performance. It is prudent to act before the utility is into an extensive multi-year shutdown and then trying to recover.

So I think we have an obligation to try to understand, when we see what is coming, and use whatever means we can that are within our authority to point that out. There are plants where we are trying to do that, where problems have been occurring, causing us to stop and pause. I think to stand by and just use a compliance concept when we at least can see that plant performance is sliding—and, it would be unconscionable for us not to at least raise the issue.

Do you agree with that, Tom? I can tell you very strongly that the concentration of thinking, at least back here and through the regions and through the regional senior people, is directed to those plants where it is perceived that performance is slipping. There are many plants that day by day, week by week, perform well enough that they do not show up as having serious problems.

Frankly those plants seldom cause us any major regulatory concern of any consequence. And there are a lot of plants that have worked themselves up to that status. Somebody said, what do you want, perfection? No, perfection may not be there, but they have certainly worked themselves out of being of a running concern to the NRC.

I did not mean to dwell on that. Frank, you wanted to hit that?

Mr. Miraglia:

I wanted to respond to Jack's invitation for a reaction as opposed to response. Those were tough questions, Jack. I think they were all good ones.

I think what we have tried to say here at the conference for the last three days that our approach to regulation is a little bit different. We are trying to get a different ethic into the way of doing business. And if you are saying, do we want to get back into the traditional approach of strict adversary kind of relationship, I do not think that is our goal.

I think we are saying operational safety is important. Compliance is part of a regulatory gain, but we are looking for safety significance and we are looking for performance and improvements in that area.

I do not think that is in conflict, the seeking of an excellence of level does not necessarily have to be in conflict with INPO. I do not think we are trying to usurp INPO's and NUMARC's role. I think we are both striving for the same end. Perhaps we have different objectives to serve there. You are serving your stockholders and your rate payers. You are doing both. That is your responsibility. You have a fiduciary type of responsibility.

I do not think I am willing to say that we do not want to go back to a traditional role. I think we are trying some new things. We are going to slip and fall and we are going to have problems and we are going to have difficulty communicating, but we should not let that stop the communication path. Where we do differ, we should talk about the differences. We should try and understand those differences. I think our goals and objectives are basically the same. We have slightly different roles to play.

I think the Sillen report back in 1985 tried to put it in perspective. The industry has to improve and, if the industry is to have credibility in this country, it needs a credible regulator. That is what we are trying to be.

Vic Stello mentioned a word and I think it was picked up by Jim Sniezek. It is trust. In this time and age and perhaps when you look over the decade, here is a Federal bureaucrat saying, we are trying something different. It is not going to be easy. Yes, we have to get this kind of different message out to the inspectors in the field and it is going to take time, trust us. Let us work together on that kind of thing.

It brings a smile and I know with recent events, and maybe not so recent events, it is kind of hard to hear somebody in Washington say, trust me. But, I think, we have to work in that kind of way. I think we should, we are not going to see things the same way all of the time. But I think we ought to put the issues on the table and we ought to deal in an up front way. You have a role to play and you have responsibilities and we have a responsibility as an agency. We are here to protect the public health and safety. We are going to meet that mandate and I think we are trying to do that in a mutually constructive way.

Even though we have perhaps different objectives, I think the end is the same.

Mr. Sniezek:

Let me add on what Frank said just a little bit. There is no question in my mind that the industry does not trust us. And I know why I can say that. A few years ago we issued a backfit rule, a rule to guide the staff. We wrote to every CEO. We gave seminars in four regions to all of the utilities. We said, if the reviewer, the inspector, in your mind is pushing an unauthorized backfit on you, appeal it. We are not getting appeals. So maybe that inspector that lacks judgment, maturity is doing what he is supposed to do out there because we have not heard any complaint from the utilities that they are being backfit.

Why are the complaints not coming in? Do you fear retribution? That means you do not trust us.

We have lectured our staff. We have told them what we expect. We expect cost benefits. We expect to do things that will cause a substantial improvement in safety, but the cost has to be commensurate with that improvement in safety. There is no question that we are not fully implementing that across the board. Yet, I do not hear any appeals. Why is that?

Is it because you do not trust us? There must be a reason. We have not heard that reason and we do not see the results of a good rule we put in place, a rule on the staff.

You have an opportunity, if the staff is not doing what they are supposed to do, raise it to senior management. You have to trust that we are going to deal with those appeals fairly.

Mr. Taylor:

Brian, you had something you wanted to add? Brian Grimes?

Mr. Grimes:

Yes. I was going on the same subject of the inspectors in the field versus the intentions of the managers in the regions and in headquarters. We recognize that this is a continuing problem.

Over the last few years we think we have made substantial progress in getting people to focus on safety versus the paper compliance end of things. But I have to say, when we go out and inspect, we expect people not to inspect against excellence, but to inspect for performance: whether it is in the engineering area or operations area, whether the maintenance procedures are being followed in a way that results in things being maintained so they are still operational after the maintenance is finished, whether it is in the design area, whether it is the control room operators following their procedures and whether the procedures are all right.

However, but when we do look at those performance aspects, we tend to find that the root cause of that is an attitude in the management of the utility. When we have very poor performance, the reason is—as objectively measured—the reason is usually not striving for excellence in all aspects. I think that NRC management has picked that up and reacts to those specifics and wants to get back with you and tell you our perceptions that this is an important root cause.

Mr. Taylor:

I would like to add, I think, Jack, you asked about—say something good about your mother-in-law or that type thing on the part of the agency.

With the improved plant performance there are many speeches being made by senior people in the agency in various forums that the signs are very positive. We were not in that position a few years ago. We really were not. The plants were not there collectively. They are there today, and we are very pleased to see that.

It is a credit, first to you who operate the plants. It is a credit to all of the others, INPO, NUMARC, perhaps us, but whatever is making it happen, we are very pleased to see that.

That is an important message that does not get a lot of press because it is always the bad stuff that seems to get into the press. However, it is being said and it is being said in important places. You do not read about it because the press does not want to—you know, it is like saying something nice about somebody, they do not particularly react to that. But it is understood. It is being used with the oversight committees and I think it is important to know that the staff is saying it. The Chairman is saying it, Stello is saying it, all of us who have an opportunity to speak in public arenas are quite pleased about the gains that are being made.

Mr. Crutchfield:

You asked us to end the elegance in engineering. I think we are kind of caught in the middle and maybe you are too.

Your vendors are constantly coming to you saying: "Well we can get you another two megawatts out at this plant. We have this very fancy computer code that you can go to." So you come to us with that. We spend a lot of time going through it, getting into the details of it. We come back to you with a series of questions and things like that. It takes a lot of time. It takes a lot of effort on both sides. I recognize you are trying to get more power out of the machines so that it is more economical for you.

At the same time, it is bringing in instability to the process. It is fostering that atmosphere. It is causing us to have to go back and look at reducing the level of margins that we do not necessarily like to do all of the time.

So, you can help us by kind of keeping a little more control over your vendors and suppliers and getting them to put some stability into the process also.

Mr. Taylor:

Jack, I hope we have been of some help. I do not think you feel completely satisfied but, on the other hand, you all come in and meet with Vic or the regional administrator or Tom or senior people in the agency and you should let your hair down.

I realize that PUC and others are on your case very heavily. It is not a happy environment for you. But you certainly should take the opportunity to talk about it. If the staff is being onerous in a way that we ought not to be—we are not infallible—so do not hesitate to talk. You really need to talk to us about it and you need to be as specific as you can because we ought to fix it.

NRC is a big organization too and there are sometimes miscues about what to do.

Next speaker, Don Shelton, Vice President of Toledo Edison. Don, are you here? There he is. Don, I have been saying nice things about Davis-Besse after you came out of that big outage and had a record run.

Mr. Donald C. Shelton:

. . . or down at INPO a number of folks that have real experience with design activities and that is the preparation review of specifications, calculations, drawings is very, very few.

Today we are moving into an area for lots of good reasons. We are looking at engineering activities and I have a concept I would like to put out there.

We are doing SSFIs and Jack the other day went through a laundry list of all of the things we are finding wrong; those things are wrong all right. But that, I guess, is a representative characteristic of the activities that designed and built these hundred and some odd plants we have running today.

As we look at things like improved safe operation and we are looking at our design base to make sure we understand what is out there and looking ahead to licensing extension, those are important activities to have handled on the engineering. I see it as kind of a new growth industry. It is kind of unavoidable.

On the other hand, given the lack of expertise and experience of the people that may get involved in that, I just want to make a cautionary note: As we go out there—kind of like the severe accident business and so on—we have a great opportunity to get through a compliance drill, like Frank says that we do not want to do. Or, on the other hand, to look at things that are really significant. That is really the point I wanted to make.

I gave Jim Sniezek last year what I consider a rather droll package of an unauthorized modification we made back in 1980 at Davis-Besse for which the inspector did not give us a violation. However, he gave us a violation for the calculation that went with it—for putting a 1-pound gauge glass on a 1600-pound sump. But, when you look at the engineering that went into that calculation, there is really nothing wrong with it except that it was not perfect.

That is the kind of thing—wrong wisdom—that, as we get into these activities for the future, we have to be very careful we avoid. That potentially gives you a real problem with the enforcement side of your business; I guess we have to work that out somehow.

We are going to spend some money on this, but we can spend a lot of money on it and not get much out of it if we are not careful.

So my rhetorical question is, what are you going to do about it?

Mr. Taylor:

I will take a shot at that. Although I have gotten out of the enforcement end, it has been our intention in this area that self identification and correction even of significant safety items is what we would like to see.

Nobody in this agency is going to solve this problem. It will have to come out of the effort by the utilities, particularly the older plants. It is going to come out of the utility effort itself and out of the architect engineers or experts that you can employ.

It is disturbing to continue to see engineering failures such as overloaded buses, emergency buses. I had just been reading earlier this month of conditions where under an accident sequence the Class 1E buses could be overloaded. That is a basic electrical issue; you are in the electrical business. Now a lot of these issues get down to the very remote single-failure problems and they are not nearly as important. It is important to be able to be sure that in an emergency the buses will continue to supply power to the emergency equipment that is supposed to run and not get into some type of overload condition.

I believe it will be the intent in the enforcement area to encourage companies to investigate when they believe that there are engineering problems or difficulties and to find and resolve them.

I just read of an incident in the last week or two in which turbine building sump pumps that were to have both alarms with an automatic start feature, per the FSAR, in the case of flooding of the turbine building and the auxiliary building. Those features were not there. The company self-identified the problem. I can only look at that type of thing, flooding the turbine hall as a result of a service water failure, as a remote possibility, but it is possible. The conditions were not there to alert the operators to a problem and to automatically start the pumps.

It was an important finding, and it is to the credit of the utility that it identified it. That is an example of the kinds of problems that lurk out there that you surely do not want to find out about at two o'clock in the morning. It is a credit to the utility that it was looking and saying, "wait a minute, we thought we had that. We, in fact, do not and we are going to do something about it."

I hope we can keep our enforcement sanctions in that area in the mode of encouraging a solution. I do not want to dwell on this, but these problems may indeed cause your plant to go through a very serious event. I will tell you, though, if it goes through a serious event and you have design features that do not work, then you get in the position of having to explain why things did not work. Then you have to appear in front of the Commission and try to explain why your plant did not respond and why, in fact, the equipment was not there. That is a very difficult position to get into because you end up trying to re-establish your credibility, which is a hard job.

Tom, I did not mean to dominate that answer. I can tell you, though, I hate to harken the Navy experience, but we went through some of this in the early submarine days with multiple designers and thought we had things that we did not have, and it was a problem. Excuse me.

Dr. Murley:

No, I think that was a good answer. Let me pose the question a little more starkly because I have been hearing it through the conference and in the halls and so forth. It is a legitimate concern.

That is, we, the NRC, now have discovered engineering, so to speak, and the whole thrust of what we are proposing in terms of design-basis reconstitution and better support and responsibility of engineering is to help improve operations. If we start pushing on that theme and then doing more SSFIs and finding more and more weaknesses, design weaknesses in the plants, that provides the opportunity for almost unlimited mischief in terms of distracting operators from operating their plant and distracting the management of the utilities from operations.

I think all I can say is we recognize that possibility. We are going to do what we can to manage it so that it does not get out of hand.

On the other hand, as Jim pointed out, every day we see examples of cases where the engineering has not kept up. The plant modifications are being done in such a way that it is not the same plant that was designed and that we licensed. Loads are being added to emergency systems, and they are not being reanalyzed.

We have a responsibility, and we are going to meet it, to make sure that the engineering does keep up in support operations. All I can do is give you our assurance that as managers we are going to keep an eye on engineering, but we are not going to let it get out of hand so that it distracts operations.

Mr. Taylor:

If it does, I agree with Tom, I think it would be detrimental to safety. We do not want to allow that.

So if you see signs of that, I think that is another issue that we would like to hear about. Let me see, anymore on that one from the panel? Any others? Bill Rasin from NUMARC. Now we are really going to catch it, right, Bill?

Mr. Bill Rasin:

You bet, Jim. Well fortunately Jack covered a number of my points so I will be able to be a little bit brief.

I was interested, at the opening of the conference, to hear the talk about trust and we must trust one another. I certainly have had conversations with some of you and with Vic Stello on that—that clearly we do not.

I guess, I think maybe that is almost too much to hope for, maybe even going too far. I am not sure we should completely trust one another because we have different missions and different motivations. But clearly we have to work toward an era of mutual respect: a view or an understanding as to what motivates each of us, rather than the total distrust that has been displayed in the past. I believe that we are making progress in that endeavor.

You stated that the staff is trying something new and it is hard; it is difficult; it is not perfect. Industry is also doing that and it is hard for us and it is not perfect.

I have told a lot of my colleagues that I have stumbled on to the way to tell whether you have the right balance at NUMARC and that is for the industry and the NRC to be equally upset with you. I think I am doing a great job from the indications I get so far.

You mentioned that you have not heard—Jim Sniezek did—but you have not heard a lot of complaints on backfits and you have not heard a lot of feedback from the regions who stated, "gee, you have to hear that." I think that is correct; you need to hear that. You know, Jim, that everything is not perfect and you are not hearing it because of concerns and those are valid concerns.

I have had some direct feedback from inspections that indicated implementation of a regulatory requirement was discussed and the response was, "yes, that's what headquarters wants and if that's what you do that's worth a SALP 3, but here's what I think really ought to be done." We know that is going on and you have to realize that is going on. We both have to just continue to work at it so that the people with the wisdom and the experience are the ones that really can set the requirements and go ahead.

I would be interested in any ideas you have as to how we can help you do that rather than simply ask the poor guy in the utility to risk the wrath of his resident inspector over those things. I think we need to give that some thought as an industry.

From the standpoint of our work in trying to proceed to resolve some of the longstanding generic issues on the books, it is difficult to do that because we keep getting interrupted, I am speaking for both the staff and the industry, with issues that come up, short-term issues.

I wonder if we always have the right perspective on the priorities. I guess I would like to hear your thoughts with regard to the generic communications.

The last reorganization at the NRC certainly has muddied the waters with regard to what is a generic letter, what is a bulletin, what do they each mean and who can initiate one, is the issuance of the generic communication coordinated at a high enough level, and what the role is of CRGR in the reorganization?

I think we all generally know these things; we know what happened in the past. Yet, I think, the clear understanding—even of someone like myself who has spent about two years now working on these things every day—does not have a clear understanding of how you make that distinction and what guidance you really operate under in that area.

It does seem as though many times a generic communication . . . last year we had what we thought was a tremendously alarming increasing trend of generic communications. You have to understand how disruptive that can be to the industry—I am sure you do. I am wondering if we are not exercising too little discipline in the number of generic communications that we issue.

The other point in generic communications that I would like your thoughts on is the fact that it seems to us in a number of cases that there are actually new requirements being put on the industry and individual licensees by generic communications. We need to have care given that we are not circumventing the rulemaking requirement, which does bring into account the wisdom of the senior element of the NRC and of the public in deciding what new requirements should be put on the industry.

Again, this can be a judgment. It can be hidden in terms of well, "no, it is not a new requirement, it is just a new way we are going to look at what is good enough to meet an old requirement." There are some fine lines.

However, some of those things, I think, have been of concern to the industry over the last couple of years.

Mr. Taylor:

Thank you, Bill. Tom, do you want to take a first shot at that?

Dr. Murley:

I would like to ask Jim Sniezek to answer most of it. That is the good thing about having your deputy here. Jim is the one who pulls all this together on generic communications and the role of CRGR and that sort of thing for NRR.

However, I must say that I have been somewhat troubled myself lately about the large increase in generic communications, particularly information notices and that sort of thing.

Maybe Jim and my other staff can speak to this as well. Our thinking has been, when we see a problem out there to get that problem communicated as widely as we can—I suppose it is a "cover-your-butt" kind of feeling. You know, we got zinged very badly at Three Mile Island because we did not tell everybody about a similar event at Davis-Besse, which was almost the exact precursor.

That was the reason the EOD was set up. That was the reason why we do try to communicate as much as we can. Thus, there is a feeling among the staff that we have an obligation when an event comes up or we find some phoney equipment or whatever to get it out to the industry.

I think maybe we need to be a little more introspective. We will do that to see if this is being too disruptive. I guess, what I can say, is that I will commit to you that we will examine this over the next six months. We will consider whether we are exercising, as you put it, too little discipline.

I do not think that is the issue. I think it has been our policy, my policy, to get as much information out and to not inhibit the flow of information.

Mr. Sniezek:

I think Bill brought up a lot of good questions and Ernie Rossi, be ready when I am done. Ernie is the responsible division director.

Basically we have three generic communications: information notices—which were an old I&E method of communication, when I&E existed, to get information out—bulletins, and generic letters. We are probably on the trend of about 90 to 100 a year. Part of that goes back to the plenary session in which I said, "you are responsible for the safety of your reactors."

When we have any safety information, we do not have time to analyze its applicability to every individual plant, so we say, "let's get the information to the utility so they can do with it what they please." We ask the individual utilties to review the information to determine whether it applies to the facility.

There should be absolutely no requirements or staff positions in information notices. In other words, we are very careful about the wording. If anyone tells you, "well, you did not do what this information notice showed you should be doing," they are wrong because they should not be telling you that you should be doing anything. It is information. It is meant to be information for you as an early warning regarding a potential problem that may or may not apply to your facility—nothing more, nothing less. The only thing we ask is that you look at it to see if it applies to your facility; and if it does, then you do whatever you think is right.

The other two types of communications, generic letters and bulletins, may or may not establish new requirements. Again, going back pre-reorganization, before Apr[illegible] 1987, a bulletin was an I&E tool and the generic le[illegible]s basically an NRR tool. When we reorganized in [illegible] 1987, we left them both on the books because the[illegible] common usage and we did not want to confu[illegible]tility. They come through Ernie Rossi's division.

Basically a bulletin, in most cases, is something that we look for, for a shorter term response and it normally is precipitated by an event at a facility. Whereas a generic letter is normally used to give longer term guidance. It has something to do with a licensing action. It is normally the type of thing that NRR used to be involved in.

Occasionally generic letters and bulletings do cross over: they both have to go to the Committee for Review of Generic Requirements.

The Director, AEOD, Ed Jordan, is the chairman of that committee. The staff has to show CRGR that it is a new requirement and that there is a cost benefit analysis that meets the requirements of 10 CFR 50.109 each and every time. If you ever look at minutes of the CRGR meetings, when they come out, you will see many times the staff is turned around—the whole complexion of the generic requirement changes. In fact, bulletins and generic letters have been killed by the CRGR saying there is no need to go forward.

I know the staff, in the last two years, has not disagreed with any of the CRGR recommendations and has always implemented them. I think that is about it.

Mr. Taylor:

I think Ernie may want to add some thoughts.

Mr. Rossi:

Yes. I am not sure whether the comment on generic communications did or did not apply to information notices. You might want to clarify that because what Jim Sniezek said about information notices is exactly correct: They are to provide information and to make sure that everyone knows about problems that have occurred.

We do work closely with INPO and we also work with vendors to try to determine whether they have disseminated information on problems that have occurred. If we are satisfied, generally, with the information that they have disseminated, we would refrain from issuing an information notice under many situations.

In some cases however, even though we know a vendor has disseminated the information, we feel that it is important for us to issue an information notice to further emphasize our concern.

Just this week we did that in the case of some differential pressure transmitter problems where the vendor had disseminated the information and so had INPO. We followed it up with an information notice to further emphasize the concern and to make sure that everyone knew.

Jim Sniezek indicated that every bulletin, every generic letter that has any kind of a requirement in it, has to go to CRGR and every one has gone to CRGR.

With respect to whether these do or do not contain new requirements, let me just make one comment. I tried to make a list of things that I could think of off of the top of my head where we have issued either generic letters or bulletins in the last year or so.

I think all of these were issued not with the intent of new requirements, but because we had found problems with equipment or systems that are in the plant that we needed responses back in some form from all of the utilities to make sure that they had indeed fixed these problems. Let me just mention a few of those. There have been the ones on fraudulent materials, the flange bulletin, and circuit breakers. These bulletins were issued because of actual problems that had been found with the existence of fraudulent material.

There was a generic letter that was issued on air systems. That was issued because there have been a large number of problems with the air systems. There was a bulletin issued on thermal stratification problems in plants in which we had seen actual cracks in piping as a result of thermal stratification. So, there was an actual problem there. There was a bulletin on power oscillations in BWRs. Again, that resulted from an actual problem that we did not expect to occur in the plant. There was a bulletin issued on some relay failures, other circuit breaker failures, and, again, those were issued because of actual problems. There was a bulletin issued on new phenomena that resulted in an actual tube rupture in a pressurized water reactor and, again, that was issued as a result of an actual problem.

Dr. Murley:

So the conclusion, Ernie, is that where there is an actual operating event or problem, we have to get those out.

I guess I will reiterate my point and then also tell you that we will talk to you to re-examine it.

My point has been and my policy has been the more communications the better. Now if that is causing disruption or overloading operating staff or something like that, I guess I would like to know it.

So maybe, Bill, we can chat. If there is a sense in the industry, we can re-examine that policy.

Mr. Sniezek:

Let me add one more thing. Ernie's listing has taught me, I think, that, basically, bulletins are initiated because of events or problems that we saw. Whereas the generic letters are more, like the one we sent out last Friday, the result of having to correct something. That one did not go through CRGR. It is the only one that I am aware of that has not gone through CRGR, the one we sent out last Friday on the TMI status.

The other thing is, we have seen an increase this past year of bulletins and generic letters. One of the big drivers was the fraudulent materials issue--completely unexpected.

The other thing is that some of the long-term actions we have had on the books, we have been quibbling with each other over SPDS for eight or nine years now.

IST programs have been a disgrace from the NRC perspective in the way we were reviewing them and everything had to come in for exemptions.

And what we have done basically, we have issued generic letters on both of those issues and we have said, "IST programs here are some criteria to which you can give yourself an exemption." Basically, a generic exemption is what we have essentially issued through the generic letter and said, "you meet these criteria you do not even have to come in and talk to us about it. Just do it."

With regard to SPDS, we have said, "we are done quibbling with you. Here is some information. Digest it and, then after you digest it, you decide whether or not you meet NUREG-0737, Supplement 1."

That goes back to the trust issue, in many cases, we do not feel we were going to have to do preimplementation reviews. We found you to be technically and managerially competent when we issued the license. You do it and tell us you have done it and that is the end of it. We are not going to play this game of rocking back and forth.

Mr. Rossi:

One more comment on generic letters. There have been some generic letters issued in the last year to inform the industry of the availability of technical specification improvements. We would hope that those are a true benefit to safety and to the industry. Those, I think, are a different kind of generic letter.

Those also have gone through the CRGR, but those have been issued independent of there being specific events and problems, I would hope that everybody would agree that those truly benefit safety and should also reduce resources in many cases.

Mr. Taylor:

I would like to thank Jack and Don Shelton and Bill Rasin for bringing these frank issues to us. You have left us with some closing thoughts. With that, I will turn to Tom who has been our host for this conference. Tom, you have the last word.

Dr. Murley:

Well, thank you. We appreciate you coming. We appreciate your candid thoughts. We have all learned some things. I hope you all have. We will follow up on some of the issues that have come up throughout the conference. I think that many of you have planes to catch and that sort of thing so I appreciate your coming and let us follow up on some of these items. Thanks.

APPENDIX A

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PLENARY SESSION

IMPROVING OPERATIONAL SAFETY

DEVELOPING A SAFETY CULTURE

by

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For Presentation at the NRC
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The Mayflower Hotel
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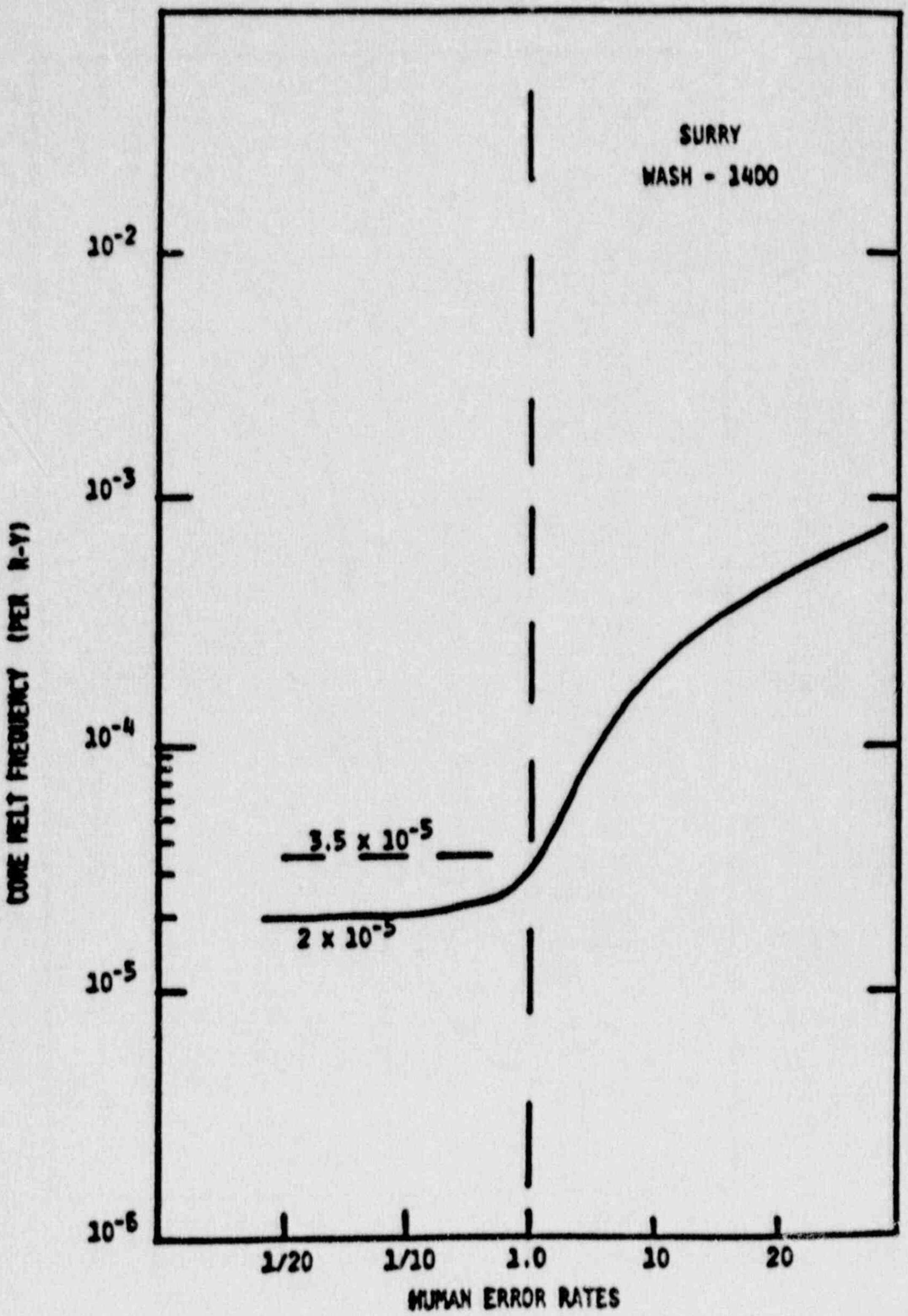

Figure 1 *(Murley)*

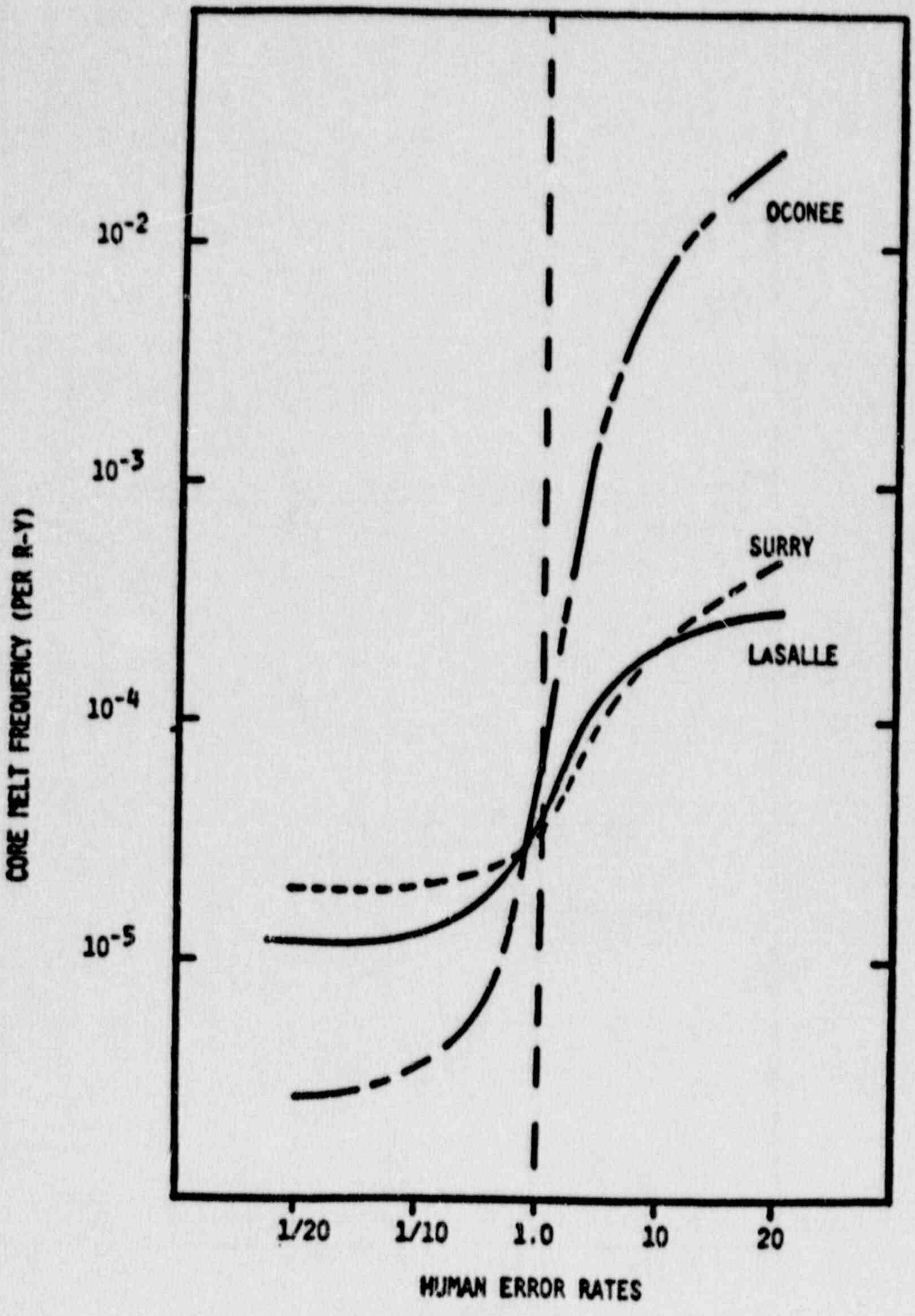

Figure 2 *(Murley)*

WHAT IS A SAFETY CULTURE?

A PREVAILING STATE OF MIND

- ALWAYS LOOKING FOR WAYS TO IMPROVE SAFETY
- CONSTANT AWARENESS OF WHAT CAN GO WRONG
- A FEELING OF PERSONAL ACCOUNTABILITY FOR SAFE OPERATION
- A FEELING OF PRIDE AND "OWNERSHIP" IN THE PLANT

A DISCIPLINED, CRISP APPROACH TO OPERATIONS

- HIGHLY TRAINED STAFF
- CONFIDENT BUT NOT COMPLACENT
- FOLLOW PROCEDURES
- GOOD TEAMWORK AND CRISP COMMUNICATIONS AMONG STAFF

INSISTENCE ON SOUND TECHNICAL BASIS FOR ACTIONS

- PROCEDURES UP-TO-DATE
- DESIGN BASIS UP-TO-DATE
- TECHNICAL DOCUMENTATION FOR PLANT CHANGES
- ALWAYS STAYING WITHIN THE DESIGN BASIS OF THE PLANT

RIGOROUS SELF-ASSESSMENT

- OPENNESS TO PROBLEMS
- FACING FACTS; BAD NEWS
- DEALING WITH PROBLEMS IMMEDIATELY

Figure 3 *(Murley)*

HOW DOES ONE DEVELOP A SAFETY CULTURE?

POLICIES MUST COME FROM THE TOP

- MUST BE SINCERE AND FORCEFULLY ARTICULATED
- ACTIONS ARE NEEDED TO SET EXAMPLES; WORDS ARE NOT ENOUGH

INSISTENCE OF COMPETENT MANAGERS THROUGHOUT ORGANIZATION

- MAKE SURE MANAGERS UNDERSTAND SAFETY POLICY
- MAKE SURE POLICIES ARE UNDERSTOOD DOWN THROUGH ORGANIZATION

INSIST ON STRICT ACCOUNTABILITY FROM MANAGERS

- PICK GOOD PEOPLE
- GIVE THEM CLEAR INSTRUCTIONS AND AUTHORITY
- HOLD THEM ACCOUNTABLE

NEED A BALANCE OF STRENGTHS IN THE ORGANIZATION

- PLANT MANAGER
- ENGINEERING MANAGER
- QA MANAGER

Figure 4 *(Murley)*

EXAMPLES OF TWO DIFFERENT CULTURES

PLANT A

- WELL-TRAINED STAFF
- PLANT-SPECIFIC SIMULATOR
- STAFF RIGOROUSLY FOLLOWS PROCEDURES
- FULLY STAFFED
- VERY LITTLE OVERTIME
- GOOD NUCLEAR WORK ETHIC
- PROFESSIONAL DECORUM IN CONTROL ROOM
- SCRAMS EXTREMELY RARE
- DILIGENT, PROBING PORC
- GOOD PREVENTIVE MAINTENANCE
- SHUT DOWN TO FIX SAFETY SYSTEMS
- LOW MAINTENANCE BACKLOG
- EQUIPMENT REPAIRED IMMEDIATELY
- CLEAN PLANT
- SYSTEMS ENGINEERS ONSITE

PLANT B

- POORLY TRAINED STAFF
- NO PLANT-SPECIFIC SIMULATOR
- STAFF DOESN'T USE PROCEDURES
- MANY MANAGEMENT AND STAFF VACANCIES
- ROUTINE USE OF HIGH OVERTIME
- FOSSIL PLANT CULTURE
- NOISY, UNDISCIPLINED CONTROL ROOM
- FREQUENT SCRAMS
- INEFFECTIVE, PRO FORMA PORC
- RUN EQUIPMENT UNTIL IT BREAKS
- ROUTINELY OPERATE IN LCO ACTION STATEMENTS
- HIGH MAINTENANCE BACKLOG
- EQUIPMENT OUT OF SERVICE FOR LONG PERIODS
- MANY HIGH RADIATION AREAS
- NO ENGINEERING SITE PRESENCE

Figure 5 *(Murley)*

THE POLICIES AND TONE SET BY TOP MANAGEMENT

- BOARD OF DIRECTORS EXPERIENCE IN NUCLEAR ACTIVITIES
- SENIOR MANAGEMENT AWARENESS AND INVOLVEMENT IN PLANT ACTIVITIES
- EXISTENCE AND EFFECTIVENESS OF A CORPORATE LEVEL NUCLEAR REVIEW COMMITTEE
- PARTICIPATION IN INDUSTRY INITIATIVES
- POLICIES FOR REWARDING GOOD PERFORMANCE AND DISCIPLINING POOR PERFORMANCE
- MANAGEMENT ATTITUDE REGARDING QUALITY ASSURANCE
- MANAGEMENT POLICY OF "DO IT RIGHT THE FIRST TIME"
- MANAGEMENT POLICY OF BEING SELF-CRITICAL
- COMMITMENT TO EFFECTIVE TRAINING PROGRAM (SIZE OF TRAINING STAFF, COURSES TAUGHT, AND SUCCESS OF OPERATORS IN NRC EXAMS)
- RESPONSIVENESS TO NRC CONCERNS AND SUGGESTIONS

Figure 6 *(Murley)*

ADEQUACY OF THE ORGANIZATIONAL STRUCTURE

- CLEAR LINES OF AUTHORITY AND RESPONSIBILITY
- DEPTH OF TALENT IN THE MANAGEMENT ORGANIZATION
- ADEQUACY OF ENGINEERING SUPPORT FOR OPERATIONS
- TECHNICAL SELF-SUFFICIENCY

Figure 7 *(Murley)*

EFFECTIVENESS OF ON-SITE MANAGEMENT

- ATTITUDE OF MANAGEMENT AND WORKERS TOWARD ADHERENCE TO PROCEDURES
- EFFECTIVENESS OF COMMUNICATIONS AMONG PLANT STAFF (DAILY PLANT STATUS MEETINGS)
- EFFECTIVENESS OF THE ON-SITE SAFETY REVIEW COMMITTEE IN REVIEWING PLANT OPERATIONS
- EFFECTIVE MANAGEMENT INFORMATION SYSTEMS
- EVIDENCE OF OUTAGES PLANNED WELL IN ADVANCE
- MANAGEMENT PHILOSOPHY REGARDING MAINTENANCE (PREVENTIVE vs. REACTIVE)
- ADEQUACY OF POST-EVENT ANALYSIS
- AWARENESS OF OPERATIONAL EVENTS AT OTHER PLANTS
- EFFECTIVENESS OF WATER CHEMISTRY CONTROL
- EFFECTIVENESS OF ALARA PROGRAM IN THE PLANT
- MAINTENANCE OF UP-TO-DATE DRAWINGS AND RECORDS
- HOUSEKEEPING AND GENERAL APPEARANCE OF THE PLANT
- NRC ENFORCEMENT HISTORY

Figure 8 *(Murley)*

ADMIRAL RICKOVER'S CRITERIA OF MANAGEMENT COMPETENCE

1. RISING STANDARD OF ADEQUACY
2. TECHNICAL SELF-SUFFICIENCY
3. FACING FACTS
4. RESPECT FOR RADIATION
5. THE IMPORTANCE OF TRAINING
6. CONCEPT OF TOTAL RESPONSIBILITY
7. CAPACITY TO LEARN FROM EXPERIENCE

Figure 9 *(Murley)*

SOME ROOT CAUSES OF POOR PERFORMANCE

1. COMPLACENCY
2. MANAGEMENT OVEREMPHASIS ON PRODUCTION VS SAFETY
3. ATTITUDE OF MINIMAL COMPLIANCE WITH REGULATIONS
4. LACK OF ACCOUNTABILITY FOR PERFORMANCE
5. FOSSIL PLANT CULTURE
6. EXCESSIVE DEPENDENCE ON OUTSIDERS
7. INBRED MANAGERS AND INBRED ATTITUDES
8. PLANT MANAGER BURNOUT
9. "GOOD OLD BOY" SYNDROME GOVERNING PROMOTIONS
10. ALIENATION OF OPERATIONS STAFF FROM MANAGEMENT

Figure 10 *(Murley)*

AREAS FOR FUTURE EMPHASIS ON DEVELOPING A SAFETY CULTURE

- HOW TO DEVELOP MANAGERS WITH LEADERSHIP POTENTIAL
- HOW TO KEEP PLANT WORKERS HIGHLY MOTIVATED AND ATTENTIVE TO THE DETAILS OF THEIR TASKS
- HOW TO KEEP OPERATORS ALERT DURING QUIET, MONOTONOUS TIMES

Figure 11 *(Murley)*

THE NUCLEAR REGULATORY COMMISSION INTERFACE WITH INDUSTRY GROUPS

by

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U.S. Nuclear Regulatory Commission

For Presentation at the NRC
Regulatory Information Conference

The Mayflower Hotel
Washington, D.C.

April 18-20, 1989

IMPROVEMENT OF OPERATIONAL SAFETY

- Safe enough argument
- Backslide toward inadequacy
- Principle of cost effective safety improvement

Figure 1 *(Sniezek)*

RESPONSIBILITY FOR SAFETY

- Utility responsible for safety
- NRC is regulator
- Need for nuclear industry safety culture
- Trust is foundation of NRC/industry relationship
  - NUMARC
  - INPO
  - EPRI
  - NSSS Owners Groups
  - Vendors
  - Standards setting organizations

Figure 2 *(Sniezek)*

RELATIONSHIP WITH UTILITIES

- License based on technical/managerial competence
  - NRC hands off, if true
  - NRC active involvement, if not true
- NRC emphasis on communication of expectations
- Utility certification of performance
- Utility responsible for safety evaluation
- NRC responsible to regulate

Figure 3 *(Sniezek)*

RELATIONSHIP WITH NUMARC

- NUMARC focus on Generic Issues
  - safety enhancement
  - cost effective implementation
- Generally positive history
  - erosion/corrosion
  - fitness for duty
  - 10 CFR 50.59 guidelines
  - fraudulent components
- Need for industry-wide support

Figure 4 *(Sniezek)*

RELATIONSHIP WITH INPO

- Industry self assessment and assistance function
- INPO is not the regulator
- Peer perspective to utility activities
- Release of findings to public
  - **merits of good self assessment program**
  - **enhance public confidence**
- Major INPO/nuclear industry accomplishments
  - **training and accreditation**
  - **event response and followup**
  - **performance improvement**
- Good performance results in fewer NRC requirements

Figure 5 *(Sniezek)*

RELATIONSHIP WITH NSSS OWNERS GROUPS

- Resolution of technical issues
  - **operational savvy**
  - **technical competency**
- Positive experience
  - **EOP guidelines**
  - **Tech Spec split**
  - **USI/GSI resolution**
  - **Design reassessment**
- Additional attention warranted
  - authority
  - duplication of effort
  - impact of regulatory action

Figure 6 *(Sniezek)*

RELATIONSHIP WITH VENDORS

- 10 CFR 21 applicability
- Expert knowledge and commensurate responsibility
- Generic resolution of safety matters
  - topical reports
  - resource conservation
  - priority NRC attention
- Positive interfaces
  - allowed outage times
  - surveillance test intervals
- Utility acceptance of topical reports
  - adopt in entirety
  - recognition of design differences

Figure 7 *(Sniezek)*

RELATIONSHIP WITH EPRI

- Research arm of industry
- Contribution to safety and efficiency
  - plant life extension
  - erosion/corrosion guidelines
  - NDE techniques
- Expertise in unique and difficult evaluations

Figure 8 *(Sniezek)*

RELATIONSHIP WITH STANDARDS SETTING ORGANIZATIONS

* NRC supports consensus approach

  - **volunteers**
  - **hands-on expertise**

* **NRC desires to endorse industry standards rather than develop regulatory standards**

* **Requires committed utility support**

* **Must eliminate long lead time**

Figure 9 *(Sniezek)*

SUMMARY

* Most NRC/Industry interfaces are positive

* Interfaces must be straightforward and honest

* Result in effective and efficient safety programs

* Greater NRC emphasis on proper interfaces in the future

Figure 10 *(Sniezek)*

NRC'S OPERATING PERFORMANCE EVALUATIONS

by

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For Presentation at the NRC
Regulatory Information Conference

The Mayflower Hotel
Washington, D.C.

April 18-20, 1989

NRC PERFORMANCE INDICATORS

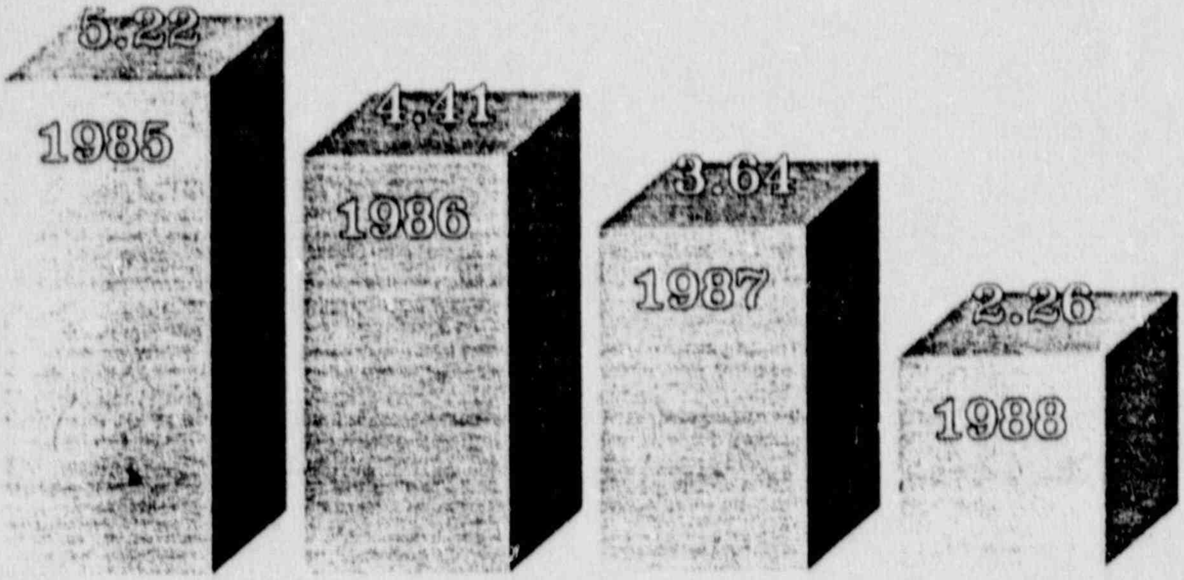
ANNUAL INDUSTRY AVERAGES

FOR

1985 - 1988

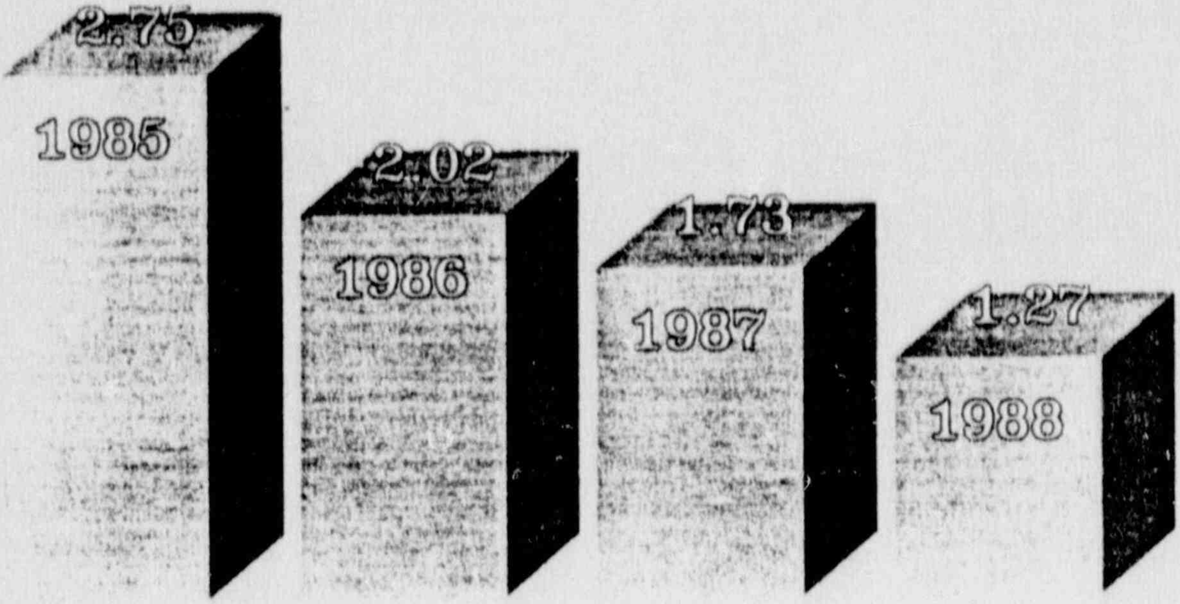
EXCLUDING PLANTS IN EXTENDED SHUTDOWN MODE

Source: AEOD Quarterly Report Issued 1/89



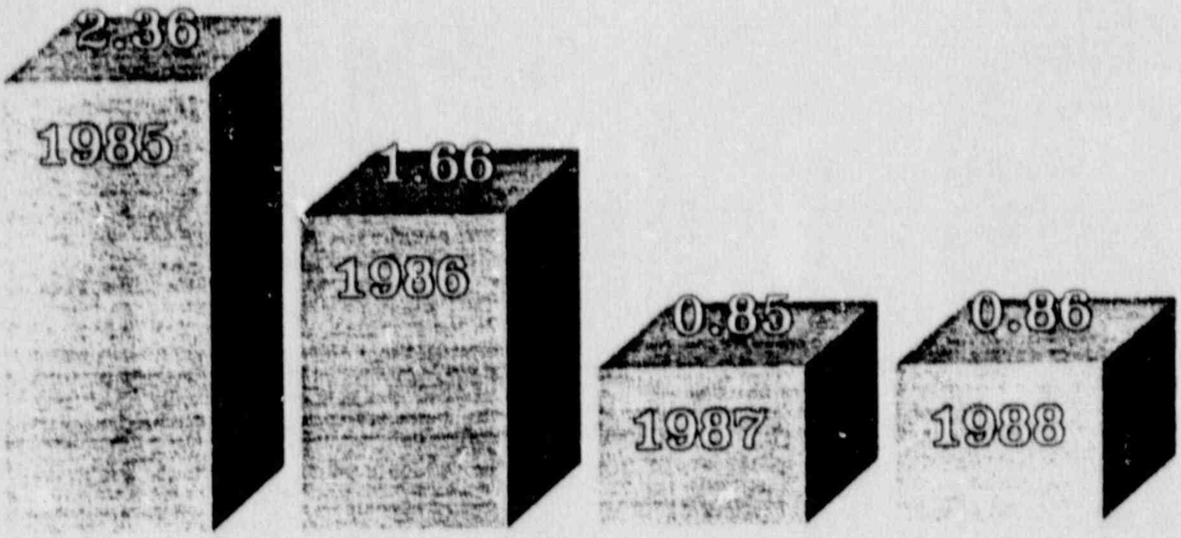
Average Number of Automatic Reactor Trips While Critical

Figure 1 *(Miraglia)*



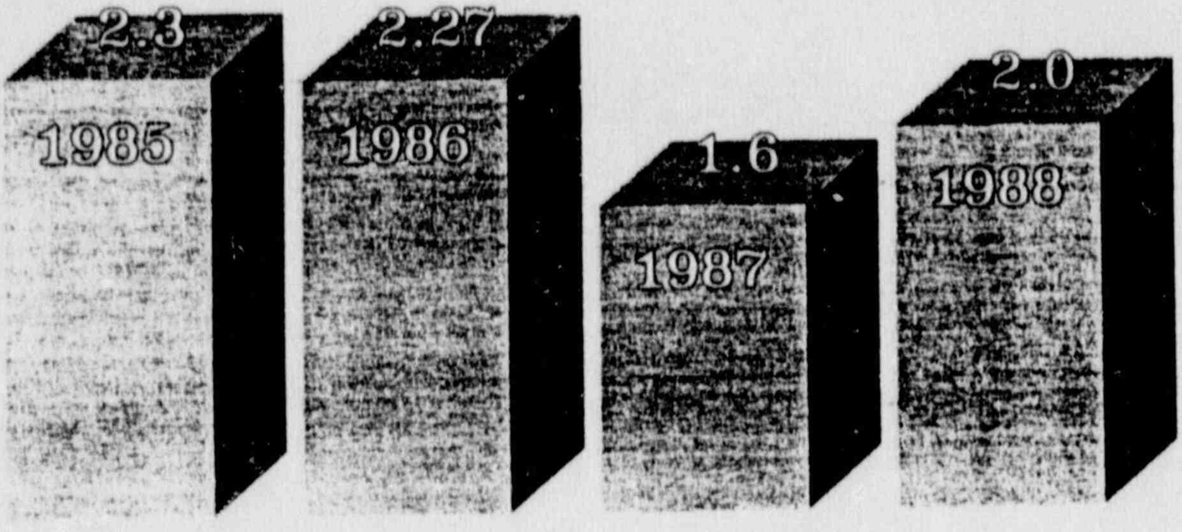
Average Number of Safety System Actuations

Figure 2 *(Miraglia)*



Average Number of Significant Events

Figure 3 *(Miraglia)*



Average Number of Safety System Failures

Figure 4 *(Miraglia)*

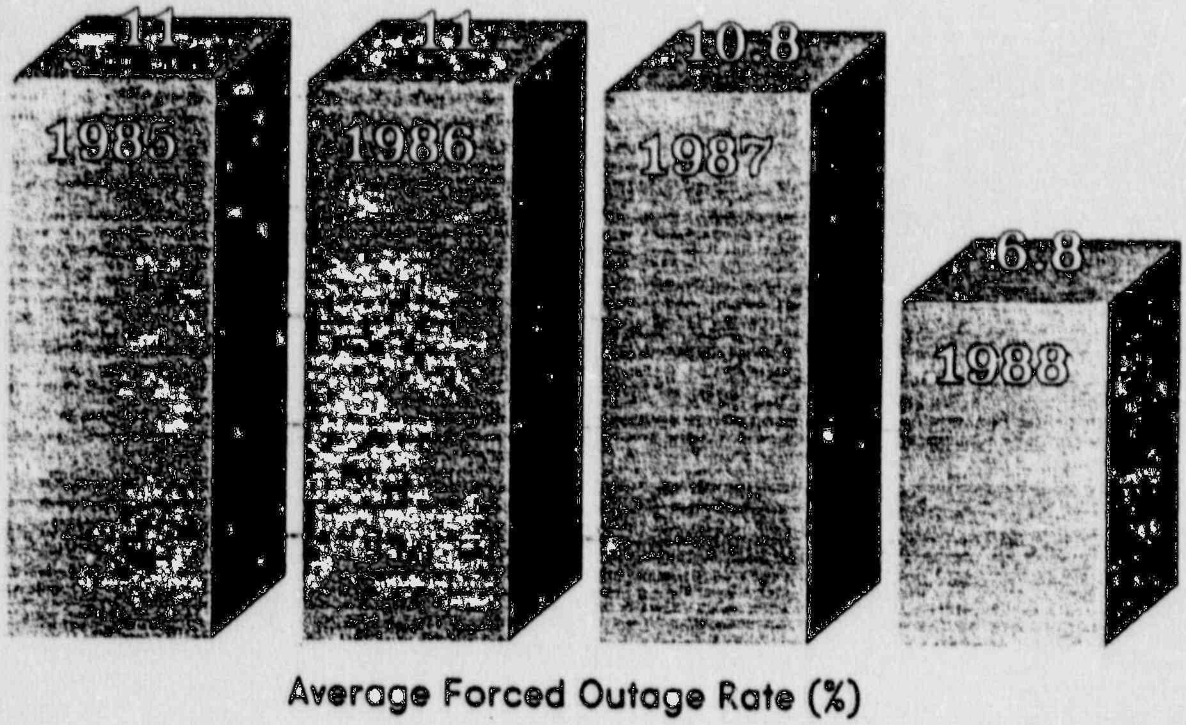


Figure 5 *(Miraglia)*

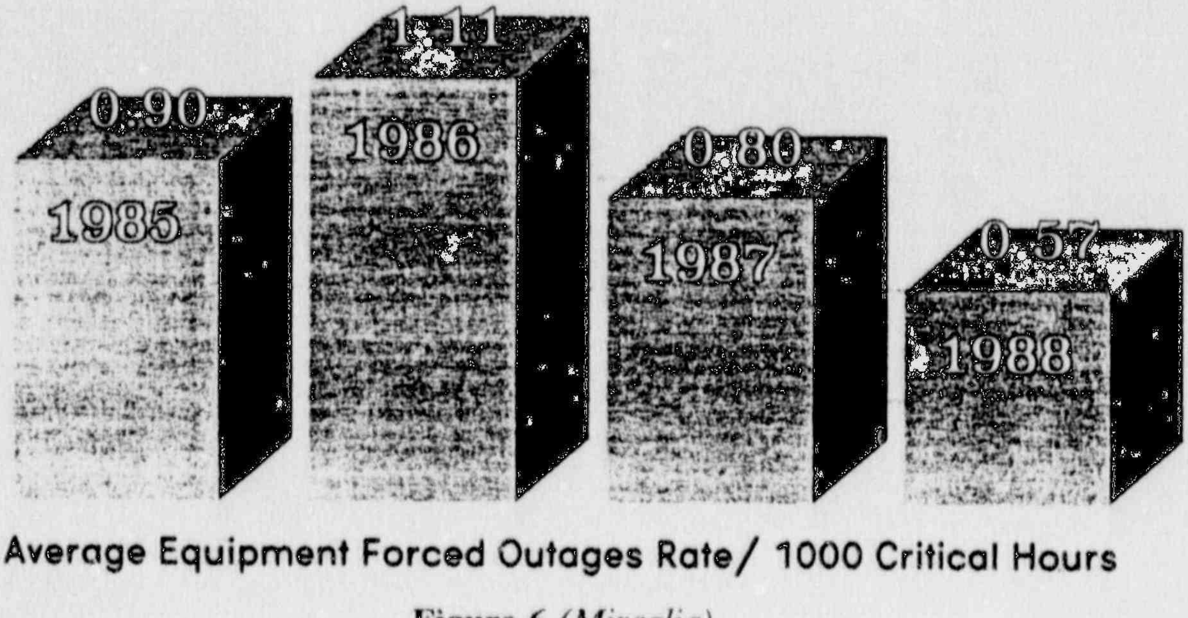
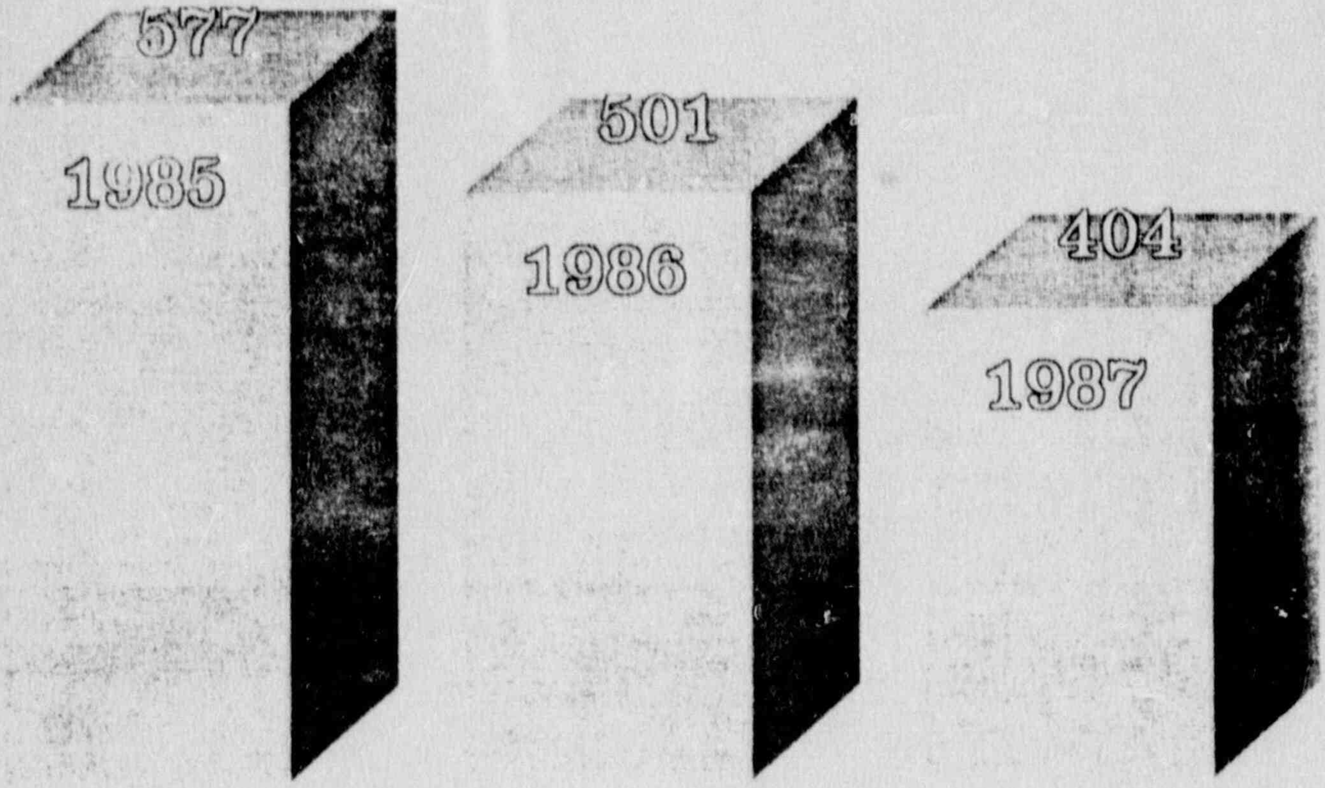


Figure 6 *(Miraglia)*



Average Collective Radiation Exposure (Man-REM)

Figure 7 *(Miraglia)*

INPO PERFORMANCE INDICATORS

FOR

THE U. S. NUCLEAR UTILITY INDUSTRY

1980 - 1988

Source: INPO Report Issued 3/89, Progress in the U. S. Nuclear Utility Industry 1979 - 1989

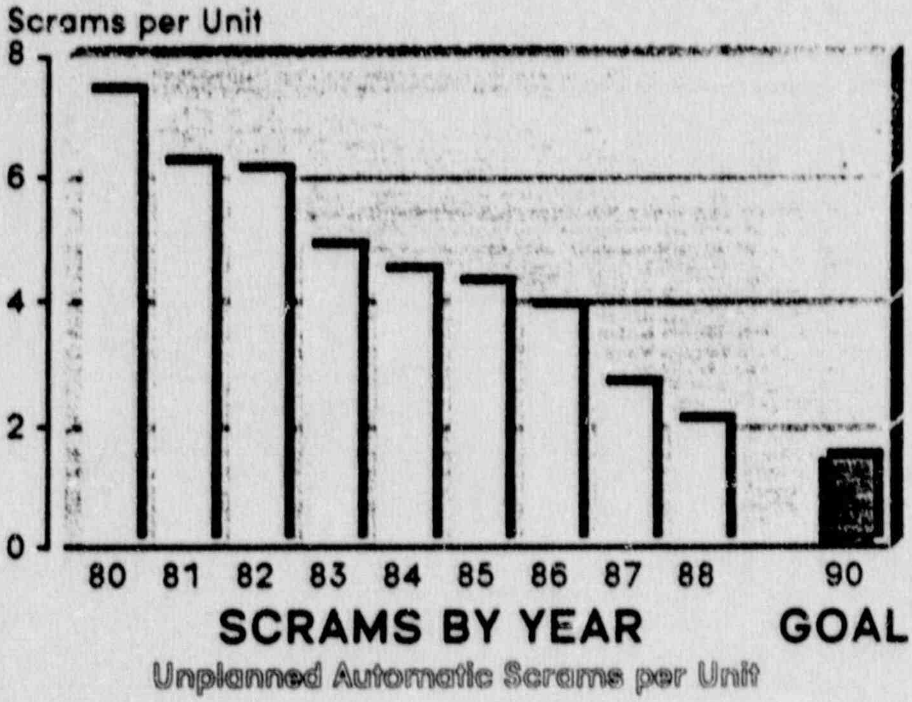


Figure 8 *(Miraglia)*

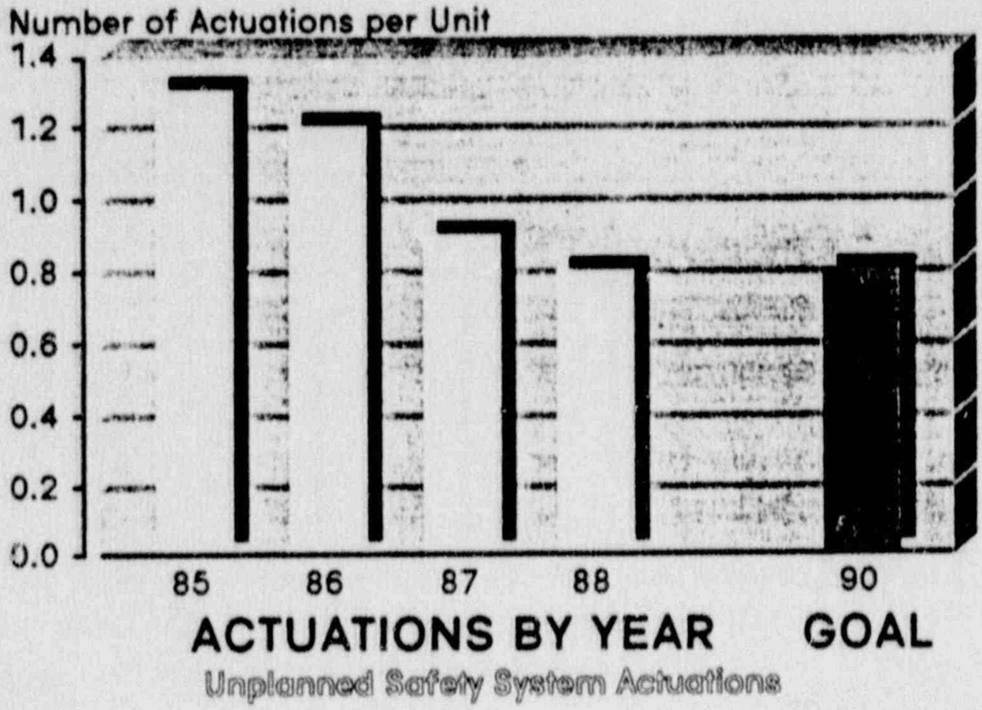
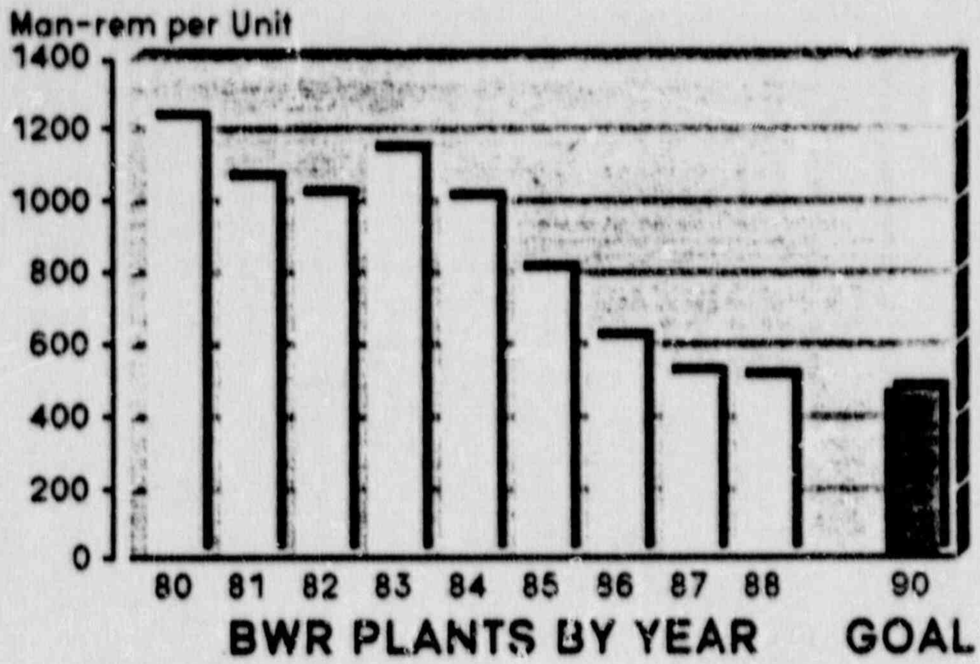
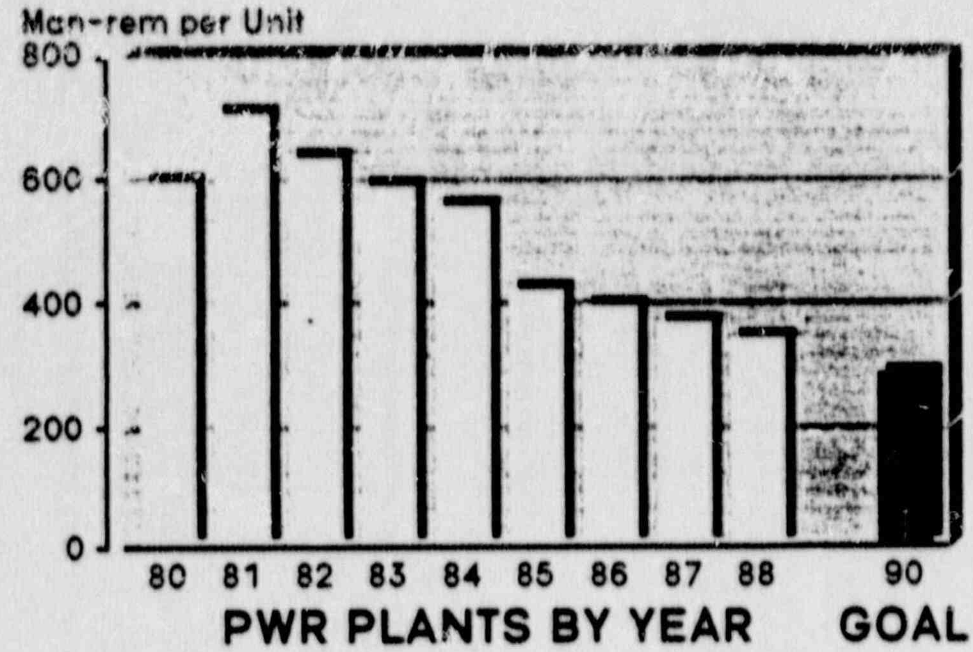


Figure 9 *(Miraglia)*



Collective Radiation Exposure per Unit for BWR Plants

Figure 10 *(Miraglia)*



Collective Radiation Exposure per Unit for PWR Plants

Figure 11 *(Miraglia)*

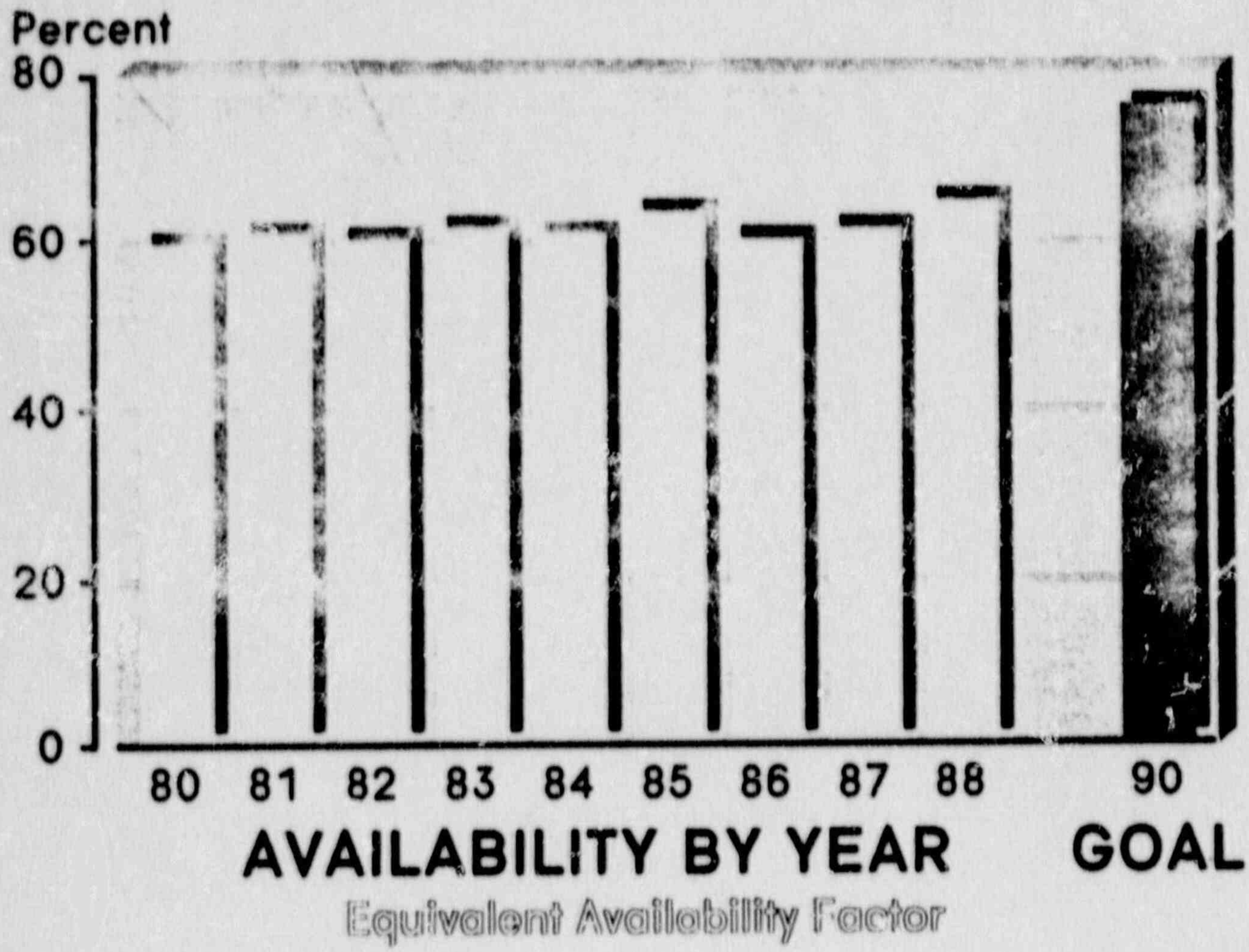


Figure 12 *(Miraglia)*

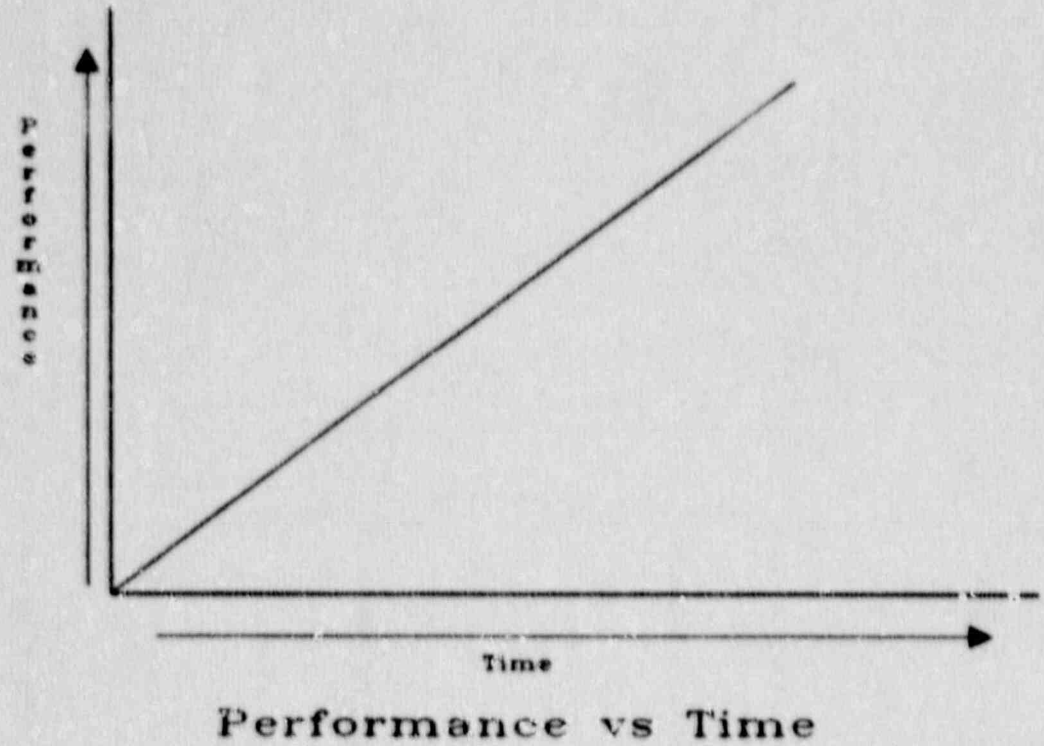


Figure 13 *(Miraglia)*

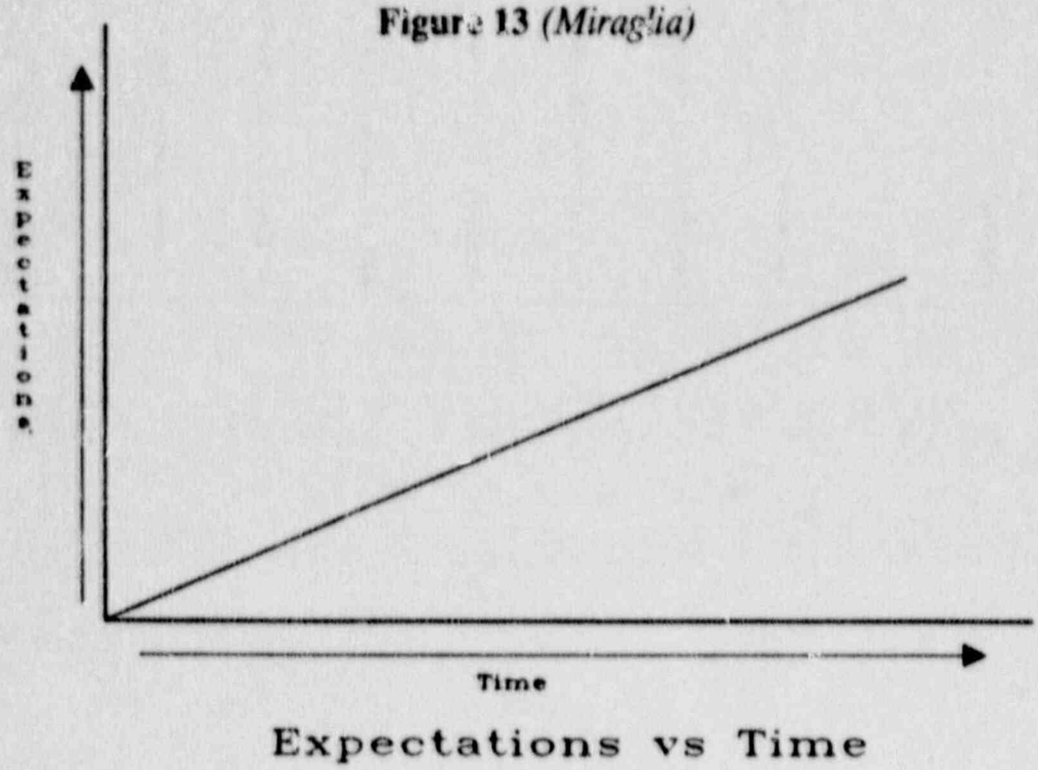


Figure 14 *(Miraglia)*

ATTRIBUTES AFFECTING PLANT PERFORMANCE

PLANT A	PLANT B
WELL-TRAINED STAFF	POORLY TRAINED STAFF
PLANT-SPECIFIC SIMULATOR	NO PLANT-SPECIFIC SIMULATOR
STAFF RIGOROUSLY FOLLOWS PROCEDURES	STAFF DOESN'T USE PROCEDURES
FULLY STAFFED	MANY MANAGEMENT AND STAFF VACANCIES
VERY LITTLE OVERTIME	ROUTINE USE OF HIGH OVERTIME
GOOD NUCLEAR WORK ETHIC	FOSSIL PLANT CULTURE
PROFESSIONAL DECORUM IN CONTROL ROOM	NOISY, UNDISCIPLINED CONTROL ROOM
SCRAMS EXTREMELY RARE	FREQUENT SCRAMS
DILIGENT, PROBING PORC	INEFFECTIVE, PRO FORMA PORC
GOOD PREVENTIVE MAINTENANCE	RUN EQUIPMENT UNTIL IT BREAKS
SHUT DOWN TO FIX SAFETY SYSTEMS	ROUTINELY OPERATE IN LCO ACTION STATEMENTS
LOW MAINTENANCE BACKLOG	HIGH MAINTENANCE BACKLOG
EQUIPMENT REPAIRED IMMEDIATELY	EQUIPMENT OUT OF SERVICE FOR LONG PERIODS
CLEAN PLANT	MANY HIGH RADIATION AREAS
SYSTEMS ENGINEERS ONSITE	NO ENGINEERING SITE PRESENCE

Figure 15 *(Miraglia)*

SESSION 1

OPERATING EXPERIENCE

NRC REVIEW OF OPERATING EVENTS

by

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For Presentation at the NRC
Regulatory Information Conference

The Mayflower Hotel
Washington, D.C.

April 18-20, 1989

NRC ORGANIZATIONS DEALING WITH EVENTS ASSESSMENT

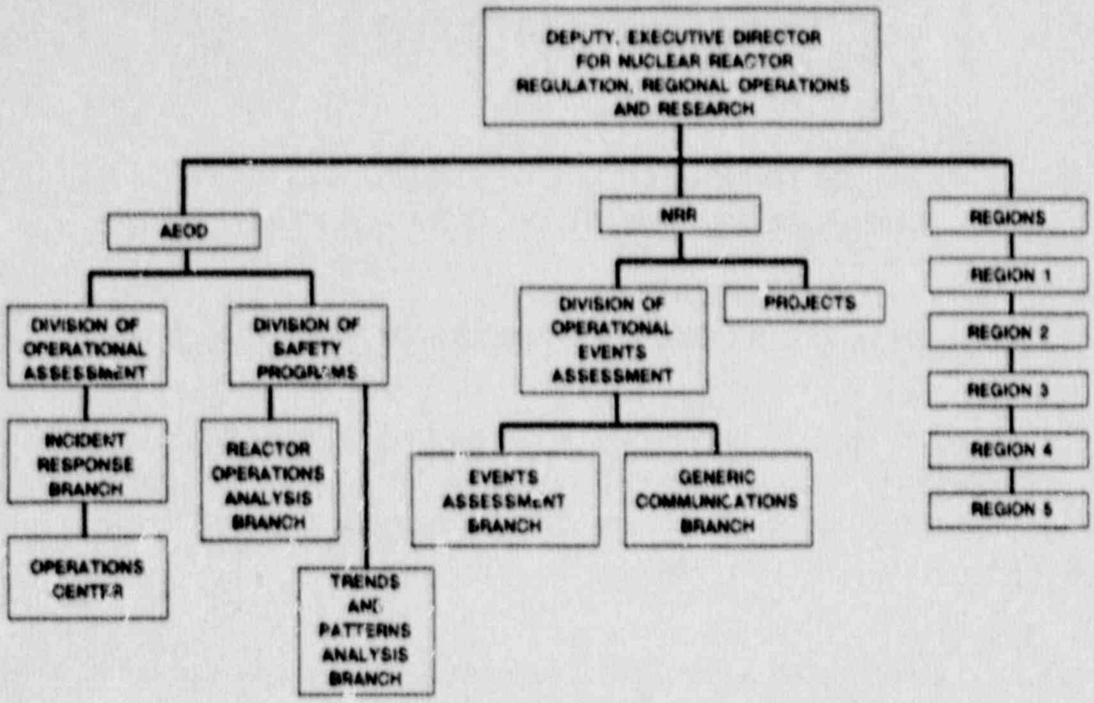

Figure 1 *(Lanning)*

REACTOR EVENTS EVALUATION

- REPORTING
- PROMPT RESPONSE, WHEN NECESSARY
- CAREFUL EVALUATION FOR GENERIC AND PLANT SPECIFIC SAFETY CONCERNS
- ISSUANCE OF GENERIC COMMUNICATIONS, WHEN APPROPRIATE

Figure 2 *(Lanning)*

REGULATORY REPORTING REQUIREMENTS

10 CFR 50.72

- APPLIES TO HOLDERS OF OPERATING LICENSES
- TELEPHONE NOTIFICATION TO NRC OPERATIONS CENTER
- 1-HOUR OR 4-HOUR REPORTS
- REVIEWED BY EVENTS ASSESSMENT BRANCH, NRR

10 CFR 50.73

- APPLIES TO HOLDERS OF OPERATING LICENSES
- WRITTEN REPORT ON EVENT
- MUST BE SUBMITTED TO NRC WITHIN 30 DAYS
- REVIEWED BY AEOD

10 CFR 21

- APPLIES TO HOLDERS OF CONSTRUCTION PERMITS, OPERATING LICENSES AND VENDORS
- WRITTEN REPORT ON DEFECTS ON SAFETY RELATED COMPONENTS OR SERVICES
- "SUBSTANTIAL SAFETY HAZARD"
- INITIAL NOTIFICATION WITHIN TWO DAYS
- REVIEW BY NRR

10 CFR 50.55 (e)

- APPLIES TO HOLDERS OF CONSTRUCTION PERMITS
- NOTIFICATION OF APPROPRIATE NRC REGIONAL OFFICE WITHIN 24 HOURS
- REVIEWED BY REGIONS

REPORTS REQUIRED BY TECHNICAL SPECIFICATIONS

- REPORTS ON SPECIFIC TOPICS

Figure 3 *(Lanning)*

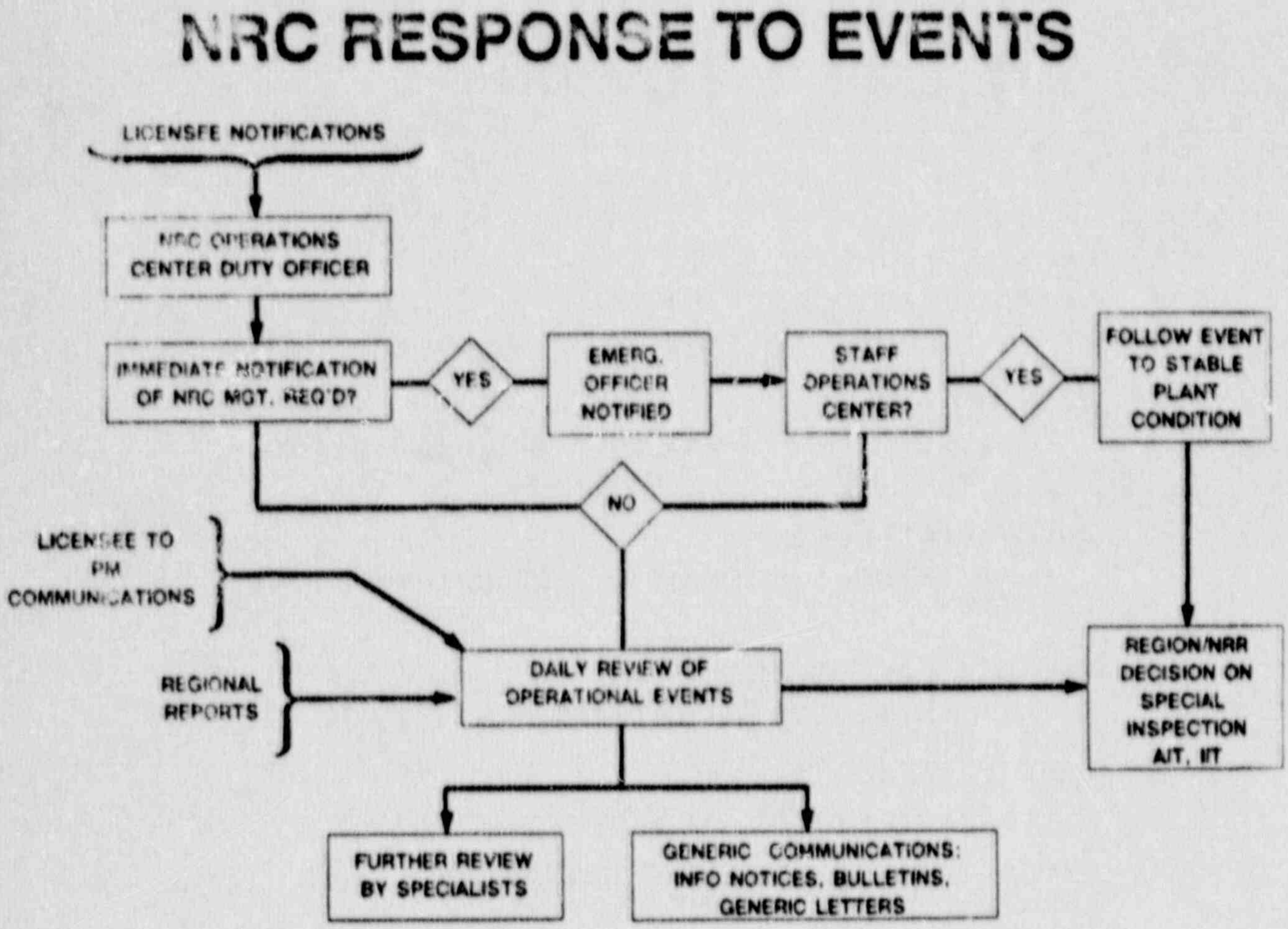

Figure 4 *(Lanning)*

OPERATIONS CENTER MODES OF OPERATION

NORMAL
- STAFFED BY DUTY OFFICER
- MAINTAINING READINESS

STANDBY
- EVALUATION OF AVAILABLE INFORMATION FROM A SITE ABOUT AN ONGOING EVENT

INITIAL ACTIVATION
- NRC RESPONSE TEAMS REPORT TO OPERATIONS CENTER

EXPANDED ACTIVATION
- NRC RESPONSE OPERATIONS MOVE TO SITE

DEACTIVATION
- RETURN TO NORMAL MODE OF OPERATION

EXCEPT FOR NORMAL OPERATION, REGIONS HAVE THE LEAD FOR EACH MODE

Figure 5 *(Lanning)*

EVENT ANALYSIS PROCESS

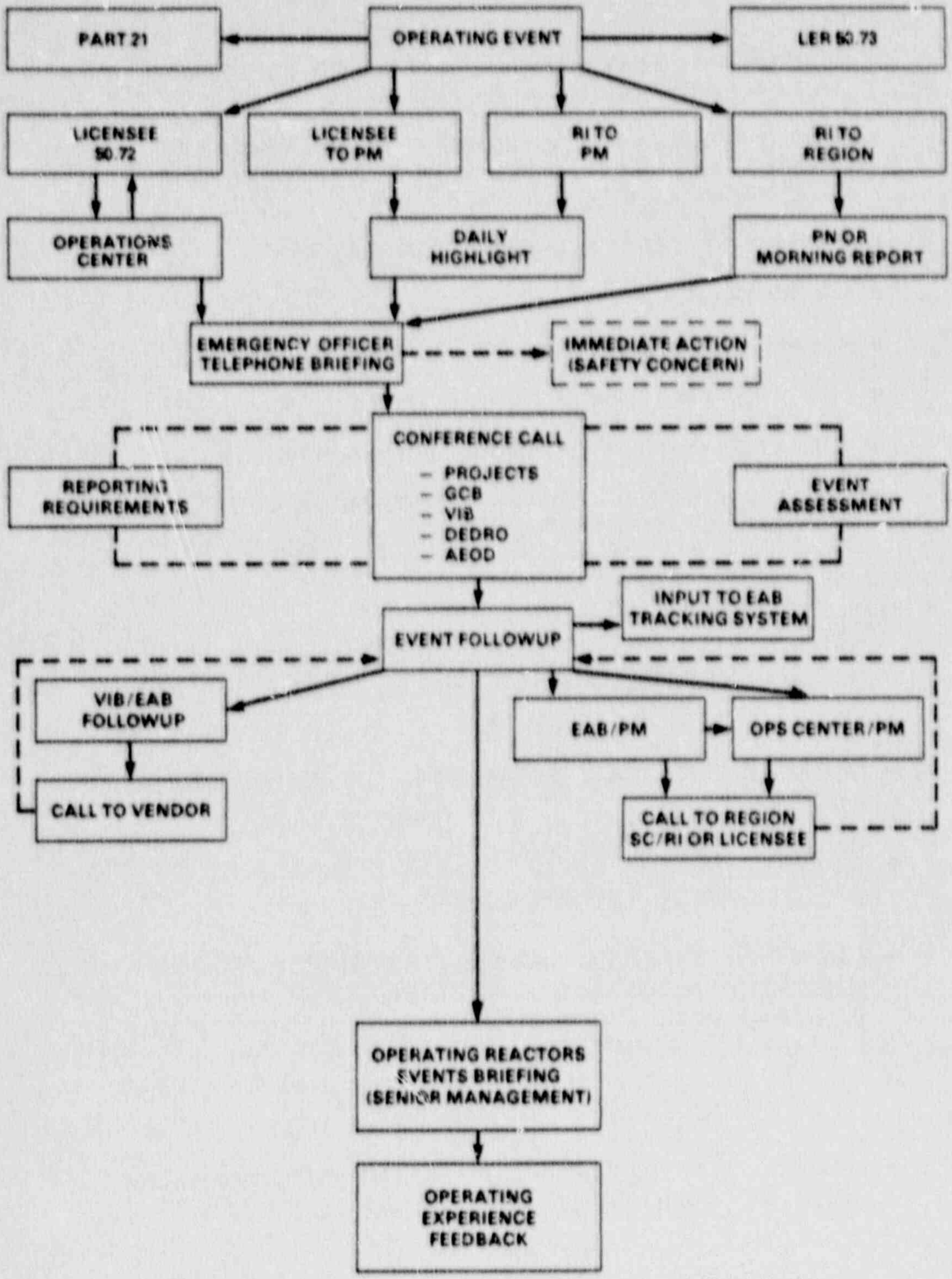

Figure 6 *(Lanning)*

SIGNIFICANT EVENTS

- DEGRADATION/LOSS OF IMPORTANT SAFETY EQUIPMENT (MULTIPLE COMMON MODE FAILURE)
- DEGRADATION OF FUEL INTEGRITY, PRIMARY COOLANT PRESSURE BOUNDARY, CONTAINMENT, AND IMPORTANT SAFETY-RELATED STRUCTURES
- UNEXPECTED PLANT RESPONSE TO A TRANSIENT
- MAJOR TRANSIENT
- SCRAM WITH COMPLICATIONS
- UNPLANNED RELEASE OF RADIOACTIVITY
- OPERATION OUTSIDE THE LIMITS OF TECH SPEC
- OTHER (RECURRING INCIDENTS, PLANT MANAGEMENT OR PROGRAMMATIC BREAKDOWNS)

Figure 7 *(Lanning)*

POTENTIALLY SIGNIFICANT EVENTS

- SOME BUT NOT ALL ELEMENTS OF SIGNIFICANT EVENT
- NEW OR UNIQUE EVENT (FAILURE MODE, CAUSE, OR SEQUENCE PROGRESSION)
- EVENT WITH POTENTIAL GENERIC IMPLICATIONS (USUALLY INVOLVING A SPECIFIC PIECE OF EQUIPMENT OR PROCEDURE)
- AN EVENT WHICH DOES NOT CONFORM TO KNOWN DESIGN/OPERATION FEATURES
- OTHER (SUPERVISOR'S JUDGMENT, MANAGEMENT INQUIRY, RECURRING SYMPTOMATIC EVENTS)

Figure 8 *(Lanning)*

EVENT NOT UNDERSTOOD

- MISSING INFORMATION COULD RESULT IN SIGNIFICANT CLASSIFICATION

- DIFFERENCES IN DESIGN, TECHNICAL SPECIFICATIONS, ETC.

Figure 9 *(Lanning)*

EXAMPLE OF EVENT FOLLOWUP PROCESS

FOR INTERFACING LOCA PRECURSORS

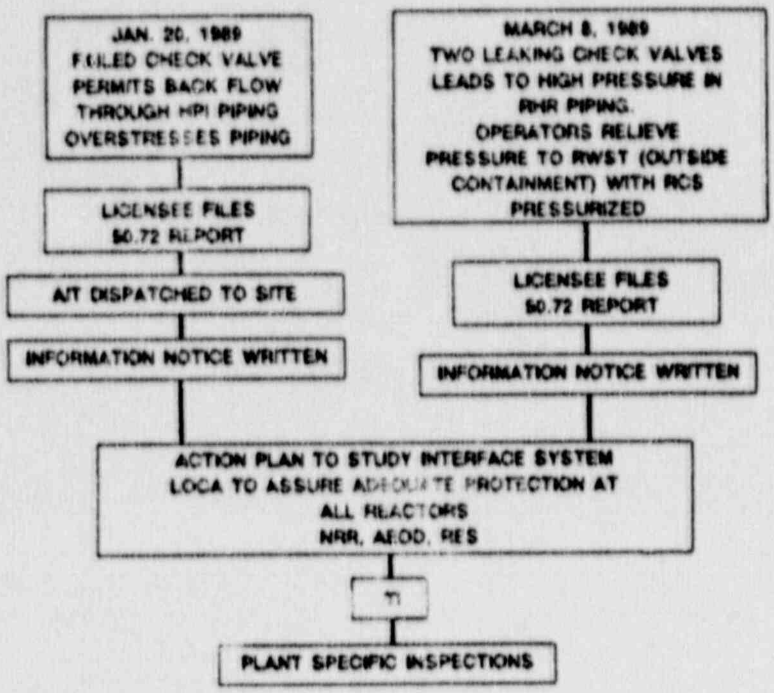

Figure 10 *(Lanning)*

NRC'S PROGRAM FOR THE EVALUATION OF OPERATING EXPERIENCE

by

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For Presentation at the NRC
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The Mayflower Hotel
Washington, D.C.

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SOURCES OF OPERATIONAL EXPERIENCE

- OPERATIONS CENTER TELEPHONE CALLS
  - PURSUANT TO 10 CFR 50.72
- REGIONAL OFFICE DAILY REPORTS
- INSPECTION REPORTS
- LICENSEE EVENT REPORTS (LERS)
  - PURSUANT TO 10 CFR 50.73
- NUCLEAR PLANT RELIABILITY DATA SYSTEMS (NPRDS)
  - OPERATED BY INPO
- FOREIGN REPORTS
- SPECIAL REPORTS

Figure 1 *(Heltemes)*

CURRENT NRC REPORTING REQUIREMENTS

- APPLIES EQUALLY TO ALL OPERATING NUCLEAR POWER PLANTS
- MINIMIZES EXISTING REQUIREMENTS TO REPORT EVENTS THAT ARE NOT INDIVIDUALLY SIGNIFICANT
- REQUIRES REPORTING OF POTENTIALLY SIGNIFICANT EVENTS
  - ACTUATIONS OF REACTOR PROTECTION SYSTEM
  - ACTUATIONS OF OTHER ENGINEERED SAFETY FEATURES
  - LOSSES OF SAFETY FUNCTION AT SYSTEM LEVEL
  - SIGNIFICANT SYSTEMS INTERACTIONS
  - TECHNICAL SPECIFICATION VIOLATIONS
  - INTERNAL AND EXTERNAL THREATS TO PLANT SAFETY
- LER REPORTS CONTAIN DETAILED NARRATIVE DESCRIPTION OF REPORTABLE EVENTS
- COORDINATES LER REPORTING AND RELATED REPORTING REQUIREMENTS

Figure 2 *(Heltemes)*

PERCENTAGE OF LERS BY REPORTING REQUIREMENT

		PERCENT
50.73(A)(2)(IV)	RPS/ESF ACTUATION	41
50.73(A)(2)(I)	TS SHUTDOWN OR TS VIOLATION	40
50.73(A)(2)(V)	REAL OR POTENTIAL LOSS OF A SAFETY SYSTEM	8
50.73(A)(2)(II)	UNANALYZED CONDITIONS	7
50.73(A)(2)(VII)	FAILURES IN MULTIPLE SYSTEMS	5
50.73(A)(2)(III)	EXTERNAL THREAT	<1
50.73(A)(2)(X)	INTERNAL THREAT	<1
50.73(A)(2)(VIII)(A)	AIRBORNE ACTIVITY RELEASE	0
50.73(A)(2)(VIII)(B)	LIQUID EFFLUENT	0

Figure 3 *(Heltemes)*

EXAMPLES OF REPORTING PROBLEMS

- EQUIPMENT FAILURES INDICATING A POTENTIAL GENERIC PROBLEM OR COMMON CAUSE
  - EXAMPLE: DAMAGED CABLES IN MULTIPLE SYSTEMS
    SCRAM SOLENOID PROBLEMS CAUSE MULTIPLE RODS TO HAVE EXCESSIVE SCRAM TIMES

- INCOMPLETE REPORTING
  - EXAMPLES: SCRAM REPORT DID NOT NOTE THAT SEVERAL RODS FAILED TO INSERT
    STEAM GENERATOR TUBE RUPTURE REPORTED WITH LEAK RATE UNDERESTIMATED BY THREE TIMES

- STATE/LOCAL GOVERNMENTS NOTIFIED OR MEDIA INTEREST
  - EXAMPLE: LEAK OUTSIDE PRIMARY CONTAINMENT
    MEDIA COVERAGE OF EVACUATION OF PLANT AREA

Figure 4 *(Heltemes)*

AEOD Analysis and Evaluation Program

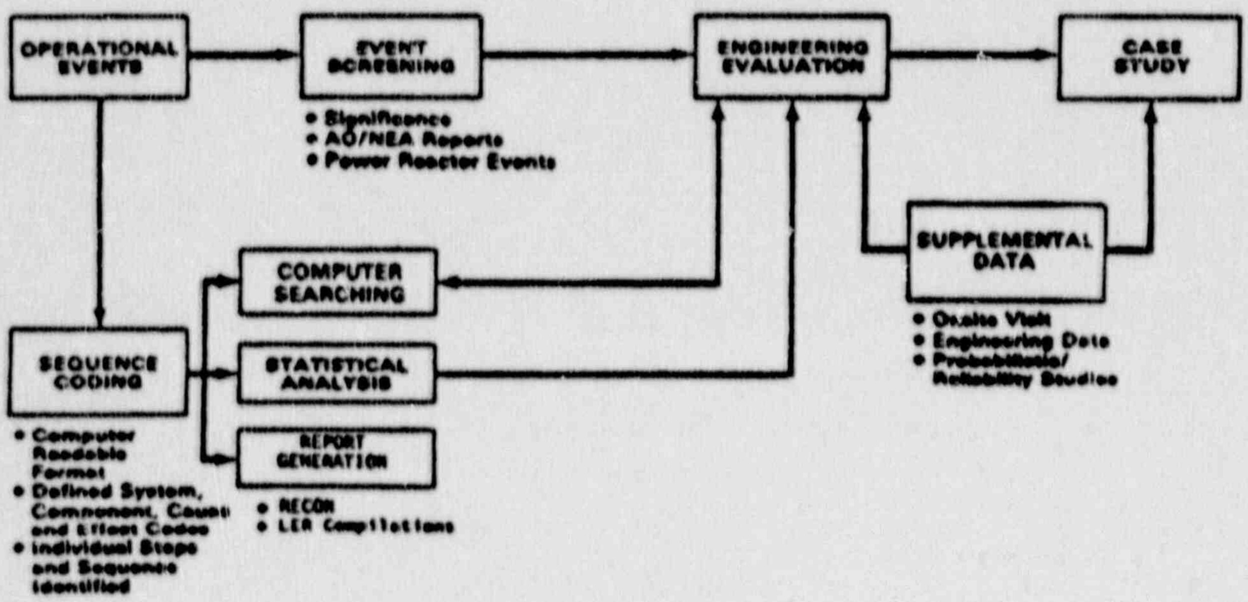

Figure 5 *(Heltemes)*

TYPICAL AEOD CRITERIA FOR IDENTIFYING SAFETY SIGNIFICANT EVENTS

1. EVENT SEQUENCE NOT PREVIOUSLY ANALYZED OR COULD BE FAR MORE SERIOUS WITH CREDIBLE ALTERNATIVE CONDITIONS

2. SYSTEM INTERACTION RESULTING FROM A PREVIOUSLY UNRECOGNIZED INTERDEPENDENCE OF SYSTEMS AND COMPONENTS

3. IMPROPER OPERATION, MAINTENANCE, OR DESIGN THAT HAS OR COULD CAUSE COMMON CAUSE/COMMON MODE FAILURE OF A SAFETY SYSTEM

4. UNEXPECTED SYSTEM OR COMPONENT PERFORMANCE WITH SERIOUS SAFETY IMPLICATIONS OR RADIATION RELEASE

5. MULTIPLE FAILURES (INCLUDING PERSONNEL ERRORS) OCCURRED IN THE EVENT

6. EQUIPMENT FAILURES (PARTICULARLY NONSAFETY EQUIPMENT) THAT CAUSED SERIOUS TRANSIENTS AND CHALLENGES TO SAFETY SYSTEM

Figure 6 *(Heltemes)*

SIGNIFICANT EVENT CONSIDERATIONS

- WHAT HAPPENED?
- WHY DID IT HAPPEN?
- SHOULD IT HAVE HAPPENED?
- HAS IT HAPPENED BEFORE?
- WHAT COULD HAVE HAPPENED?
- WHAT CORRECTIVE ACTIONS ARE NEEDED?

Figure 7 *(Heltemes)*

AEOD PRODUCTS

- TECHNICAL REPORTS
  - CASE STUDY REPORTS
  - ENGINEERING EVALUATION REPORTS
  - TECHNICAL REVIEW REPORTS
  - TREND AND PATTERN REPORTS
  - SPECIAL STUDY REPORTS

- ABNORMAL OCCURRENCE REPORTS TO CONGRESS

- POWER REACTOR EVENT PUBLICATION

- LER MONTHLY COMPILATION REPORTS

- REPORTS OF U.S. EVENTS TO THE NEA-IRS

- 1985 ANNUAL REPORT

- OUTPUT FROM OPERATIONAL EXPERIENCE DATA BASES

Figure 8 *(Heltemes)*

INCIDENT INVESTIGATION PROGRAM

OBJECTIVES

- CONDUCT A TIMELY, THOROUGH, SYSTEMATIC AND FORMAL INVESTIGATION OF SIGNIFICANT EVENTS.
- COLLECT, ANALYZE, AND DOCUMENT FACTUAL INFORMATION AND DETERMINE CAUSES AND CONDITIONS

Figure 9 *(Heltemes)*

CONCEPT OF NRC INCIDENT INVESTIGATION PROGRAM

- PROGRAM HAS TWO NEW INITIATIVES
  - EVENTS WITH CLEAR AND SERIOUS IMPLICATIONS REGARDING SAFETY
    -- INTEROFFICE, INTERDISCIPLINARY TEAM IS ESTABLISHED BY SENIOR MANAGEMENT AND SENT PROMPTLY TO THE SITE
    -- OBJECTIVE IS TO DETERMINE WHAT HAPPENED AND THE PRINCIPAL CAUSES AS TO WHY IT HAPPENED, AND TO DEVELOP FINDINGS AND CONCLUSIONS FOR POSSIBLE FOLLOW-ON ACTIONS
    -- TEAM IS TO FOCUS ON THE EVENT AND WILL NOT NORMALLY: (1) IDENTIFY AND ANALYZE ALL OF THE "WHAT IF" QUESTIONS; (2) REVIEW THE OVERALL DESIGN OR REGULATORY BASE FOR THE PLANT; OR (3) DETERMINE POSSIBLE VIOLATIONS OF NRC REQUIREMENTS
  - EVENTS WITH LESSER SIGNIFICANCE BUT WITH POTENTIAL IMPORTANT SAFETY LESSONS
    -- TECHNICAL PERSONNEL FROM HEADQUARTERS OFFICES WILL AUGMENT REGIONAL INVESTIGATION
    -- POTENTIAL GENERIC ASPECTS AND IMPLICATIONS ARE CONSIDERED

Figure 10 *(Heltemes)*

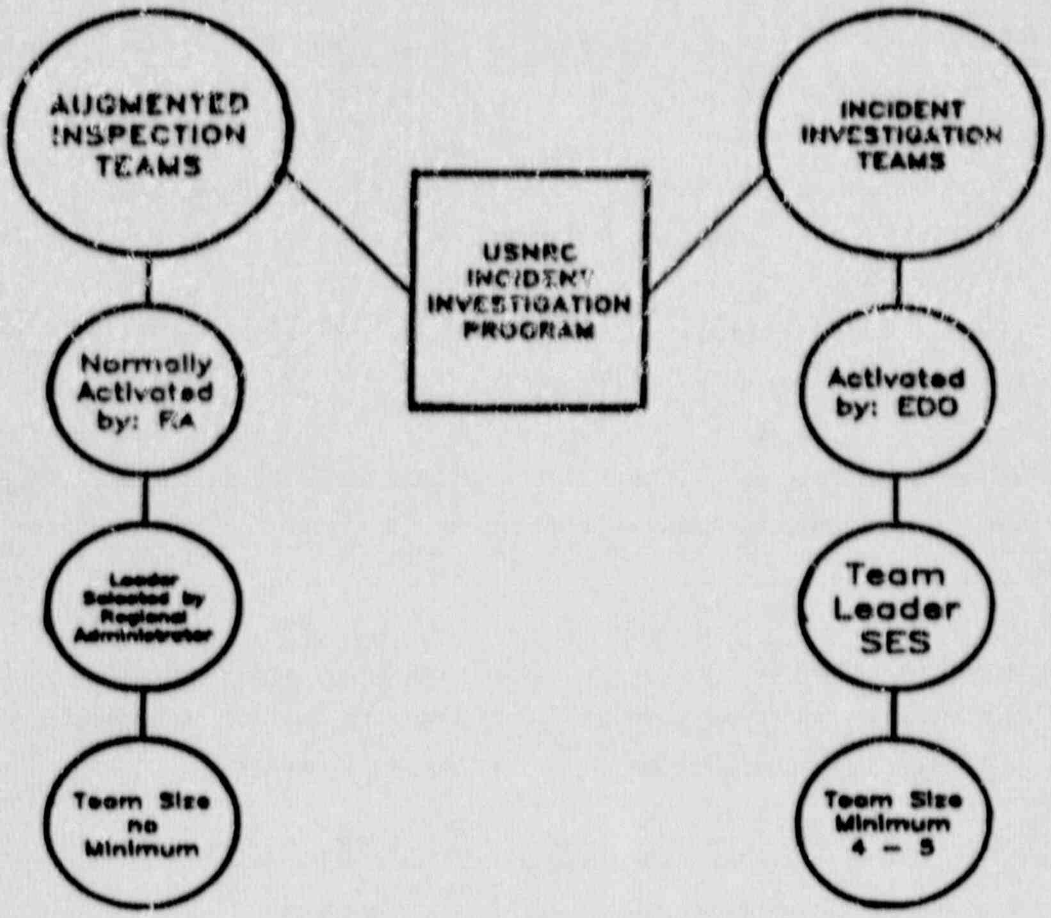

Figure 11 *(Heltemes)*

<u>OPERATIONAL EXPERIENCE REVIEW PROGRAM</u>

- EMPHASIS ON ROOT CAUSE IDENTIFICATION. EFFECTIVE CORRECTIVE ACTION TO PREVENT RECURRENCE DEPENDS UPON A CLEAR UNDERSTANDING OF WHAT HAPPENED AND, MOST IMPORTANTLY, WHY.
    - ANALYSIS INVOLVES COMPREHENSIVE AND INTERDISCIPLINARY APPROACH.
    - COMPONENT FAILURES ANALYSIS DETERMINES UNDERLYING CAUSE(S) FOR FAILURE, NOT JUST WHAT FAILED.
    - ANALYSIS CONTINUES UNTIL THERE IS HIGH CONFIDENCE THAT CORRECTIVE ACTION IS SUFFICIENT TO PREVENT RECURRENCE.

- BROAD VIEW TO NOT ONLY ASSURE THAT EVENTS OR FAILURES WILL NOT RECUR, BUT ALSO THAT GENERIC IMPLICATIONS ARE ADDRESSED FOR OTHER SYSTEMS OR LOCATIONS AND OTHER UNITS.

- FEED BACK OPERATIONAL EXPERIENCE TO LICENSED OPERATORS AND TECHNICIANS.
    - RECOGNIZING THAT FEEDBACK NEEDS TO BE SELECTIVE SO THAT PERSONNEL ARE NOT ROUTINELY OVERWHELMED BY VOLUME OR EXTRANEOUS INFORMATION.

- FEEDBACK TO OTHERS VIA AVAILABLE SYSTEMS IS TIMELY AND COMPLETE
    - LERS AND OTHER NOTIFICATIONS ARE DETAILED AND CLEAR.
    - COMPONENT DATA REPORTING VIA NPRDS IS ACCURATE AND COMPLETE.

Figure 12 *(Heltemes)*

OPERATING EXPERIENCE SESSION

by

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

and

NRC GENERIC COMMUNICATIONS

by

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U.S. Nuclear Regulatory Commission

For Presentation at the NRC
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NRC GENERIC COMMUNICATIONS

MAJOR TOPICS

- PROCESS OF SCREENING AND REVIEWING OPERATIONAL SAFETY DATA

- DISCUSSION ON 10 CFR PART 21 AND 50.55(e) REPORTS AND AEOD RECOMMENDATIONS AND SUGGESTIONS

- IDENTIFYING POTENTIALLY GENERIC SAFETY SIGNIFICANT AND GENERIC ISSUES

- PROCESS OF DETERMINING NEED TO ISSUE GENERIC COMMUNICATION

- DIFFERENT TYPES AND PURPOSES OF NRC GENERIC COMMUNICATIONS

- EXAMPLES OF NRC GENERIC COMMUNICATIONS

Figure 1 *(Berlinger)*

NRC GENERIC COMMUNICATIONS

OPERATIONAL SAFETY DATA

- OPERATIONAL SAFETY DATA IS ROUTINELY SCREENED AND REVIEWED BY NRC STAFF AND INCLUDES THE FOLLOWING TYPE OF REPORTS AND NOTIFICATIONS

  - REPORTS AND NOTIFICATIONS REQUIRED BY THE FOLLOWING NRC REGULATIONS: 10 CFR PART 21, 10 CFR 50.55(E), 10 CFR 50.72, AND 10 CFR 50.73

  - DAILY REPORTS SUBMITTED BY THE REGIONAL OFFICES

  - CASE STUDIES, SPECIAL REPORTS, AND ENGINEERING EVALUATIONS PREPARED BY AEOD AND ASSOCIATED RECOMMENDATIONS AND SUGGESTIONS

  - NRC INSPECTION REPORTS PREPARED BY NRC STAFF AND CONTRACTORS

  - POTENTIALLY GENERIC SAFETY QUESTIONS IDENTIFIED BY REGIONAL STAFF

  - NUCLEAR INDUSTRY REPORTS (INPO SERs, SOERs, AND O&MRs, VENDOR SERVICE LETTERS, AND GENERAL ELECTRIC GERMANE-TO-SAFETY REPORTS)

  - REPORTS OF OPERATIONAL EXPERIENCE AT FOREIGN NUCLEAR FACILITIES

Figure 2 *(Berlinger)*

NRC GENERIC COMMUNICATIONS

SCREENING AND REVIEW OF OPERATIONAL SAFETY DATA

- EVENTS ASSESSMENT BRANCH IN DOEA IS RESPONSIBLE FOR COORDINATING THE SHORT-TERM ASSESSMENT OF 10 CFR 50.72 NOTIFICATIONS AND REGIONAL DAILY REPORTS

- GENERIC COMMUNICATIONS BRANCH IN DOEA IS RESPONSIBLE FOR SCREENING, REVIEWING, AND ENSURING THE CLOSE OUT OF 10 CFR PART 21 NOTIFICATIONS, POTENTIALLY GENERIC 10 CFR 50.55(E) REPORTS, AND POTENTIAL GENERIC SAFETY QUESTIONS SUBMITTED BY REGIONAL STAFF

- THE OFFICE FOR ANALYSIS AND EVALUATION OF OPERATIONAL DATA IS RESPONSIBLE FOR SCREENING AND REVIEWING 10 CFR 50.73 LICENSEE EVENT REPORTS, VARIOUS INDUSTRY REPORTS, AND FOREIGN OPERATIONAL EVENTS TO IDENTIFY TRENDS AND PATTERNS IN OPERATIONAL EXPERIENCE

- IF ADDITIONAL OR SPECIALIZED REVIEW IS REQUIRED ON AN EVENT TO DETERMINE ITS SIGNIFICANCE, THE EVENT MAY BE TRANSFERRED BY THE OFFICE HAVING LEAD REVIEW RESPONSIBILITY TO ANOTHER BRANCH FOR REVIEW AND LONG-TERM FOLLOW-UP

- REGIONAL AND RESIDENT INSPECTOR STAFF SUPPORT REVIEW OF OPERATIONAL SAFETY DATA BY ENSURING THAT INFORMATION RECEIVED BY HEADQUARTERS IS ACCURATE AND TIMELY

- REGIONAL AND RESIDENT INSPECTOR STAFF ARE ALSO COGNIZANT TO SERIES OF SIMILAR OR RELATED EVENTS THAT WHEN REVIEWED TOGETHER MAY BE POTENTIALLY GENERIC AND SAFETY SIGNIFICANT

Figure 3 *(Berlinger)*

NRC GENERIC COMMUNICATIONS

POTENTIALLY SAFETY SIGNIFICANT AND GENERIC ISSUES

NRR MAY TAKE ONE OR MORE OF THE FOLLOWING ACTIONS ONCE AN ISSUE IS DETERMINED TO BE POTENTIALLY SAFETY SIGNIFICANT AND GENERIC

- CONSULTS WITH VENDORS OR INDUSTRY ORGANIZATIONS SUCH AS INPO, NUMARC, OR VENDOR GROUPS TO DETERMINE WHETHER THE INDUSTRY HAS TAKEN OR IS PLANNING TO TAKE ANY ACTIONS TO ADDRESS THE ISSUE
- ISSUES AN NRC INFORMATION NOTICE, BULLETIN, OR GENERIC LETTER
- PROVIDES INPUT TO AND COORDINATES WITH THE ACTIVITIES OF AEOD
- PROVIDES INPUT TO PROGRAMS HANDLED BY OFFICE OF NUCLEAR REGULATORY RESEARCH SUCH AS NRC GENERIC ISSUES PROGRAM, REGULATORY GUIDES, AND REGULATIONS
- FORWARDS THE ISSUE TO THE DIVISION OF REACTOR PROJECTS IN NRR FOR POSSIBLE LICENSING ACTIONS (WHEN ISSUE APPLICABLE TO LIMITED NUMBER OF PLANTS)
- REQUESTS THE PREPARATION OF REGIONAL TEMPORARY INSTRUCTIONS
- FORWARDS ISSUE TO OTHER OFFICE RESPONSIBLE FOR SPECIFIC PROGRAM AREAS

Figure 4 *(Berlinger)*

NRC GENERIC COMMUNICATIONS

DETERMINATION TO ISSUE NRC GENERIC COMMUNICATION

- PRIMARY OBJECTIVE OF GENERIC COMMUNICATIONS PROGRAM IS TO ENSURE THAT ALL UTILITIES THAT MAY BE AFFECTED BY GENERIC SAFETY ISSUE ARE NOTIFIED AND THAT APPROPRIATE ACTIONS ARE TAKEN TO PREVENT ITS RECURRENCE

- MOST COMMON RESPONSE BY NRC TO GENERIC SAFETY SIGNIFICANT PROBLEMS INCLUDE ISSUING INFORMATION NOTICES, BULLETINS, AND GENERIC LETTERS

- NRC MAY SEND INDIVIDUAL LETTERS ONLY TO THOSE PLANTS POSSIBLY AFFECTED BY A SAFETY ISSUE THAT MAY NOT BE WIDESPREAD

- THE TYPE OF NRC COMMUNICATION TO BE ISSUED DEPENDS ON THE SAFETY SIGNIFICANCE OF THE ISSUE, GENERIC APPLICABILITY, URGENCY OR NEED TO TAKE IMMEDIATE ACTION, AND ACTIONS TAKEN BY INDUSTRY TO ADDRESS ISSUE

- NRC CONSULTS AND COORDINATES WITH INDUSTRY ORGANIZATIONS SUCH AS INPO, NUMARC, AND OWNERS GROUPS TO DETERMINE IF INDUSTRY IS TAKING APPROPRIATE ACTIONS TO ADDRESS SPECIFIC EVENT OR ISSUE

- IN MOST CASES, NRC WILL NOT ISSUE GENERIC COMMUNICATION ON AN EVENT OR ISSUE IF VENDORS OR INDUSTRY ORGANIZATIONS HAVE APPROPRIATELY INFORMED ALL AFFECTED PLANTS, UNLESS ADDITIONAL REGULATORY CONCERNS ARE IDENTIFIED

Figure 5 *(Berlinger)*

NRC GENERIC COMMUNICATIONS

INFORMATION NOTICES

- INFORMATION NOTICES ARE USED TO NOTIFY LICENSEES AND CONSTRUCTION PERMIT HOLDERS OF PROBLEMS THAT COULD AFFECT THEIR FACILITIES AND GENERALLY DESCRIBES ONE OR MORE RELATED EVENTS

- INFORMATION NOTICES MAY DELINEATE CORRECTIVE ACTIONS TAKEN BY ONE OR MORE UTILITIES, BUT NEITHER ENDORSES ACTIONS TAKEN BY UTILITIES NOR PRESCRIBES ANY SPECIFIC ACTIONS FOR ADDRESSEES TO TAKE

- EXPECTATION BY NRC IS THAT ADDRESSEES WILL REVIEW INFORMATION NOTICE, DETERMINE APPLICABILITY OF PROBLEMS TO THEIR FACILITIES, AND IF APPLICABLE, DETERMINE APPROPRIATE CORRECTIVE ACTIONS

- INFORMATION NOTICES ARE SOMETIMES ISSUED IMMEDIATELY AFTER AN EVENT TO ALERT THE INDUSTRY OF THE EVENT AND TO INFORM THEM THAT THE NRC IS CONSIDERING FURTHER REGULATORY ACTION

Figure 6 *(Berlinger)*

NRC GENERIC COMMUNICATIONS

BULLETINS

- BULLETINS MUST BE APPROVED BY NRC COMMITTEE TO REVIEW GENERIC REQUIREMENTS (CRGR)

- BULLETINS DESCRIBE [illegible] MORE RELATED EVENTS OR PROBLEMS

- BULLETINS REQUEST THAT ADDRESSEES PERFORM SPECIFIC ACTIONS IN ACCORDANCE WITH NRC ESTABLISHED SCHEDULE

- BULLETINS REQUIRE THAT ADDRESSEES CONFIRM THAT THE ACTIONS REQUESTED BY NRC HAVE BEEN COMPLETED OR WILL BE IMPLEMENTED AS REQUESTED

- BULLETINS MAY ALSO REQUIRE ADDRESSEES TO SUBMIT SPECIFIC INFORMATION REGARDING THE ACTIONS TAKEN

- BULLETIN RESPONSES ARE SOMETIMES SYSTEMATICALLY REVIEWED BY NRC TO DETERMINE THE NEED FOR FURTHER REGULATORY ACTION, WHILE OTHER RESPONSES ARE REVIEWED ON A SAMPLE BASIS

- IF AN ADDRESSEE FAILS TO PERFORM A BULLETIN REQUESTED ACTION OR TAKES EXCEPTION TO A REQUEST, THE NRC MAY ISSUE AN ORDER

Figure 7 *(Berlinger)*

NRC GENERIC COMMUNICATIONS

GENERIC LETTERS

- GENERIC LETTERS ARE SIMILAR TO BULLETINS, HOWEVER, IN SOME CASES THEY MAY REQUEST THAT ADDRESSEES DEVELOP APPROPRIATE PLANT-SPECIFIC CORRECTIVE ACTIONS, WITHIN STATED GENERAL GUIDELINES, AND TO SUBMIT THEM TO NRC FOR APPROVAL

- GENERIC LETTERS ARE GENERALLY APPROVED BY COMMITTEE TO REVIEW GENERIC REQUIREMENTS (CRGR)

- GENERIC LETTERS DESCRIBE ONE OR MORE RELATED EVENTS AND REQUEST THAT CERTAIN ACTIONS BE TAKEN IN ACCORDANCE WITH AN NRC ESTABLISHED SCHEDULE

- GENERIC LETTER RESPONSES ARE SOMETIMES SYSTEMATICALLY REVIEWED BY NRC TO DETERMINE IF THERE IS NEED FOR FURTHER REGULATORY ACTIONS, WHILE OTHER RESPONSES ARE REVIEWED ON A SAMPLE BASIS

- IF AN ADDRESSEE FAILS TO PERFORM A GENERIC LETTER REQUESTED ACTION OR TAKES EXCEPTION TO A REQUEST, THE NRC MAY ISSUE AN ORDER

Figure 8 *(Berlinger)*

NRC GENERIC COMMUNICATIONS

EXAMPLES

- NRC INFORMATION NOTICE NO. 87-34, "SINGLE FAILURES IN AUXILIARY FEEDWATER SYSTEMS," DATED JULY 24, 1987

- NRC INFORMATION NOTICE NO. 87-28, "AIR SYSTEMS PROBLEMS AT U.S. LIGHT WATER REACTORS," DATED JUNE 22, 1987

- NRC GENERIC LETTER 88-14, "INSTRUMENT AIR SUPPLY SYSTEM PROBLEMS AFFECTING SAFETY-RELATED EQUIPMENT," DATED AUGUST 8, 1988

- NRC INFORMATION NOTICE NO. 89-26, "INSTRUMENT AIR SUPPLY TO SAFETY-RELATED EQUIPMENT," DATED MARCH 7, 1989

- NRC INFORMATION NOTICE NO. 88-46, "LICENSEE REPORT OF DEFECTIVE REFURBISHED CIRCUIT BREAKERS," AND SUPPLEMENTS 1 AND 2

- NRC BULLETIN NO. 88-10, "NONCONFORMING MOLDED-CASE CIRCUIT BREAKERS," DATED NOVEMBER 22, 1988

- NRC BULLETIN NO. 88-03, "INADEQUATE LATCH ENGAGEMENT IN HFA TYPE LATCHING RELAYS MANUFACTURED BY GENERAL ELECTRIC," DATED MARCH 10, 1988

Figure 9 *(Berlinger)*

NRC GENERIC COMMUNICATIONS

CONCLUSION

- NRC PROGRAM FOR SYSTEMATICALLY REVIEWING OPERATIONAL SAFETY DATA AND FOR INFORMING NUCLEAR INDUSTRY OF SIGNIFICANT ISSUES PROVIDES REASONABLE ASSURANCE THAT THE INDUSTRY IS KEPT INFORMED OF THESE ISSUES AND THAT STEPS ARE TAKEN TO PREVENT THEIR RECURRENCE

- NRC GENERIC COMMUNICATIONS HAVE PROVEN TO BE EFFECTIVE FEEDBACK MECHANISMS TO MAINTAIN THE NUCLEAR INDUSTRY INFORMED OF THESE SIGNIFICANT ISSUES AND TO ENHANCE THE LEVEL OF SAFETY AT NUCLEAR POWER PLANTS

Figure 10 *(Berlinger)*

ROOT-CAUSE ANALYSIS OF OPERATING PROBLEMS

by

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For Presentation at the NRC
Regulatory Information Conference

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REGULATORY BASIS FOR ROOT-CAUSE ANALYSIS

10 CFR 50, APPENDIX B, CRITERION XVI

"MEASURES SHALL BE ESTABLISHED TO ASSURE THAT CONDITIONS ADVERSE TO QUALITY, SUCH AS FAILURES, MALFUNCTIONS, DEFICIENCIES, DEVIATIONS, DEFECTIVE MATERIAL AND EQUIPMENT, AND NONCONFORMANCE ARE PROMPTLY IDENTIFIED AND CORRECTED. IN THE CASE OF SIGNIFICANT CONDITIONS ADVERSE TO QUALITY, THE MEASURES SHALL ASSURE THAT THE CAUSE OF THE CONDITION IS DETERMINED AND CORRECTIVE ACTION TAKEN TO PRECLUDE REPETITION...."

Figure 1 *(Ernst)*

DEFINITION

ROOT-CAUSE ANALYSIS -

THE METHOD BY WHICH THE MOST BASIC CAUSE OF AN EVENT IS DETERMINED IN ORDER TO BEST PREVENT RECURRENCE.

CRITERIA FOR A ROOT CAUSE -

- UPON REMOVAL OF THE CAUSE, REPEATED EVENTS DO NOT OCCUR OR ARE MUCH LESS LIKELY TO OCCUR.
- CAUSE MUST BE WITHIN MANAGEMENT'S CONTROL TO CORRECT.

Figure 2 *(Ernst)*

IMPORTANCE OF A GOOD ROOT-CAUSE PROGRAM

- SAFETY BENEFITS
  - DECREASES LIKELIHOOD OF REPETITIVE OCCURENCES RESULTING IN REACTOR TRANSIENTS OR SAFETY SYSTEM CHALLENGES.
  - MINIMIZES LIKELIHOOD OF SEVERE CORE DAMAGE, GIVEN A SAFETY SYSTEM CHALLENGE.
  - INDICATOR THAT A LICENSEE IS THOROUGH, OBJECTIVE, AND A SELF-EVALUATOR.
- ECONOMIC BENEFITS
  - REDUCES UNNECESSARY OUTAGE TIME
- INDUSTRY BENEFITS
  - FEEDBACK

Figure 3 *(Ernst)*

EXAMPLES OF RECENT ROOT-CAUSE ANALYSIS

1. MULTIPLE FAILURES OF SILICON-BRONZE CARRIAGE HEAD BUSS BAR BOLTS
2. NUMEROUS FAILURES OF THE HIGH PRESSURE COOLANT INJECTION SYSTEM
3. REPEATED EMERGENCY DIESEL GENERATOR FAILURES
4. FAILURE OF REDUNDANT CONTAINMENT ISOLATION VALVES TO CLOSE ON DEMAND

Figure 4 *(Ernst)*

EXAMPLE 2: NUMEROUS FAILURES OF HPCI

SITUATION

- NUMEROUS OPERABILITY PROBLEMS HAD BEEN IDENTIFIED WITH HPCI
- NUMEROUS "FIXES" OVER A SEVERAL YEAR PERIOD
- RECENT HPCI INJECTION FAILURE DUE TO A HPCI TURBINE TRIP
- INJECTION FAILURE DUE TO PUMP TRIP FROM LOW SUCTION PRESSURE DURING STARTUP

LESSONS LEARNED

- NUMEROUS ISSUES RELATED TO HPCI SYSTEM CLOUDED REAL ROOT CAUSE.
- HPCI SSFI CONDUCTED BY LICENSEE, BUT RECOMMENDATIONS NOT AGGRESSIVELY PURSUED.
- MAJOR QUESTIONS REGARDING RELIABILITY OF SAFETY EQUIPMENT SHOULD BE COMPREHENSIVELY ADDRESSED WITH A TEAM APPROACH.

Figure 5 *(Ernst)*

EXAMPLE 4: FAILURE OF REDUNDANT CONTAINMENT ISOLATION VALVES TO CLOSE

SITUATION

- PREVIOUS PROBLEMS WITH ASCO SOLENOID VALVES
- BEGAN TESTING AND TRENDING VALVE PERFORMANCE
- FOUR CONTAINMENT ISOLATION VALVES FAILED TO CLOSE UPON RECEIPT OF AN AUTOMATIC SIGNAL
- LICENSEE IMMEDIATELY FORMED INVESTIGATION TEAM
- THE VENDOR CONTACTED TO PERFORM AN INVESTIGATION

ROOT CAUSE

- FAILURE OF SOLENOID VALVES DUE TO STICKING OF LOWER DISK TO LOWER SEAT
- CAUSE WAS ACCELERATED OXIDATION OF EPDM SEAT WHEN IN CONTACT WITH LOWER COPPER SEAT

CORRECTIVE ACTIONS

- SHORT TERM - CYCLING VALVES AT INCREASED FREQUENCY UNTIL REPLACEMENTS COMPLETED
- LONG TERM - REPLACEMENT OF EPDM SEATS WITH VITCON

Figure 6 *(Ernst)*

ROOT-CAUSE "TRAPS"

- ASSUMING THE IDENTIFIED PROBLEM IS THE CAUSE
- BLAMING THE CIRCUMSTANCE ON PERSONNEL ERROR WHEN THE INDIVIDUAL MAY HAVE BEEN SET UP TO FAIL
- JUMPING TO CONCLUSIONS
- OVERKILL - TAKING SO MANY ACTIONS TO ADDRESS THE PROBLEM THAT THE CAUSE IS NEVER KNOWN
- DELAYING RESOLUTION UNTIL AN OUT[illegible]
- LOW MAINTENANCE PRIORITIZATI[illegible]

Figure 7 *(Ernst)*

MANAGEMENT INVOLVEMENT IS THE <u>KEY</u>

- ASSURES PROPER ATTENTION IS PLACED ON SAFETY IMPORTANT EQUIPMENT AND SYSTEMS
- ASSURES PROPER EMPHASIS IS PLACED ON LEARNING FROM PAST EXPERIENCE
- ASSURES FEEDBACK OF ROOT - CAUSE DETERMINATIONS IS FACTORED INTO ALL ASPECTS OF PLANT OPERATIONS
- ASSURES PERFORMANCE IS TRENDED TO MEASURE WHETHER BASIC ROOT CAUSES ARE FOUND

Figure 8 *(Ernst)*

HANDLING OF LOW-LEVEL WASTE
AND
DRY CASK STORAGE

by

Robert M. Bernero, Director
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U.S. Nuclear Regulatory Commission

For Presentation at the NRC
Regulatory Information Conference

The Mayflower Hotel
Washington, D.C.

April 18-20, 1989

HANDLING OF LOW-LEVEL WASTE AT PLANT SITES

- 10 CFR 20.311 requires waste generators to meet waste waste characteristics requirements of 10 CFR 61

- STRUCTURAL STABILITY is an important waste characteristic of Class B & C waste

Figure 1 *(Bernero)*

STRUCTURAL STABILITY

- STABLE WASTE
- PROCESSING TO A STABLE FORM
- HIGH-INTEGRITY CONTAINER OR STRUCTURE

Figure 2 *(Bernero)*

TOPICAL REPORTS

- 30 SUBMITTED ON WASTE FORMS AND HIGH-INTEGRITY CONTAINERS
- APPROVED
  - 3 High-Integrity Container Designs
  - 3 Solidification Media
- OTHER ACTIONS
  - 3 Topical Reports Not Approved
  - 10 Reviews Discontinued
  - 8 Reviews Still Ongoing
  - 3 Withdrawn
- HIGH-INTEGRITY CONTAINERS NOT APPROVED
  - High-Density Polyethylene Designs
- REVIEWS ONGOING
  - 6 Topical Reports on Cement Solidification Media
  - 2 High-Integrity Containers
- NRC Information Notice (No. 89-27)
  Limitations on the Use of Waste Forms and High Integrity Containers for the Disposal of Low-Level Radioactive Waste.

- Workshop on the Cement Solidification of Low-Level Radioactive Waste
  NIST
  May 31 - June 2, 1989

Figure 3 *(Bernero)*

SESSION 2

SUBSTANDARD MATERIAL AND EQUIPMENT

DEDICATION AND PROCUREMENT

by

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For Presentation at the NRC
Regulatory Information Conference

The Mayflower Hotel
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OVERVIEW OF THE PROBLEM

- INSTANCES OF COUNTERFEIT AND FRAUDULENT VENDOR PRODUCTS HEIGHTEN CONCERN ON ADEQUACY OF PROCUREMENT AND DEDICATION PROGRAMS
- RECENT DISCOVERIES DEMONSTRATE CURRENT PRACTICES HAVE NOT ALWAYS BEEN SUFFICIENT
- PROBLEMS DETECTED IN BOTH PROCUREMENT AND DEDICATION PROGRAMS

Figure 1 *(Brach)*

CAUSES FOR INCREASE IN MISREPRESENTED VENDOR PRODUCTS

- SHRINKING NUCLEAR MARKET
- INTERMEDIATE SUPPLIER'S UPGRADING OF MATERIAL
- ECONOMIC INCENTIVE
- INCREASED AWARENESS RESULTS IN INCREASED DETECTION

Figure 2 *(Brach)*

PROCUREMENT OPTIONS

- SAFETY-RELATED PROCUREMENTS FROM APPROVED VENDORS
- COMMERCIAL-GRADE PROCUREMENTS WITH SUBSEQUENT DEDICATION FOR SAFETY-RELATED APPLICATION

Figure 3 *(Brach)*

RECENT PROCUREMENT PROBLEMS

- INCOMPLETE PROCUREMENT PACKAGES
- LACK OF ENGINEERING INVOLVEMENT
- RELIANCE ON CERTIFICATION FROM UNAPPROVED VENDORS
- INADEQUATE AUDITS OF VENDORS
- INEFFECTIVE RECEIPT INSPECTION PROGRAMS
- INEFFECTIVE DEDICATION PROGRAMS
- SECONDARY MARKET PROCUREMENTS

Figure 4 *(Brach)*

CHARACTERISTICS OF EFFECTIVE PROCUREMENT AND DEDICATION PROGRAMS

- ENGINEERING INVOLVEMENT
  - DEVELOPMENT OF PROCUREMENT SPECIFICATIONS
  - DETERMINATION OF CRITICAL CHARACTERISTICS
  - DETERMINATION OF INSPECTION/TEST REQUIREMENTS
  - EVALUATION OF RESULTS

- EFFECTIVE PRODUCT ACCEPTANCE PROGRAMS
  - VENDOR AUDITS
  - SOURCE/RECEIPT INSPECTIONS
  - SPECIAL TESTS/INSPECTIONS

- DEDICATION PROCESS
  - TECHNICAL EVALUATION TO DETERMINE CRITICAL CHARACTERISTICS
  - ACCEPTANCE PROCESS TO ENSURE THOSE CRITICAL CHARACTERISTICS ARE MET

Figure 5 *(Brach)*

SUBSTANDARD AND FALSIFIED MATERIALS

by

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For Presentation at the NRC
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SUBSTANDARD AND FALSIFIED MATERIALS

- FASTENERS
- FITTINGS AND FLANGES
- VALVES
- VALVE PARTS
- PUMP PARTS

Figure 1 *(Baker)*

FASTENERS

- BULLETIN 87-02 TEST RESULTS
  2218 SAFETY RELATED FASTENERS TESTED
  8% NONCONFORMING

- 1355 NONSAFETY RELATED FASTENERS TESTED
  12% NONCONFORMING

Figure 2 *(Baker)*

FITTINGS AND FLANGES

- SUBSTANDARD/NOT COUNTERFEIT
- COUNTERFEIT/NOT SUBSTANDARD
- COUNTERFEIT AND SUBSTANDARD

- ACCEPTANCE OF INSTALLED MATERIAL
  BULLETIN 88-05 TEST RESULTS
  RESULTS OF NUMARC EVALUATIONS

- ACCEPTANCE/USE OF WAREHOUSE STOCK
  ESTABLISH HOMOGENEITY OF HEATS
  SAMPLE TENSILE AND CHEMISTRY

Figure 3 *(Baker)*

VALVE AND PUMP PARTS

- INADEQUATE PROCUREMENT QUALITY REQUIREMENTS
- PURCHASED FROM SECONDARY SOURCES
- SUBSTANDARD OR MISAPPLIED PARTS

Figure 4 *(Baker)*

NRC CONCERNS

- COUNTERFEIT PRODUCTS
- INADEQUATE DEDICATION PROGRAMS
- SECONDARY MARKET PURCHASES
- INADEQUATE PROCUREMENT QUALITY REQUIREMENTS
- INADEQUATE VENDOR AUDITS
- INADEQUATE RECEIPT INSPECTION AND TESTING
- INSUFFICIENT ENGINEERING INVOLVEMENT IN PROCUREMENT

Figure 5 *(Baker)*

SUBSTANDARD AND FALSIFIED EQUIPMENT

by

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BACKGROUND
SUBSTANDARD & FALSIFIED EQUIPMENT

- ISSUE IDENTIFIED BY PGECO REPORT THAT DISCUSSED REFURBISHED CBS SOLD AS NEW EQUIPMENT

- NRC CONCERNED ABOUT:

  - REFURBISHED CBS DO NOT MEET INDUSTRY AND MANUFACTURER STANDARDS AND SPECIFICATIONS

  - REFURBISHED CBS BEING UPGRADED TO SAFETY-RELATED APPLICATIONS

  - LICENSEE'S DEDICATION PROGRAMS NOT STANDARDIZED AND UNABLE TO IDENTIFY REFURBISHED CBS

  - SAFETY SIGNIFICANCE OF REFURBISHED CBS INSTALLED IN SAFETY-RELATED SYSTEMS

- NRC CONCLUDES THAT:

  - REFURBISHED CBS DO NOT MEET 10 CFR 50: GDC 1, APPENDIX A; QAC IV AND QAC VII, APPENDIX B

  - REFURBISHED CBS NOT SUITABLE FOR UPGRADING TO SAFETY-RELATED APPLICATIONS

- NRC ACTIONS:

  - ISSUED IN 88-46 AND ITS SUPPLEMENT IN JULY 1988 ALERTING LICENSEES

  - ISSUED BULLETIN 88-10 IN NOV. 1988 REQUESTING LICENSEES TO TAKE ACTIONS TO IDENTIFY UNTRACEABLE CBS

    RESPONSE DUE TO NRC BY APRIL 1, 1989

Figure 1 *(Gill)*

BULLETIN 88-10 ACTION ITEMS

•REVIEW PURCHASE RECORDS FOR:

STORED SPARES FOR SAFETY-RELATED APPLICATIONS FOR TRACEABILITY TO THE CBM

INCLUDE INSTALLED CBS FOR MINIMUM SAMPLE OF 50

IF INSTALLED CBS FOUND PER ITEM 1, PREPARE A JCO WITHIN 30 DAYS

IF TRACEABILITY IS LESS THAN 80% REVIEW RECORDS OF CBS PURCHASED AND INSTALLED BETWEEN 8/83 - 8/88

IF TRACEABILITY GREATER THAN 80%, THEN TEST CBS THAT ARE NOT TRACEABLE OR CONSIDER THEM AS FAILED CBS

IF FAILURE RATE GREATER THAN 10%, THEN REVIEW RECORDS OF INSTALLED CBS AS REPLACEMENT OR MODIFICATIONS FOR 8/83 TO 8/88

REPLACE OR TEST INSTALLED CBS THAT CANNOT BE TRACED TO THE CBM

REPLACE THOSE THAT FAIL THE TESTS OF BULLETIN 88-10 ATTACHMENT 1

•AS OF 8/1/88, CBS INSTALLED IN SAFETY APPLICATIONS SHOULD BE:

MANUFACTURED BY AND PROCURED FROM CBM UNDER 10 CFR 50, APPENDIX B PROGRAM

PROCURED FROM CBM OR OTHERS WITH VERIFIABLE TRACEABILITY TO CBM AND UPGRADED TO SAFETY APPLICATIONS USING AN ACCEPTABLE DEDICATION PROGRAM

Figure 2 *(Gill)*

BULLETIN 88-10 REPORTING
REQUIREMENTS

•LICENSEES TO PROVIDE A WRITTEN REPORT BY 4/1/89 THAT:

CONFIRMS THAT ONLY CBS THAT MEET THE CRITERIA OF ACTION ITEM 7 OF THE BULLETIN ARE BEING MAINTAINED AS STORED SPARES

SUMMARIZES THE TOTAL NO. MAKE, MODEL AND PROCUREMENT CHAIN OF THOSE CBS THAT COULD NOT BE TRACED

CONFIRMS THAT ITEMS 1,2,3,4,5,6 AND 7 OF THE ACTIONS REQUESTED HAVE OR WILL BE IMPLEMENTED

•LICENSEES REQUIRED TO SUBMIT REPORT THAT:

SUMMARIZES AVAILABLE RESULTS OF TESTS CONDUCTED WITHIN 30 DAYS AFTER STARTUP FROM THE FIRST AND SECOND REFUELING OUTAGE BEGINNING AFTER MARCH 1, 1989

(FOR CPS SUBMIT REPORT WITHIN 30 DAY AFTER FUEL LOAD)

SUMMARIZES THE RESULTS AND PROCUREMENT CHAIN OF CBS THAT PASS/FAIL THE TESTS

Figure 3 *(Gill)*

LICENSEE RESPONSES TO
BULLETIN 88-10

*APPROXIMATELY 50 RESPONSES RECEIVED TO DATE

*RESPONSES VARY IN SIZE AND QUALITY

*SOME RESPONSES HAVE NOT ADDRESSED SPECIFIC BULLETIN ACTIONS & INSTEAD PROPOSE ALTERNATIVES

*PROPOSED ALTERNATIVES NOT ACCEPTABLE TO NRC

*NRC NOT TO MAKE COMPLETE REVIEW OF THE RESPONSES BUT MAKE AUDITS DURING INSPECTIONS

*LICENSEE RESPONSIBLE FOR ASSURING THAT SUBSTANDARD AND FALSIFIED EQUIPMENT NOT STORED OR INSTALLED FOR SAFETY APPLICATIONS

Figure 4 *(Gill)*

CONCLUSIONS - SUBSTANDARD & FALSIFIED EQUIPMENT

*NRC CONCERNS ARE:

LACK OF APPENDIX B QUALITY CONTROLS OVER PROCUREMENT OF REPLACEMENT EQUIPMENT FOR SAFETY-RELATED APPLICATIONS

SAFETY SIGNIFICANCE OF REFURBISHED CBS INSTALLED IN NUCLEAR POWER PLANTS

INADEQUATE DEDICATION PROCESS

*NRC RATIONALE FOR ALLOWING PLANTS TO CONTINUE TO OPERATE:

REDUNDANT SAFETY SHUTDOWN AND ACCIDENT MITIGATION CAPABILITY

INSTALLED CBS PERIODICALLY TESTED FOR SAFETY FUNCTION

FEW REFURBISHED CBS ARE EXPECTED TO BE INSTALLED IN ORIGINAL EQUIPMENT

OPERATING EXPERIENCE DOES NOT INDICATE HIGH CB FAILURE RATE

NORMAL FUNCTION OF CB IS TO CARRY LOAD CURRENT AND OPERABILITY WOULD BE DEMONSTRATED

Figure 5 *(Gill)*

CONTEMPLATED CHANGES TO THE REGULATORY APPROACH

by

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U.S. Nuclear Regulatory Commission

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ISSUES

ADVANCE NOTICE OF PROPOSED RULEMAKING

BULLETINS, INFORMATION NOTICES, AND GENERIC LETTERS

GENERIC LETTER 89-02

INDUSTRY INITIATIVES

Figure 1 *(Clausen)*

ADVANCE NOTICE OF PROPOSED RULEMAKING

GIVES NOTICE

REQUESTS INFORMATION

BASIS FOR FUTURE ACTIONS

Figure 2 *(Clausen)*

GENERIC LETTER 89-02

SHARES WHAT SEEMS TO WORK

ENGINEERING INVOLVEMENT

EFFECTIVE INSPECTION AND TESTING

AUDITS OF VENDORS AND SOURCES

ENDORSES THE EPRI GUIDE NP 5652 METHODS*

Figure 3 *(Clausen)*

INDUSTRY INITIATIVES

GUIDELINE FOR UTILIZATION OF COMMERCIAL ITEMS

GUIDE FOR TECHNICAL EVALUATION OF REPLACEMENT ITEMS

GUIDE ADDRESSING AUDIT METHODS AND RECEIPT INSPECTIONS

Figure 4 *(Clausen)*

SESSION 3

EVALUATION OF PLANT PERFORMANCE

TRENDS IN SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE (SALP) - OPERATING REACTORS

by

A. Bert Davis, Regional Administrator
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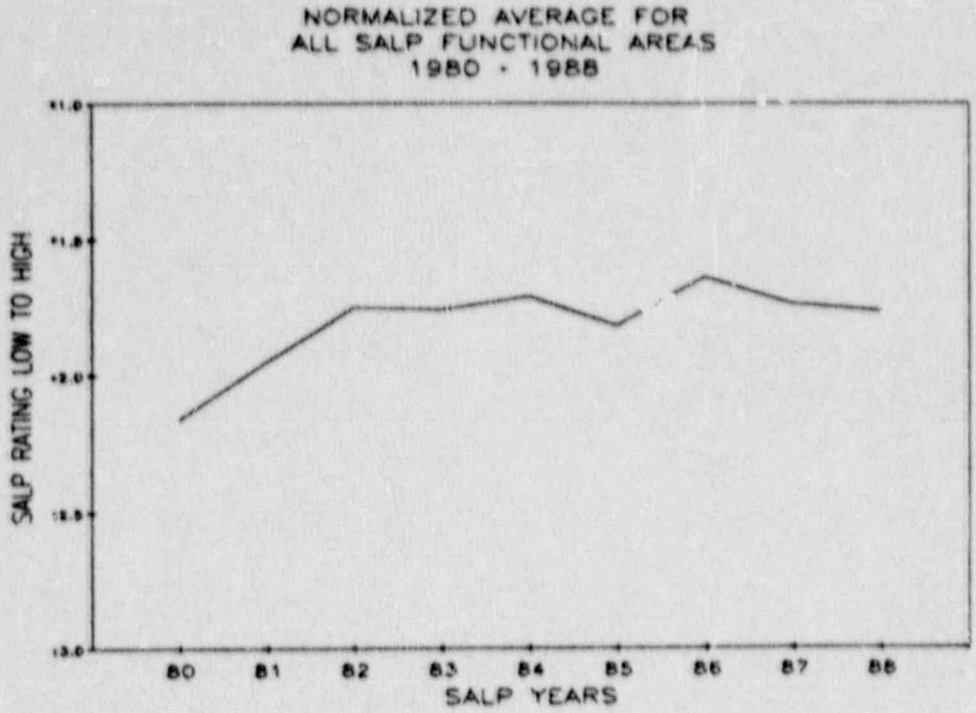

Figure 1 *(Davis)*

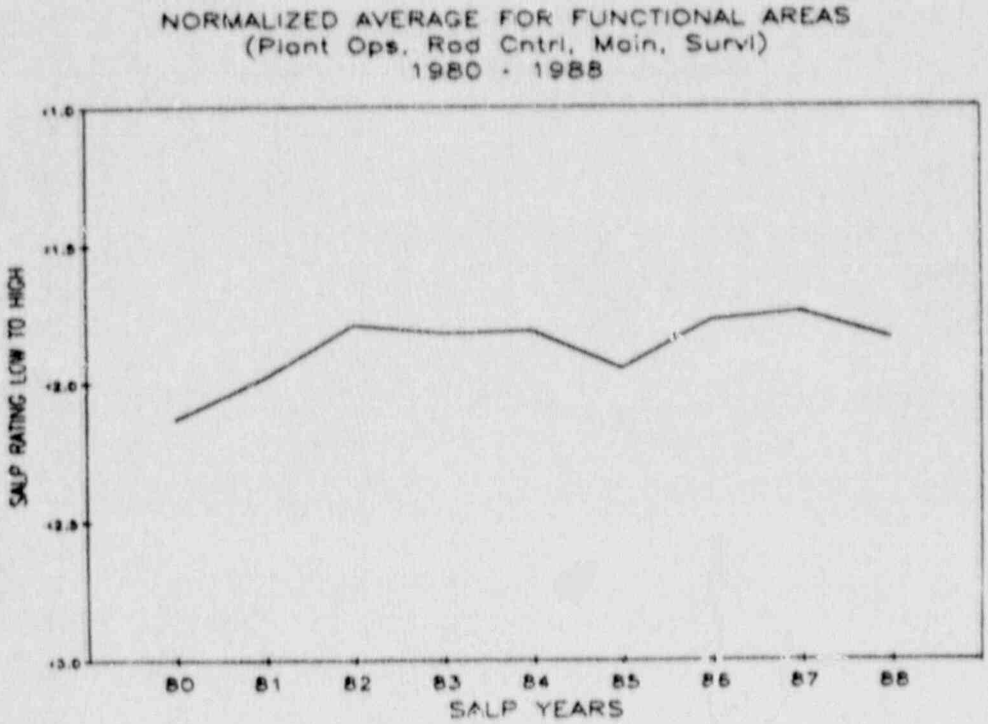

Figure 2 *(Davis)*

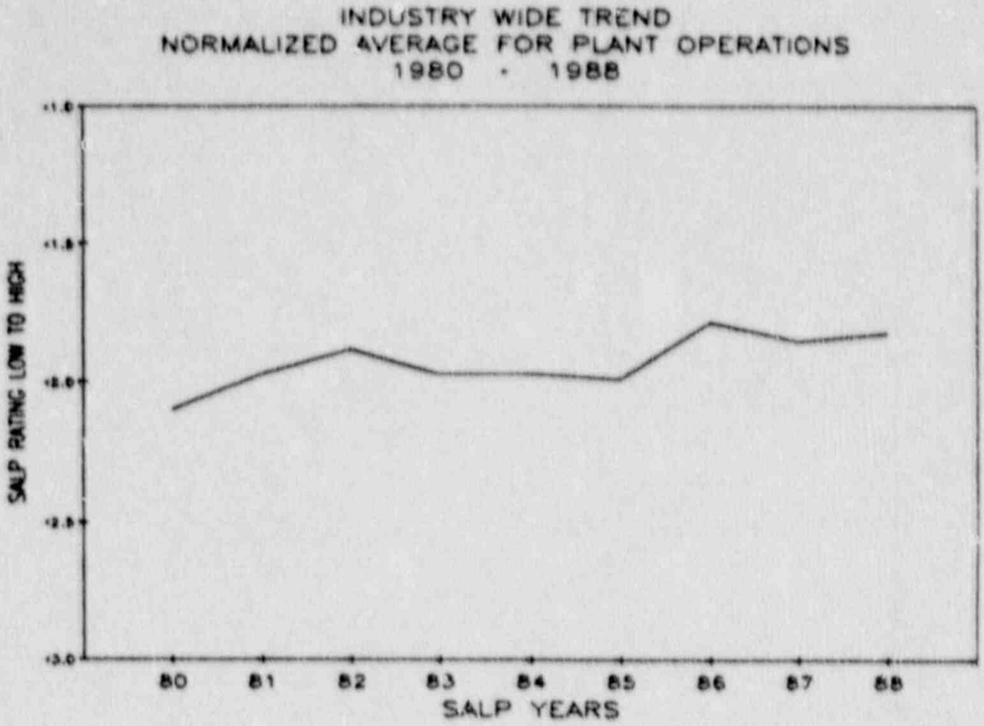

Figure 3 *(Davis)*

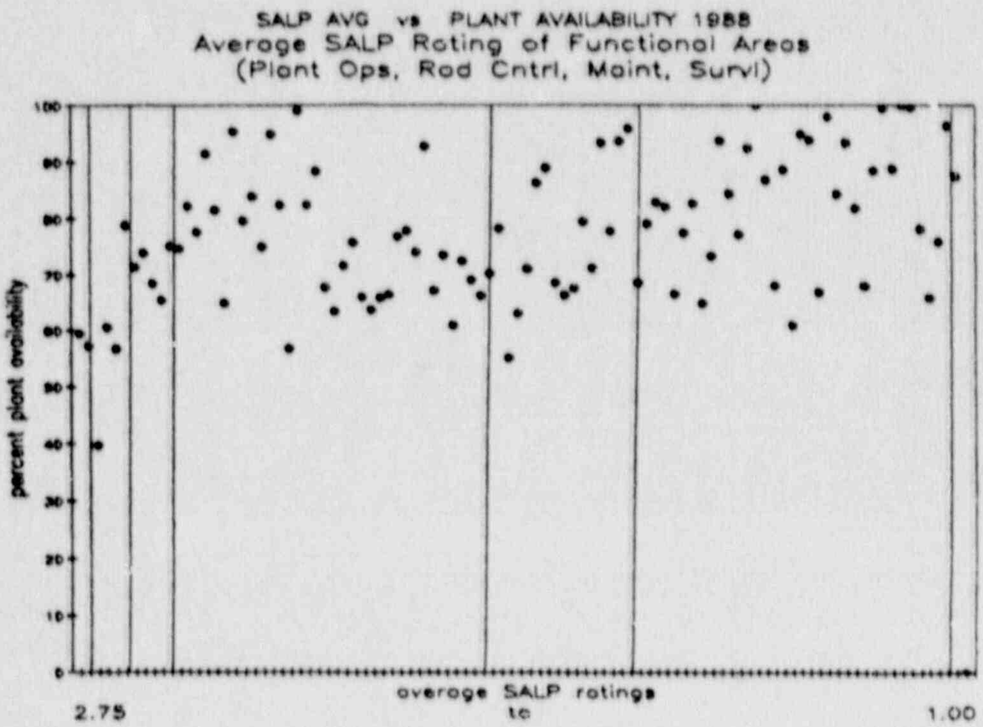

Figure 4 *(Davis)*

SALP AVG vs PLANT AVAILABILITY 1988
Average SALP Rating of Functional Areas
(Plant Ops, Rad Cntrl, Maint, Survl)

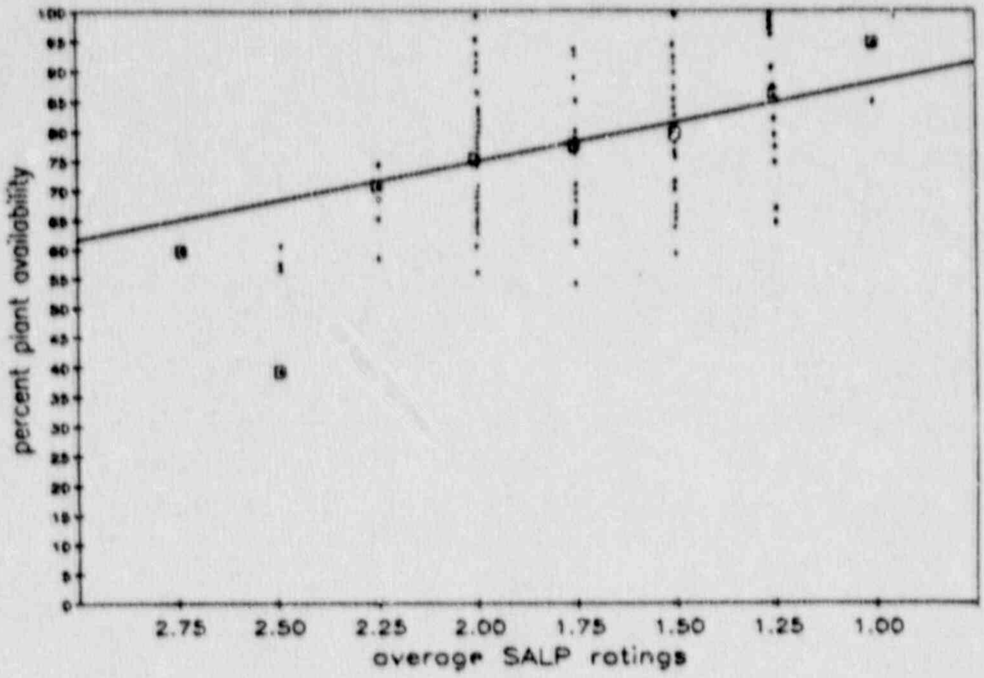

Figure 5 *(Davis)*

SALP AVG vs AVG PI DEVIATION 1988 •
Average SALP Rating of Function Areas
(Plant Ops, Rad Cntrl, Maint, Survl)

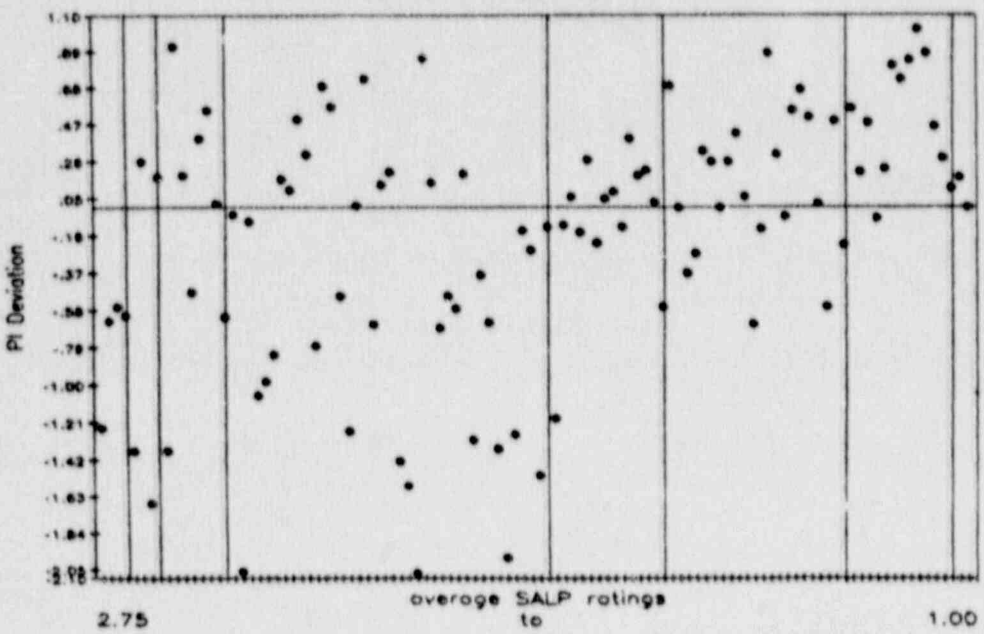

Figure 6 *(Davis)*

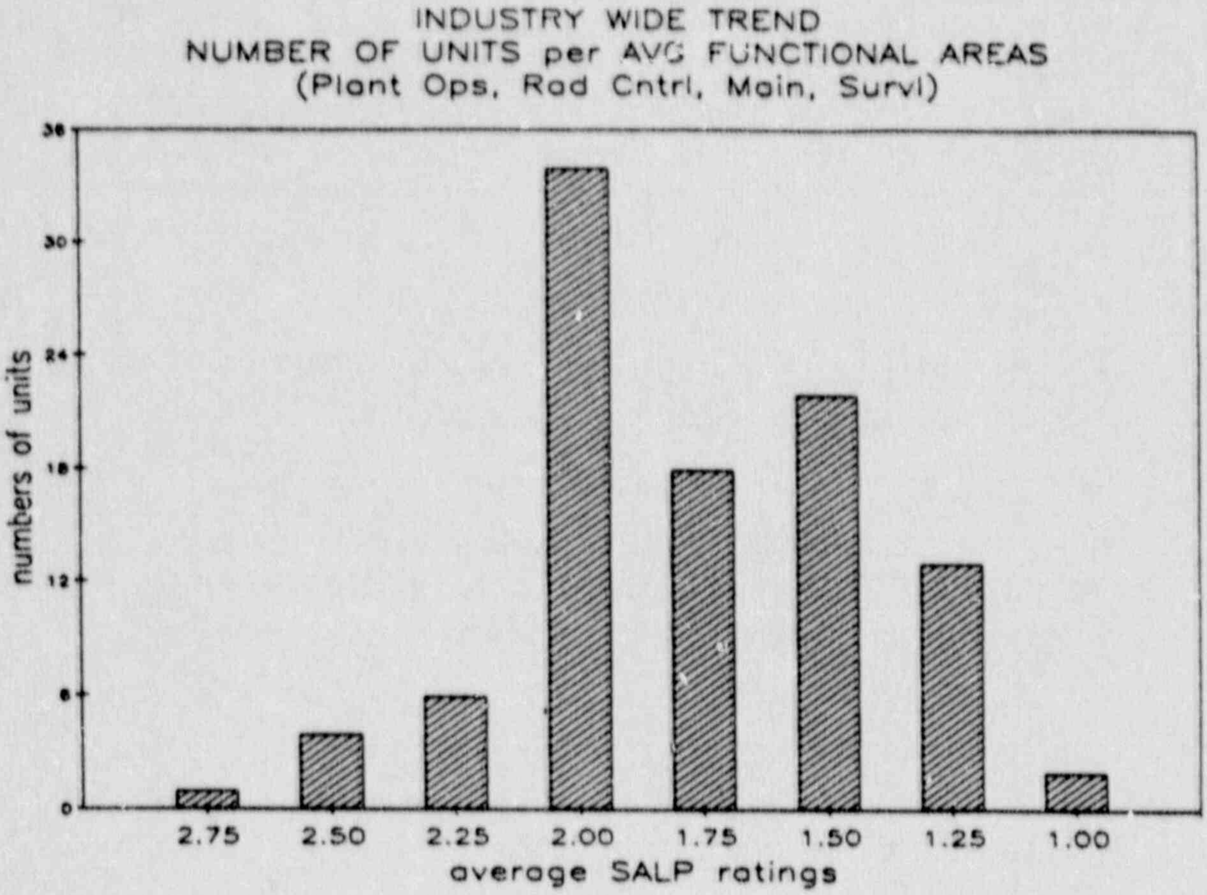

Figure 7 *(Davis)*

PERFORMANCE INDICATORS DEVELOPMENT

by

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For Presentation at the NRC
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CURRENT PI CANDIDATES

- MAINTENANCE
- CAUSE CODES
- SAFETY SYSTEM FUNCTION TRENDS

Figure 1 *(Novak)*

MAINTENANCE PI

- MAINTENANCE PROCESS INDICATORS

  Enhance management/control of process
  Plant-specific flexibility important
  Not reflective of maintenance results

- MAINTENANCE EFFECTIVENESS INDICATORS

  Those based upon actual component failure history were the most promising
  NPRDS has capability to support NRC staff and industry in providing effectiveness indicators

- USE OF NPRDS ENCOURAGED IN PROPOSED RULE

Figure 2 *(Novak)*

TYPICAL BWR ODE SYSTEMS AND COMPONENTS

Control Rod Drive System

- Rod Mechanism
- Rod Drive Flow Control Valve
- Rod Drive Flow Control Valve Operator
- Rod Drive Supply Pump
- Rod Drive Supply Pump Motor
- Rod Drive Supply Pump Motor Circuit Breaker

Feedwater System

- High Pressure Heater
- Pump
- Pump Motor
- Pump Motor Circuit Breaker
- Pump Turbine
- Pump Turbine Governor

Neutron Monitoring System

- Instrumentation, Bistable/Switch
- Instrumentation, Indicators/Recorders
- Instrumentation, Transmitter/Primary Detector/Element

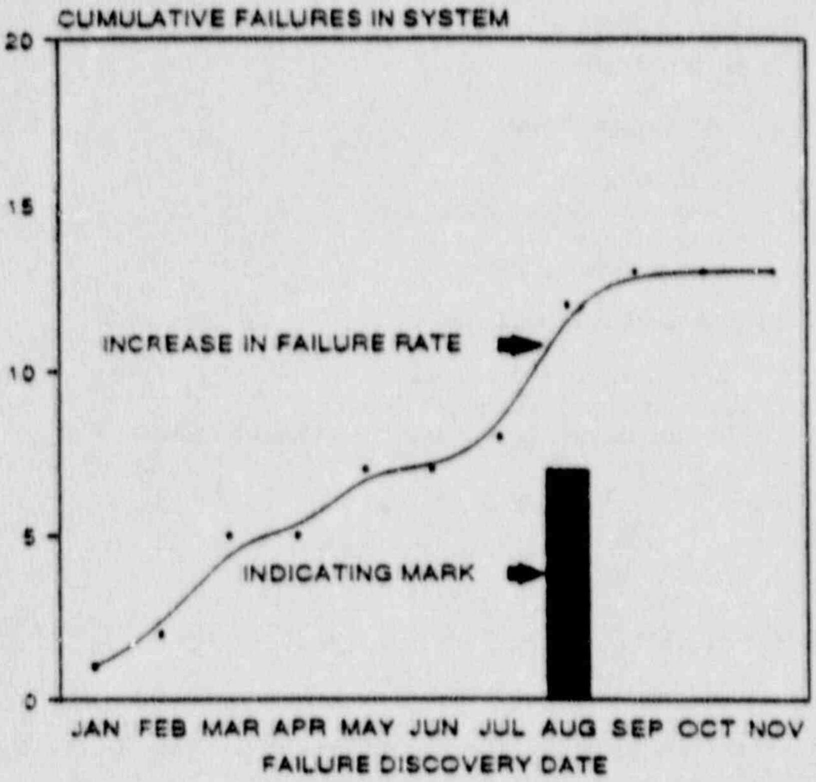
Figure 3 *(Novak)*

NPRDS COMPONENT FAILURE DEFINITIONS

- COMPONENT FAILURE: The termination of the ability of a component to perform one of its required functions satisfactorily.
- IMMEDIATE FAILURE: A failure that is both sudden and complete.
- DEGRADED FAILURE: A failure that is both gradual and partial whereby the component degrades to an unacceptable performance level that, in effect, is a termination of the ability to perform its intended function.
- INCIPIENT FAILURE: An imperfection in the state or condition of a component so a degraded or immediate failure may occur if corrective action is not taken.

Figure 4 *(Novak)*

INDICATOR CONCEPT



- **ALGORITHM METHOD** - COMPARES LATEST 2 MONTHS AVG. TO PRIOR 3 MONTHS (MOVING).
- **SETPOINT** - SENSITIVITY BASED ON OPERATING EXPERIENCE [DIFFERENCES GREATER THAN THRESHOLD CAUSE INDICATION].

Figure 5 *(Novak)*

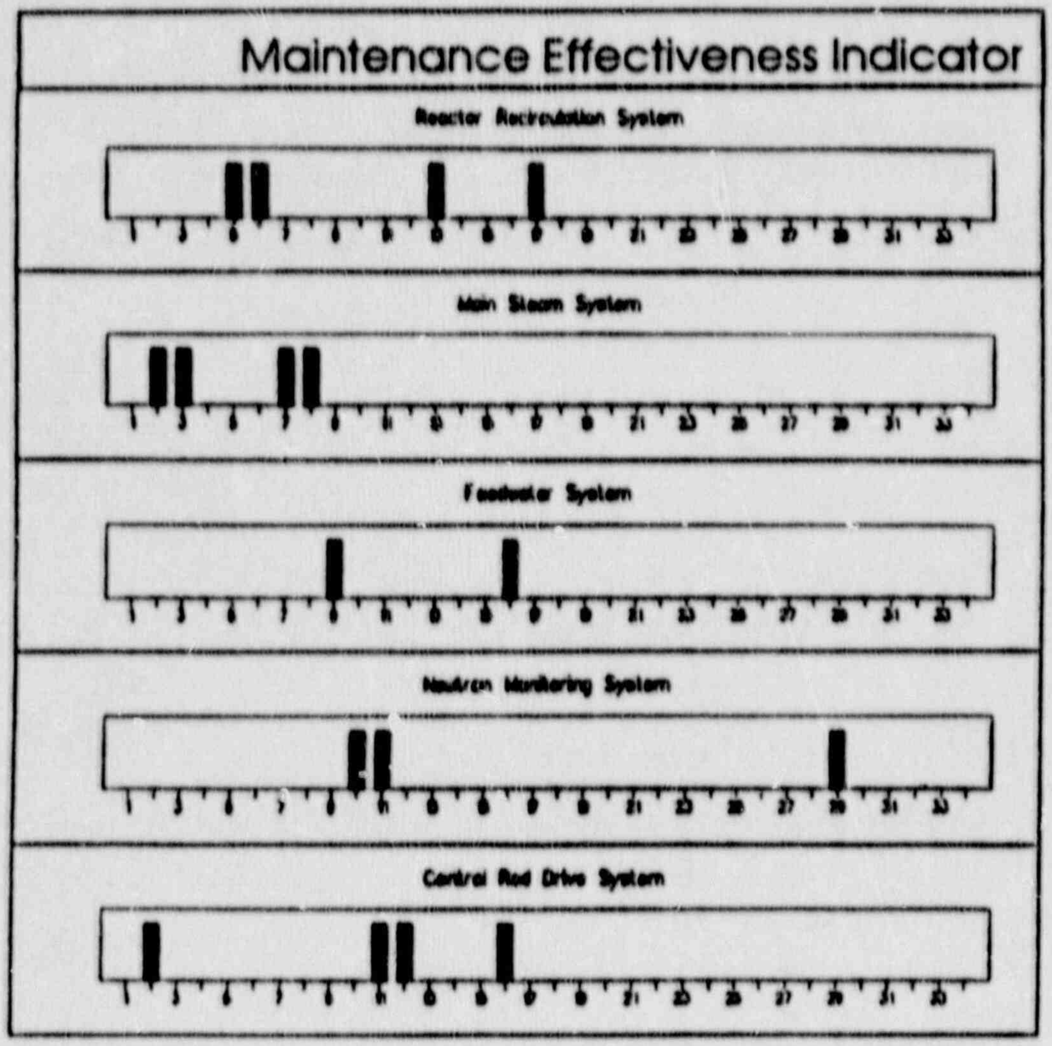


Figure 6 *(Novak)*

INDICATOR ATTRIBUTES

- NORMALIZED TO PLANT REPORTING PRACTICES
- GENERATED ON SYSTEM/MONTHLY BASIS
- SYSTEMS AND COMPONENTS SELECTED FOR REPORTING CONSISTENCY FOR VALIDATION
- OTHER SYSTEMS AMENABLE TO SAME APPROACH

Figure 7 *(Novak)*

VALIDATION METHOD

- ROOT-CAUSE ANALYSES

  500 failure records covering about 40 indications

- CORRELATION WITH OTHER DATA

  LERs

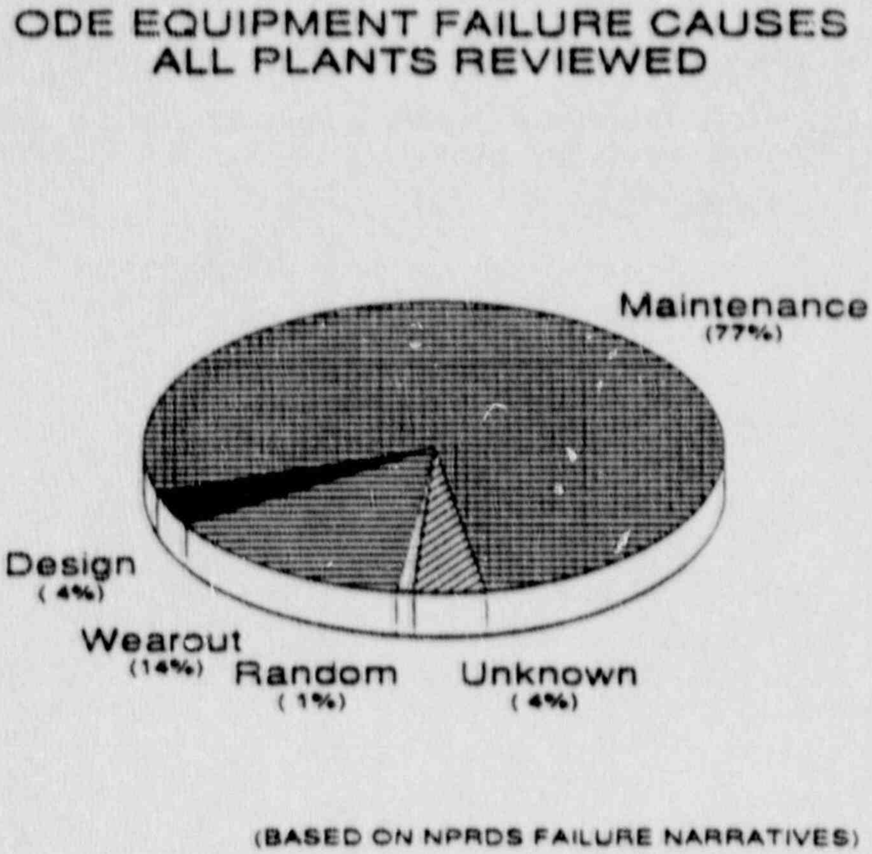
  Technical studies

- PLANT ANALYSIS

  Period from 1/1/85 thru 3/31/88 for all commercial BWRs with adequate data

Figure 8 *(Novak)*

MAINTENANCE INDICATOR CONSTITUTION
(Average of 40 Indications across plants)



- **POOLING 500 FAILURE CAUSES - 77% WERE DUE TO MAINTENANCE (PLANT SPECIFIC RANGE FOR MAINT. ON THE 500 FAILURES WAS 25% TO 100%).**

NOTE: Maintenance - Failures experienced while conducting, or as a consequence of, maintenance, upkeep, repair, surveillance, testing, and calibration of plant equipment. Examples include personnel errors of omission and commission by maintenance staff, procedure problems resulting in inadequate/improper maintenance, problems traceable to maintenance program administrative control, and equipment failures due to improper previous repair.

Figure 9 *(Novak)*

CORRELATION WITH OTHER DATA

- COMPONENT FAILURE STUDIES

  Finding: Differences among maintenance practices drove the failure rates

- LER CORRELATION - CAUSE CODES

  Finding: Mutually reinforcing to MPI perspective

Figure 10 *(Novak)*

MPI VS. CAUSE CODE CORRELATION

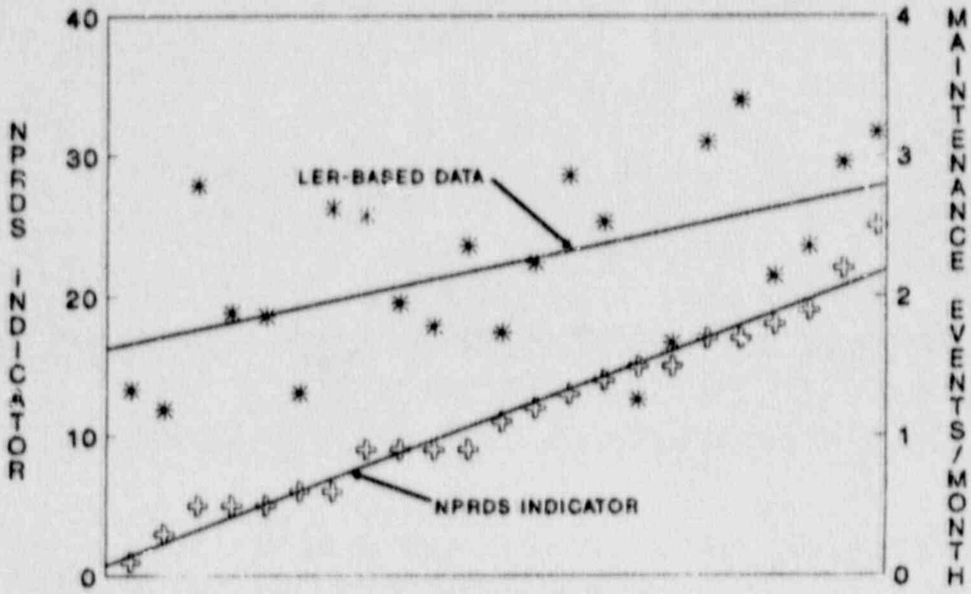


Figure 11 *(Novak)*

PLANT ANALYSES

- LOGICAL RELATIONSHIP BETWEEN OUTAGE DOMINATING EQUIPMENT AND EQUIPMENT FORCED OUTAGES
- REVIEWED OPERATING EXPERIENCE OF THE BWRs IN DETAIL (EXAMPLES IN PROPRIETARY APPENDIX A TO AEOD/S804B)
- 10 OF 28 PLANTS EXPERIENCED AT LEAST 1 OUTAGE THAT WAS PRECEDED BY AN MPI (LEAD TIME VARIED)

Figure 12 *(Novak)*

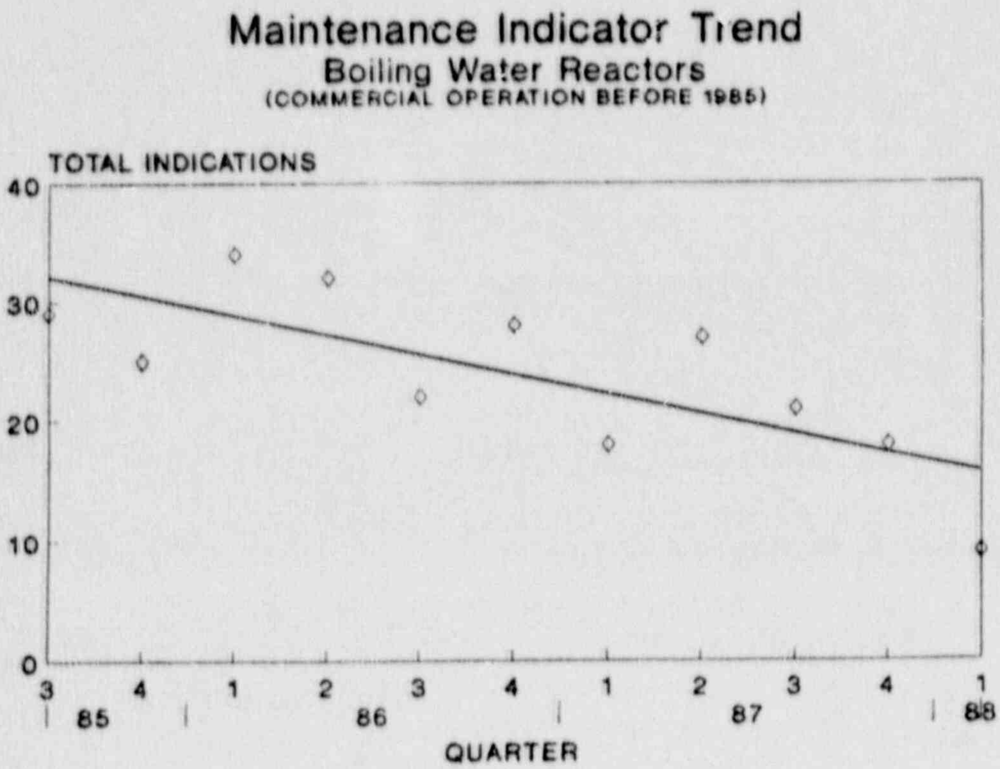


Figure 13 *(Novak)*

MAINTENANCE PI CONCLUSIONS

- CANDIDATE INDICATOR'S ABILITY TO REFLECT MAINTENANCE EFFECTIVENESS WAS CONFIRMED
- METHOD IS SUITABLE FOR REGULATORY GUIDE
- METHOD SHOULD BE VALID FOR OTHER DESIGNS
- FOR INDUSTRY-WIDE USE, EFFECT OF NPRDS REPORTING DIFFERENCES CAN BE MINIMIZED
- NRC USE REQUIRES IMPROVED EFFICIENCY TO MINIMIZE IMPACT ON RESOURCES
- CORRELATION WITH LER DATA REVEALS PROSPECT OF ADDITIONAL MAINTENANCE PIs

Figure 14 *(Novak)*

CAUSE CODES

- TRIAL PROGRAM COMPLETED
- CAUSE CODES USED LERs AND CODER ENGINEERING JUDGMENT
- CAUSE CODE DATA EXTENDED BY SCSS WITHOUT ADDITIONAL CODING
- CORRECTIVE ACTION DATA NECESSITATED SPECIAL CODING OF 6 MONTHS OF DATA

Figure 15 *(Novak)*

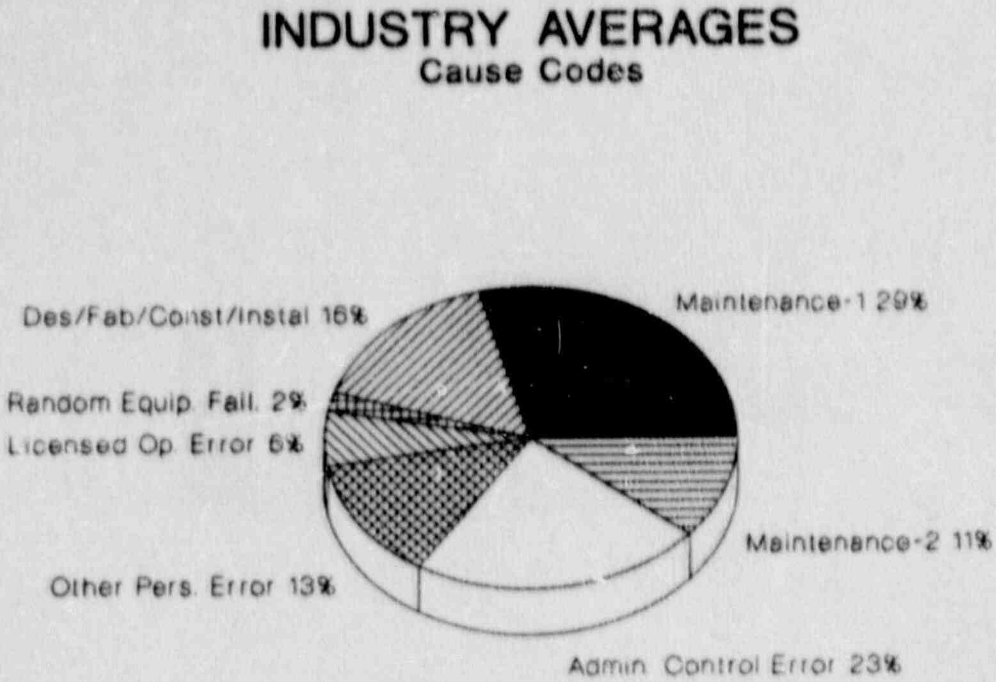


Figure 16 *(Novak)*

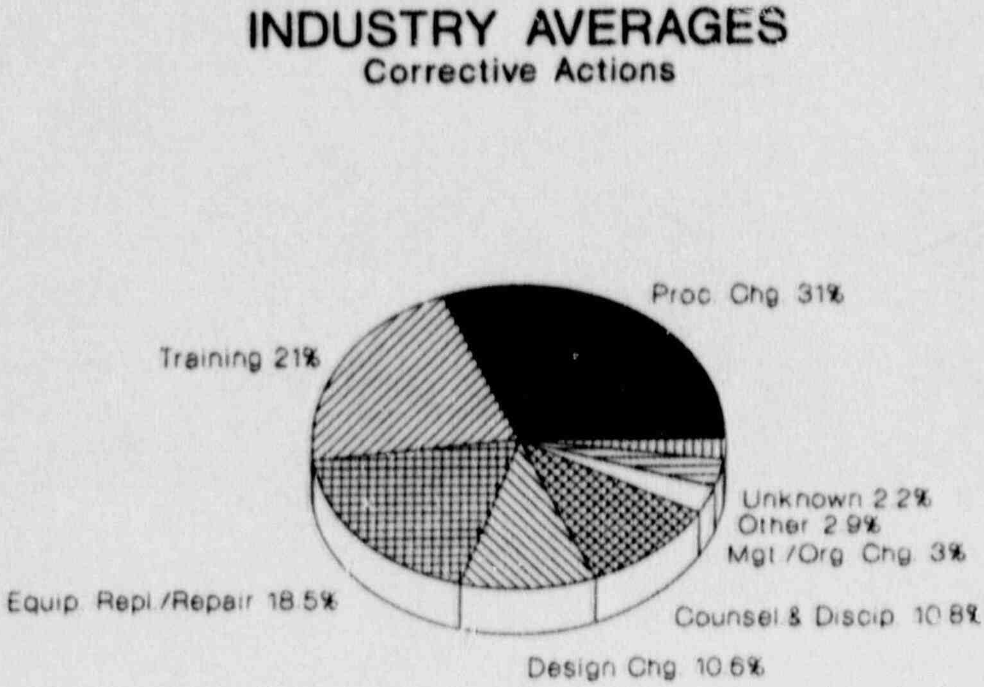


Figure 17 *(Novak)*

CORRECTIVE ACTIONS
Events With Licensed Operator Errors

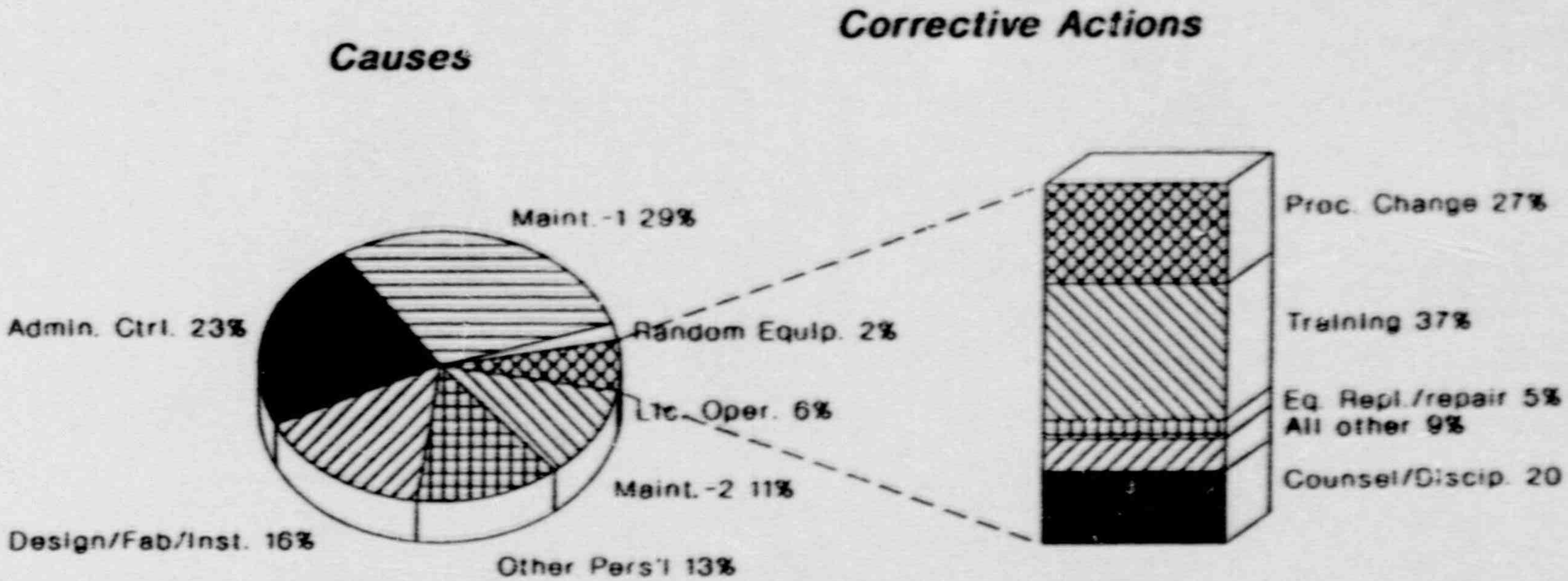


Figure 18 *(Novak)*

VALIDITY OF LER DATA FOR CAUSE CODES

- ACCURACY OF INFORMATION IN LERs

  Compared LERs and AIT inspection report findings

  Enforcement history: reporting

  SALP assessments

  LER quality reviews

- ACCURACY OF LER CODING

  Trial program experience

  SCSS quality assurance results

Figure 19 *(Novak)*

BENEFITS

- CAUSE CODE PIs PROVIDE ADDITIONAL PERFORMANCE INFORMATION

- CAUSE CODES ARE OF DIAGNOSTIC VALUE

  Trend causes and related corrective actions

Figure 20 *(Novak)*

SAFETY SYSTEM FUNCTION TRENDS (SSFT)

- INDICATOR OF SAFETY TRAIN AVAILABILITY FOR SELECTED RISK-SIGNIFICANT SYSTEMS

- POTENTIAL REPLACEMENT FOR SAFETY SYSTEM FAILURE PERFORMANCE INDICATOR

- SSFT REQUIRES:

  Safety train out-of-service times

  Train failures

Figure 21 *(Novak)*

RETROSPECTIVE ANALYSIS

- HISTORIC DATA FROM 5 UNITS AT 3 SITES
- RECONSTRUCT TRAIN LEVEL AVAILABILITY FROM PLANT LOGS

  Component degradations vs. failures
- RESULTS

  Promising but not conclusive

Figure 22 *(Novak)*

SSFT FOLLOW ON ACTIVITIES

- VALIDATION WITH PROSPECTIVE DATA
- VOLUNTEER UNITS
- EXAMINE EXISTING DATA SOURCES

  NPRDS

  INPO safety system performance indicator

  Pre-1984 LERs

Figure 23 *(Novak)*

MAINTENANCE INSPECTIONS

by

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Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

For Presentation at the NRC
Regulatory Information Conference

The Mayflower Hotel
Washington, D.C.

April 18–20, 1989

OBJECTIVE

TO DETERMINE WHETHER COMPONENTS, SYSTEMS AND STRUCTURES OF NUCLEAR POWER PLANTS ARE ADEQUATELY MAINTAINED SO THAT THEY ARE AVAILABLE TO PERFORM THEIR INTENDED FUNCTIONS.

TO DETERMINE WHETHER THE MAINTENANCE PROCESS PROVIDES FOR PROMPT REPAIR, AS APPROPRIATE, TO THEIR PRESCRIBED FUNCTIONS.

Figure 1 *(Gody)*

BACKGROUND

- MAINTENANCE SURVEYS AND SITE VISITS, 1980 - 1985 (NUREG-1212, JUNE 1986)
- INPO PUBLISHED "GUIDELINES ON CONDUCT OF MAINTENANCE AT NUCLEAR POWER PLANTS", 1985 (INPO 85-038)
- REVIEW OF MAINTENANCE PRACTICES IN OTHER U.S. INDUSTRIES AND FOREIGN NUCLEAR POWER PROGRAMS, 1988 (NUREG-1333)
- MAINTENANCE IS CHOSEN AS AREA OF EMPHASIS IN THE CORE INSPECTION PROGRAM FOR FY89 AND FY90

Figure 2 *(Gody)*

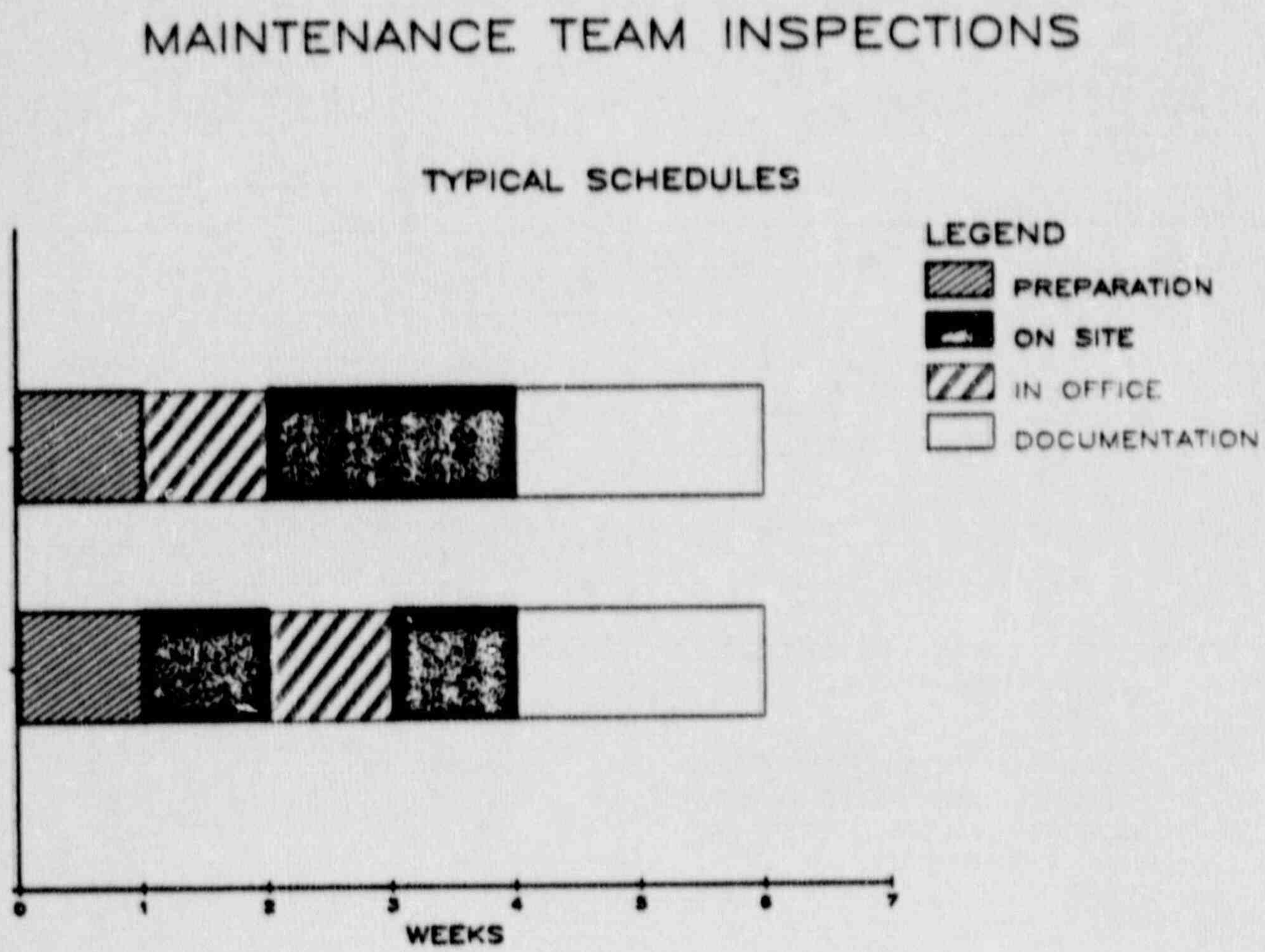


Figure 3 *(Gody)*

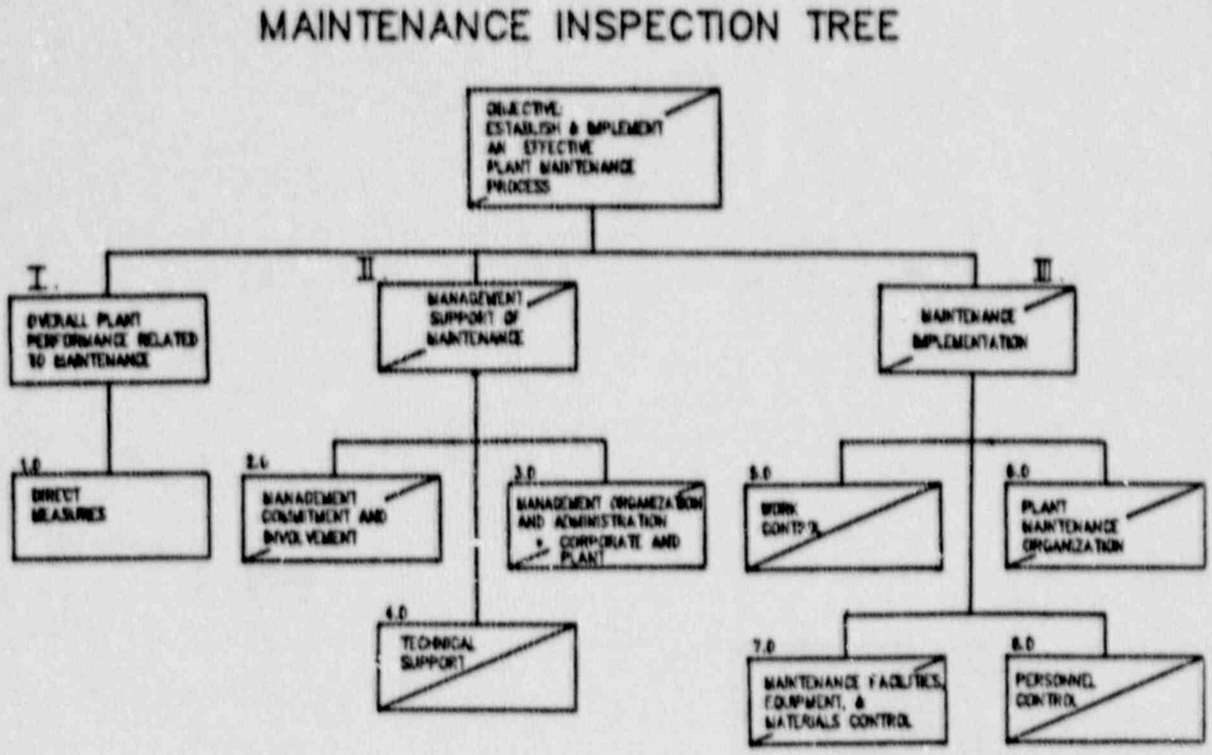


Figure 4 *(Gody)*

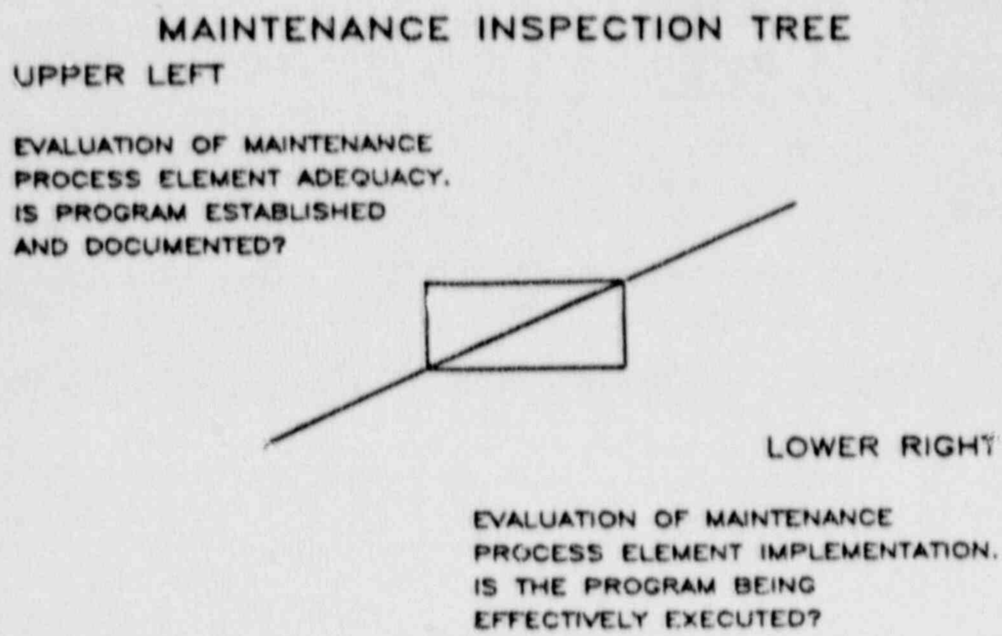
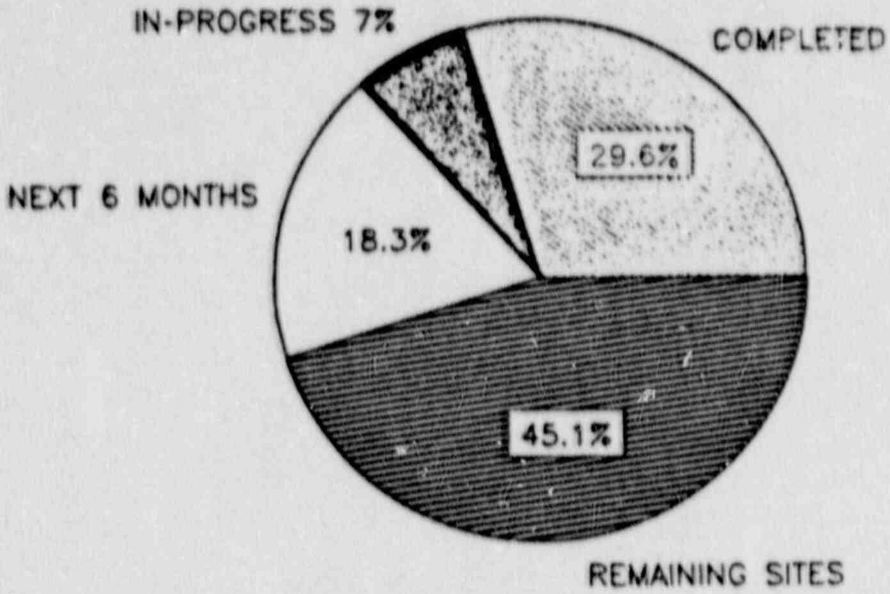


Figure 5 *(Gody)*

MAINTENANCE TEAM INSPECTIONS



INSPECTION STATUS

Figure 6 *(Gody)*

MAINTENANCE TEAM INSPECTIONS

RESULTS OF TEAM INSPECTIONS
OVERALL GRADES

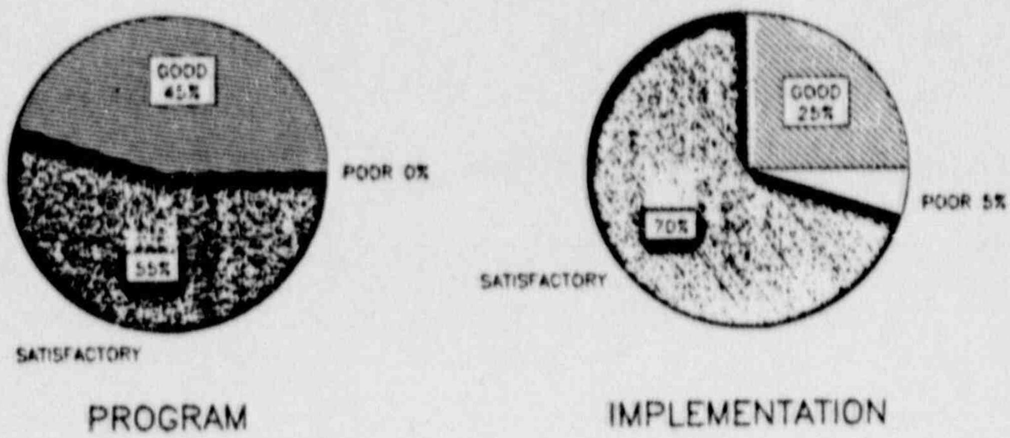


Figure 7 *(Gody)*

MAINTENANCE INSPECTION TREE

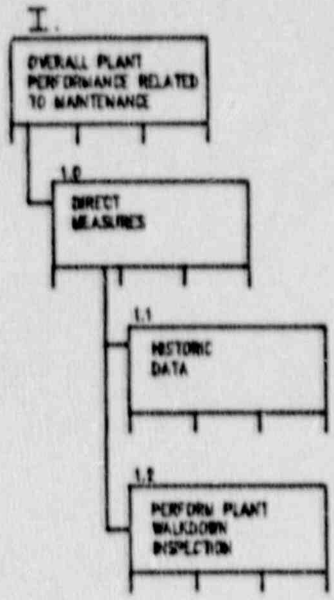


Figure 8 *(Gody)*

MAINTENANCE TEAM INSPECTIONS

1.0 DIRECT MEASURES

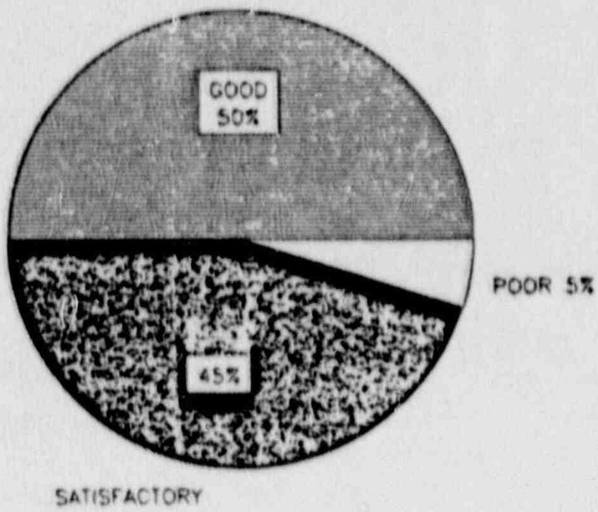


Figure 9 *(Gody)*

MAINTENANCE INSPECTION TREE

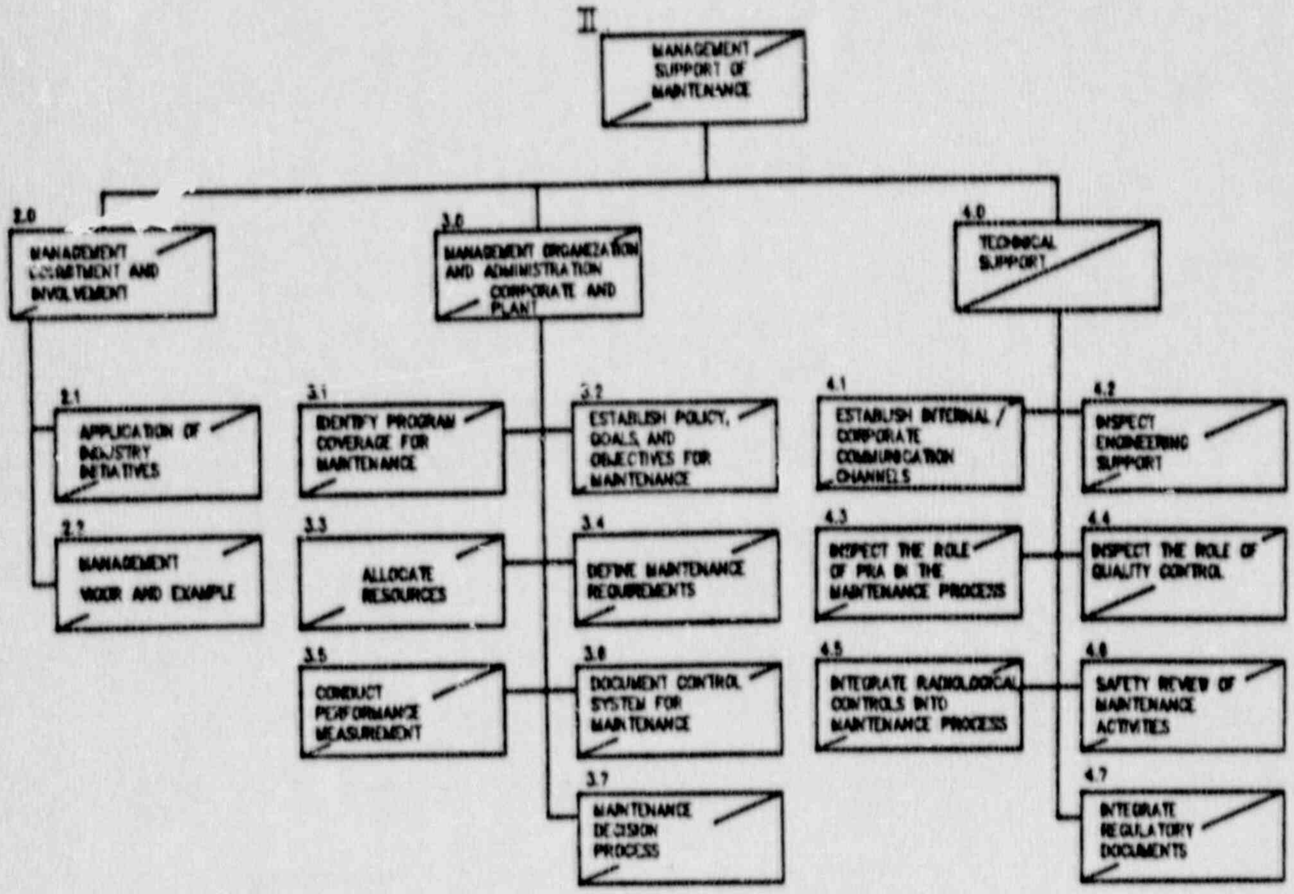


Figure 10 *(Gody)*

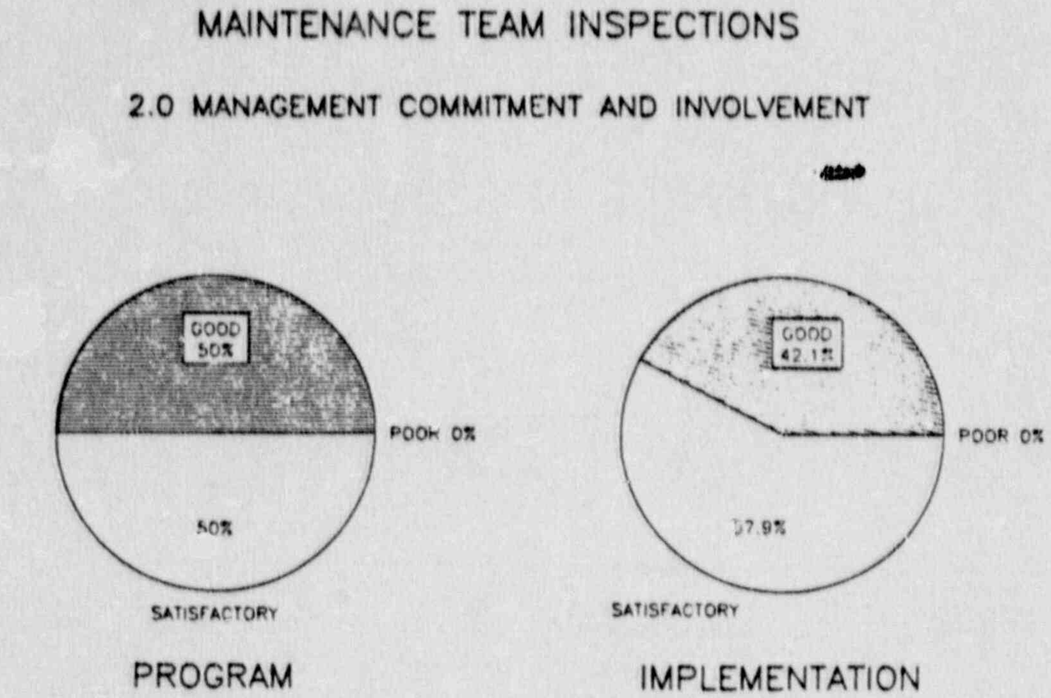


Figure 11 *(Gody)*

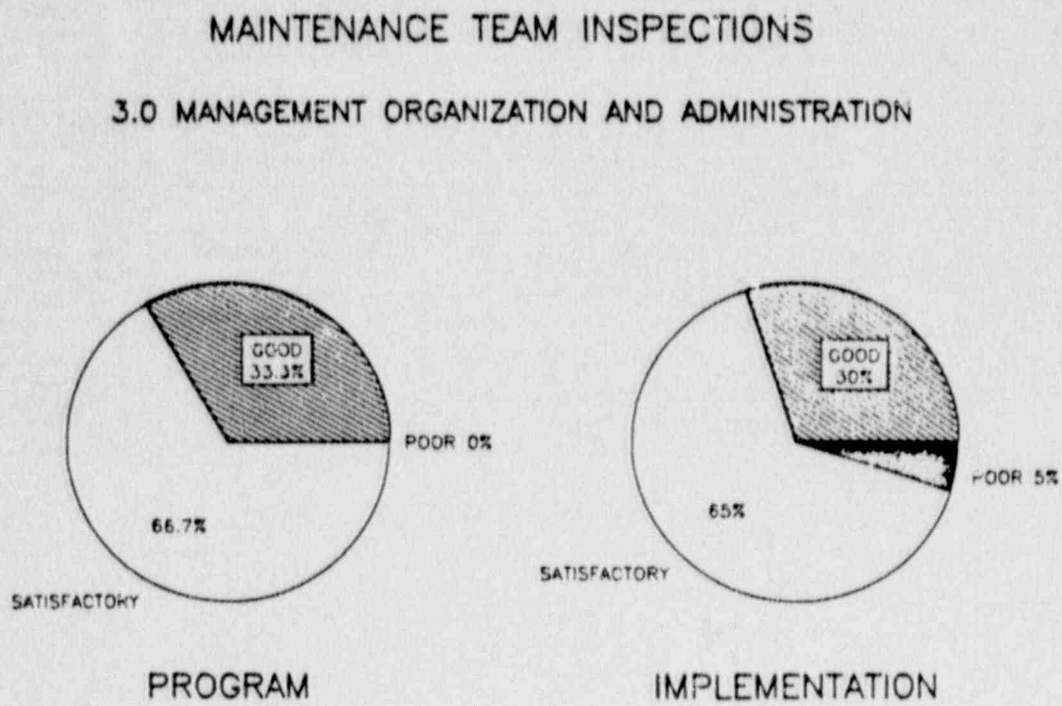


Figure 12 *(Gody)*

MAINTENANCE TEAM INSPECTIONS

3.6 DOCUMENT CONTROL SYSTEM FOR MAINTENANCE

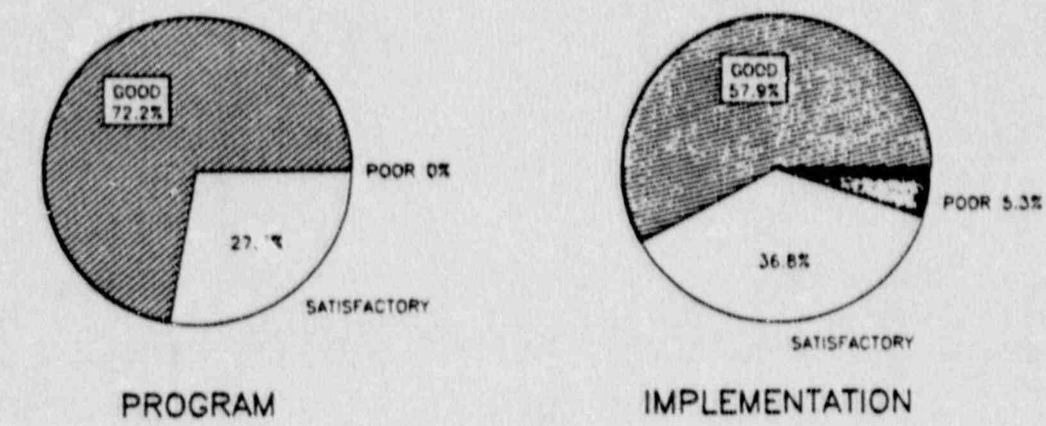


Figure 13 *(Gody)*

MAINTENANCE TEAM INSPECTIONS

4.0 TECHNICAL SUPPORT

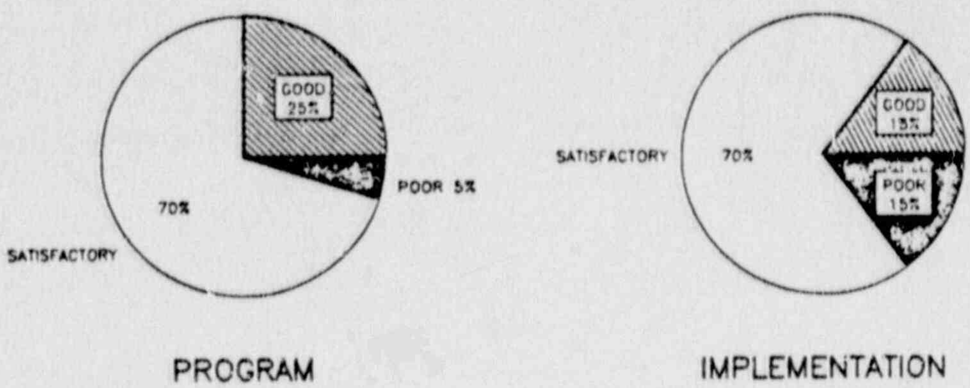


Figure 14 *(Gody)*

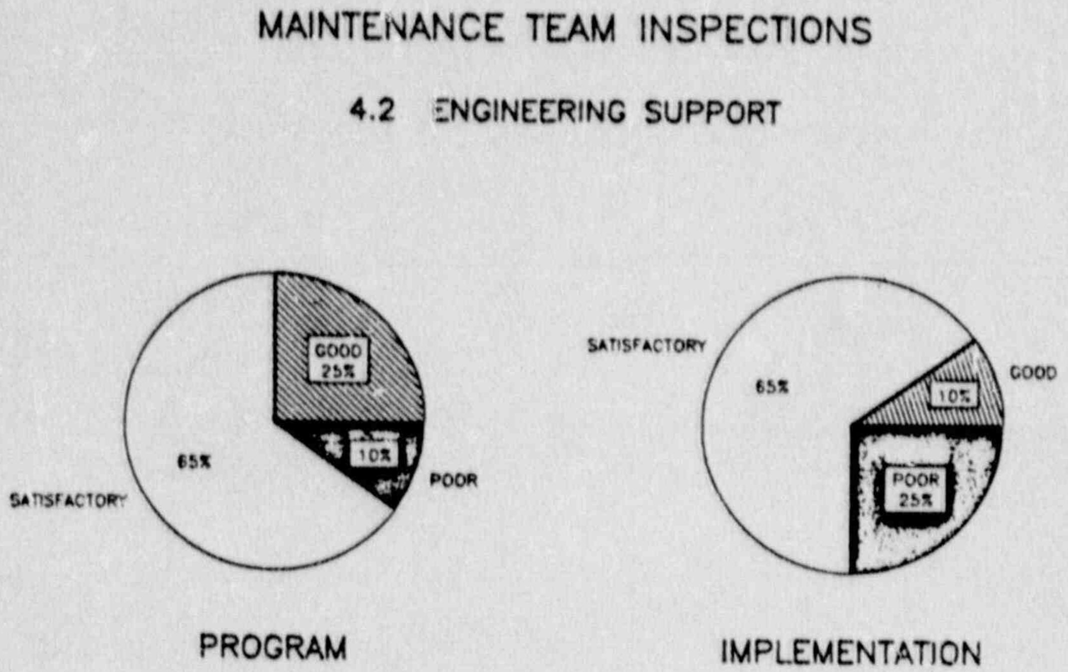


Figure 15 *(Gody)*

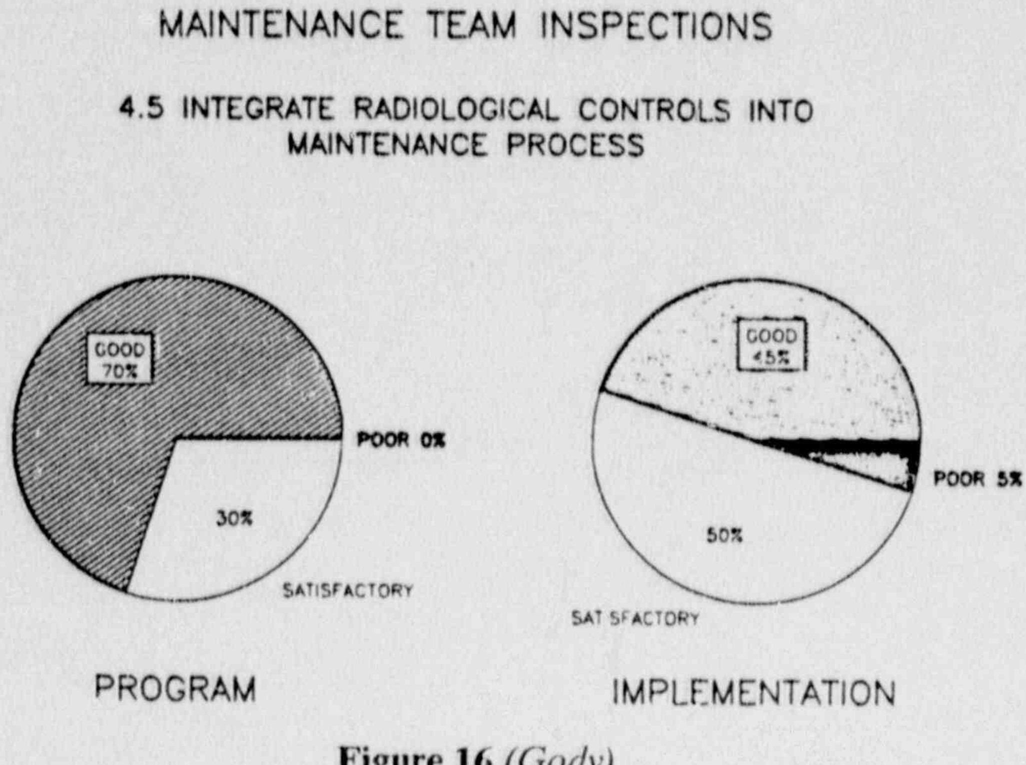


Figure 16 *(Gody)*

MAINTENANCE INSPECTION TREE

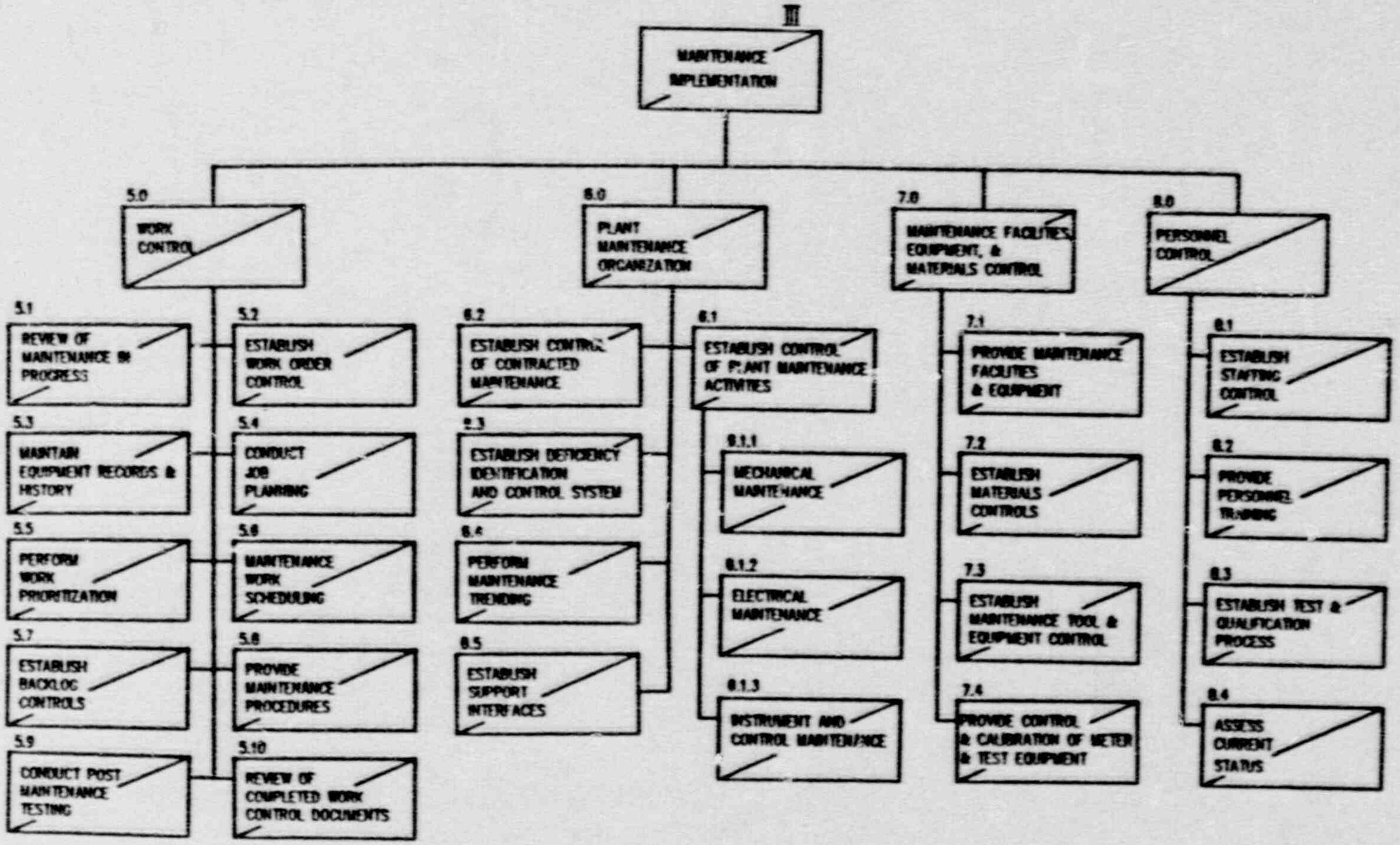


Figure 17 *(Gody)*

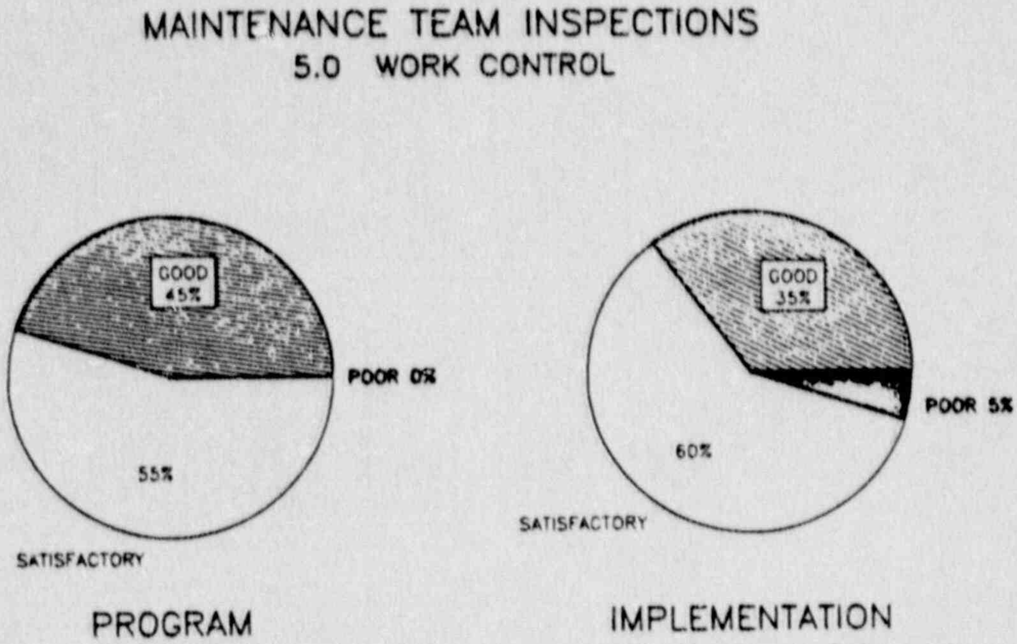


Figure 18 *(Gody)*

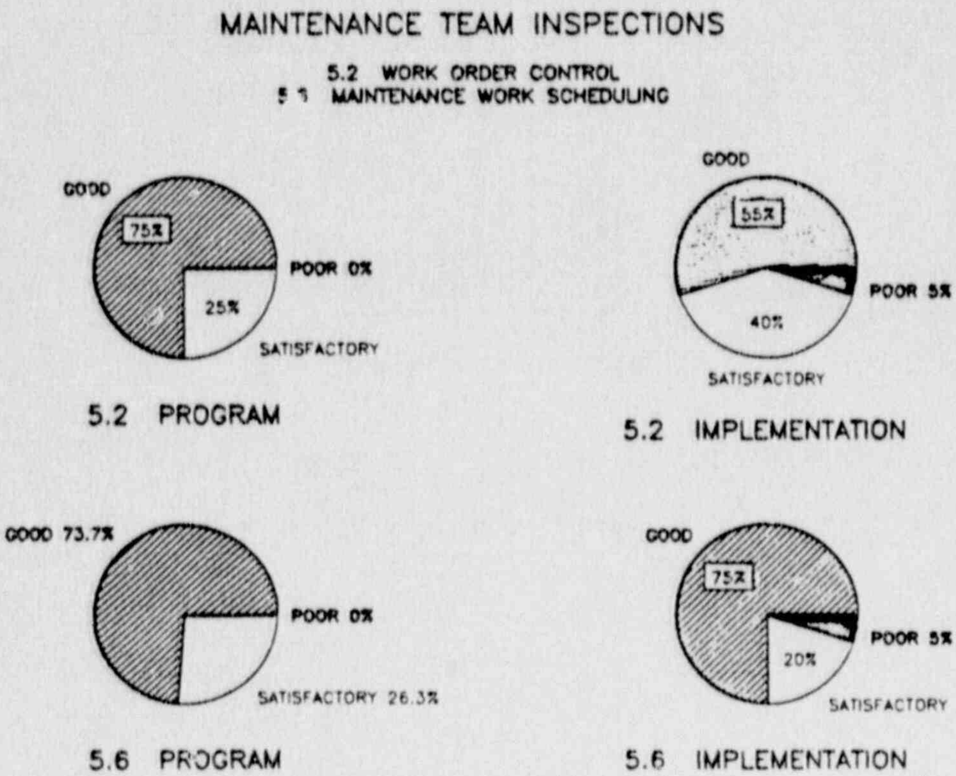


Figure 19 *(Gody)*

MAINTENANCE TEAM INSPECTIONS

5.3 MAINTAIN EQUIPMENT RECORDS AND HISTORY

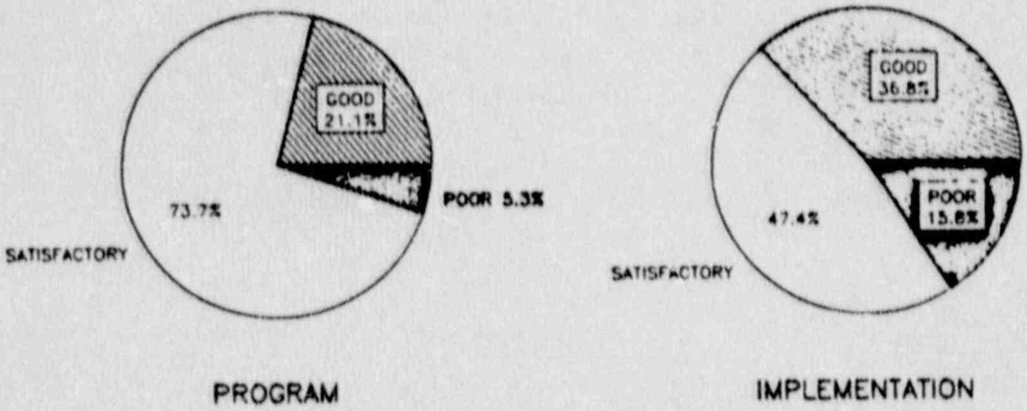


Figure 20 *(Gody)*

MAINTENANCE TEAM INSPECTIONS

6.0 PLANT MAINTENANCE ORGANIZATION

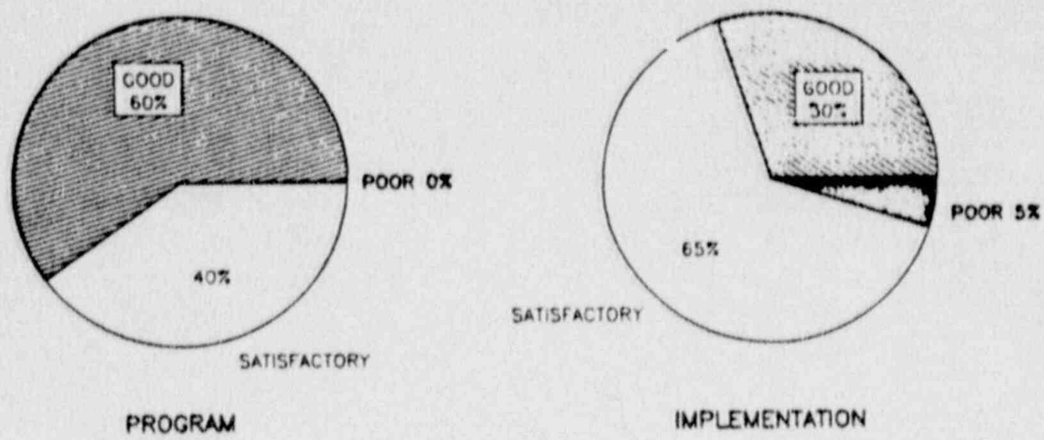


Figure 21 *(Gody)*

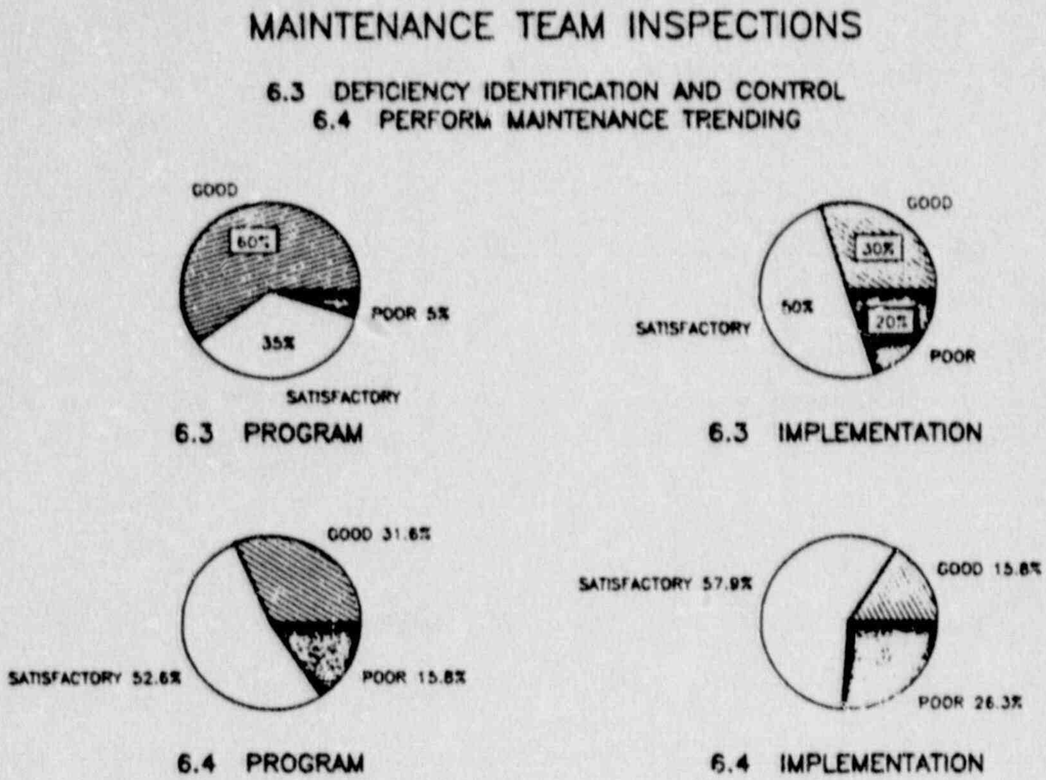


Figure 22 *(Gody)*

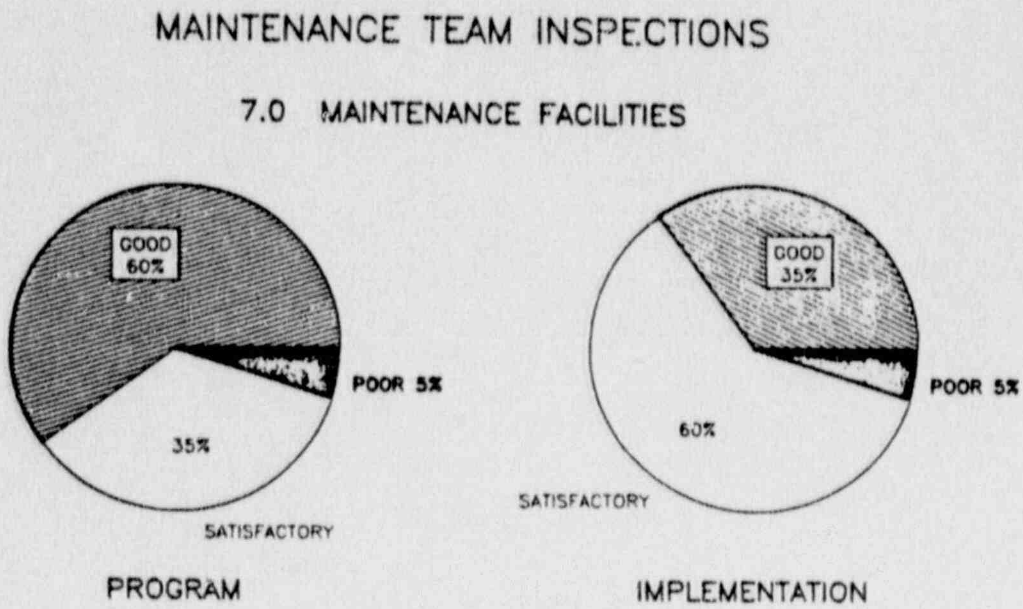


Figure 23 *(Gody)*

MAINTENANCE TEAM INSPECTIONS

8.0 PERSONNEL CONTROL

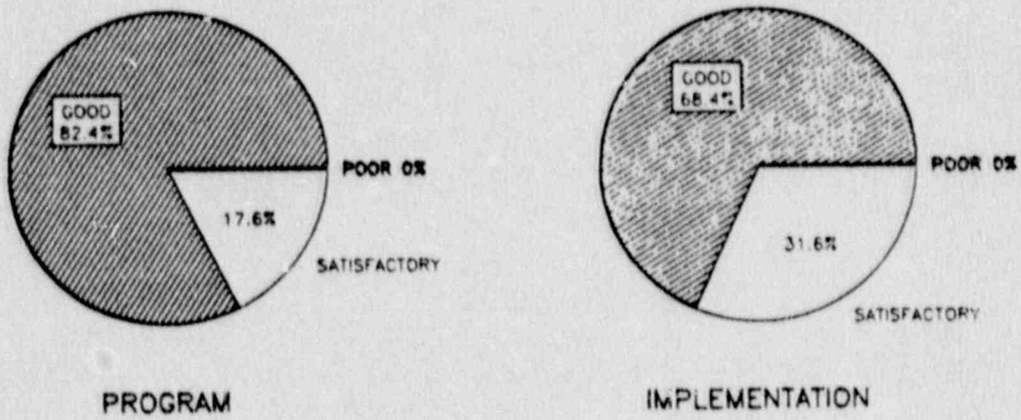


Figure 24 *(Gody)*

MAINTENANCE TEAM INSPECTIONS

SUMMARY:

- INSPECTION RESULTS DEMONSTRATE THE NEED FOR CONTINUED IMPROVEMENT IN MAINTENANCE ACTIVITIES
- ALL SITES HAVE MAINTENANCE PROGRAMS DOCUMENTED; ALL ARE ADEQUATE; MANY ARE GOOD.
- THE IMPLEMENTATION OF MAINTENANCE PROGRAMS AND ACTIVITIES IS LAGGING

Figure 25 *(Gody)*

EQUIPMENT OPERABILITY

by

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For Presentation at the NRC
Regulatory Information Conference

The Mayflower Hotel
Washington, D.C.

April 18–20, 1989

OVERVIEW

- DEALING WITH DEGRADED OR NONCONFORMING SAFETY EQUIPMENT REQUIRES:
  - SAFETY ASSESSMENT
  - OPERABILITY DETERMINATIONS
  - 50.59 EVALUATIONS WHERE APPROPRIATE
  - LICENSE AMENDMENTS IF NEEDED
  - CORRECTIVE ACTION PLANS
  - DOCUMENTATION

Figure 1 *(Holahan)*

EXAMPLES OF NONCONFORMANCES

- CODES AND STANDARDS SPECIFIED IN THE FSAR ARE NOT MET
- AS BUILT EQUIPMENT, OR AS MODIFIED, DOES NOT MEET FSAR DESIGN REQUIREMENTS
- OPERATING EXPERIENCE OR ENGINEERING REVIEWS HAVE RAISED QUESTIONS OF DESIGN ADEQUACY
- DOCUMENTATION REQUIRED BY RULES SUCH AS 10 CFR 50.49 IS NOT AVAILABLE OR DEFICIENT
- PHYSICAL EVIDENCE OF DEGRADATION EXISTS (SUCH AS WHEN HEAT EXCHANGER FOULING HAS REDUCED HEAT REMOVAL CAPABILITY BELOW THE FSAR OR DESIGN VALUE).

Figure 2 *(Holahan)*

INITIAL ACTIONS

- IDENTIFY DEGRADED OR NONCONFORMING CONDITION
- INITIAL SAFETY ASSESSMENT (I.E., ASSESS IMMEDIATE THREAT)
- PROMPT OPERABILITY DETERMINATION
- FOLLOW UP ACTIONS BASED ON OPERABILITLY DETERMINATION
- DOCUMENTATION

Figure 3 *(Holahan)*

OPERABILITY DETERMINATIONS

° OPERABILITY=CAPABILITY TO PERFORM SAFETY FUNCTION

° BASIS FOR DETERMINATION
  - ANALYSIS OF FUNCTIONAL CAPABILITY
  - TEST OR PARTIAL TEST RESULTS (E.G., SURVEILLANCE TEST, LABORATORY TEST)
  - OPERATING EXPERIENCE
  - ENGINEERING JUDGEMENT

Figure 4 *(Holahan)*

FOLLOWUP ACTIONS BASED ON OPERABILITY DETERMINATION

EQUIPMENT SPECIFIED IN TECHNICAL SPECIFICATIONS

IF DETERMINED TO BE OPERABLE, THEN:

1. OPERATION AUTHORIZED BY LICENSE AND
2. PROMPT CORRECTIVE ACTION OR 50.59 EVALUATION

IF DETERMINED TO BE INOPERABLE, THEN:

1. NORMALLY FOLLOW T/S ACTIONS OR
2. WHERE SAFETY ALLOWS OR DICTATES, EMERGENCY LICENSE AMENDMENT OR OTHER REGULATORY ACTION, AND
3. PROMPT CORRECTIVE ACTION OR 50.59 EVALUATION

EQUIPMENT NOT SPECIFIED IN TECH SPECIFICATIONS

IF DETERMINED TO BE OPERABLE, THEN:

1. CONTINUED OPERATION IS ACCEPTABLE AND
2. PROMPT CORRECTIVE ACTION OR 50.59 EVALUATION

IF DETERMINED TO BE INOPERABLE, THEN:

1. ASSESS REASONABLE ASSURANCE OF SAFETY AND
2. CONTINUE OR PLACE THE PLANT IN A SAFE CONDITION AND
3. PROMPT CORRECTIVE ACTION OR 50.59 EVALUATION

Figure 5 *(Holahan)*

ASSESSING REASONABLE ASSURANCE OF SAFETY
WITH INOPERABLE EQUIPMENT

CONSIDERATIONS:

- AVAILABILITY OF REDUNDANT OR BACKUP EQUIPMENT
- COMPENSATORY MEASURES
- SAFETY FUNCTIONS AND EVENTS PROTECTED AGAINST
- CONSERVATISM AND MARGIN
- PROBABILITY OF NEEDING THE SAFETY FUNCTION

Figure 6 *(Holahan)*

CORRECTIVE ACTION PLANS

- REPAIRS OR MODIFICATIONS
- ANALYSIS
- TEST
- 50.59 EVALUATION, LICENSE AMENDMENT OR OTHER REGULATORY ACTION
- SCHEDULE BASED ON SAFETY SIGNIFICANCE

Figure 7 *(Holahan)*

SUMMARY

- DEGRADED OR NONCONFORMING SAFETY EQUIPMENT MUST BE EVALUATED FOR SAFETY AND OPERABILITY
- OPERABILITY IS THE CAPABILITY TO PERFORM A SAFETY FUNCTION
- PROMPT CORRECTIVE ACTION OR 50.59 EVALUATION REQUIRED

Figure 8 *(Holahan)*

SESSION 4

REGULATORY ISSUES

NRC PREPAREDNESS FOR LICENSING

by

Dennis M. Crutchfield
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Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

For Presentation at the NRC
Regulatory Information Conference

The Mayflower Hotel
Washington, D.C.

April 18-20, 1989

READINESS OF THE NRC TO PROCESS FUTURE CP/OL APPLICATIONS

-LICENSING PROCESS

-RESOURCES FOR THE PROCESS

-GUIDANCE DOCUMENT UPDATE

-RESOURCES TO SATISFY DOE PROJECTIONS

-RESOURCES TO SATISFY EXPECTED APPLICATIONS

-ORGANIZATIONAL STRUCTURE

-CONCLUSIONS

Figure 1 *(Crutchfield)*

LICENSING PROCESS

-HISTORICAL PROCESS
- -2 STEP - CP/OL

-NEW CUSTOM PLANT SCENARIO
- -NEW ISSUES

-REACTIVATED PLANT SCENARIO
- -HOLD A VALID CP

-STANDARD PLANT ON PREAPPROVED SITE SCENARIO
- -EARLY SITE REVIEW
- -COMBINED CP/CONDITIONAL OL
- -OPERATIONAL AUTHORIZATION

Figure 2 *(Crutchfield)*

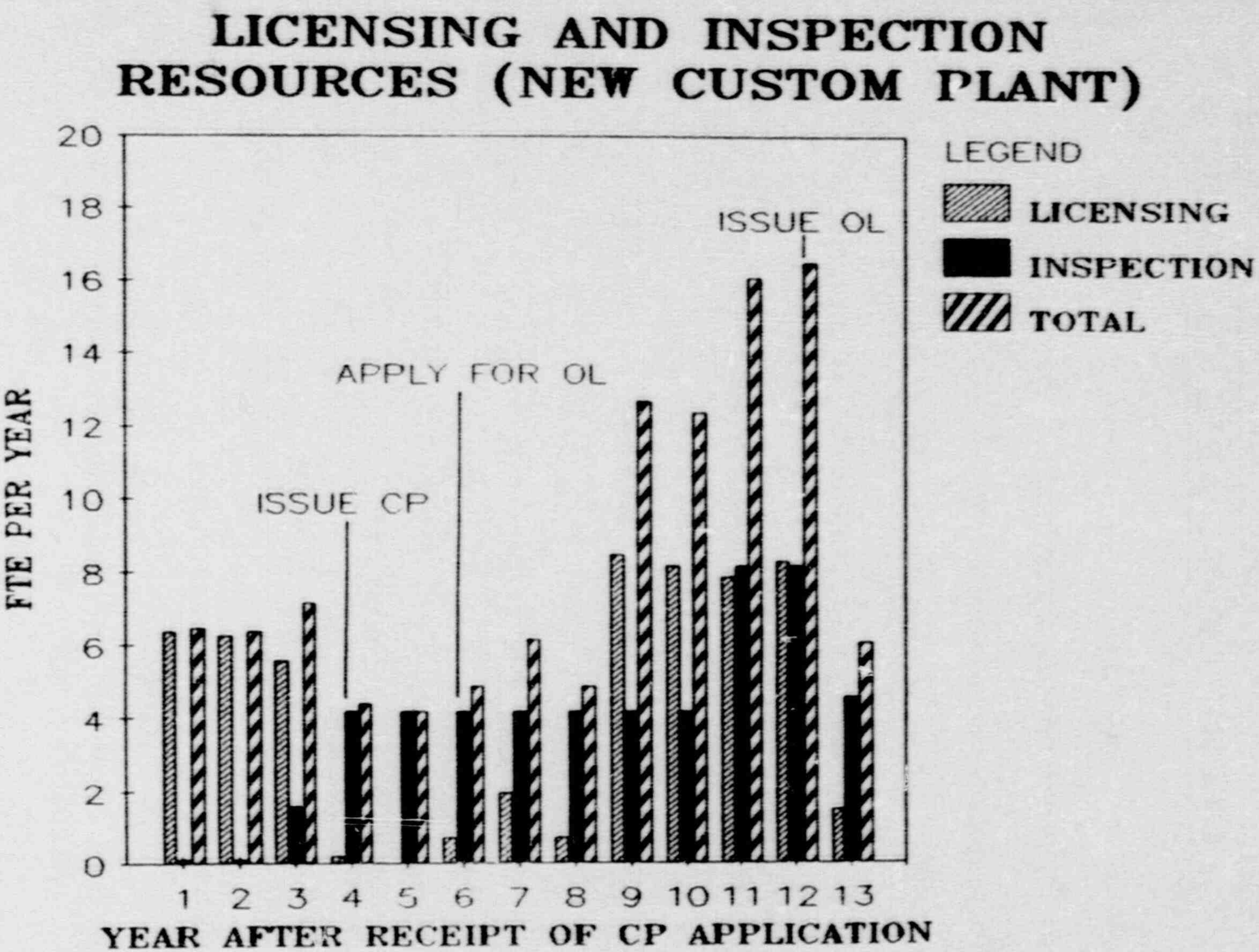


Figure 3 *(Crutchfield)*

RESOURCE PROJECTIONS

-BASE CASE PROFILE DEVELOPED

-RESOURCE PROJECTIONS FOR SELECTED SCENARIOS

SCENARIOS	(DURATION)	LICENSING	INSPECTION	TA	LEGAL	TOTAL
CUSTOM	(13 YEARS)	56	52	21	25	155
REACTIVATED W/ASLB+STAFF SER 40% COMPLETE	(6 YEARS)	16	35	9	10	70
REACTIVATED W/O ASLB+NO STAFF SER 70% COMPLETE	(5 YEARS)	34	32	15	13	94
STANDARD PRE-APPROVED SITE COMBINED CP/OL AUTHORIZATION TO OPERATE	 (3 YEARS) (2 YEARS) (8 YEARS)	43	52	13	18	126

Figure 4 *(Crutchfield)*

GUIDANCE DOCUMENTATION UPDATE

-INCORPORATE OPERATING EXPERIENCE AND ADD STABILITY

-ONLY UPDATE GUIDANCE DOCUMENTATION FOR AREAS NOT COVERED BY CERTIFICATION

-SITE SAFETY AND ENVIRONMENTAL

-RULE CHANGES

-CONSTRUCTION INSPECTION PROGRAM

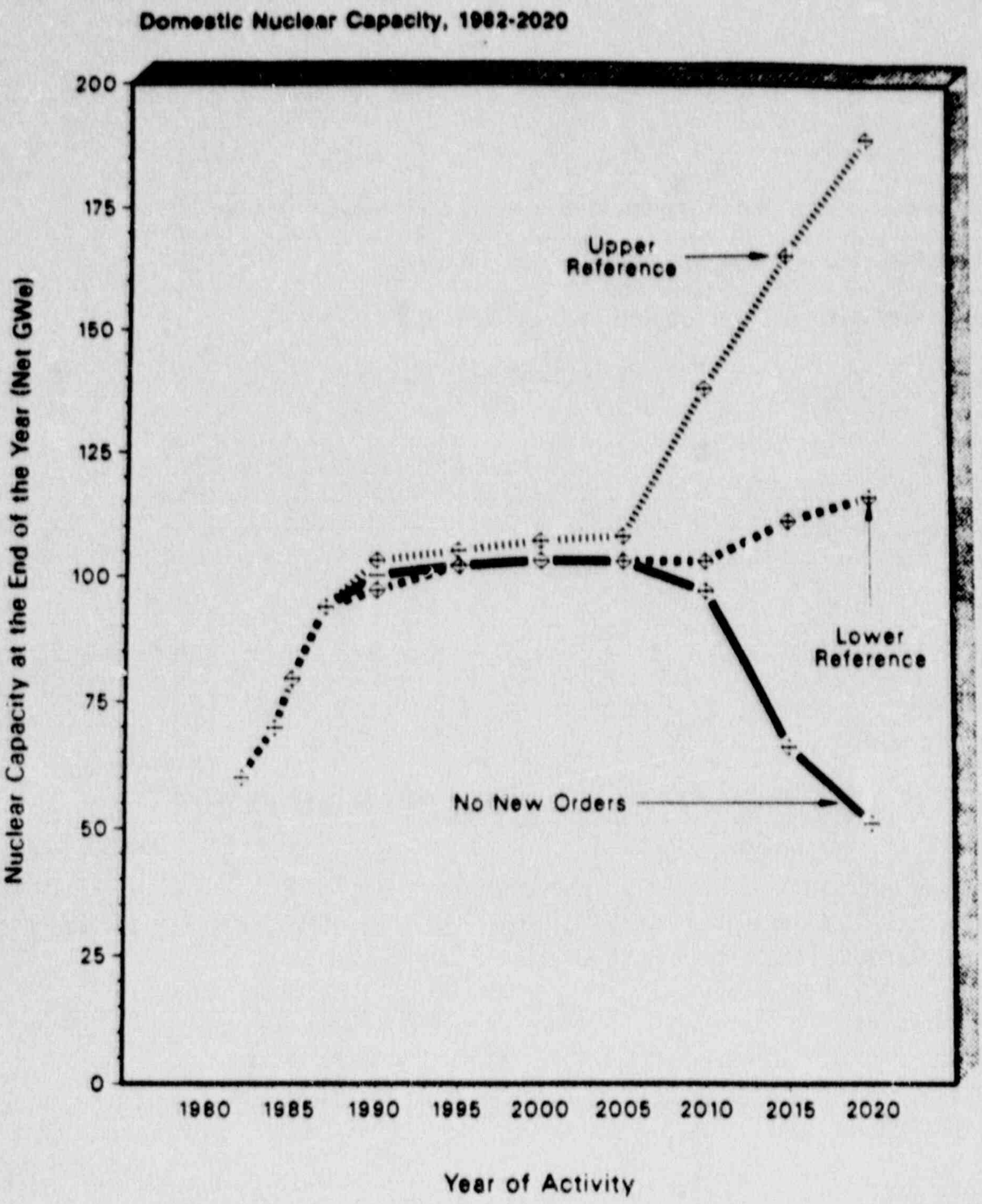
Figure 5 *(Crutchfield)*

DOE CAPACITY PROJECTIONS

-UPPER REFERENCE CASE
11 NEW AND 3 REACTIVATED PLANTS ON LINE BY 2007

-LOWER REFERENCE CASE
1 NEW PLANT ON LINE BY 2007

Figure 6 *(Crutchfield)*



Source See Table 8 and Energy Information Administration Monthly Energy Review January 1988 DOE EIA-0035(88 01) (Washington DC April 1988)

Figure 7 *(Crutchfield)*

NRC RESOURCES TO SATISFY EXPECTED APPLICATION

-LOGICAL TO ASSUME NO NEW APPLICATIONS IN NEAR FUTURE

-PRUDENT TO PLAN FOR ONE REACTIVATED PLANT

-PRUDENT TO PLAN TO UPDATE GUIDANCE

BUDGET RECOMMENDATION
FTE

	1991	1992	1993	1994	1995
REACTIVATED PLANT	12.7	16.0	23.5	27.5	14.4
UPDATE GUIDANCE	--	--	9.5	9.5	--

Figure 8 *(Crutchfield)*

ORGANIZATIONAL STRUCTURE

PROJECTS
-PM SHOULD REPORT TO A/D FOR ONE OR TWO NEW APPLICATIONS
-FOR MORE THAN TWO ESTABLISH A NEW PD

TECHNICAL
-EXISTING ORGANIZATION GENERALLY SATISFACTORY
-SITING AND ENVIRONMENTAL SPECIALISTS BRANCH
-ANTITRUST

REGIONAL
-ASSIGN ADDED CONSTRUCTION AND RESIDENT INSPECTORS
TO EXISTING REGIONAL STRUCTURE

Figure 9 *(Crutchfield)*

CONCLUSIONS

- USE EITHER PART 50 (TWO STEP) OR PROPOSED PART 52 PROCESS FOR REVIEWS.

- PLAN TO UPDATE SITING, ENVIRONMENTAL AND CONSTRUCTION INSPECTION GUIDANCE.

- NO MAJOR ORGANIZATION CHANGES NEED TO BE MADE.

- INCLUDE RESOURCES IN 1991 AND OUT YEAR BUDGETS.

Figure 10 *(Crutchfield)*

PLANS FOR LICENSE RENEWALS

by

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For Presentation at the NRC
Regulatory Information Conference

The Mayflower Hotel
Washington, D.C.

April 18-20, 1989

ORDER OF PRESENTATION

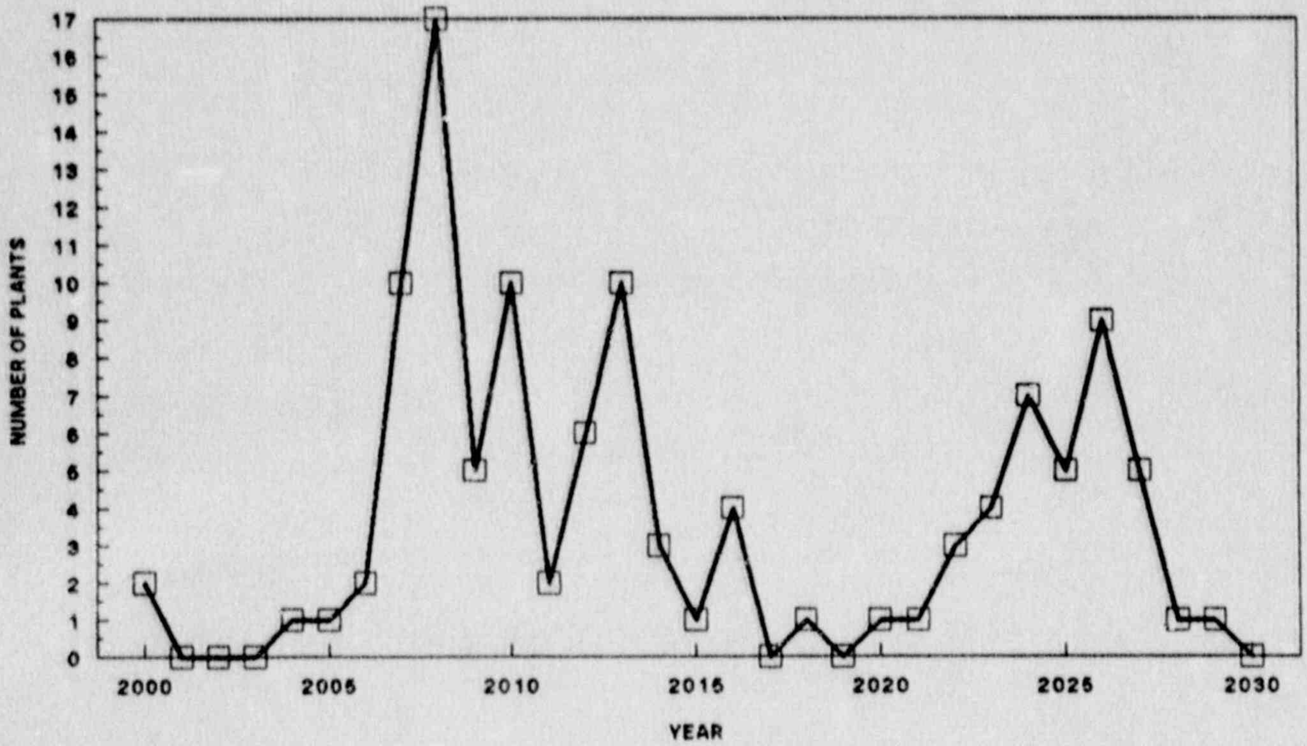
- Introduction
- Current and planned activities
- Regulatory approach and positions--preliminary considerations

Figure 1 *(Thomas)*

INTRODUCTION

- 112 plants currently provide 20 percent of nation's power
- Operating licenses expire beginning in 2000; 43 percent expire by end of 2010
- Timely renewal essential to ensuring adequate energy supply during first half of 21st century
- Steps need to be taken promptly to ensure license continuity and public safety

Figure 2 *(Thomas)*



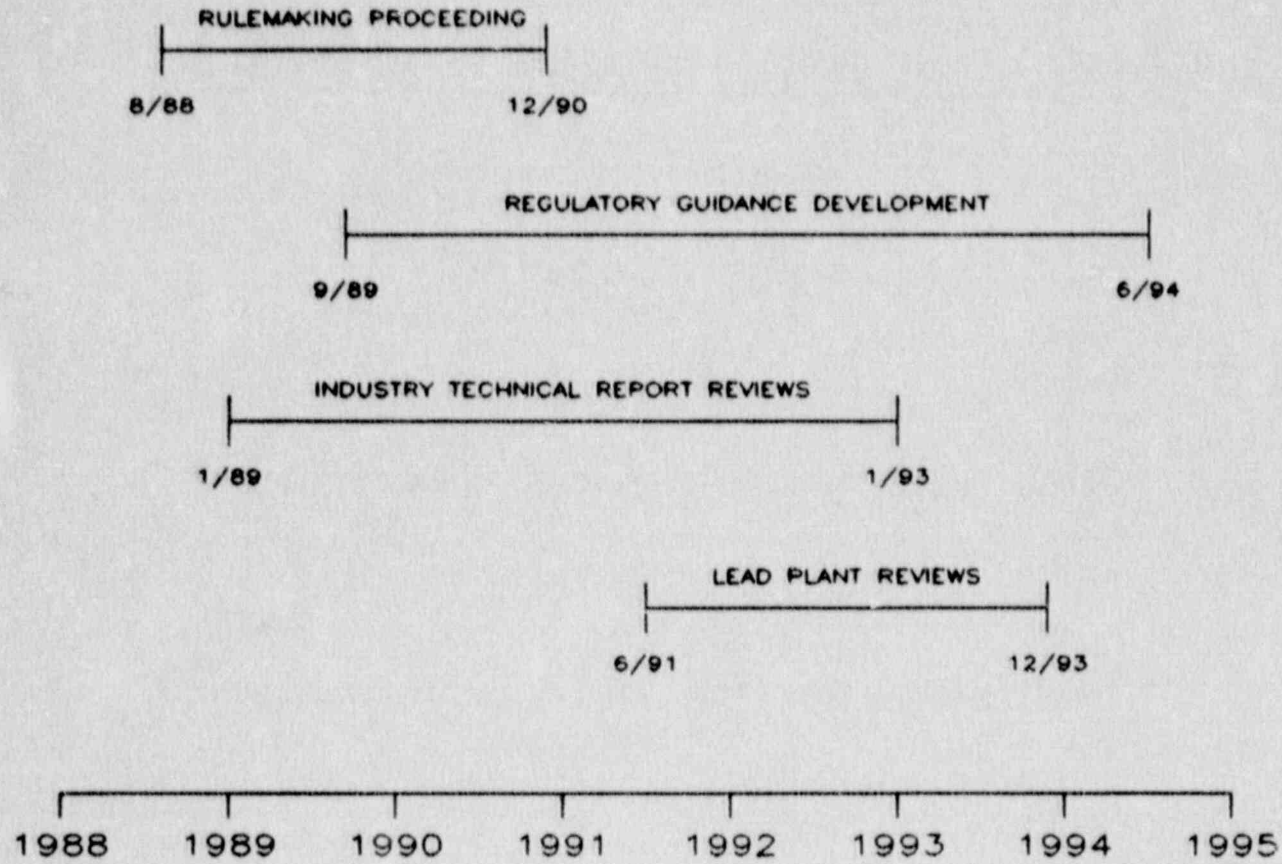
OPERATING LICENSE EXPIRATION DATE DISTRIBUTION

Figure 3 *(Thomas)*

CURRENT AND PLANNED ACTIVITIES

- Rulemaking proceeding
- Regulatory guidance development
- Industry technical report reviews
- Lead plant reviews

Figure 4 *(Thomas)*



LICENSE RENEWAL PROGRAM ACTIVITIES

Figure 5 *(Thomas)*

REGULATORY APPROACH--PRELIMINARY CONSIDERATIONS

- Current level of safety for each plant acceptable for license renewal

- Current level of safety must be maintained throughout renewal period

- Limited number of issues need to be considered for license renewal

Figure 6 *(Thomas)*

REGULATORY POSITIONS--PRELIMINARY CONSIDERATIONS

- Supersession-type license, 20-year maximum renewal term, additional renewals if technically justified

- Applications accepted between 20 and 5 years prior to current license expiration date

- Operation beyond current license expiration date would require "no undue risk" finding

- Opportunity for public participation through rulemaking and plant-specific adjudicatory hearings

- Considering requiring PRA to identify risk-significant components and systems

- Licensing basis consists of current licensing basis with modifications to assure maintenance of level of safety

- Existing exemptions expire, reconsider technical bases for any sought for renewal period

- Backfit rule would not apply to rule requirements; would apply after renewal

- Need environmental statement(s)/assessment(s) to support rulemaking and plant-specific renewal actions

Figure 7 *(Thomas)*

PRIORITIZATION AND CATEGORIZATION OF LICENSING ACTIONS

by

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U.S. Nuclear Regulatory Commission

For Presentation at the NRC
Regulatory Information Conference

The Mayflower Hotel
Washington, D.C.

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PURPOSE AND GOALS

- More Effective Management of Technical Resources
- Formalize Management Programs for NRC Resources
- To Focus Impact of New Initiatives on Existing Resources

Figure 1 *(Varga)*

INTERNAL NRC PROCEDURES

Categorization Procedure
Effective September 1987

Prioritization Procedure
Effective April 1988

Figure 2 *(Varga)*

CATEGORIZATION PROCEDURE

- Initially Aimed at Amendments but Process Being Applied to Other Areas as Well
- Goal To Shift Technical Review To NRC Project Management Staff
- Currently, Approximately 60% of Incoming Amendments Are Processed Entirely By The Projects Staff

Figure 3 *(Varga)*

CATEGORY I - REJECTION

- AMENDMENT APPLICATION INADEQUATELY JUSTIFIED

  - INADEQUATE SIGNIFICANT HAZARDS CONSIDERATION

  - INADEQUATE DESCRIPTION OF THE LICENSING BASIS AND THE REASON FOR THE CHANGE

  - INADEQUATE SAFETY ANALYSIS TO JUSTIFY THE CHANGE

- NOT A REQUEST FOR ADDITIONAL INFORMATION OR CLARIFICATION OF A SUBTLE PORTION OF THE APPLICATION

- RETURNED TO LICENSEE

  - FOR NRC INITIATED EVENTS, SCHEDULE FOR RESUBMITTAL. NRC MAY CONSIDER ORDERS TO RESOLVE GENERIC CONCERNS ON A PLANT LEVEL.

  - FOR LICENSEE INITIATIVES, MAY SCHEDULE RESUBMITTAL (TYPICALLY WITHIN 60 DAYS), MAY WITHDRAW OR MAY BE DENIED BY NRC. LICENSEE MAY SUBMIT NEW SUBMITTAL AT ANY TIME DEFICIENCIES ARE CORRECTED.

- SHOULD MINIMIZE CATEGORY I AMENDMENT APPLICATIONS

Figure 4 *(Varga)*

CATEGORY II
PM REVIEW

- VERY DEPENDENT ON LICENSEE'S APPLICATION
- ADVANTAGES
  - GENERALLY SAVES TIME ON THE ENTIRE NRC REVIEW PROCESS
  - ALLOWS TECHNICAL STAFF TO CONCENTRATE ON MORE DIFFICULT ISSUES

Figure 5 *(Varga)*

CATEGORY III
TECHNICAL STAFF REVIEW

- GENERALLY INVOLVES MORE COMPLEX OR BASIC POLICY ISSUES
- REVIEW SCHEDULE STRONGLY DRIVEN BY PRIORITY ASSIGNED

Figure 6 *(Varga)*

PRIORITIZATION PROCEDURE

- UNIFORM PRIORITY RANKING SCHEME USED BY NRR

- ESTABLISHES SCHEDULES AND STAFF ASSIGNMENTS

- PRIORITIES BASED UPON

  - SAFETY SIGNIFICANCE
  - COMMISSION STATUTORY RESPONSIBILITIES
  - OPERATIONAL IMPACT

- SOMEWHAT FLEXIBLE

  - PRIORITIES CAN BE CHANGED ON A TOPIC OR PLANT BASIS
  - REQUIRES DISCIPLINE TO MAINTAIN AS A VIABLE PROGRAM

- FOUR LEVELS OF PRIORITY
  - PRIORITY 1
  - PRIORITY 2
  - PRIORITY 3
  - PRIORITY 4

Figure 7 *(Varga)*

PRIORITY 1

- SIGNIFICANT SAFETY CONCERNS OR VERY HIGH RISK SIGNIFICANT EVENTS REQUIRING IMMEDIATE ACTION

- EMERGENCY OR EXIGENT REQUESTS AS DEFINED BY 10 CFR 50.91

- IMMEDIATE ACTION NEEDED FOR COMPLIANCE WITH STATUTORY AND JUDICIAL REQUIREMENTS OR COMMISSION DIRECTIVES

Figure 8 *(Varga)*

PRIORITY 2

- Significant Safety Issues Requiring Near-Term Staff Evaluation
- Determining Safety Significance/ Generic Significance of an Operating Event
- Needed to Support Continued Plant Operation or Enhancement of Plant Operation
- Plant-Specific Resolution of Very Significant Generic Topics
- Topical Report Reviews Which Will Have Extensive Application in the Short-to-Mid Term
- Licensing Reviews Where SER Preparation is Needed Within 6 Months to Prevent Impact on CP or OL Issuance

Figure 9 *(Varga)*

PRIORITY 3

- Important Issues (Potentially of Moderate Safety Significance) Requiring Staff Action Over the Long Term
- Support for Generic Issue Resolution and Multiplant Actions
- Topical Report Reviews with Wide Accountability in the Short-to-Mid Term Which Offers an Operational or Economic Benefit
- Technical Specification Changes Not Needed to Correct a Safety Problem, Support Continued Plant Operation, or Prevent Derate
- Long-Term License Reviews

Figure 10 *(Varga)*

PRIORITY 4

- ISSUES NOT DIRECTLY IMPACTING PLANT SAFETY
- ADMINISTRATIVE TECHNICAL SPECIFICATION CHANGES
- TOPICAL REPORT REVIEWS WITH LIMITED APPLICATION OR SAFETY BENEFIT
- GENERIC OR CONFIRMATORY ITEMS WITH RELATIVELY LOW SAFETY IMPACT

Figure 11 *(Varga)*

PROBLEMS

- LARGE NUMBER OF PRIORITY 3 AND 4 ISSUES
- SOME PRIORITY 4 ISSUES ESSENTIALLY HAVE AN INDEFINITE SCHEDULE (I.E., CONSTANTLY BUMPED BY HIGHER PRIORITY EFFORTS)

Figure 12 *(Varga)*

NRC GOALS ON ACTIVE LICENSING ACTION INVENTORY

- AN AVERAGE OF 20 OR LESS ACTIVE LICENSING ACTIONS PER PLANT
- AGE DISTRIBUTION
  - 80% OF ACTIVE LICENSING ACTIONS ARE LESS THAN 1 YEAR
  - 95% OF ACTIVE LICENSING ACTIONS ARE LESS THAN 2 YEARS
  - 100% OF ACTIVE LICENSING ACTIONS ARE LESS THAN 3 YEARS
- GOALS ARE ACHIEVABLE
  - REQUIRES COOPERATION FROM LICENSEES

Figure 13 *(Varga)*

POTENTIAL SOLUTIONS TO LARGE NUMBER OF LOWER PRIORITY ITEMS

- Where Feasible, Narrowly Define the Scope and Depth of Review for Low Priority Applications
- Increasing the Priority as the Issue Reaches Selected Ages. At a Minimum, Increasing Management Attention as the Issue Ages
- Requesting Voluntary Withdrawal by the Licensee
- Rejection of the Application Based on Low Significance and High Impact on Staff Resources

Figure 14 *(Varga)*

LICENSEE PARTICIPATION

- Recognize the Priority System and Limit Independent Priority 4 Issues Submitted for Review
- Communicate with Assigned NRR Project Manager the Licensee's Own Priority for an Amendment and the Reasons Behind that Priority
- Submit Detailed Submittals Which Can Readily be Classified as Category II, PM Review

Figure 15 *(Varga)*

IMPROVED TECHNICAL SPECIFICATIONS

by

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For Presentation at the NRC
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TECHNICAL SPECIFICATIONS IMPROVEMENT

— FOCUS ON SAFETY —

Figure 1 *(Butcher)*

PROGRAM GOALS

- IMPROVE OPERATIONAL SAFETY BY
  - Reducing The Size And Complexity Of Tech Specs
  - Making Tech Specs More Understandable To Operations Personnel
  - Making Improvements To Specific Technical Requirements
  - Reducing Operational Transients
- PROVIDE A CLEARER LINK BETWEEN TECHNICAL REQUIREMENTS AND THEIR SAFETY SIGNIFICANCE
  - Improve Operators And Plant Staff Focus On The More Risk Significant Requirements
  - Assure Proper Unambiguous Interpretations Of Tech Specs
  - Facilitate Improvements In Training

Figure 2 *(Butcher)*

POLICY STATEMENT

- PURPOSE & SCOPE OF TECH SPECS DEFINED
- THREE SELECTION CRITERIA ESTABLISHED
- RISK CONSIDERATIONS
- NEW STS TO BE DEVELOPED BY OWNERS GROUPS
- VOLUNTARY PARTICIPATION

Figure 3 *(Butcher)*

PURPOSE

The Purpose Of Technical Specifications Is To Impose Rigid Conditions Or Limitations Upon Reactor Operation Necessary To Obviate The Possibility Of An Abnormal Situation Or Event Giving Rise To An Immediate Threat To Public Health And Safety.

CRITERIA

1. *Installed Instrumentation That Is Used To Detect, And Indicate In The Control Room, A Significant Abnormal Degradation Of The Reactor Coolant Pressure Boundary Or,*

2. *A Process Variable That Is An Initial Condition Of A Design Basis Accident Or Transient Analysis That Either Assumes The Failure Of Or Presents A Challenge To The Integrity Of A Fission Product Barrier Or,*

3. *A Structure, System Or Component That Is Part Of A The Primary Success Path And Which Functions Or Actuates To Mitigate A Design Basis Accident Or Transient That Either Assumes The Failure Of Or Presents A Challenge To The Integrity Of A Fission Product Barrier.*

Figure 4 *(Butcher)*

IMPLEMENTATION OF THE INTERIM POLICY STATEMENT

THE PROGRAM WILL IMPLEMENT THE COMMISSION'S POLICY STATEMENT THRU:

I. DEVELOPMENT OF NEW STS

II. A PARALLEL PROGRAM OF SPECIFIC LINE ITEM IMPROVEMENTS TO TECHNICAL SPECIFICATIONS

III. OTHER ACTIVITIES NECESSARY TO FULLY IMPLEMENT THE POLICY STATEMENT

Figure 5 *(Butcher)*

I. NEW STS DEVELOPMENT

- *COMPLETED ACTIVITIES*

— *NRC Staff Reviewed Model Specifications And Supporting Documentation For Two Owners Groups*	*Mid 87*
— *Key Implementation Issues Addressed*	*Jan 88*
— *STS "Split" Report Issued*	*May 88*
— *Meetings With NUMARC To Discuss Draft Chapters Of New STS*	*Late 88*

- *ONGOING/PLANNED ACTIVITIES*

— *Industry Completes Rewrite Of New STS*	*Early 89*
— *Staff Completes Reviews Of New STS And Begins Review Of Lead Plant Submittals*	*Late 89—Early 90*
— *Staff Visits Lead Plants*	*Late 89*
— *Issue Final Policy Statement*	*Late 89*
— *Additional Conversions To New STS*	*Late 90*

Figure 6 *(Butcher)*

II. PARALLEL PROGRAM FOR LINE ITEM IMPROVEMENTS

- *COMPLETED ACTIVITIES*
  - *Revision Of The STS General Requirements 3.0/4.0*
  - *Relocation Of Organization Charts*
  - *Eight Vendor Owners Groups' Topical Reports Extending RPS/ESFAS STI's And AOT's*
  - *Removal Of Fire Protection System TS*
  - *Relocation Of Cycle–Specific Parameter Limits*
  - *Relocation Of Radiological Effluent TS*
- *ONGOING/PLANNED ACTIVITIES*
  - *Removal Of 3.25 Limit On Extending Refueling Outage Surveillances*
  - *Reduced Testing At Power Program*
  - *Extension Of RPS/ESFAS STI's For CE Plants*

Figure 7 *(Butcher)*

III. OTHER ACTIVITIES

- GUIDELINES FOR CONDUCTING 10 CFR 50.59 REVIEWS
- RISK-BASED TECHNICAL SPECIFICATIONS

Figure 8 *(Butcher)*

OVERALL PROGRAM IMPACT ON SAFETY AND RESOURCE REQUIREMENTS

- IMPROVE OPERATIONAL SAFETY
- MORE RELIABLE AND EFFICIENT PLANT OPERATION
- RESOURCE SAVINGS TO BOTH NRC AND INDUSTRY

Figure 9 *(Butcher)*

CONDUCTING CHANGES, TESTS, AND EXPERIMENTS WITHOUT PRIOR NRC APPROVAL

by

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and

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10 CFR 50.59

- PURPOSE
- PROBLEM
- COURSE FOR RESOLUTION

Figure 1 *(Virgilio)*

10 CFR 50.59(2)

"A PROPOSED CHANGE, TEST, OR EXPERIMENT SHALL BE DEEMED TO INVOLVE AN UNREVIEWED SAFETY QUESTION (i) IF THE PROBABILITY OF OCCURRENCE OR THE CONSEQUENCES OF AN ACCIDENT OR MALFUNCTION OF EQUIPMENT IMPORTANT TO SAFETY PREVIOUSLY EVALUATED IN THE SAFETY ANALYSIS REPORT MAY BE INCREASED OR (ii) IF A POSSIBILITY FOR AN ACCIDENT OR MALFUNCTION OF A DIFFERENT TYPE THAN ANY EVALUATED PREVIOUSLY IN THE SAFETY ANALYSIS REPORT MAY BE CREATED; OR (iii) IF THE MARGIN OF SAFETY AS DEFINED IN THE BASIS FOR ANY TECHNICAL SPECIFICATION IS REDUCED."

Figure 2 *(Virgilio)*

ISSUE # 1 - INCREASE IN PROBABILITY

- INDUSTRY PROPOSAL

I. ANSI 18.2 - 1973

NORMAL OPERATION
INCIDENTS OF MODERATE FREQUENCY
INFREQUENT INCIDENTS
LIMITING FAULTS

MODIFICATIONS RESULTING IN A CHANGE FROM A LESSER FREQUENCY CLASS TO A MORE FREQUENT CLASS ARE EXAMPLES OF CHANGES THAT INCREASE THE PROBABILITY OF OCCURRENCE.

II. ACCIDENTS ARE THE ANTICIPATED OPERATIONAL TRANSIENTS AND POSTULATED DESIGN-BASIS ACCIDENTS THAT ARE ANALYZED IN THE LICENSING PROCESS.

- NRC CONCERN

I. METHODOLOGY WOULD ALLOW INCREASES IN PROBABILITY AND RISK

II. DEFINITION OF ACCIDENTS IS TOO PAROCHIAL

Figure 3 *(Virgilio)*

ISSUE #2 - INCREASE IN CONSEQUENCES

- INDUSTRY PROPOSAL

  CONSEQUENCE (DOSE) MAY INCREASE UP TO REGULATORY LIMITS DEFINED IN NRC'S STANDARD REVIEW PLAN (NUREG-0800) AND SELECT PORTIONS OF THE CODE OF FEDERAL REGULATIONS.

- NRC CONCERN

  PROPOSED APPROACH WOULD ALLOW INCREASES IN CONSEQUENCE AND RISK.

Figure 4 *(Virgilio)*

ISSUE #3 - REDUCTION IN MARGIN

- INDUSTRY PROPOSAL

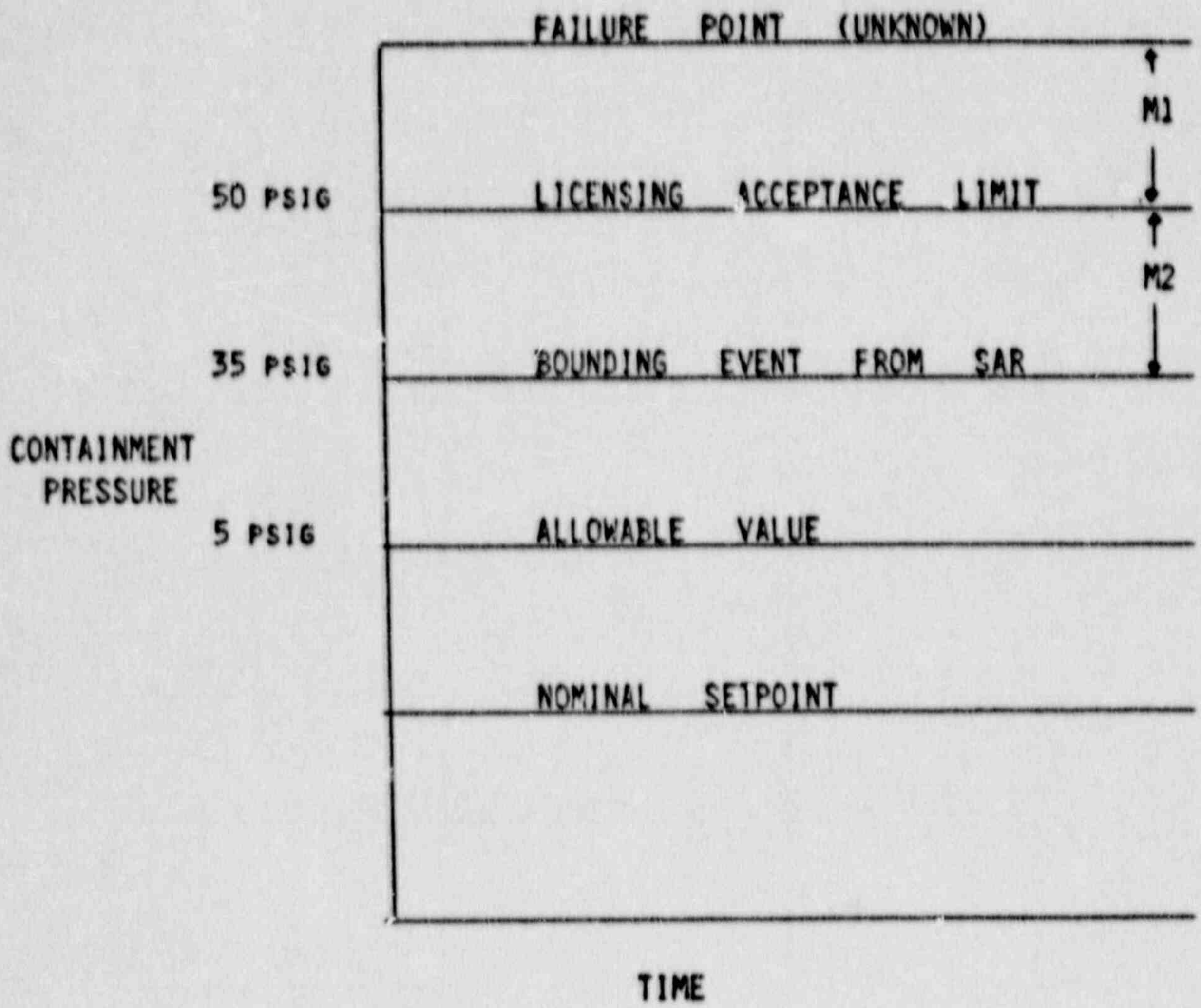
  DECREASES IN MARGIN BETWEEN THE LICENSING BASIS ACCEPTANCE LIMIT AND THE FAILURE POINT CONSTITUTE A REDUCTION IN MARGIN.

- NRC CONCERN

  DECREASES IN MARGIN OF SAFETY WITHIN THE LICENSING BASIS ACCEPTANCE LIMIT ARE NOT CONSIDERED. PROPOSAL WOULD ALLOW REDUCTION IN MARGINS.

Figure 5 *(Virgilio)*

MARGIN CASE #1

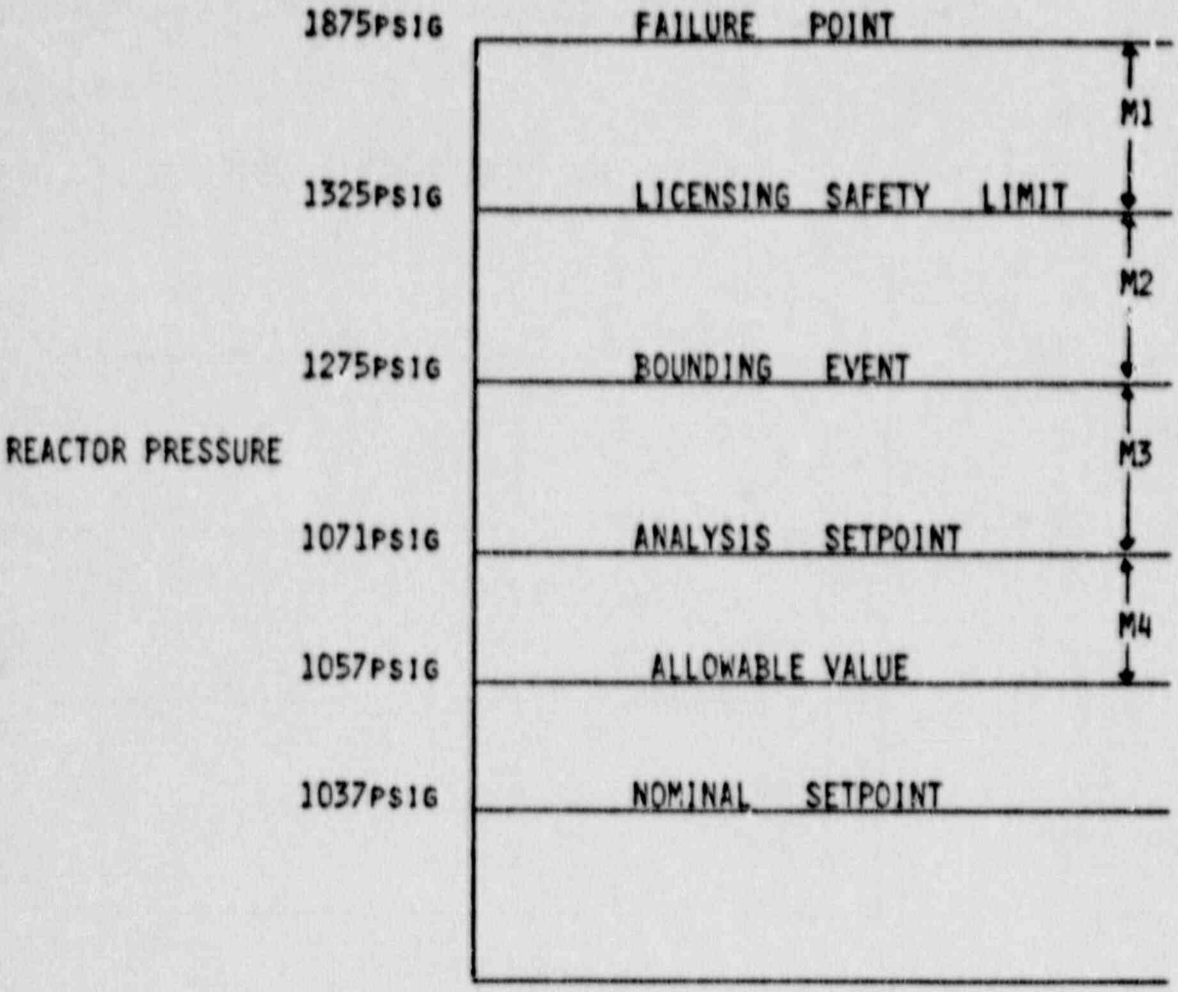


MARGIN 1 = MARGIN TO FAILURE POINT

MARGIN 2 = MARGIN TO LICENSING ACCEPTANCE LIMIT

Figure 6 *(Virgilio)*

MARGIN CASE #2



MARGIN 1 = MARGIN TO FAILURE
MARGIN 2 = MARGIN TO LICENSING SAFETY LIMIT
MARGIN 3 = ANALYSIS RESULTS INCLUDING MARGIN FOR MODELING UNCERTAINTIES
MARGIN 4 = COMBINED INSTRUMENT ERROR ALLOWANCES INCLUDING MARGIN FOR MAXIMUM POSSIBLE SETPOINT

Figure 7 *(Virgilio)*

SUMMARY

- REVISED DOCUMENTS PROVIDE IMPROVED GUIDANCE IN SEVERAL AREAS
- CERTAIN AREAS PROPOSAL WOULD ALLOW LICENSEES TO MAKE DECISIONS ABOUT REGULATORY COMPLIANCE RATHER THAN PRESERVING THE LICENSING BASES OF THE PLANT.
- WHILE FINAL DRAFT GUIDELINES OFFER SOME BENEFIT, ADDITIONAL WORK IS NECESSARY.

Figure 8 *(Virgilio)*

SESSION 5

NRC INSPECTION EXPERIENCE

NRC INSPECTION EXPERIENCE

Chairman

Frank P. Gillespie, Director
Program Management, Policy Development and Analysis Staff
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

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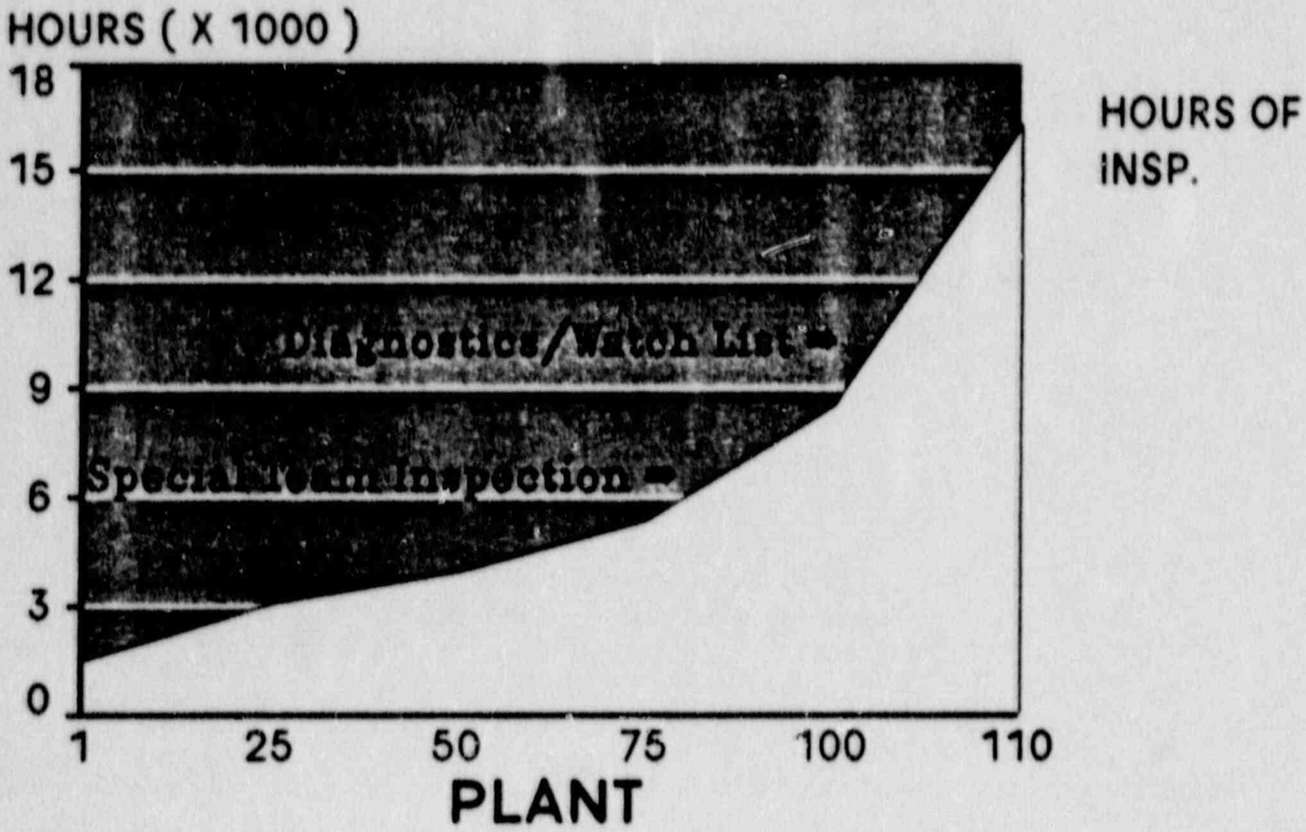

TOTAL OPERATING REACTOR INSPECTIONS BY PLANT

Figure 1 *(Gillespie)*

NRC INSPECTION PLAN

by

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OPERATING REACTOR INSPECTION PROGRAM

PURPOSE: TO OBTAIN INFORMATION THROUGH DIRECT OBSERVATION TO DETERMINE:

➡ WHETHER THE PLANT IS BEING OPERATED SAFELY

➡ WHETHER LICENSEE'S MANAGEMENT CONTROL PROGRAM IS EFFECTIVE

GATHERS INFORMATION TO SUPPORT THE SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE (SALP)

Figure 1 *(Hebdon)*

ELEMENTS OF THE REACTOR INSPECTION PROGRAM

FUNDAMENTAL INSPECTION PROGRAM

- CORE INSPECTION PROGRAM
- MANDATORY TEAM INSPECTIONS

REGIONAL INITIATIVES AND REACTIVE INSPECTIONS

SPECIAL TEAM INSPECTION PROGRAM

SAFETY ISSUES PROGRAM

Figure 2 *(Hebdon)*

FUNDAMENTAL INSPECTION PROGRAM

CORE INSPECTION PROGRAM

- ✓ SELECTED SET OF INSPECTION PROCEDURES
- ✓ CORE INSPECTION PROGRAM IS DONE AT EVERY SITE
- ✓ INCLUDES A LARGE PORTION OF THE RESIDENT INSPECTOR'S TIME

MANDATORY TEAM INSPECTION

- ✓ DONE AT EVERY SITE ON A BIENNIAL CYCLE
- ✓ AREA OF EMPHASIS SELECTED FOR EACH BIENNIAL CYCLE
- ✓ CURRENT AREA OF EMPHASIS IS MAINTENANCE

Figure 3 *(Hebdon)*

REGIONAL INITIATIVES AND REACTIVE INSPECTION

MOST PLANTS WILL RECEIVE SOME REGIONAL INITIATIVE INSPECTION

RESOURCES ARE ALLOCATED AND FOCUSED BASED ON PLANT PERFORMANCE

REGIONAL INITIATIVES ARE PLANNED INSPECTIONS BASED ON PLANT PERFORMANCE (E.G., FINDINGS FROM OTHER INSPECTIONS)

REACTIVE INSPECTIONS ARE UNPLANNED INSPECTIONS BASED ON OPERATIONAL EVENTS AND EMERGING SAFETY CONCERNS

Figure 4 *(Hebdon)*

SPECIALIZED TEAM INSPECTIONS

SPECIAL SET OF TEAM INSPECTIONS WHICH ARE STRUCTURED TO ADDRESS SPECIFIC CONCERNS

EXAMPLES:

- SAFETY SYSTEM FUNCTIONAL INSPECTION (SSFI)
- SAFETY SYSTEM OUTAGE MODIFICATION INSPECTION (SSOMI)
- OPERATIONAL SAFETY TEAM INSPECTION (OSTI)

Figure 5 *(Hebdon)*

SAFETY ISSUE PROGRAM

ONE-TIME INSPECTIONS TO ADDRESS SPECIFIC SAFETY ISSUES OR CONCERNS

EXAMPLES:

- EMERGENCY OPERATING PROCEDURE INSPECTIONS
- BWR POWER OSCILLATIONS (BULLETIN 88-07)
- RECEIPT, STORAGE, AND HANDLING OF DIESEL FUEL OIL

INSPECTION REQUIREMENTS ARE DEFINED IN A TEMPORARY INSTRUCTION (TI)

Figure 6 *(Hebdon)*

RELATED INSPECTION PROGRAM ACTIVITIES

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE (SALP)

- THE INSPECTION PROGRAM FEEDS AND IS CONTROLLED BY SALP

MASTER INSPECTION PLAN (MIP)

- A MIP IS PREPARED FOR EACH SITE BASED ON THE SALP RESULTS
- THE MIP FOR EACH SITE IS UPDATED QUARTERLY AS PERCEPTIONS ABOUT PLANT PERFORMANCE CHANGE

PROBABILISTIC RISK ASSESMENT (PRA)

- PRA RESULTS ARE USED TO FOCUS INSPECTION ACTIVITIES ON THE MOST SAFETY SIGNIFICANT ISSUES, SYSTEMS, COMPONENTS, ETC.

Figure 7 *(Hebdon)*

INTEGRATION OF INSPECTION FINDINGS

by

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INSPECTION

INSPECTION TYPE	TYPICAL EFFORT MAN HOURS (DIRECT INSPECTION)	CHARACTERISTICS
REGION-BASED SPECIALIST	25 TO 30 MAN HOURS	HIGHLY SPECIALIZED FOCUSED - INDEPTH LIMITED PERSPECTIVE COMPLETED IN ONE WEEK PERIOD
RESIDENT INSPECTOR	80 TC 160 MAN HOURS	MORE GENERALIZED COVERS ALL PLANT OPERATIONS MORE BREADTH ONE MONTH DURATION
REGIONAL TEAM	300 TO 600 MAN HOURS	MULTI-DISCIPLINED FOCUSED OBJECTIVE IN A BROAD FUNCTION INTERFACE REVIEW
PROGRAM TEAM	90 - 1500 MAN HOURS	MULTI-DISCIPLINED SYSTEM OR DISCIPLINE ORIENTED SCOPE IS BROADER INDEPTH AND BREADTH
SPECIAL TEAMS	AS REQUIRED	

Figure 1 *(Ebneter)*

"FINDINGS"

VIOLATION
DEVIATION
UNRESOLVED ITEM
OPEN ITEM
INSPECTOR FOLLOWUP ITEM

VULNERABILITY
INADEQUACY
DEFICIENCY

CONCERN
WEAKNESS
IMPROVEMENT ITEM
STRENGTH

Figure 2 *(Ebneter)*

FINDINGS

- **HARD**
  - QUANTITATIVE
  - SPECIFIC
  - COMPLIANCE STRUCTURED
- **SOFT**
  - QUALITATIVE
  - IMPRECISE
  - INDIRECT RELATION TO REGULATIONS

Figure 3 *(Ebneter)*

MANAGEMENT INTEGRATION

- LINE MANAGEMENT
- MIDDLE MANAGEMENT
- SENIOR MANAGEMENT

Figure 4 *(Ebneter)*

TIME INTEGRATION

- FOR A SPECIFIC SITE
  - ➡ SALP
  - ➡ ESCALATED ENFORCEMENT (SAFETY AND COMPLIANCE)
- GENERIC ISSUES
  - ✓ SAFETY
  - ✓ RULE CHANGE

Figure 5 *(Ebneter)*

ENFORCEMENT

- INTEGRATION - TIME
  - RECURRENT FINDINGS
  - SIMILARITY OF FINDINGS
- INTEGRATION - RELATED FACTORS
  - IDENTIFICATION
  - CORRECTIVE ACTION
  - PAST PERFORMANCE
  - PRIOR NOTICE
  - MULTIPLE OCCURRENCES

Figure 6 *(Ebneter)*

SALP INTEGRATION

- ✓ COMMITTEE
- ✓ SENIOR MANAGERS
- ✓ OBJECTIVE
- ✓ SUBJECTIVE

Figure 7 *(Ebneter)*

CRITERIA

ANALYSIS AREA	MGT INVOLVE	RESOLUTION OF ISSUES	RESPONSIVENESS	ENFORCEMENT	STAFFING	EVENTS R&A	TRAINING
OPERATIONS							
RAD CON							
MAINT/SURV							
EP							
SECURITY							
ENG'G/TS							
SAFETY/QUAL ASSESS/VER							

INTEGRATION VIA SALP

Figure 8 *(Ebneter)*

SALP HISTORY

(REACTORS IN OPERATION)

PLANT NAME:
REGION:

RPT	ASSMT. PERIOD	OPS	RADCON	MAINT	SURV	FP	EP	SEC	OUTG	QP	LIC	TRG
01/81	04/01/79 - 03/31/80	2	3	2	2	2	2	2	2	3	N	N
11/82	07/01/80 - 06/30/81	3	3	2	2	3	N	2	2	3	N	N
06/83	07/01/81 - 12/31/82	3	3	3	2	2	2	3	1	3	2	N
06/84	01/01/83 - 02/29/84	3	3	3	2	N	2	3	3	3	2	N
09/85	03/01/84 - 05/31/85	3	2	3	3	3	2	3	N	3	3	2

Figure 9 *(Ebneter)*

SPECIAL TEAM INSPECTIONS

by

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NRR SPECIAL INSPECTION BRANCH

- **3 TYPES OF TEAM INSPECTIONS**

  - OPERATIONAL SAFETY TEAM INSPECTION
  - SAFETY SYSTEM FUNCTIONAL INSPECTIONS
  - SAFETY SYSTEMS OUTAGE MODIFICATION INSPECTION

Figure 1 *(Haughney)*

OPERATIONAL SAFETY TEAM INSPECTION (OSTI)

- DIRECT OBSERVATION - CONTROL ROOM AND IN-PLANT
- ROUND-THE-CLOCK OR DEEP BACKSHIFT COVERAGE
- FOCUS ON OPERATIONS DEPARTMENT
- KEY SUPPORT INTERFACES:

  ✓ MAINTENANCE
  ✓ ENGINEERING
  ✓ QA

- 6-7 PERSON TEAM, 2 WEEKS ON-SITE

Figure 2 *(Haughney)*

SAFETY SYSTEMS FUNCTIONAL INSPECTION

- DEEP VERTICLE SLICE OF A SINGLE SAFETY SYSTEM
  - DESIGN, OPERATIONS, MAINTENANCE ADEQUACY
  - SUPPROT SYSTEMS DESIGN INTERFACES
  - TESTING, TRAINING, PROCEDURE ADEQUACY
  - CAN DETECT DEEPER-ROOTED PROBLEMS
- THROUGH LOOK AT ENGINEERING SUPPORT AND INTERFACES
- 8-12 PERSON TEAM FOR 2-3 WEEKS ON SITE

Figure 3 *(Haughney)*

SAFETY SYSTEMS OUTAGE MODIFICATIONS INSPECTION (SSOMI)

- MULTI-PHASED EXAMINATION OF OUTAGE ACTIVITIES
- MODIFICATION DESIGN ADEQUACY
- DIRECT OBSERVATION OF FIELD ACTIVITIES
  - ✓ CRAFT INSTALLING MODIFICATIONS
  - ✓ CRAFT PERFORMING MAINTENANCE
  - ✓ POST-INSTALLATION AND POST-MODIFICATION TESTING
- 2 OR 3 TEAMS OF 6-10 PERSONS, 2 WEEKS PER PHASE

Figure 4 *(Haughney)*

HOW DO YOU GET PICKED?

- **REGIONAL OFFICE REQUEST**
- **NRC LICENSING REQUESTS**
- **TEAMS LED BY NRR OR REGION**

Figure 5 *(Haughney)*

UTILITY - CONDUCTED SELF - ASSESSMENTS

- NRC ENCOURAGES THOROUGH, TECHNICAL SELF-ASSESSMENTS
- SAFETY RESOURCE LEVERAGE
- YOU CAN AND SHOULD UNCOVER LURKING SAFETY PROBLEMS

Figure 6 *(Haughney)*

SELF-ASSESSMENT EXCELLENCE

- TECHNICALLY SOUND ISSUES DEVELOPED AND RESOLVED

- TRAINING LEVERAGE FOR YOUR STAFFS

- CONTRIBUTING AND ROOT CAUSE DETERMINATION

  ➡ DEEP INSIGHT INTO REASONS FOR PROBLEMS
  ➡ DON'T MERELY CORRECT SYMPTOMS

- BOTTOM LINE - CORRECTIVE ACTION TO PREVENT RECURRENCE

Figure 7 *(Haughney)*

DIAGNOSTIC TEAM INSPECTIONS

by

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presented by

Stuart D. Rubin, Chief
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DIAGNOSTIC EVALUATION

* A BROAD-BASED INDEPENDENT EVALUATION OF SAFETY PERFORMANCE:
    * TECHNICAL
    * PROGRAMMATIC
    * MANAGEMENT
    * ORGANIZATIONAL

Figure 1 *(Spessard)*

SPECIAL FEATURES OF A DIAGNOSTIC EVALUATION

* EDO REQUESTS REVIEW
* EDO APPROVES TEAM AND PLAN
* SES TEAM MANAGER
* MEMBERS ARE INDEPENDENT
* MANAGEMENT CONSULTANTS USED
* COMPREHENSIVE PERFORMANCE EVALUATION
* PLANT AND CORPORATE
* MANAGEMENT AND ORGANIZATIONAL CULTURE ASSESSED
* INTERVIEWS USED EXTENSIVELY
* ROOT CAUSES EMPHASIZED
* NRC CONTRIBUTING CAUSES IDENTIFIED
* EDO TRANSMITS REPORT
* EDO ASSIGNS FOLLOWUP ACTIONS

Figure 2 *(Spessard)*

PLANT SELECTION

* DISCUSSION AT SENIOR MANAGERS MEETING
    * PI, SALP, SIMS, AIT DATA
    * MANAGERS' PERSPECTIVES
* SENIOR MANAGERS' RECOMMENDATIONS
* EDO SELECTS PLANTS

Figure 3 *(Spessard)*

TEAM PLANNING AND PREPARATIONS

* COLLECT AND REVIEW BACKGROUND INFORMATION
* REVIEW LICENSEE PERFORMANCE, IMPROVEMENT PROGRAMS AND NRC ACTIONS
* TAILOR TEAM COMPOSITION TO ASSESSMENT NEEDS
* CONDUCT TEAM BRIEFINGS
* SELECT A SYSTEM FOR EVALUATION
* PREPARE EVALUATION PLANS

Figure 4 *(Spessard)*

ONSITE EVALUATION SEQUENCE

* OBSERVE AND ASSESS SAFETY PERFORMANCE
* ASSESS THE QUALITY, IMPLEMENTATION OF PROGRAMS
* ASSESS MANAGEMENT AND ORGANIZATIONAL EFFECTIVENESS
* IDENTIFY CAUSES FOR PERFORMANCE PROBLEMS

Figure 5 *(Spessard)*

COMMUNICATION OF RESULTS

* SENIOR MANAGEMENT BRIEFINGS
* LICENSEE EXIT MEETING
* REPORT TRANSMITTAL TO LICENSEE
* ASSIGNMENT OF NRC FOLLOW UP ACTION

Figure 6 *(Spessard)*

COMPLETED DIAGNOSTIC EVALUATIONS

PLANT	UTILITY	REPORT DATE
DRESDEN	CECo	NOV 1987
MCGUIRE	DUKE	MAR 1988
FERMI	DECo	MAY 1988
TURKEY POINT*	FP&L	JUN 1988
PERRY	CEI	MAY 1989
BRUNSWICK	CP&L	JUN 1989**

* SPECIAL EVALUATION
** PROJECTED DATE

Figure 7 *(Spessard)*

ROOT CAUSES

- PLANT NEGLECTED IN FAVOR OF OTHER PRIORITIES
- FOSSIL PLANT ATTITUDE
- LACK OF CLEAR PERFORMANCE GOALS
- INEFFECTIVE PLANNING FOR OPERATIONS
- LACK OF OPERATING EXPERIENCE
- LACK OF ATTENTION TO HUMAN RELATIONS MATTERS
- CORPORATE MICROMANAGEMENT

Figure 8 *(Spessard)*

PERFORMANCE STRENGTHS/IMPROVEMENTS

- CORPORATE LEADERSHIP, OVERSIGHT AND INVOLVEMENT
- INTEGRATED PERFORMANCE PLANS
- STAFF TECHNICAL CAPABILITIES
- POSITIVE MANAGEMENT AND STAFF ATTITUDE TOWARD SAFETY
- MANAGERIAL AND ORGANIZATIONAL CHANGES
- PROGRAMS FOR IMPROVED ENGINEERING SUPPORT

Figure 9 *(Spessard)*

PERFORMANCE WEAKNESSES

- STRAINED RESOURCES
- ORGANIZATIONAL INSTABILITY
- COMMUNICATIONS PROBLEMS
- INEFFECTIVE ENGINEERING SUPPORT
- QA STAFF CAPABILITIES LIMITED
- UNRELIABLE EQUIPMENT
- INADEQUATE CHECK VALVE TESTING
- INADEQUATE MOV MAINTENANCE
- OPERATOR OVERTIME SAFETY ISSUE
- IST PROGRAM DEFICIENCIES
- POOR EQUIPMENT FAILURE ANALYSIS

Figure 10 *(Spessard)*

EDO STAFF ACTIONS

* GENERIC ACTIONS
  * APPROVE LICENSEE IST PROGRAMS
  * EVALUATE INDUSTRY RESPONSES TO CHECK VALVE FAILURES
  * EVALUATE FAILURES OF AUXILIARY FEEDWATER PUMPS
  * EVALUATE MOV MAINTENANCE PROGRAMS
* PLANT-SPECIFIC ACTIONS
  * HANDLED BY APPROPRIATE OFFICE/REGION

Figure 11 *(Spessard)*

CONCLUSIONS

* SUCCESS DEPENDS ON INTENSIVE PREPARATION, EXPERIENCED TEAM MEMBERS AND GOOD TEAM COMMUNICATIONS
* MANAGEMENT AND CULTURE EVALUATIONS ENHANCE ROOT CAUSE ASSESSMENT
* ROOT CAUSE DETERMINATIONS IMPROVE UNDERSTANDING OF PERFORMANCE PROBLEMS, LIKELIHOOD FOR IMPROVEMENT AND THE NEED FOR ADDITIONAL NRC ACTIONS
* DIAGNOSTIC EVALUATIONS GENERALLY HAVE CONFIRMED NRC SENIOR MANAGERS' PERFORMANCE PICUTRE THAT WAS BASED ON EXISTING SALP, PI
* EVALUATIONS HAVE BEEN WELL RECEIVED BY UTILITIES AND NRC MANAGEMENT

Figure 12 *(Spessard)*

RECONSTITUTION OF DESIGN BASES AND DESIGN DOCUMENTS

by

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WHAT ARE DESIGN DOCUMENTS?

DESIGN DOCUMENTS ARE THOSE DOCUMENTS TO WHICH ONE CAN REFER TO VERIFY THAT STRUCTURES, SYSTEMS, AND COMPONENTS HAVE BEEN DESIGNED TO PERFORM THEIR IDENTIFIED FUNCTION.

Figure 1 *(Imbro)*

WHY ARE DESIGN DOCUMENTS NECESSARY?

- FORM THE BASIS FOR FUTURE PLANT MODIFICATION
- QUANTIFY DESIGN MARGINS AND DEFINE OPERATING ENVELOPE
  - ✓ BASIS FOR 50.59 EVALUATIONS
- FORM A LIVING RECORD OF THE AS CONFIGURED PLANT
- PROVIDE A TECHNICAL BASIS FOR CONTINUED OPERATION (INCLUDING LIFE EXTENSION)

Figure 2 *(Imbro)*

RECONSTITUTION OF DESIGN BASES AND DESIGN DOCUMENTS

NRC TEAM INSPECTIONS (SSFI, SSOMI) HAVE IDENTIFIED THAT:

(1) MODIFICATIONS HAVE BEEN MADE WITHOUT SUFFICIENT ENGINEERING BASIS THAT HAVE COMPROMISED SAFETY SYSTEM FUNCTIONALITY.

(2) MISSING DESIGN DOCUMENTATION APPEARS TO BE A ROOT CAUSE OF THESE PROBLEMS

Figure 3 *(Imbro)*

ACTION PLAN

- PERFORM LIMITED INDUSTRY SURVEY BY VISITING UP TO 10 LICENSEES

- COLLECT INFORMATION

  - DESIGN DOCUMENT AVAILABILITY
  - CHANGE CONTROL PROCESS
  - INTERFACE BETWEEN ENGINEERING, MAINTENANCE, OPERATIONS, TRAINING, LICENSING, ETC.
  - UTILITY INITIATED DESIGN BASIS DOCUMENT RECONSTITUTION PROGRAMS

- ISSUE NUREG TO PROVIDE INFORMATION ON GOOD PRACTICE IN THE FOLLOWING AREAS:

  ✓ TYPES OF DESIGN DOCUMENTS THAT SHOULD BE CONTROLLED AND MAINTAINED AS CONFIGURED
  ✓ THE CIRCUMSTANCES AND TIMEFRAME THAT DOCUMENTS SHOULD BE RECREATED, IF AT ALL
  ✓ EVALUATION OF STRENGTHS AND WEAKNESS OF UTILITY INITIATED DESIGN BASIS DOCUMENT RECONSTITUTION PROGRAMS
  ✓ ADEQUACY OF CURRENT NRC REGS AND INDUSTRY STANDARDS IN ADDRESSING DESIGN CONTROL/CONFIGUARTION MANAGEMENT

Figure 4 *(Imbro)*

DESIGN AUTHORITY

AFTER THE O/L, THE OPERATING ORGANIZATION GENERALLY DRIVES MODIFICATIONS AND MAINTENANCE, HOWEVER, THE ENGINEERING ORGANIZATION SHOULD BE RESPONSIBLE FOR CONTROLLING THE PLANT DESIGN

Figure 5 *(Imbro)*

LEVEL OF DESIGN DOCUMENTATION

- SUFFICIENT DESIGN DOUMENTATION SHOULD BE AVAILABLE FOR FUTURE PLANT MODIFICATIONS TO SUPPORT THE FINAL AS-CONFIGURED DESIGN OF THE SYSTEM BEING MODIFIED.

- THIS MAY REQUIRE THE REGENERATION OF MISSING DOCUMENTATION.

Figure 6 *(Imbro)*

SESSION 6

CURRENT TECHNICAL ISSUES

INSERVICE TESTING OF PUMPS AND VALVES

by

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U.S. Nuclear Regulatory Commission

For Presentation at the NRC
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The Mayflower Hotel
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INTRODUCTION

- REQUIRED IN 10 CFR 50.55a IN 1978
- GENERIC GUIDANCE AND PLANT-SPECIFIC REVIEWS
- RELIEF REQUESTS
- PROGRAM UPDATES AND RESUBMITTALS
- BACKLOG

Figure 1 *(Sullivan)*

GENERIC LETTER 89-04

- ADDRESSES PROGRAMMATIC WEAKNESSES
- THREE PLANT GROUPINGS
- CONSTITUTES APPROVAL
- SCHEDULE
- REGIONAL MEETINGS WITH LICENSEES

Figure 2 *(Sullivan)*

INITIATIVES

- SYMPOSIUM
- SECOND GENERIC LETTER
  - SCOPE ISSUES
  - METHOD ISSUES
- CONSIDERING RULEMAKING
  - REVISED SCOPE
  - REVISED REVIEW METHOD
  - REGULATORY GUIDE

Figure 3 *(Sullivan)*

INSERVICE INSPECTION

by

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Washington, D.C.

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REGULATORY AREAS OF INTEREST AND CONCERN

- PROGRAMMATIC AREAS

  (1) RESOURCES

    (A) INDUSTRY

    (B) NRC

  (2) IMPLEMENTATION

- TECHNICAL AREAS

  (1) GENERIC LETTER 88-01

  (2) NON-CODE OVERLAY REPAIRS

  (3) HYDROGEN ADDITION

  (4) REACTOR VESSEL EXAMINATIONS

Figure 1 *(Cheng)*

INITIATIVES FOR STREAMLINING ISI REVIEWS

- HISTORICAL INFORMATION

(1) 1976 UPDATING RULE

(2) FORTY-MONTH UPDATING REQUIREMENT

(3) REVIEW RESPONSIBILITY

(A) DSS
(B) DOR

(4) APPROXIMATELY SIXTY PLANTS OPERATING

(5) WORKLOAD IMPACT

(6) RESOLUTION OF PROBLEM

(A) SPLIT ISI & IST
(B) REQUIRE TEN-YEAR PROGRAM UPDATE

(7) IMPACT OF RULE CHANGE

(A) SUBMITTALS REDUCED FROM NINE TO TWO EACH TEN-YEAR INTERVAL
(B) NUMBER OF REVIEW PERSONNEL REDUCED

- PRESENT ISI PROGRAM REVIEW

(1) PROGRAMS REVIEWED FOR:

(A) APPLICATION OF CORRECT CODE EDITION AND ADDENDA
(B) CORRECT EXAMINATION SAMPLE
(C) CORRECT USE OF EXEMPTION CRITERIA
(D) AUGMENTED REQUIREMENTS

(2) REVIEWS AND EVALUATIONS OF ISI PROGRAMS ARE PERFORMED WITH TECHNICAL ASSISTANCE FROM NATIONAL LAB

- REVIEW PROCESS BEING CONSIDERED

(1) ELIMINATE SUBMISSION OF PROGRAMS BY LICENSEES

(2) ELIMINATE REVIEW OF PROGRAMS AND RELIEF REQUESTS BY NRC STAFF

(2) MAKE LICENSEE ASSUME MORE OF BURDEN BY RULE MAKING

(3) CERTIFY PROGRAMS BY UTILITY UPPER MANAGEMENT THAT REQUIREMENTS OF REVISED RULE HAVE BEEN SATISFIED

(4) PERFORM AUDITS OF ISI PROGRAMS

Figure 2 *(Cheng)*

PIPE EROSION/CORROSION

by

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EROSION/CORROSION EVENTS

INITIATING EVENT - SURRY FEEDWATER PIPE RUPTURE, DECEMBER 9, 1986

ADDITIONAL EVENTS - TROJAN, STRAIGHT SECTIONS, 1987

- HADDAM NECK, FEEDWATER HEATER LINE, 1985
- SURRY, FEEDWATER PIPE, MORE RAPID WALL THINNING THAN PREDICTED

Figure 1 *(MCracken)*

ACTIONS AS A RESULT OF EVENTS

A COOPERATIVE PROGRAM WITH INDUSTRY TO ESTABLISH GUIDELINES AND HAVE PLANTS INSPECTED

- NUMARC - INDUSTRY LEAD, OBTAIN AGREEMENT FROM MEMBER UTILITIES
- EPRI - DEVELOP PROGRAM FOR INSPECTION
- INPO - AUDIT IMPLEMENTATION
- NRC - REVIEW AND COMMENT ON INDUSTRY PROGRAMS

Figure 2 *(McCracken)*

CHRONOLOGY SUMMARY

JANUARY 1987 TO FEBRUARY 1989	-	FIRST ROUND OF INSPECTION CONDUCTED
JUNE 1987	-	ACCEPTABLE GUIDELINES DEVELOPED FOR SINGLE PHASE
JULY 1987	-	BULLETIN ISSUED REQUESTING INFORMATION TO ASSESS STATUS
APRIL 1988	-	INFORMATION NOTICE STATING PROBLEM IS EXTENSIVE
OCTOBER 1988	-	COMPLETED AUDIT OF 10 PLANTS, IMPLEMENTATION OF INITIAL INSPECTION OUTSTANDING
DECEMBER 1988	-	NRC DETERMINATION THAT ADDITIONAL ADMINISTRATIVE CONTROLS NEEDED FOR LONG TERM
1989	-	ISSUE GENERIC LETTER TO DETERMINE PLANT-SPECIFIC IMPLEMENTATION OF LONG-TERM PROGRAMS

Figure 3 *(McCracken)*

ATWS IMPLEMENTATION

by

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ATWS RULE

BWRS

ALTERNATE ROD INJECTION (ARI)

RECIRCULATION PUMP TRIP (RPT)

UPGRADE STANDBY LIQUID CONTROL SYSTEM

CE/B&W

DIVERSE SCRAM SYSTEM (DSS)

DIVERSE ACTUATION AFW AND TT (AMSAC)

WESTINGHOUSE

DIVERSE ACTUATION AFW AND TT (AMSAC)

Figure 1 *(Newberry)*

CHRONOLOGICAL BACKGROUND

ATWS RULE PUBLISHED	6/84
QA GUIDANCE FOR ATWS EQUIPMENT (G.L. 85-06)	4/85
NRC REVIEW EFFORT START (MULTI-PLANT ACTION A-20 ESTABLISHED)	5/85
OWNERS GROUP SUBMIT GENERIC DESIGN	
CEOG CEN-315	9/85
BWOG B&W 47-1159091	10/85
WOG WCAP-10858	10/85
BWROG NEDE-31096-P	1/86
NRC STAFF ACCEPTED GENERIC DESIGN	
WOG	7/86
BWROG	10/86
BWOG	6/88
NRC STAFF REJECTED CEOG REPORT, REGARDING DIVERSITY OF AFW ACTUATION	8/86
INSPECTION GUIDANCE ISSUES (TI 2500/20)	2/87
NRC STAFF PLANT SPECIFIC REVIEWS	1/87 -- PRESENT
82 SERS COMPLETED	
30 PLANTS INSPECTED	

Figure 2 *(Newberry)*

IMPLEMENTATION STATUS

	PLANTS IMPL.	PLANTS WILL IMPL. 1989	PLANTS WILL IMPL. 1990 OR LATER	PLANTS WILL IMPL. 1991 OR LATER	PLANTS EXEMPT
BWR (TOTAL 37)					
RECIR PUMP TRIP	36				1
ALTERNATE ROD INJECTION	32	2	2		1
STANDBY LIQ CONTROL	36	1			
WESTINGHOUSE PLANTS (TOTAL 55)					
ATWS MITIGATION ACT CKT (AMSAC)	20	16	10	7	2
CE PLANT (TOTAL 15)					
AMSAC	3	3	4	5	
DIVERSE SCRAM SYSTEM	6	3	3	3	
B&W PLANT (TOTAL 8)					
AMSAC	0		3	5	
DSS	0		3	5	

Figure 3 *(Newberry)*

ATWS ISSUES

- o BWR ATTU DIVERSITY
- o CE AMSAC DIVERSITY
- o INSPECTION FINDINGS
- o OPERABILITY AND SURVELLANCE (TECH SPECS)

Figure 4 *(Newberry)*

EXTERNAL EVENTS FOR SEVERE ACCIDENTS

by

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BACKGROUND

- SEVERE ACCIDENT POLICY STATEMENT (AUG. 8, 1985)
- TREATMENT OF EXTERNAL EVENTS IN THE SEVERE ACCIDENT POLICY STATEMENT (SECY-86-162, MAY 22, 1986)
- EXTERNAL EVENTS WORKSHOP (AUGUST 4-5, 1987)
- INTEGRATION PLAN FOR CLOSURE OF SEVERE ACCIDENT ISSUES (SECY-88-147, MAY 25, 1988)
- GENERIC LETTER FOR THE IMPLEMENTATION OF THE SEVERE ACCIDENT POLICY STATEMENT (SECY-88-205, JULY 15, 1988)
- INDIVIDUAL PLANT EXAMINATION FOR SEVERE ACCIDENT VULNERABILITIES (GENERIC LETTER 88-20, NOV. 23, 1988)
- FUTURE NEED FOR PLANT EXAMINATION FOR EXTERNAL EVENTS

Figure 1 *(Bagchi)*

ORGANIZATION

NRC: EXTERNAL EVENT STEERING GROUP
CHAIRMAN: L. C. SHAO
SEISMIC SUBCOMMITTEE
FIRE SUBCOMMITTEE
HIGH WIND, FLOOD AND OTHERS SUBCOMMITTEE

INDUSTRY: NUMARC
LEAD: W. RASIN
SEISMIC ISSUES WORKING GROUP
SEVERE ACCIDENT WORKING GROUP

Figure 2 *(Bagchi)*

KEY EXTERNAL EVENTS

EARTHQUAKE
FIRE
HIGH WIND
FLOODS
TRANSPORTATION ACCIDENTS

Figure 3 *(Bagchi)*

METHODS FOR IPE OF EXTERNAL EVENTS

PROBABILISTIC RISK ASSESSMENT: HAZARD, FRAGILITY, PLANT DAMAGE STATES, COREMELT FREQUENCIES, LOSS OF CONTAINMENT PROBABILITY
OTHER SIMPLIFIED METHODS: SIMPLIFIED PROBABILISTIC, DETERMINISTIC MARGINS METHOD
EARTHQUAKE: BOTH METHODS FEASIBLE
FIRE: PRA METHOD IS ACCEPTABLE, OTHER SIMPLIFIED METHODS FEASIBLE
OTHER EXTERNAL EVENTS: PROGRESSIVE SCREENING

Figure 4 *(Bagchi)*

PREVIOUS PRA RESULTS

CONTRIBUTION TO TOTAL CORE DAMAGE FREQUENCY	
EARTHQUAKE	1% TO 68%
FIRE	3% TO 55%
OTHER EVENTS	PLANT-SPECIFIC WEAKNESSES

Figure 5 *(Bagchi)*

RESULTS EXPECTED

- THOROUGH FAMILIARITY OF PLANT LAYOUT AND PLANT PHYSICAL CHARACTERISTICS
- DETAILED PLANT WALKDOWN
- IDENTIFICATION OF TRUE PLANT WEAKNESSES RATHER THAN FOCUSING ON MEAN FREQUENCIES
- INTEGRATION OF GENERIC SAFETY ISSUES USI A-17, USI A-40, USI A-45, USI A-46, EASTERN U.S. SEISMICITY

Figure 6 *(Bagchi)*

STATION BLACKOUT IMPLEMENTATION

by

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STATION BLACKOUT RULE IMPLEMENTATION

- o WHY CONCERN FOR STATION BLACKOUT?
  - CORE MELT/CONTAINMENT FAILURE
  - MANY LOOPS & DG FAILURES
- o WHAT IS SBO PER RULE
  - LOOP & DGS LOST
  - INVERTER AC AVAILABLE

Figure 1 *(Knight)*

SBO RULE REQUIREMENTS

- o ENDURE SBO FOR REQ'D DURATION
  - BASED ON EAC SOURCE REDUNDANCY, RELIABILITY, LOOP FREQ. OFFSITE RESTORATION TIME
- o COPING ANALYSIS
- o AAC SOURCE SATISFIES RULE

Figure 2 *(Knight)*

SBO GUIDANCE DOCUMENTS

- o REG. GUIDE 1.155 - SBO
  - ADDRESSES: SBO DURATION, DG RELIABILITY PROCEDURES, QA & SPECS.
- o NUMARC DOCUMENTS
  - GUIDELINES/PROC. ADDRESS RULE
  - STANDARD RESPONSE FORMAT

Figure 3 *(Knight)*

SBO REVIEW PROCESS

- o RULE RESPONSE DUE APRIL'89
- o PRIORITIZE PLANTS BY RISK
- o REVIEW AND SER
- o INSPECTION PER TI
- o REVIEW COMPLETE 1991 MODS. 1994

Figure 4 *(Knight)*

SHUTDOWN DECAY HEAT REMOVAL

by

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SAFETY SIGNIFICANCE

- NUMEROUS LOSSES OF DHR HAVE OCCURRED
- DIABLO CANYON EVENT SHOWED DEFICIENCIES IN PROCEDURES, HARDWARE, & TRAINING
- PRA INSIGHTS
  - CDF 10^{-5}
  - 85% OF RISK DURING MID-LOOP
- CORE DAMAGE COULD OCCUR IN ONE HOUR
- CONTAINMENT COULD BE OPEN TO FACILITATE MAINTENANCE
- CONCLUDED ACTIONS NEEDED TO PREVENT AND MITIGATE LOSS OF DHR

Figure 1 *(Jones)*

NRC RESPONSE

- NUMEROUS DISCUSSIONS WITH INDUSTRY
- ISSUED GENERIC LETTER 88-17
- EXPEDITIOUS ACTIONS
  - MITIGATE OFFSITE RELEASE
  - PRACTICAL ACTIONS TO PREVENT MITIGATE LOSS OF DHR
- PROGRAM ENCHANCEMENTS
  - IMPROVED INSTRUMENTATION
  - IMPROVED PROCEDURES
  - DEFENSE-IN-DEPTH PHILOSOPHY
- EMPHASIZED SAFETY SIGNIFICANCE
  - LETTER TO EACH CEO
  - LETTER TO EACH OPERATOR

Figure 2 *(Jones)*

REVIEW METHOD

- STAFF AUDIT
- IMPLEMENTATION AUDIT BY REGIONAL PERSONNEL
- DETAILED INSPECTION AT SOME PLANTS

Figure 3 *(Jones)*

REVIEW FINDINGS - EXPEDITIOUS ACTIONS

- CONTAINMENT CLOSURE CONCERNS
  - ADMINISTRATIVE CONTROLS
  - INDIRECT PATHS TO THE ENVIRONMENT MUST BE CONTROLLED
  - CLOSURE REQUIREMENT FOR EQUIPMENT HATCH
- INSTRUMENTATION
  - RECONCILE DIFFERENCES BETWEEN REDUNDANT INSTRUMENTS
  - DAILY WALKDOWN OF TYGON TUBING
  - CONDUCT WALKDOWN IMMEDIATELY PRIOR TO THE USE OF TYGON TUBING
- DISCUSS OPERATING EXPERIENCE WITH ALL PERSONNEL

Figure 4 *(Jones)*

CONCLUSIONS

- SUBSTANTIAL EFFORT SINCE DIABLO CANYON EVENT
- RECOMMENDATIONS REFLECT GOOD OPERATIONAL PRACTICE AND CONTROL OF SHUTDOWN ACTIVITIES
- ENCOURAGE LICENSEES TO CONSIDER THESE RECOMMENDATIONS IN ALL MODES OF SHUTDOWN HEAT REMOVAL

Figure 5 *(Jones)*

THERMAL STRESSES AND FATIGUE IN PWR COOLANT PIPING

by

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INTRODUCTION

PWR REACTOR COOLANT SYSTEM PIPING DESIGN ACCOUNTS FOR THERMAL STRESSES AND FATIGUE EFFECTS

- DIFFERENTIAL EXPANSION
- THERMAL TRANSIENTS
- THERMAL FATIGUE

THREE RECENT PWR EVENTS HAVE SHOWN THERMAL EFFECTS NOT PREVIOUSLY ACCOUNTED FOR

- THERMAL FATIGUE DUE TO INTERMITTENT FLOW OF DIFFERENT TEMPERATURE FLUID
- THERMAL STRESSES AND FATIGUE DUE TO STRATIFIED FLOW

PIPING INTEGRITY WAS COMPROMISED IN TWO CASES

NRC ISSUED INFORMATION NOTICES AND BULLETINS

Figure 1 *(Marsh)*

INTERMITTENT SI FLOW

* LEAKING CRACK FOUND IN UNISOLABLE SECTION OF ECCS - 0.7 GPM

* THROUGH WALL CIRCUMFERENTIAL CRACK LOCATED AT AN ELBOW BETWEEN THE REACTOR COOLANT SYSTEM LOOP AND THE CHECK VALVE IN THE SIS

* ROOT CAUSE ATTRIBUTED TO HIGH-CYCLE FATIGUE CREATED BY OSCILLATING THERMAL STRATIFICATION

* STRATIFICATION CREATED BY CHECK VALVE OSCILLATION DUE TO INTERMITTENT COLD CHARGING FLUID FLOW THROUGH A CLOSED UPSTREAM VALVE

* VALVE NOT TESTED FOR LEAK-TIGHT INTEGRITY

Figure 2 *(Marsh)*

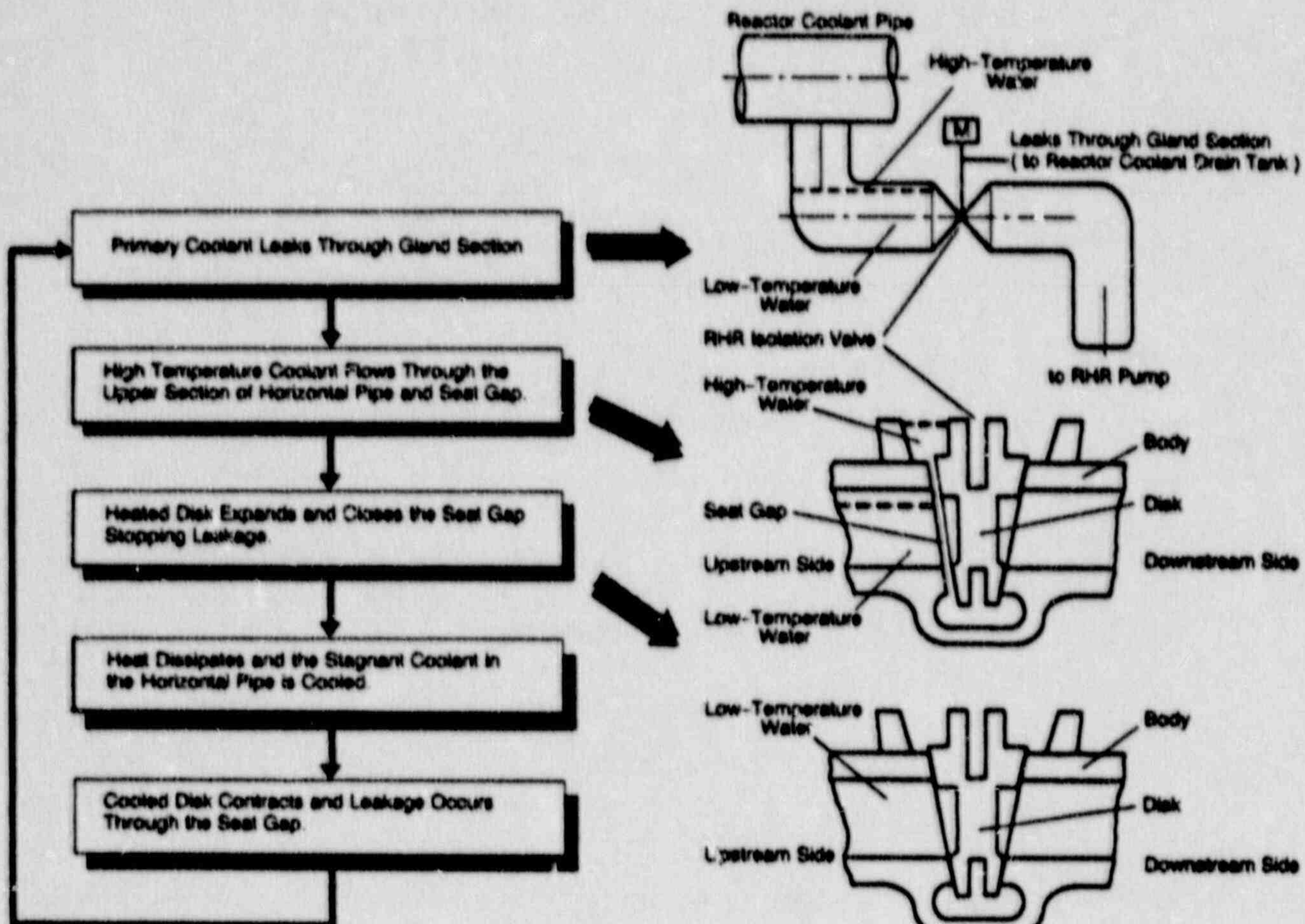
INTERMITTENT RCS LEAKAGE

* LEAKING CRACK FOUND IN UNISOLABLE SECTION OF THE ASME CLASS 1 PORTION OF THE RHR PIPING

* THROUGH WALL CIRCUMFERENTIAL CRACK AT TOP OF PIPE-TO-ELBOW WELD

* ROOT CAUSE ATTRIBUTED TO LEAKAGE OUT THE RHR ISOLATION VALVE STEM

Figure 3 *(Marsh)*



Formation and Fluctuation Mechanism of Thermal Stratification

Figure 4 *(Marsh)*

SURGE LINE STRATIFICATION

- UNEXPECTED MOVEMENT DISCOVERED ON THE PRESSURIZER SURGE LINE

- PIPE WHIP RESTRAINT SHIMS CRUSHED: PLASTIC DEFORMATION IN PIPE

- ROOT CAUSE WAS STRATIFIED FLOW CAUSING LARGE BENDING MOMENTS

- DURING PLANT STARTUPS AND SHUTDOWNS THERE EXISTS A LARGE PRESSURIZER TO RCS T (UP TO 300°F)

- LOW SURGE LINE FLOWS AND HIGH T CAUSES STRATIFICATION

- IMPORTANT PARAMETERS ARE LENGTH OF PIPE AND ITS SLOPE, FLOW, T AND SUPPORT CONFIGURATION

Figure 5 *(Marsh)*

CONCLUSIONS

NEWLY DISCOVERED THERMALLY INDUCED PHENOMENA CAN HAVE SIGNIFICANT EFFECTS ON PIPING INTEGRITY

DESIGN MARGINS DO NOT ACCOUNT FOR THESE PHENOMENA

REMEDIAL ACTIONS NEEDED. BULLETINS ISSUED

Figure 6 *(Marsh)*

INSTRUMENT AIR SYSTEM

by

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INTRODUCTION

- Nuclear Power Plant Instrument Air Systems Provide Clean, Dry, Oil Free Air for Both Safety-related and Nonsafety-related Equipment for Normal Operation and Post-accident Safe Shutdown

- Designs Vary but Generally the System is Nonsafety-related

  - Safety-related Components are Designed to Fail to Their Safe Position on Loss of Air

  - Backup Pneumatic Accumulators or Other Systems are Provided to Ensure Post-accident Operability of Certain Safety-related Components

Figure 1 *(Wermiel)*

DISCUSSION

- NRC Focus on Balance-of-Plant Systems Following the TMI-2 Accident Included the Instrument Air System
  - AEOD Case Study, NUREG-1275, Volume 2 (NRC IN No. 87-28, Supplement 1) Pointed out Events and Circumstances Where the Instrument Air System Would not Satisfy its Intended Design Basis
  - Recommendations Made to Ensure Air Quality, Adequacy of Procedures and Training, Design Adequacy of Backup Air Accumulators, and Performance of Gradual Loss of Air Test
- RES Study of Instrument Air System Problems Under GI 43
  - Conclusion that Existing Criteria and Proposed Generic Letter are Sufficient to Ensure Air System Function Based on its Risk Impact; Also Include Instrument Air in GI B-56 Resolution on Diesel Generator Reliability
- NRR Issued GL 88-14 to Address Instrument Air System Problems
  - Requests Design-Basis Verification by Air Quality Test; Maintenance, Procedure and Training for Function on Loss of Air; Design of Pneumatic Accumulators, Test for Function on Loss of Air, and Review for Correct Failure Position
  - GL 88-14 Addressed Staff Concerns Regarding Instrument Air System Performance and Assurance of Safety Functions
  - GL 88-14 Responses Indicate That Problems Did Exist in Instrument Air Systems But Licensees Are Taking Action to Correct Them
    - Additional Equipment Added to Improve Air Quality and Capacity
    - Generic Design Deficiencies Noted; NRC IN No. 89-26 Issued
  - GL 88-14 Has Had the Desired Impact by Focusing Licensee Attention on Importance of Instrument Air System

Figure 2 *(Wermiel)*

REVIEW OF INTERSYSTEM LOCA ISSUE

by

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INTERFACING SYSTEM LOCA (ISL)

- POTENTIAL FOR ISL OF LONG CONCERN
- WASH-1400 IDENTIFIED CLASS, "EVENT V"
  - INVOLVES ISOLATION OF HIGH/LOW PRESSURE SYSTEMS
  - CONCERNS INVOLVE:
    - ISOLATION CAPABILITY
    - RUPTURE OF LOW PRESSURE SYSTEM
  - SCENARIO COULD RESULT IN CORE MELT AND CONTAINMENT BYPASS
  - LOW LIKELIHOOD: SEVERE CONSEQUENCES
  - RISK REDUCED BY VERIFYING VALVE CLOSURE
- SUBSEQUENT NRC REVIEW INDICATES CONCERN NOT LIMITED TO EVENT V
- EXPANDED EFFORT TO CONSIDER ALL PRESSURE ISOLATION VALVES (PIV) AND INTERFACING SYSTEM ISOLATION DESIGNS

Figure 1 *(Phillips)*

PAST AND CURRENT ACTIONS

- GENERIC LETTER, FEB. 23, 1980
  - LICENSEES TO IDENTIFY EVENT V CONFIGS., IF EXIST IDENTIFY:
    - SURVEILLANCE
    - OPERATING HISTORY/TEST DATA
    - NEEDED PROCEDURE/PLANT MODIFICATION
- ORDER ISSUED APRIL 1981 TO 34 PLANTS
  - IMPOSED CORRECTIVE ACTIONS
    - TESTING
    - TS SURVEILLANCE AND LCO
- CONCERN NOT LIMITED TO EVENT V, BUT BACKFIT JUSTIFICATION NEEDED
- BNL STUDY OF GENERIC ISSUE 105, COST - BENEFIT OF BACKFITTING
- RESULTS SHOW BENEFIT OF PIV TESTS
- TEST PROGRAM LOWERS CORE DAMAGE FREQUENCY 2 OM
- APPEARS BACKFIT CAN BE JUSTIFIED
- OTHER STUDY FINDINGS
- OTHER NRC ACTIVITY
  - TMI ITEM II.E.6.1

Figure 2 *(Phillips)*

PLAN FOR RESOLUTION OF ISL ISSUE

- ACTION PLAN DEVELOPED
  - PILOT INSPECTION PROGRAM (6 PLANTS)
  - PAST ACTIVITIES FOCUSED ON TESTING PIV
  - PROGRAM SCOPE BROADENED TO ADDRESS HUMAN FACTORS
  - LEAD TO IMPROVED INSPECTION ALL PLANTS
- PILOT PROGRAM BASED ON CRITERIA:
  - ONLY PWR
  - EACH OF THE 5 REGIONS
  - EACH OF 3 VENDORS
  - PLANTS WITH MINIMAL ISOLATION
  - EFFECTS OF PLANT VINTAGE
- PILOT INSPECTION SCOPE
  - POTENTIAL ISL PATHWAY IDENTIFIED
  - ADEQUACY OF: TRAINING
    ALARMS
    INTERLOCKS
    ADMINISTRATIVE PROCEDURES
    TEST/SURVEILLANCE
    OPERATING PROCEDURES
  - ASSESSMENT OF STRUCTURAL STRENGTHS
  - IDENTIFY VULNERABLE SYSTEMS AND SEQUENCES
  - USE FOR PRA AND DETERMINISTIC ANALYSES OF RADIOLOGICAL CONSEQUENCES

Figure 3 *(Phillips)*

RECOMMENDATIONS FOR FURTHER NRC ACTIONS

- BASED ON: RESULTS OF PILOT INSPECTIONS
  - REVIEW OF PREVIOUS ACTIONS
  - PREVIOUS DATA STUDIES
- MAY INCLUDE: REVISION OF GENERIC ISSUE 105
  - NEW GENERIC ACTION
- GOAL: HIGH CONFIDENCE THAT PROBABILITY OF ISL WITH UNISOLABLE LOCA 10^{-6}/RY
- CANDIDATE ACTIONS
  - MORE EXTENSIVE TESTING
  - IMPROVED PROCEDURE
  - IMPROVED INSTRUMENTATION & ALARMS
  - IMPROVED DESIGN OF SYSTEMS
  - MEASURES TO REDUCE HUMAN ERRORS

Figure 4 *(Phillips)*

SESSION 7

HUMAN FACTORS/OPERATOR LICENSING

NRC OPERATOR LICENSING PROGRAM
A SITUATION REPORT

by

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and

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NRC REQUALIFICATION EXAMINATIONS

- ON TRACK: 10 FACILITIES TO DATE
- INDUSTRY & EXAMINER FEEDBACK POSITIVE
- BASED ON FACILITY REQUALIFICATION PROGRAM
- MAXIMUM USE OF PLANT SIMULATOR
- FACILITY PROVIDES SITE-SPECIFIC EXPERTISE
- INDIVIDUAL, CREW & PROGRAM EVALUATED
- MORE EFFICIENT TECHNIQUES EXPLORED

Figure 1 *(Perkins)*

GENERIC FUNDAMENTALS EXAMINATION

- PILOT TESTED BWR GFE SEPTEMBER 1988
- ONE EXAM ON FUNDAMENTAL KNOWLEDGE FOR SO AND INSTANT SRO
- TRANSFERRABLE WITHIN REACTOR TYPE (BWR/PWR)
- LAST PILOT FOR BWR & PWR JUNE 28, 1989 (GENERIC LETTER 89-05)
- IMPLEMENT OCTOBER 1, 1989 ON TRIMESTER BASIS
- ONLY INDIVIDUALS SEEKING FIRST-TIME NRC LICENSES OR CHANGING REACTOR TYPE NEED TAKE THE GFE
- MUST BE ENROLLED IN FACILITY'S LICENSE TRAINING PROGRAM

Figure 2 *(Perkins)*

NATIONAL EXAMINATION SCHEDULE

- GL 88-13 SOLICITED EXAM NEEDS THROUGH 1992 AND STATED INTENT TO IMPLEMENT NES OCT 1, 1989
- GL 89-03 PROMULGATED EXAM SCHEDULE FOR FY 1990
- OBJECT: SEMI-ANNUAL EXAM VISITS TO ADMINISTER INITIAL, REQUAL OR RETAKE EXAMS AS NEEDED
- WILL PROVIDE MORE STABILITY FOR NRC AND FACILITIES TO MANAGE PROGRAMS
- ADOPTING REQUAL LESSONS LEARNED INTO INITIAL EXAM PROGRAM WILL INCREASE BENEFIT

Figure 3 *(Perkins)*

SIMULATION FACILITY EVALUATION PROGRAM

- IMPLEMENTS 10 CFR 55.45(b)
- MEET ANSI 3.5 OR GET NRC APPROVAL OF ALTERNATIVE BY MARCH 1991
- NRC DESK-TOP REVIEW OF CERTIFICATIONS
- PROBLEMS WITH INADEQUATE DOCUMENTATION WILL BE IDENTIFIED TO THE FACILITY
- MAJOR SIMULATOR PROBLEMS IDENTIFIED BY REVIEW OR EXAM EXPERIENCE WILL RESULT IN ONSITE INSPECTION
- ONSITE INSPECTION MAY RESULT IN HALT TO OPERATING TESTS FOR INITIAL AND REQUAL EXAMS
- OL PROGRAM'S OPERATIONAL EMPHASIS RELIES ON VALID SIMULATION FACILITIES
- JUSTIFIABLE EXTENSION FOR COMPLIANCE ARE VERY UNLIKELY

Figure 4 *(Perkins)*

INITIAL EXAMINATION PROGRAM

- GFE PERMITS MORE SITE-SPECIFIC FOCUS
- INCORPORATE APPLICABLE LESSONS LEARNED FROM REQUAL FOR A MORE OPERATIONALLY ORIENTED INITIAL EXAM
- CONSIDERING:
  - LIMITED REFERENCE OPEN-BOOK EXAM TO TEST RECALL AND PROCEDURE USE
  - STATIC SIMULATOR TO TEST PLANT SYSTEMS, INTEGRATED PLANT OPERATIONS AND I & C KNOWLEDGE
  - DYNAMIC SIMULATOR TO TEST INDIVIDUAL PERFORMANCE ON CRITICAL TASKS
  - WALK-THROUGH TO TEST PERFORMANCE OF SELECTED SYSTEM TASKS USING JPMs
- WILL RELY ON FACILITY DEVELOPED MATERIAL AND PARTICIPATION
- INITIAL & REQUAL EXAM SIMILARITIES WILL FACILITATE PREPARATION AND ADMINISTRATION

Figure 5 *(Perkins)*

MAN-MACHINE INTERFACE

by

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U.S. Nuclear Regulatory Commission

For Presentation at the NRC
Regulatory Information Conference

The Mayflower Hotel
Washington, D.C.

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INTRODUCTION

- TMI ACTION ITEMS ADDRESSED HUMAN FACTORS CONCERNS
- LARGE FRACTION OF REPORTABLE EVENTS ATTRIBUTED TO HUMAN ERROR
- NUCLEAR INDUSTRY HAD CONSIDERED ONLY VERY LIMITED HUMAN FACTORS PRINCIPLES IN DESIGNING THEIR CONTROL ROOMS

Figure 1 *(Zwolinski)*

HUMAN-MACHINE INTERFACE: TWO INITIATIVES

DETAILED CONTROL ROOM DESIGN REVIEW

IMPROVE THE ABILITY OF OPERATORS TO PREVENT ACCIDENTS OR COPE WITH ACCIDENTS IF THEY OCCUR BY IMPROVING THE INFORMATION PROVIDED

SAFETY PARAMETER DISPLAY SYSTEM

AID OPERATORS IN RAPIDLY AND RELIABLY DETERMINING THE SAFETY STATUS OF THE PLANT DURING AN EMERGENCY

Figure 2 *(Zwolinski)*

DCDR PROCESS

· CONDUCT DCRDR REVIEW

IDENTIFY "HUMAN ENGINEERING DISCREPANCIES" (HEDs IN THE CONTROL ROOM

ASSESS SAFETY SIGNIFICANCE OF HEDs

DETERMINE CORRECTIVE ACTIONS

· SUBMIT SUMMARY REPORT TO NRC INCLUDING SCHEDULE FOR IMPLEMENTATION

· IMPLEMENT CORRECTIVE ACTION PROGRAM (USUALLY ACCOMPLISHED OVER ONE OR TWO REFUELING OUTAGES)

Figure 3 *(Zwolinski)*

DCRDR STATUS

CONTROL ROOM IMPROVEMENT COMPLETED OR IMPLEMENTATION SCHEDULE SATISFACTORY, 58 UNITS

INCOMPLETE RESOLUTION TO ONE OR MORE SAFETY SIGNIFICANT HEDs, 41 UNITS

LICENSEE REVIEW PROCESS INCOMPLETE, 19 UNITS

Figure 4 *(Zwolinski)*

SPDS

ISSUE GENERIC LETTER REQUIRING LICENSEES TO DO ONE OF THE FOLLOWING:

(1) CERTIFY THAT THE SPDS FULLY MEETS THE REQUIREMENTS OF NUREG-0737, SUPPLEMENT 1, OR

(2) CERTIFIY THAT THE SPDS WILL BE MODIFIED TO FULLY MEET THE REQUIREMENTS BY A SPECIFIED DATE, OR

(3) PROVIDE A DISCUSSION OF THE REASONS FOR NOT CERTIFYING AND A DISCUSSION OF THE COMPENSATORY ACTION THEY INTEND TO TAKE OR HAVE TAKEN.

ENCLOSED WITH GENERIC LETTER IS A NUREG WHICH PROVIDES LICENSEES DESIGN FEATURES AND METHODS FOUND ACCEPTABLE AND UNACCEPTABLE IN IMPLEMENTING THE REQUIREMENTS

Figure 5 *(Zwolinski)*

FUTURE INITIATIVES

ROOT-CAUSE ANALYSIS OF EVENTS INVOLVING HUMAN ERRORS

- DEVELOP A STRUCTURED PROTOCOL FOR ASSESSING ROOT CAUSE OF EVENTS INVOLVING HUMAN ERROR

- OBTAIN DETAILED HUMAN PERFORMANCE INFORMATION

- EVALUATE AND SUPPLEMENT AS NECESSARY THE GUIDANCE FOR THE LER SYSTEM.

ADVANCE COMPUTER-ORIENTED SYSTEMS

- NEED EMPHASIS ON HUMAN FACTORS ANALYSIS AND DESIGN

- CRITERIA FOR EVALUATION OF ADVANCED SYSTEMS FOR DISPLAYS, ALARMS, CONTROL, INFORMATION MANAGEMENT, AND COMMUNICATION

- CRITERIA FOR EVALUATING INTEGRATION OF ADVANCED SYSTEMS INTO EXISTING CONTROL ROOMS

- CHANGE OF OPERATOR ROLE WITH INTRODUCTION OF ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

Figure 6 *(Zwolinski)*

FITNESS-FOR-DUTY RULE

by

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U.S. Nuclear Regulatory Commission

For Presentation at the NRC
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COMMENTS

2,899	-	378 RESPONDERS
188	-	PUBLIC MEETING
3,079	-	TOTAL

- COMPILED INTO 632 COMMENTS
- SUMMARY AND ANALYSIS OF COMMENTS: NUREG-1354
- TECHNICAL ISSUES ANALYZED: NUREG/CR-5227 AND SUPPLEMENT 1

Figure 1 *(Bush)*

SCOPE

- OPERATING AND CONSTRUCTION
- UNESCORTED ACCESS
- LICENSEE EMERGENCY RESPONSE PERSONNEL
- EXCEPTIONS
- IMPLEMENTATION

Figure 2 *(Bush)*

PROGRAM MANAGEMENT

- WRITTEN POLICIES AND PROCEDURES
  - WORKPLACE FREE OF DRUGS AND THE EFFECTS OF DRUGS
  - ADDRESS ILLEGAL AND LEGAL DRUGS, MENTAL STRESS, FATIGUE AND ILLNESS.
- COLLECTION AND ANALYSIS OF DATA
- AUDITS
- CORRECTIVE ACTIONS

Figure 3 *(Bush)*

TRAINING

- LICENSEE AND CONTRACTOR EMPLOYEES
- MANAGERS AND ESCORTS
- TRAINED PRIOR TO ASSIGNMENT OF ACTIVITIES COVERED BY RULE.
- [illegible]PERVISORS TRAINED WITHIN 3 MONTHS
- [illegible]AL REFRESHER

Figure 4 *(Bush)*

TESTING

- PRE-ACCESS
- RANDOM
- FOR CAUSE
- FOLLOW UP
- TESTING GUIDELINES
  - 5 DRUGS AND ALCOHOL
  - CUTOFF LEVELS
  - QUALITY ASSURANCE FEATURES
  - MEDICAL REVIEW OFFICER
- MAY USE MORE STRINGENT STANDARDS

Figure 5 *(Bush)*

SANCTIONS

- MINIMUM SANCTIONS
  - REMOVAL FOR AT LEAST 14 DAYS FOR FIRST CONFIRMED POSITIVE
  - REMOVAL FOR 3 YEARS FOR SECOND CONFIRMED POSITIVE
  - REMOVAL FOR 5 YEARS FOR ONSITE INVOLVEMENT
- CONDITIONS FOR RESTORATION
- REFUSAL TO PROVIDE SPECIMEN

Figure 6 *(Bush)*

ALCOHOL

- POLICY AND PROCEDURES:
  - ABSTENTION PERIOD
  - CALL-IN PROCEDURE
- SANCTIONS
- TESTING
  - BAC OF 0.04%
  - EVIDENTIAL-GRADE BREATH MEASUREMENT FOR CONFIRMATION
  - BLOOD DRAWN ONLY ON DEMAND.

Figure 7 *(Bush)*

TRACKING

- SUITABLE INQUIRY BEFORE GRANTING UNESCORTED ACCESS
- RECORDS RETENTION AND DISCLOSURE

Figure 8 *(Bush)*

CONTACTOR PERSONNEL

- SUBJECT TO FFD
- PROHIBITED ASSIGNMENT OF PREVIOUSLY REMOVED PERSONNEL WITHOUT KNOWLDGE AND CONSISTENT OF LICENSEE

Figure 9 *(Bush)*

EMERGENCY OPERATING PROCEDURE INSPECTION PROGRAM

by

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Human Factors Assessment Branch
Division of Licensee Performance and Quality Evaluation
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

and

George W. Lapinsky, Jr., Acting Section Chief
Procedures and Training Section
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U.S. Nuclear Regulatory Commission

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TECHNICAL CONTENT

PROBLEM: RANGE OF EVENTS ADDRESSED TOO NARROW

SOLUTION:

- REANALYSIS OF TRANSIENTS AND ACCIDENTS, INCLUDING MULTIPLE FAILURES AND OPERATOR ERRORS
- DEVELOPMENT OF VENDOR-SPECIFIC GENERIC TECHNICAL GUIDELINES AS TECHNICAL BASIS FOR PLANT-SPECIFIC GUIDELINES AND EOPs

Figure 1 *(Regan)*

HUMAN FACTORS

PROBLEM: POORLY DESIGNED FROM OPERATOR'S VIEWPOINT

- EVENT DIAGNOSIS PREREQUISITE TO PROCEDURE SELECTION
- HEAVY RELIANCE ON TRAINING AND EXPERIENCE
- AMBIGUOUS WORDING
- FLAWED LOGIC STATEMENTS

SOLUTION:

- SYMPTOM OR FUNCTION-BASED PROCEDURES ALLOW MITIGATION BEFORE DIAGNOSIS
- NUREG-0899 ISSUED-PROVIDES PROCEDURE PREPARATION GUIDANCE
- WRITER'S GUIDE INCORPORATING GOOD HUMAN FACTORS PRINCIPLES TO BE USED IN PREPARING PROCEDURES
- VERIFICATION AND VALIDATION OF EOPs TO ENSURE TECHNICAL CORRECTNESS AND USEABILITY

Figure 2 *(Regan)*

REGULATORY REQUIREMENTS FOR EOPS

- NUREG-0737, SUPPLEMENT 1/GENERIC LETTER 82-33 REQUIRED SUBMITTAL OF PGP WHICH INCLUDED:

  -PLANT-SPECIFIC TECHNICAL GUIDELINES/ DERIVATION FROM GENERIC TECHNICAL GUIDELINES
  -WRITER'S GUIDE
  -VERIFICATION AND VALIDATION PROGRAM
  -DESCRIPTION OF TRAINING PROGRAM FOR EOPS

- STAFF POST-IMPLEMENTATION REVIEW OF PGP WITH A FEW EOP AUDITS

Figure 3 *(Regan)*

EARLY RESULTS OF EOP UPGRADE PROGRAM

- INITIAL PGP AUDITS IDENTIFIED POTENTIAL CONCERNS

- FOUR PGP/EOP SITE AUDITS, CARRIED OUT IN 1984-86; FINDINGS FORMED BASIS FOR INFORMATION NOTICE 86-64, AUGUST 1986

- SIGNIFICANT DEFICIENCIES FOUND, INCLUDING:

  -UNDOCUMENTED DEVIATIONS FROM GENERIC GUIDELINES
  -INAPPROPRIATE USE OF GENERIC GUIDELINES AS PROCEDURES
  -FAILURE TO USE WRITER'S GUIDE
  -FAILURE TO CONDUCT ADEQUATE V&V
  -INADEQUATE TRAINING PROGRAMS

- SIX ADDITIONAL INSPECTIONS CONDUCTED IN 1986-87; FINDINGS-DISCUSSED IN INFORMATION NOTICE 86-64, SUPPLEMENT 1, APRIL 1987

- SAME DEFICIENCIES CONTINUED TO BE FOUND; CONFIRMED THEIR WIDESPREAD NATURE

- PLANNING WAS INITIATED FOR AN INTENSIFIED INSPECTION PROGRAM, WITH EMPHASIS SHIFTED FROM PGPS TO EOPS

Figure 4 *(Regan)*

CURRENT EOP INSPECTION PROGRAM

- THREE PHASES: EOP-1, EOP-2, EOP-3

  -EOP-1: PILOT PROGRAM, 15 INSPECTIONS DIVIDED BETWEEN VENDOR TYPES
  -EOP-2: FOCUSED ON BWR'S WITH MARK I CONTAINMENT; EMPHASIS ON CONTAINMENT VENTING PROCEDURE
  -EOP-3: INSPECTIONS OF REMAINING U.S. PLANTS DURING TWO YEAR PERIOD

- PERFORMANCE-BASED INSPECTION WITH EMPHASIS ON EOPs RATHER THAN SUPPORTING PROGRAMS

- EXAMINES TECHNICAL CORRECTNESS, PERFORMABILITY, AND USEABILITY OF EOPs

Figure 5 *(Regan)*

INSPECTION FINDINGS

- MOST PROBLEMS HAD THEIR SOURCE IN PROGRAMMATIC WEAKNESSES

- MAJOR PROGRAMMATIC PROBLEMS:

  -LACK OF MULTIDISCIPLINARY TEAM APPROACH
  -LACK OF INDEPENDENT REVIEW FOR CORRECTNESS AND PERFORMABILITY
  -LACK OF SYSTEMATIC PROCESS FOR MAINTENANCE OVER-TIME
  -LACK OF ADEQUATE MANAGEMENT COMMITMENT TO EOP QUALITY

Figure 6 *(Regan)*

MULTIDISCIPLINARY APPROACH TO EOP DEVELOPMENT

- WHAT'S NEEDED:

  -TEAMS WITH BACKGROUNDS IN ENGINEERING, OPERATIONS, TRAINING, HUMAN FACTORS, TECHNICAL WRITING

- WHAT WAS FOUND:

  -BACKGROUNDS OFTEN LIMITED TO ENGINEERING AND/OR OPERATIONS; SOMETIMES A ONE-PERSON OPERATION

Figure 7 *(Regan)*

INDEPENDENT REVIEW (V&V)

- WHAT'S NEEDED:

  -FRESH EYES AND BRAINS
  -DESKTOP REVIEW
  -CONTROL ROOM & PLANT WALKTHROUGH
  -OPERATING TEAM REVIEW
  -SIMULATOR EXERCISES

- WHAT WAS FOUND:

  -LACK OF INDEPENDENCE-OFTEN SAME PERSON OR ORGANIZATION PERFORMED EOP PREPARATION AND V&V
  -PERVASIVE EVIDENCE OF LACK OF V&V: INCORRECT, MISSING, OR UNNECESSARY STEPS; REFERENCES TO EQUIPMENT, INSTRUMENTATION, PROCEDURES NO LONGER IN USE; NECESSARY IN-PLANT TOOLS, ACCESS AIDS, JUMPERS, LOCAL INFORMATION NEEDS MISSING

Figure 8 *(Regan)*

EOP MAINTENANCE AND REVISION

- WHAT'S NEEDED.

  -FORMAL PROGRAM FOR MAINTENANCE AND REVISIONS
  -CONTROLLED BASIS DOCUMENTS
  -ADEQUATE DOCUMENTATION OF CHANGES
  -REVISION FREQUENCY COMMENSUATE WITH REASONABLE CHANGE REQUEST BACKLOG
  -TRAINING ON CHANGES

- WHAT WAS FOUND

  -MISSING OR INCOMPLETE PROGRAMS
  -BASIS DOCUMENTS INCOMPLETE OR INCORRECT
  -GENERALLY POOR OR MISSING DOCUMENTATION OF CHANGES
  -BACKLOGS OF AS MANY AS 50 OR 100 CHANGES; SEVERAL MONTHS OLD EQUIPMENT MODS NOT REFLECTED
  -INADEQUATE OR NO TRAINING ON CHANGES
  -INSUFFICIENT RESOURCES TO SUPPORT ADEQUATE PROGRAM

Figure 9 *(Regan)*

MANAGEMENT COMMITMENT

- WHAT'S NEEDED:

  -HIGH PRIORITY PLACED ON QUALITY PROCEDURES
  -ADEQUATE RESOURCE ALLOCATION
  -INVOLVEMENT IN PROGRAM
  -QUALITY ASSURANCE CONTROLS IN PLACE

- WHAT WAS FOUND:

  -LITTLE OR NO MANAGEMENT INVOLVEMENT
  -EOP DEVELOPMENT AND MAINTENANCE SOMETIMES TURNED OVER TO CONTRACTORS
  -LITTLE OR NO INVOLVEMENT OF INDEPENDENT REVIEW COMMITTEE OR QA ORGANIZATION
  -LACK OF STAFFING AND RESOURCES

Figure 10 *(Regan)*

CORRECTIVE ACTIONS

- CLARIFICATION OF NRC EXPECTATIONS
  -OWNERS GROUP MEETINGS
  -NUREG 1358
  -NUMARC SPONSORED WORKSHOPS
- ACCELERATED REVIEW OF PGPS
- CONTINUATION OF EOP INSPECTIONS (EOP-3)
- MORE ATTENTION BY NRC INSPECTORS TO HUMAN PERFORMANCE ISSUES, INCLUDING EOPS, IN FUTURE

Figure 11 *(Regan)*

SESSION 8

ENFORCEMENT AND INVESTIGATIONS

HANDLING ALLEGATIONS

by

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U.S. Nuclear Regulatory Commission
Region IV

For Presentation at the NRC
Regulatory Information Conference

The Mayflower Hotel
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April 18-20, 1989

- Information Sources
  - Direct NRC Reviews
  - Licensee Provided Information
  - Allegations

- Definition

- Origin and Types
  - Individual Contacts (Direct/Third Party)
  - News Media Contacts
  - Concerned Congressional Constituents
  - Via Other Governmental Agencies

Figure 1 *(Martin)*

- Process

- Specified Handling

- Allegation Collection

- Allegation Evaluation

- Allegation Resolution

Figure 2 *(Martin)*

RELATED ISSUES

- Followup: Inspection vs Investigation

- Allegations Turned Over To Licensee
  - Criteria
  - Results (General)

- Licensee Concern Programs
  - Technical Issues
  - Wrongdoing Issues

Figure 3 *(Martin)*

CONCLUSIONS/RESULTS
(18-Mo. Period)

Type:
- 98 Allegations
  - 50% Substantiated
  - 35% (of Substantiated) Safety Significant

Sources:
- 50% From Technicians/ Craft Personnel
- 25% From Private Citizenship
- 10% From Professional Employees
- 10% From All Others

Value of Results Worth the Expenditure

Figure 4 *(Martin)*

AFTERNOON PLENARY SESSION

SEVERE ACCIDENT ISSUES

INTEGRATED SEVERE ACCIDENT PROGRAM

by

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For Presentation at the NRC
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WHAT IS THE TECHNICAL ISSUE CONCERNING SEVERE ACCIDENTS?

- CORE MELT ACCIDENTS WERE NOT INCLUDED AS PART OF THE ORIGINAL DESIGN BASIS FOR SAFETY SYSTEMS AND CONTAINMENT STRUCTURES FOR CURRENT PLANTS.

- WHAT ADDITIONAL FEATURES OR PROCEDURES, IF ANY, ARE REQUIRED FOR SAFETY SYSTEMS AND CONTAINMENTS TO PROVIDE REASONABLE ASSURANCE OF PROTECTION AGAINST THE RISKS OF CORE MELT ACCIDENTS?

Figure 1 *(Murley)*

SEVERE ACCIDENT POLICY STATEMENT (AUGUST 1985)

- "EXISTING PLANTS POSE NO UNDUE RISK TO PUBLIC HEALTH AND SAFETY."

- NO BASIS FOR IMMEDIATE ACTION ON REGULATORY CHANGES BECAUSE OF SEVERE ACCIDENT RISK.

- REQUIRE A SYSTEMATIC EXAMINATION OF EACH NUCLEAR PLANT FOR POSSIBLY SIGNIFICANT RISK CONTRIBUTORS

Figure 2 *(Murley)*

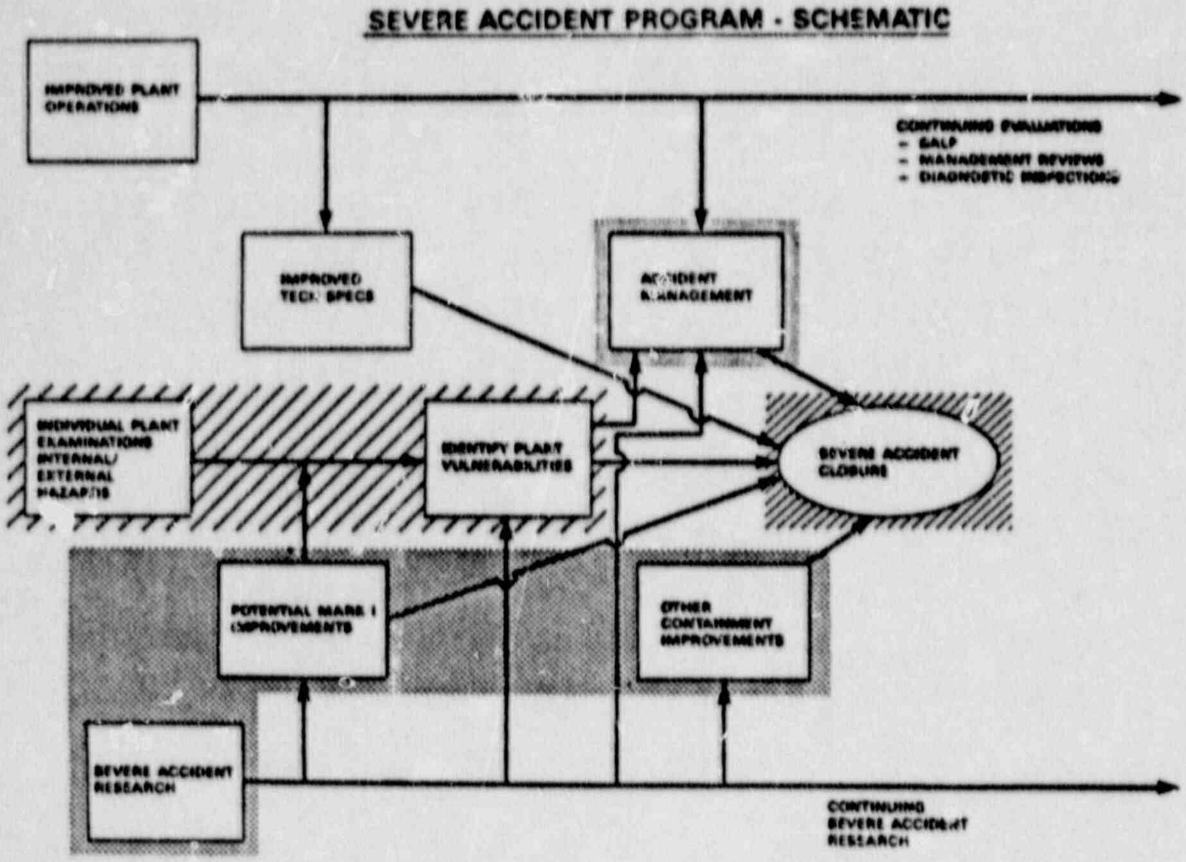

Figure 3 *(Murley)*

INTEGRATED SEVERE ACCIDENT PROGRAM

MAIN OBJECTIVES OF PROGRAM

- IMPROVE PLANT OPERATIONS
- INDIVIDUAL PLANT EXAMINATIONS (IPE)
- IMPROVED CONTAINMENT PERFORMANCE

OTHER RELATED EFFORTS

- SAFETY GOALS
- CURRENT BENCHMARK OF PRA METHODOLOGY (NUREG-1150)
- ESTABLISH REQUIREMENTS FOR FUTURE PLANTS
- PLANT EXAMINATIONS FOR EXTERNAL EVENT VULNERABILITIES
- LONG-TERM SEVERE ACCIDENT RESEARCH

Figure 4 *(Murley)*

GOAL OF ACCIDENT MANAGEMENT

TO RETURN THE PLANT TO A CONTROLLED STATE IN WHICH THE NUCLEAR CHAIN REACTION IS ESSENTIALLY TERMINATED, CONTINUED FUEL COOLING IS ENSURED, AND RADIOACTIVE MATERIALS ARE CONFINED.

Figure 5 *(Murley)*

ACCIDENT MANAGEMENT

PREVENTION:

ACTIONS TAKEN BY THE OPERATORS, AFTER CONDITIONS HAVE EXCEEDED THE DESIGN BASIS BUT BEFORE A SEVERE ACCIDENT FULLY DEVELOPS, TO ALTER OR REVERSE THE COURSE OF THE ACCIDENT.

MITIGATION:

ACTIONS TAKEN BY THE OPERATING STAFF IN THE EVENT OF A SEVERE ACCIDENT TO PROTECT THE CONTAINMENT FUNCTION OR LIMIT ANY POTENTIAL RELEASES OF RADIOACTIVE MATERIAL TO THE ENVIRONMENT.

Figure 6 *(Murley)*

FUNDAMENTAL OBJECTIVE OF ACCIDENT MANAGEMENT PROGRAM:

TO HAVE EACH NRC LICENSEE IMPLEMENT AN ACCIDENT MANAGEMENT PLAN WHICH PROVIDES A FRAMEWORK FOR:

- EVALUATING INFORMATION ON SEVERE ACCIDENTS
- PREPARING AND IMPLEMENTING SEVERE ACCIDENT OPERATING PROCEDURES
- TRAINING OPERATORS, TECHNICAL SUPPORT STAFF, AND MANAGERS IN THE PROCEDURES

Figure 7 *(Murley)*

FIVE ELEMENTS OF THE FRAMEWORK FOR ACCIDENT MANAGEMENT

1. ACCIDENT MANAGEMENT PROCEDURES

2. TRAINING IN SEVERE ACCIDENTS FOR OPERATORS, TECHNICAL SUPPORT STAFF, AND MANAGERS

3. GUIDANCE AND COMPUTATIONAL AIDS FOR ACCIDENT RESPONSE

4. INSTRUMENTATION TO RESPOND TO A SPECTRUM OF SEVERE ACCIDENTS

5. DELINEATION OF DECISIONMAKING RESPONSIBILITIES

Figure 8 *(Murley)*

CONTAINMENT PERFORMANCE IMPROVEMENTS

- STAFF GENERIC ANALYSES BEING CONDUCTED IN PARALLEL WITH PLANT-SPECIFIC IPEs
- STAFF EVALUATING GENERIC CHALLENGES, FAILURE MODES AND COST-EFFECTIVE IMPROVEMENTS
- BWR MARK I RECOMMENDATIONS MADE TO COMMISSION IN JANUARY 1989
- RECOMMENDATIONS FOR OTHER CONTAINMENT TYPES SCHEDULED TO COMMISSION IN LATE 1989 AND EARLY 1990

Figure 9 *(Murley)*

STAFF RECOMMENDATIONS FOR MARK I IMPROVEMENTS

- ACCELERATE STAFF ACTIONS TO IMPLEMENT STATION BLACKOUT RULE
- IMPLEMENT IMPROVED EPG'S
- ALTERNATE WATER SUPPLY FOR DRYWELL SPRAY
- HARDENED VENTING CAPABILITY FROM WETWELL
- ENHANCED ADS RELIABILITY

Figure 10 *(Murley)*

GENERIC AREAS FOR POTENTIAL CONTAINMENT IMPROVEMENTS

- HYDROGEN CONTROL
- VENTING CAPABILITY
- ALTERNATE WATER SUPPLY FOR CONTAINMENT SPRAY
- ENHANCED POWER SUPPLY FOR CONTAINMENT SPRAY
- ENHANCED EPG'S

Figure 11 *(Murley)*

SEVERE ACCIDENT RESEARCH

by

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RESEARCH AREAS
(1980-1987)

1. Dominant Accident Sequences at Operating Plants
2. Damaged Fuel Behavior in Vessel
3. Ex-Vessel Phenomena
4. Fission Product Release, Transport and Source Term
5. Hydrogen Generation and Burning
6. Containment Structural Performance
7. Reactor Risk (PRA)

Figure 1 *(Beckjord)*

REVISED SEVERE ACCIDENT PLAN

GOALS:

1. Assessment of Generic Containment Performance
2. Evaluation of Containment Improvements
3. Support of Accident Management Development
4. Assessment of Fission Product Release and Transport

Figure 2 *(Beckjord)*

NEAR-TERM RESEARCH ISSUES

1. **PWR Direct Containment Heating (DCH)**

2. **BWR MARK I Containment Shell Failure**

3. **Hydrogen Burn in BWR MARK III and PWR Ice Condenser**

Figure 3 *(Beckjord)*

LONG-TERM RESEARCH

1. **Severe Accident Modelling**

2. **Core Melt Progression**

3. **Steam Explosions**

4. **Molten Core-Concrete Interaction**

5. **Fission Product Behavior**

6. **Fundamental Data**

Figure [illegible] *(Beckjord)*

INDIVIDUAL PLANT EVALUATIONS (IPEs)

by

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For Presentation at the NRC
Regulatory Information Conference

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BACKGROUND

- o **COMMISSION SEVERE ACCIDENT POLICY STATEMENT ISSUED ON AUGUST 8, 1985 (50 FR 32138)**
  - **EXISTING PLANTS POSE NO UNDUE RISK TO PUBLIC HEALTH AND SAFETY**
  - **HOWEVER, BASED ON NRC AND INDUSTRY PRA EXPERIENCE, SYSTEMATIC EXAMINATIONS ARE BENEFICIAL IN IDENTIFYING PLANT-SPECIFIC VULNERABILITIES TO SEVERE ACCIDENTS FOR WHICH FURTHER SAFETY IMPROVEMENTS MAY BE APPROPRIATE**
  - **THEREFORE, EACH EXISTING PLANT SHOULD PERFORM A SYSTEMATIC EXAMINATION TO IDENTIFY ANY PLANT-SPECIFIC VULNERABILITIES AND REPORT THE RESULTS TO THE COMMISSION**

- o **IN ACCORDANCE WITH POLICY, GENERIC LETTER (G.L.) 88-20 ISSUED ON NOVEMBER 23, 1988 REQUESTED THAT LICENSEES PERFORM AN INDIVIDUAL PLANT EXAMINATION (IPE)**

- o **THE PURPOSE OF THE IPE IS FOR EACH UTILITY TO:**
  - **DEVELOP AN APPRECIATION OF SEVERE ACCIDENT BEHAVIOR**
  - **UNDERSTAND THE MOST LIKELY SEVERE ACCIDENT SEQUENCES THAT COULD OCCUR AT ITS PLANT,**
  - **GAIN A MORE QUANTITATIVE UNDERSTANDING OF OVERALL PROBABILITIES OF CORE DAMAGE AND FISSION PRODUCT RELEASES, AND**
  - **IF NECESSARY, REDUCE THE OVERALL PROBABILITIES OF CORE DAMAGE AND FISSION PRODUCT RELEASES BY MODIFYING, WHERE APPROPRIATE, HARDWARE AND PROCEDURES**

- o **ACHIEVEMENT OF THESE GOALS WILL HELP VERIFY THAT U.S. PLANTS ARE CONSISTENT WITH THE COMMISSION'S SAFETY GOAL POLICY**

Figure 1 *(Speis)*

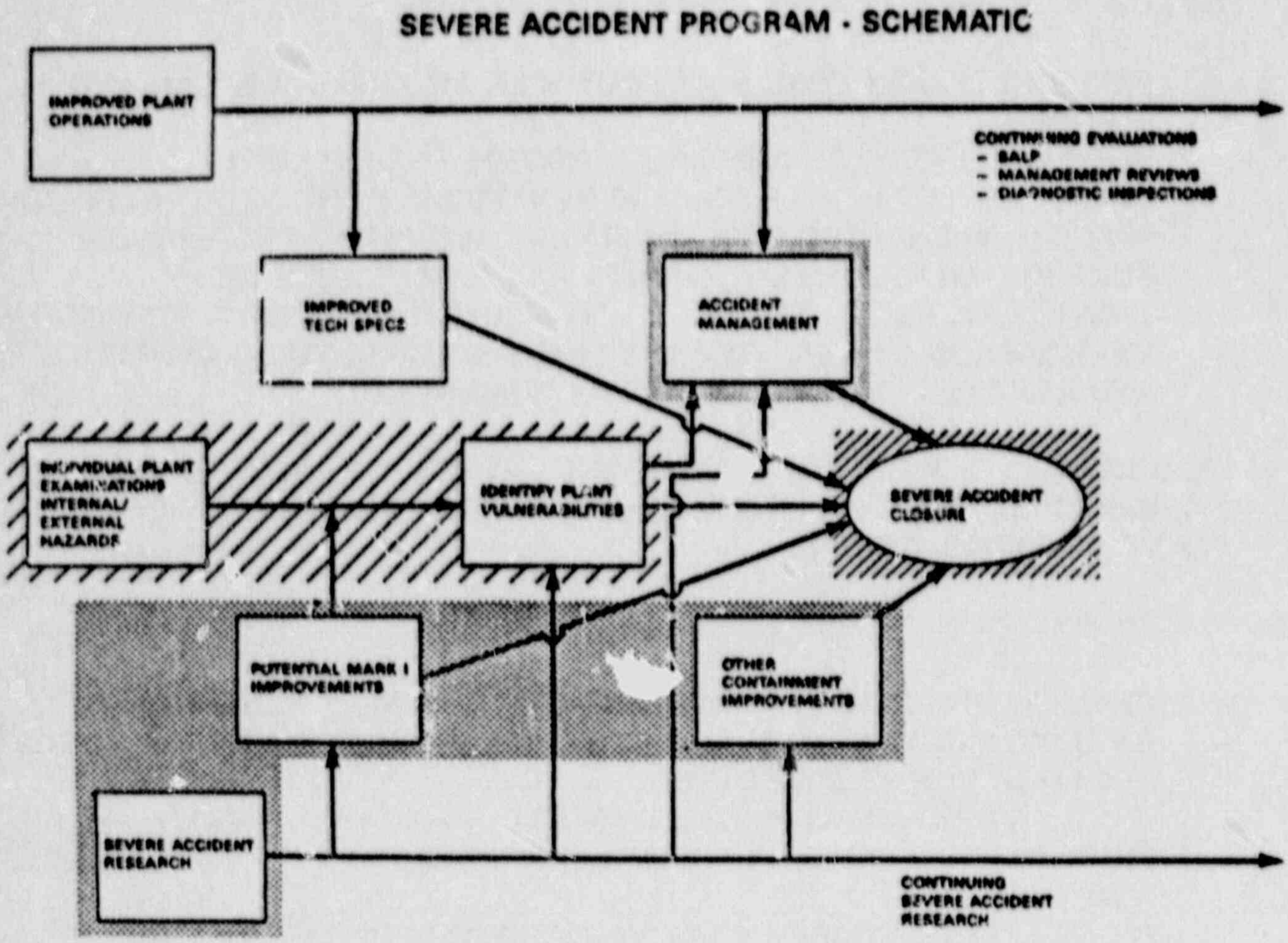

Figure 2 *(Speis)*

LICENSING/REGULATORY REQUIREMENTS/APPROACH

- o DEFENSE-IN-DEPTH (MULTIPLE, SUCCESSIVE BARRIERS)
  - DESIGN FOR NORMAL OPERATION (EMPHASIZE EQUIPMENT RELIABILITY, REDUNDANCY AND INSPECTABILITY)
  - DESIGN TO DETECT FAILURE(S) AND SHUT PLANT DOWN
  - DESIGN TO CONTROL THE CONSEQUENCES OF MORE DAMAGING ACCIDENTS
- o DESIGN-BASIS EVENTS
  - TRANSIENTS (AOOs)
  - ACCIDENTS
- o CONTAINMENT [AND OTHER SAFETY SYSTEM(S)] DESIGN
  - DBAs (e.g., LOCA, SLB)
  - EXTERNAL EVENTS
  - TID-14844 FISSION PRODUCT SOURCE TERM
- o TMI EXPERIENCE FEEDBACK
  - MULTIFAILURE CONSIDERATIONS (PLANT EQUIPMENT, SYSTEMS AND OPERATORS)
  - SYMPTOM-ORIENTED EMERGENCY OPERATING PROCEDURES
  - PERSONNEL TRAINING
  - DESIGN FOR HYDROGEN RELEASE FROM CORE-DEGRADED ACCIDENTS FOR "WEAKER" CONTAINMENTS
  - EMERGENCY PLANNING (SEVERE ACCIDENT SOURCE TERM: NUREG-0396)
- o CONTINUING OPERATING EXPERIENCE AND PRA INSIGHTS FEEDBACK
  - REVISED AND/OR NEW "REGULATIONS" (e.g., ATWS, STATION BLACKOUT)
  - ONE-TIME GENERIC AND/OR PLANT-SPECIFIC REQUIREMENT
- o IMPROVED PLANT OPERATIONS
  - CONTINUED IMPROVEMENT OF THE SYSTEMATIC ASSESSMENT (SALP) PROCESS
  - REGULAR REVIEWS BY SENIOR NRC MANAGERS OF PROBLEM PLANTS
  - TEAM INSPECTIONS TO PROBE FURTHER THE PERFORMANCE OF THOSE PLANTS IDENTIFIED IN ABOVE ITEM
  - REGULATORY ACTIONS TO IMPROVE OPERATIONAL PERFORMANCE BELOW EXPECTED STANDARDS
  - CONTINUED IMPROVEMENT OF OPERATING PROCEDURES
- o SEVERE ACCIDENT CONSIDERATIONS (CORE MELT, VESSEL PENETRATION, CONTAINMENT CHALLENGE)

Figure 3 *(Speis)*

PRA EXPERIENCE

- HUMAN ERRORS, RECOVERY ACTIONS AND PROCEDURES, TEST AND MAINTENANCE
- SUPPORT SYSTEM VULNERABILITIES
- DOMINANT ACCIDENT INITIATORS
- GENERIC AND PLANT-SPECIFIC CONTAINMENT VULNERABILITIES
- RISK CONTRIBUTING UNCERTAINTIES

<u>MOST RISK CONTRIBUTORS ARE PLANT SPECIFIC</u>

Figure 4 *(Speis)*

SEVERE ACCIDENT CONSIDERATIONS

- **WASH-1400, NUREG-1150, OTHER PRA'S, TMI-2 AND CHERNOBYL ACCIDENTS, ALL TELL US THAT SEVERE ACCIDENTS REPRESENT THE MAJOR CONTRIBUTION TO RESIDUAL RISK FROM COMMERCIAL NUCLEAR POWER PLANTS**

- **MARGINS (TO SEVERE ACCIDENT CHALLENGES) IN EXISTING PLANTS**

- **"PRACTICAL IMPROVEMENTS" TO EXISTING PLANTS (PREVENTION, ACCIDENT MANAGEMENT, MITIGATION)**

- **A DEFENSE-IN-DEPTH ISSUE (PREVENTION VS MITIGATION)?**

- **IMPORTANCE OF CONTAINMENT; REASONABLE ASSURANCE OF MITIGATION CAPABILITY FOR DOMINANT (MORE PROBABLE) THREATS TO CONTAINMENT (KEY: A REASONABLE UNDERSTANDING OF THE POTENTIAL CONTAINMENT FAILURE MODES AND THEIR RISK SIGNIFICANCE); UTILIZATION OF EXISTING CONTAINMENT PERFORMANCE MARGINS AND THE NEED FOR ADDITIONAL IMPROVEMENTS (HARDWARE/PROCEDURES)**

Figure 5 *(Speis)*

EXAMINATION PROCESS

- o QUALITY AND COMPREHENSIVENESS OF IPE RESULTS WILL DEPEND ON THE UTILITY'S COMMITMENT TO THE IPE INTENT.

- o MAXIMUM BENEFIT FROM IPE WOULD BE REALIZED IF LICENSEE'S STAFF INVOLVED IN ALL ASPECTS OF EXAMINATION. KNOWLEDGE GAINED FROM IPE SHOULD BECOME INTEGRAL PART OF PLANT PROCEDURES AND TRAINING.

- o LICENSEE IS REQUESTED TO CONDUCT IPE USING STAFF WHO ARE FAMILIAR WITH DETAILS OF DESIGN, CONTROLS, PROCEDURES AND SYSTEM CONFIGURATION.

- o NRC EXPECTS UTILITY STAFF TO:

  - EXAMINE AND UNDERSTAND PLANT DESIGN, OPERATIONS, PROCEDURES, MAINTENANCE, AND SURVEILLANCE TO IDENTIFY POTENTIAL SEVERE ACCIDENT SEQUENCES FOR THE PLANT,
  - DETERMINE LEADING CONTRIBUTORS TO CORE DAMAGE AND UNUSUALLY POOR CONTAINMENT PERFORMANCE AND DEVELOP AN UNDERSTANDING OF UNDERLYING CAUSES,
  - IDENTIFY AND EXAMINE ANY PROPOSED PLANT IMPROVEMENTS FOR PREVENTION OR MITIGATION OF SEVERE ACCIDENTS, AND
  - IDENTIFY WHICH PROPOSED IMPROVEMENTS WILL BE IMPLEMENTED AND SCHEDULE FOR IMPLEMENTATION.

Figure 6 *(Speis)*

EXAMINATION OF CONTAINMENT SYSTEM PERFORMANCE (BACK-END ANALYSIS)

- o EARLY OR LATE CONTAINMENT FAILURES DEPEND ON ACCIDENT SCENARIO AND CONTAINMENT TYPE. G.L. DISCUSSES IMPORTANT SEVERE ACCIDENT PHENOMENA WHICH AFFECT CONTAINMENT PERFORMANCE AND PROVIDES GUIDANCE ON CONTAINMENT SYSTEM PERFORMANCE EVALUATION.

- o BASIC APPROACH IS TO:

  - MAKE USE OF PAST GUIDANCE ON CONTAINMENT PERFORMANCE (CHAPTER 7 OF VOLUME 1 OF NUREG/CR-2300, "PRA PROCEDURES GUIDE," PROVIDES DETAILED PROCEDURES AND GUIDANCE ON CONTAINMENT PERFORMANCE ANALYSES).
  - BRING PAST GUIDANCE UP TO DATE USING MORE RECENT INFORMATION (NUREG/CR-4920 SUMMARIZES INSIGHTS GAINED FROM INDUSTRY-SPONSORED PRA'S, NUREG-1150, AND IDCOR REFERENCE PLANTS).
  - NOT DISMISS POSSIBLE SEVERE ACCIDENT OUTCOMES DUE TO UNCERTAINTIES IN PHENOMENA. EXAMINE THE RANGE OF POSSIBLE OUTCOMES TO UNDERSTAND WHAT COULD HAPPEN.
  - MAKE USE OF EXISTING KNOWLEDGE/INFORMATION TO THE EXTENT POSSIBLE.

- o GOAL IS TO UNDERSTAND HOW THE CONTAINMENT COULD BE CHALLENGED SO ONE CAN UNDERSTAND WHAT COULD HAPPEN AND WHAT ACTIONS COULD BE TAKEN TO MITIGATE THE CONSEQUENCES OF A SEVERE ACCIDENT.

Figure 7 *(Speis)*

GENERAL GUIDANCE ON CONTAINMENT PERFORMANCE

- FRONT-END AND BACK-END INTERFACES ARE IMPORTANT SINCE LIKELIHOOD OF CORE DAMAGE CAN BE INFLUENCED BY CONTAINMENT SYSTEMS STATUS AND CONTAINMENT PERFORMANCE CAN BE INFLUENCED BY THE CORE COOLING SYSTEMS STATUS.
- UTILIZE A CONTAINMENT EVENT TREE (CET)
- REALISTICALLY INTEGRATE SYSTEM/HUMAN RESPONSE WITH PHENOMENA FOR PLANT BEING EXAMINED. ALLOWANCE SHOULD BE MADE FOR PROBABILITY OF RECOVERY OR OTHER ACCIDENT MANAGEMENT PROCEDURES.
- FOCUS ON CONTAINMENT FAILURE MECHANISMS AND TIMING. BASE RELEASES ON CORRESPONDING DETAILED QUANTIFICATIONS FROM REFERENCE PLANT ANALYSES AND APPLY TO PLANT BEING EXAMINED.
- CET QUANTIFICATIONS SHOULD BOTH 1) CLEARLY TAKE INTO ACCOUNT EXPECTED ACCIDENT PROGRESSION AND 2) AIM TO ENVELOPE PHENOMENOLOGICAL BEHAVIOR (I.E., ACCOUNT FOR UNCERTAINTIES).
- CONSIDER STRATEGIES TO DEAL WITH SEVERE ACCIDENT ISSUES WHICH RESEARCH HAS NOT YET PRODUCED CONCLUSIVE RESULTS (I.E., LINER MELT AND DIRECT CONTAINMENT HEATING).

Figure 8 *(Speis)*

RANGE* OF CONTAINMENT DESIGN AND CAPABILITY PRESSURE ESTIMATES

Containment Type	Pressure Range	Design Pressure Range
Large Dry	95 - 150 psig	45 - 60 psig
Subatmospheric	120 - 140 psig	45 psig
Ice Condenser	60 - 120 psig	12 - 15 psig
Mark I	120 - 180 psig	60 - 65 psig
Mark II	135 - 150 psig	45 - 55 psig
Mark III	60 - 100 psig	15 psig

* Ranges reflect both uncertainties about failure modes and differences in design details for the same containment type.

Figure 9 *(Speis)*

FAILURE MODES IN MARK I CONTAINMENTS

FAILURE MODE		RISK IMPORTANCE
1.	OVERPRESSURIZATION: OVERPRESSURIZATION LEADING TO CORE DAMAGE (I.E., CONTAINMENT FAILURE BEFORE CORE MELTING)	YES+
2.	STEAM EXPLOSION: MISSILE	NO
3.	FAILURE TO ISOLATE*	NO
4.	HYDROGEN BURN/DETONATION	NO
5.	OVERPRESSURIZATION: (CORIUM/CONCRETE INTERACTION PLUS STEAM)	YES
6.	OVERTEMPERATURE: (CORIUM/CONCRETE INTERACTION)	YES
7.	BASEMAT MELT-THROUGH: (CORIUM/CONCRETE INTERACTION)	NO
8.	CONTAINMENT SHELL (STEEL LINER) MELT-THROUGH	VARIABLE**
9.	INTERFACING LOCA: (CONTAINMENT BYPASS)*	NO

---

* MITIGATION FEATURES ARE INEFFECTIVE AGAINST THESE FAILURES. THEIR PROBABILITY CAN BE REDUCED BY PROCEDURAL/DESIGN CHANGES.

** DEPENDS ON VESSEL FAILURE MODE, CORIUM'S ABILITY TO FLOW TO AND MELT THROUGH THE LINER, ESPECIALLY IN THE PRESENCE OF WATER.

\+ IN THE ABSENCE OF WETWELL VENTING.

Figure 10 *(Speis)*

SUMMARY

- o KNOWLEDGE/INFORMATION AVAILABLE FOR USE IN DEVELOPING/ IMPLEMENTING TECHNICAL SOLUTIONS TO A BROAD SPECTRUM OF SEVERE ACCIDENT ISSUES

- o THE IPE SHOULD PROVIDE THE BASIS FOR UTILITY'S
  - APPRECIATION OF SEVERE ACCIDENT BEHAVIOR
  - HOW THE CONTAINMENT COULD BE CHALLENGED
  - WHAT ACTIONS COULD BE TAKEN TO REDUCE THE PROBABILITY AND/OR MITIGATE THE CONSEQUENCES OF A SEVERE ACCIDENT (I.E., DEVELOPMENT OF PLANT-SPECIFIC ACCIDENT MANAGEMENT PROCEDURES)

- o RESEARCH IN SUPPORT OF OUTSTANDING ISSUES AND GENERIC ACCIDENT MANAGEMENT STRATEGIES TO CONTINUE

Figure 11 *(Speis)*

THE EMERGENCY RESPONSE DATA SYSTEM

by

Edward L. Jordan, Director
Office for Analysis and Evaluation of Operational Data
U.S. Nuclear Regulatory Commission

For Presentation at the NRC
Regulatory Information Conference

The Mayflower Hotel
Washington, D.C.

April 18–20, 1989

POST THREE MILE ISLAND

- COMMISSION REEXAMINED ITS ROLE IN A NUCLEAR EMERGENCY
- RECOGNIZED NEED FOR IMPROVED RESPONSE CAPABILITY-NUREG-0654
- OPERATIONS CENTER-MNBB, FEB 1985
- NRC INCIDENT RESPONSE PLAN-NUREG-0728
- RECOGNIZED NEED FOR ACCURATE REAL-TIME DATA DURING EMERGENCIES

Figure 1 *(Jordan)*

NRC RESPONSE ROLES

- MONITOR THE LICENSEE TO ENSURE THAT APPROPRIATE PROTECTIVE ACTION RECOMMENDATIONS ARE BEING MADE OFF SITE
- SUPPORT OFF-SITE AUTHORITIES, INCLUDING CONFIRMING THE LICENSEE'S RECOMMENDATIONS TO OFF-SITE AUTHORITIES, IF REQUESTED
- SUPPORT THE LICENSEE
- KEEP OTHER FEDERAL AGENCIES AND ENTITIES (e.g. CONGRESS AND THE WHITE HOUSE) INFORMED OF THE STATUS OF THE INCIDENT
- KEEP THE MEDIA INFORMED OF NRC'S KNOWLEDGE OF THE STATUS OF THE INCIDENT, INCLUDING COORDINATION WITH OTHER PUBLIC AFFAIRS GROUPS
- INTERVENE IN A LIMITED FASHION TO DIRECT THE LICENSEE'S ON-SITE RESPONSE IN SOME UNUSUAL AND VERY RARE SITUATIONS

Figure 2 *(Jordan)*

DATA NEEDS

- CORE AND COOLANT SYSTEM DATA
- CONTAINMENT BUILDING DATA
- RADIOACTIVITY RELEASE RATES
- METEOROLOGICAL DATA
- PWR AND BWR PARAMETER LISTS

Figure 3 *(Jordan)*

ERDS PARAMETER LIST

PWR PARAMETERS

PRIMARY COOLANT SYSTEM	Pressure
	Temperatures -- Hot Leg
	Temperatures -- Cold Leg
	Temperatures -- Core Exit Thermocouples
	Subcooling Margin
	Pressurizer Level
	RCS Charging/Makeup Flow
	Reactor Vessel Level (When Available)
	Reactor Coolant Flow
	Reactor Power
SECONDARY COOLANT SYSTEM	Steam Generator Levels
	Steam Generator Pressures
	Main Feedwater Flows
	Auxiliary/Emergency Feedwater Flows
SAFETY INJECTION	High Pressure Safety Injection Flows
	Low Pressure Safety Injection Flows
	Safety Injection Flows (Westinghouse)
	Borated Water Storage Tank Level
CONTAINMENT	Containment Pressure
	Containment Temperatures
	Hydrogen Concentration
	Containment Sump Levels
RADIATION MONITORING SYSTEM	Reactor Coolant Radioactivity
	Containment Radiation Level
	Condenser Air Removal Radiation Level
	Effluent Radiation Monitors
	Process Radiation Monitor Levels
METEOROLOGICAL	Wind Speed
	Wind Direction
	Atmospheric Stability

BWR PARAMETERS

REACTOR COOLANT SYSTEM	Reactor Pressure
	Reactor Vessel Level
	Feedwater Flow
	Reactor Power
SAFETY INJECTION	RCIC Flow
	HPCI/HPCS Flow
	Core Spray Flow
	LPCI Flow
	Condensate Storage Tank Level
CONTAINMENT	Drywell Pressure
	Drywell Temperatures
	Hydrogen and Oxygen Concentration
	Drywell Sump Levels
	Suppression Pool Temperature
	Suppression Pool Level
RADIATION MONITORING SYSTEM	Reactor Coolant Radioactivity Level
	Primary Containment Radiation Level
	Condenser Off-Gas Radiation Level
	Effluent Radiation Monitor
	Process Radiation Levels
METEOROLOGICAL	Wind Speed
	Wind Direction
	Atmospheric Stability

Figure 4 *(Jordan)*

ERDS

- DIRECT ELECTRONIC TRANSMISSION FROM IN-PLANT PROCESS COMPUTER
- REAL TIME
- ONLY DURING EMERGENCIES
- SAME INFORMATION (SUBSET) THAT IS SENT TO TSC & EOF
- LICENSEE ACTIVATED
- NO PARAMETER BACKFIT
- SUPPLEMENTED WITH VOICE TRANSMISSION
- OUTPUT PORT REQUIRED
- SOFTWARE FOR ACQUISITION AND TRANSMISSION

Figure 5 *(Jordan)*

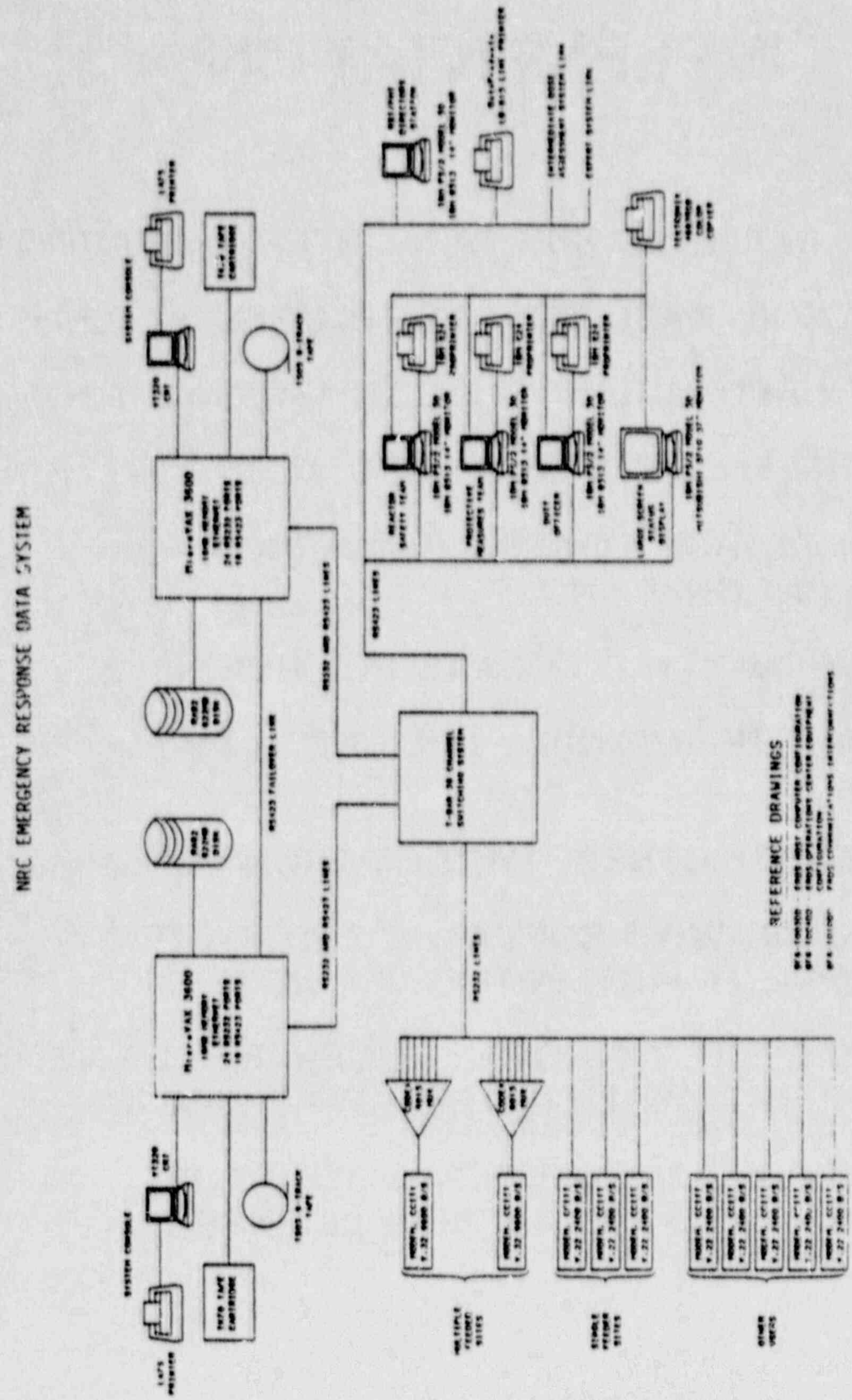

Figure 6 *(Jordan)*

IMPLEMENTATION

- SURVEY INDICATED 80% PARAMETER AVAILABILITY
- UTILITY SOFTWARE COSTS ESTIMATED AT $20-50K
- UTILITY HARDWARE COSTS ESTIMATED AT $0-150K
- NRC SYSTEM COSTS ESTIMATED AT $2.6 MILLION
- IMPLEMENTATION CONTRACT AWARDED TO EI INTERNATIONAL, INC.
- DEC MICROVAX AND COMPAQ PC DESIGN
- SOFTWARE PRELIMINARY DESIGNS IN FINAL REVIEW
- VOLUNTARY LICENSEE PARTICIPATION PROGRAM
- PROCEEDING WITH SOFTWARE AND SYSTEM DEVELOPMENT WITH INITIAL VOLUNTEERS
- GENERIC LETTER TO OTHER LICENSEES BEING DEVELOPED TO SOLICIT THEIR PARTICIPATION
- STAFF IS PURSUING APPROVAL TO START RULEMAKING TO ENSURE 100% LICENSEE PARTICIPATION

Figure 7 *(Jordan)*

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11. ABSTRACT (200 words or less)

This volume of the report provides the proceedings from the Nuclear Regulatory Commission (NRC) Regulatory Information Conference that was held at the Mayflower Hotel, Washington, D.C., on April 18, 19, and 20, 1989. This conference was held by the NRC and chaired by Dr. Thomas E. Murley, Director, Office of Nuclear Reactor Regulation. There were approximately 550 participants from nine countries at the conference. The countries represented were Canada, England, Italy, Japan, Mexico, Spain, Taiwan, Yugoslavia, and the United States. The NRC staff discussed with Nuclear Industry its regulatory philosophy and approach and the bases on which they have been established. Furthermore, the NRC staff discussed several initiatives that have been implemented recently and their bases as well as NRC's expectations for new initiatives to further improve safety.

The figures contained in Appendix A to the volume correspond to the slides that were shown during the presentations. Volume 2 of this report contains the formal papers that were distributed at the beginning of the Regulatory Information Conference and other information about the conference.

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