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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

500TH MEETING

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THURSDAY,

MARCH 6, 2003

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ROCKVILLE, MARYLAND

The Committee met at 8:30 a.m. in Room T2B3, Two White Flint North, Rockville, Maryland, Stephen L. Rosen, Chairman, presiding.

ACRS MEMBERS PRESENT:

MARIO V. BONACA	Chairman
GEORGE APOSTOLAKIS	Member
F. PETER FORD	Member
THOMAS S. KRESS	Member
GRAHAM M. LEITCH	Member
DANA A. POWERS	Member
VICTOR H. RANSOM	Member
STEPHEN L. ROSEN	Member-at-large
WILLIAM J. SHACK	Member
JOHN D. SIEBER	Member
GRAHAM B. WALLIS	Member

NRC STAFF PRESENT:

SHER BADAHUR	Designated Federal Official, AM Session
MAGGALEANA WESTON	Designated Federal Official, PM Session
JOHN T. LARKINS	Executive Director, ACRS/ACNW
SAM DURAISWAMY	Technical Assistant, ACRS/ACNW
HOWARD J. LARSON	Special Assistant, ACRS/ACNW
CHRISTINA ANTONESCU	NRR
STEVEN ARNDT	NRC/RES/DET
BILL BATEMAN	NRR/DE/EMCB
BRUCE BOGER	NRR/DIPM
CYNTHIA CARPENTER	NRR/DIPM/IIPB
BARRY ELLIOT	NRR/DE/EMCB
RONALD FRAHM	NRR/DIPM/IIPB
FRANK GILLESPIE	
PETER KOLTAY	NRR/DIPM/IIPB
P.T. KUO	NRR/DRIP/RLEP
TONY McMURTRIE	NRC/Peach Bottom SRI
MARK SATORIUS	NRR/DIPM/IIPB
DAVID SOLORIO	NRR/DRIP

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P-R-O-C-E-E-D-I-N-G-S

(8:33 a.m.)

CHAIRMAN BONACA: The meeting will now come to order. This is the first day of the 550th Meeting of the Advisory Committee on Reactor Safeguards. During today's meeting, the Committee will consider the following, Peach Bottom License Renewal Application, Reactor Oversight Process, Vessel Head Penetration Cracking and Vessel Head Degradation, Draft of Final Revision I to Regulatory Guide 1.180, DG 1119, Guidelines for Evaluating Electromagnetic and Radio Frequency Interference in Safety-Related Instrumentation and Control Systems, and finally, Proposed ACRS Reports.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Dr. Sher Badahur is the Designated Federal Official for the initial portion of the meeting. We have received no written comments or requests for time to make oral statements from Members of the Public regarding today's sessions. A transcript of the meeting is being kept, and it is requested that the speakers use one of the microphones, identify themselves and speak with sufficient clarity and volume so that they can be readily heard.

I will begin with some items of current interest. First of all, as you may have noticed, this is the 500th Meeting of ACRS, and we had a celebration over the past two days for this historic event, where we had also many of the former members coming and participating with us in panel discussions. The meeting and celebration held on March 4th and 5th were very successful.

I would like to thank the ACRS Staff, especially the Operation Support Branch Staff, and specifically Jenny Gallo, Sherry Midder, Michelle Kelton, Barbara Jo White, Ethel Barnard, Theron Brown and Tanya Winfrey, who were instrumental in organizing and contributing to the success of this event. Also, I would like to thank the Members and all meeting participants for the success of this historic event. I would like to see if Jenny Gallo is here. Well, I think you should stand up. Well, I want to thank you because everything went very well, and without a glitch and that was pretty remarkable.

I would like to start with some items of current interest. You have in front of you items of interest, and I can point to the first item there where it's mentioned that Chairman Merserve was elected to National Academy of Engineering Membership on February 14th, 2003. We want to congratulate Chairman Merserve for the election to the membership. There are also a number of interesting letters and speeches in this document.

Now we can turn to our agenda. The first item on the agenda is going to be a Peach Bottom License Renewal Application, and Mr. Graham Leitch is going to lead us through that presentation. Thank you.

MEMBER LEITCH: Thank you, Dr. Bonaca. You recall that on October 30th we had a Subcommittee Meeting concerning the Peach Bottom License Renewal Application. At that time, we reviewed the SER with some open items and confirmatory items. At our November Full Committee Meeting, I gave a verbal summary. We concluded that there was no interim letter necessary at that time, and I gave a verbal summary at our November Full Committee Meeting, a summary of the results of that SubCommittee Meeting.

In the meantime, the Staff has worked with the Applicant, and on February 5th, they issued the final SER with the open items and confirmatory items all in a closed status, so we're going to hear presentations from both the Staff and the Applicant regarding those items today.

Also of note is that on December 20th of 2002, there was a scram at Peach Bottom with some complications, and we're going to hear later in the presentation a discussion of that scram, and particularly with a focus on whether it has anything to say about the license renewal process, the aging management of passive systems, so we want to hear the normal presentation, and try to compress that discussion of the scram which I know is of interest, but yet we want to try to compress that into the last 15 minutes or so of the presentation so that we can maintain the schedule. So with those opening remarks, I'd like to turn the discussion over to P.T. Kuo.

MR. KUO: Yes, sir. Good morning. Thank you, Dr. Leitch. I'm P.T. Kuo, the Program Director for License Renewal Environmental Impacts Program. The Project Manager for the Safety Evaluation of this project is Mr. David Solorio, to my right. He will be leading the Staffer presentation today. We have also invited our senior residents at Peach Bottom, Mr. Tony McMurtrie, to my left. He and Mr. Solorio will be giving you a brief summary of the event occurred at Peach Bottom on December 21st, 2002. They will not go into the details of event, but they will present to the Committee the brief scenario of the event, the potential impact on license renewal, and preliminary findings.

We also have the technical support from Tech Staff. Most of the key reviewers are sitting in the audience. They are ready to answer any questions the Committee may have. I have also requested the presence of our Deputy Division Director, Division of Regulatory Improvement Programs, Mr. Frank Gillespie. He will be here later on to answer any questions the Committee may have on the broader aspect of the issues dealing with the current events, and the relationship with the license renewal review. At that time, I believe Mr. Gillespie will be able to answer any questions in terms of the office process, and what we are doing right now.

In terms of the application, Mr. Solorio will brief the Committee on the resolution of the 15 open items that we briefed the Subcommittee last time. We have since resolved all the open items, and Mr. Solorio will give the Committee a brief summary of some of these issues, and plus other issues of interest to the Committee.

In terms of the commitment list, Exelon has submitted a Committee list in their FSAR

Supplement, and the Staff has reviewed and verified, and also included this list in our SER. And this list will also be included in our post license renewal inspection procedure, 7/1/003.

With that, I would like to turn over the briefing first to Exelon, and then followed by the Staff presentation. Exelon.

MR. BOHLKE: Dr. Bonaca, Members of the ACRS, good morning. My name is Bill Bohlke. I'm the Senior Vice President for Nuclear Services of Exelon Corporation. I'm pleased to be here this morning. I'd like to introduce on my left Mr. Fred Polaski. Fred is the Corporate Manager responsible for license renewal, and has been involved in the daily activities since the inception of the Peach Bottom License Renewal Project. And to his left is Mr. Eric Patel, who is the Project Lead for that project. To my right is Gary Stathes. Gary is the Station Engineering Director for Peach Bottom. Gary and I will address the issues of interest regarding the December 20th scram here in a presentation.

Before we go on, I'd like to take the opportunity to tell you how honored we are to be part of the 500th ACRS Meeting. I think you are due all the congratulations that you receive, and all the compliments that you receive. Obviously, the ACRS would not have endured as long as it has had it not been consistently providing valuable insights and challenges to the industry to force us to look internally more aggressively than perhaps we might have on our own, so again, thank you for that.

At this time, I'll turn it over to Fred for the presentation. Thank you.

MR. POLASKI: Good morning. This is Fred Polaski with Exelon, and I believe you should all have a handout of the presentation. We're going to talk about the Peach Bottom Licensure Application today. The second slide is a picture of Peach Bottom, and I won't go over it in detail, but that's the plant that, you know, on the Susquehanna River. If there was any -- we had some discussion last time about how the flow goes in and out of the plant, and the water flow and that stuff. If there's any questions on that, I can explain that from a picture if anybody would like to go through that.

MEMBER POWERS: Please.

MR. POLASKI: Okay. In this view, you're looking from the north towards the south. Out here is the Susquehanna River flowing from north to south. The intake structure is right here. This is the outer screen structure. You get two intake canals, one for Peach Bottom 3, one for Peach Bottom Unit 2 going into the plant. This is the inner screen structure, the pump house. This outer screen structure, the inner screen structure, non-safety related. The pump house, the center part of that is safety-related which we discussed last time.

From there, cooling water goes in pipe underneath the ground underneath the administration building into the plant. This is your turbine building, Unit 2 on the south end, Unit 3 on the north end, two reactor buildings, Unit 2 and Unit 3. Discharge from the plant then comes out in this area into this cooling pond area here, and then down underneath this bridge, down through this discharge canal for about a mile, where it finally discharges back into the Susquehanna River.

This is an old picture that shows five cooling towers. The original design was three, we then later added two. The last two have since been removed. There have been studies done, and the cooling towers are -- there's only three left. They're only used in very extreme situations when there's very low flow in the river and very high temperatures, so the normal cooling flow path is through this canal, through the pumps, into the plant, back out and then down that way.

One other structure we talked about last time was the emergency cooling tower. This is the emergency cooling tower right here. All the piping for that is underground, and water in here can actually feed down underwater pipe, underground pipes into the pump structure isolated at that time from the river, because you would lose the whole river. And then that circulates water through the plant, back to the cooling tower and then closed loop cooling.

MEMBER POWERS: I take it the river flows from top to bottom in that picture?

MR. POLASKI: No. It flows here on the north flowing south. Okay?

MEMBER POWERS: Okay.

MEMBER LEITCH: Fred, just while you're on that picture, could you point out, you know --

MR. POLASKI: Okay. That's the containment for Unit 1, which was the prototype high temperature gas cooled reactor. The other structures around that, a lot of the office building and turbine building has been restructured into a training facility. The simulator is in that building, and there's no connection between Unit 1 and Unit 2 and 3 at all. They're totally -- no common water systems, air systems, nothing.

I guess the other thing, there's two -- the transmission lines coming out of the plant. This is the south substation up on top of the hill where the Unit 2 goes out to. The north substation is in this area up here where Unit 3 transmission lines go to, so we've got two separate substations, one for each plant.

MEMBER SHACK: Where would the high flood line for the river be?

MR. POLASKI: The high flood line is actually at elevation 116, which is the elevation of this parking lot and all of this area right here. At this point, the Conowingo Pond is several miles wide, and the most extreme problem we ever had was I believe in 1972, Hurricane Agnes. It came up through -- it came up the coast, turned up through the Chesapeake Bay, right up the Susquehanna River, went up into New York State, turned around and came back and sat there and dumped a lot of water. We had close to a million cubic feet per second flow through the river at that time. Now Peach Bottom 2 and 3 weren't started up yet, and I think the elevation got to about 115 and a half, because I was there. I was working on Unit 1, and we were sandbagging Unit 2 and 3 in case we had a flood on site, but did not. So that's essentially the design for flooding, and we didn't get any water into the plant.

MEMBER ROSEN: Fred, what are those other buildings alongside the pond?

MR. POLASKI: This one?

MEMBER ROSEN: Yes, and the one next to it.

MR. POLASKI: This is a site management building, this is offices, and this is the building maintenance shop for things like people that fix, maintain the buildings, and plow the snow and that kind of stuff. The regular maintenance shops are in this building here. This is the administration building, inside security where your maintenance shops are for people that do repair on the plant.

MEMBER ROSEN: So those first two buildings you described would be flooded during this.

MR. POLASKI: No, they wouldn't because -- well, the worst condition we had during Agnes, we did not get water up in this parking lot. This is a 116 elevation. It got to about 115 and a half, 115.9 inches, something like that. And that was, you know, probably design condition. It couldn't have gotten any worse, because Conowingo Dam south of that was -- had all of its flood gates up downstream of that, and towns got flooded with ten feet of water, and we didn't get any water on site.

MEMBER ROSEN: Thank you.

MR. POLASKI: If you'd go on the next slide. Peach Bottom Unit 2 and 3 are General Electric BWR4s, both with Mark I containment. Total net generating capacity is about 2,340. We've gone through power uprates at Peach Bottom 1, a 5 percent uprate, and then most recently I guess one and a half percent feedwater flow increase. The initial licenses expire in 2013 and 2014.

On to slide 4. What we'd like to talk about today is briefly the background of the application,and then a look ahead post receipt of the new license, and what's going to be happening with respect to licensure, and after we get the new license.

Background, July, 2001 we submitted the application. In December of 2002, the NRC issued their Supplemental Environmental Impact Statement. In February this year, the Safety Evaluation Report was issued without any open items. And also in February, Region 1 Administrator issued his letter recommending the new license for Peach Bottom.

Taking a look at what's going to happen in the future, the UFSAR Supplement, which includes the summary descriptions of our Aging Management Programs will be implemented in the next update of the FSAR. That will be in April, 2005. We update every two years, and that's the next one that's scheduled, so the supplement will be included in that one.

All the Aging Management commitments that we've made that are defined in the UFSAR Supplement will be completed and implemented. Many of them are already done now, some of them we still have to do in the future, and I'll talk about those in some more detail. And as we go forward for the next 30 years, we have established or we are establishing a process so that any plant changes will be evaluated to make sure that the commitments that we made as part of license renewal are maintained.

MEMBER WALLIS: Are you in line for an extended power uprate?

MR. PATEL: We are (off mic.) Peach Bottom.

MEMBER WALLIS: You are not.

MR. POLASKI: As far as implementing commitments, and I'm going to talk through this, and then I've got about five or six slides to show you specifics. But all commitments are documented in Exelon's Commitment Tracking System, so every commitment we've made as part of the licensure application is documented in our system.

Each Aging Management activity, and that's the term we use in the application. Other people use the term "Aging Management Program", and that runs the gamut from what we call big P Programs like ISI, in fact, which are very clearly defined, what we call little P Programs, which you don't find a program in the plant but we've described it as a program, like diesel fuel oil and lube oil monitoring program, which consists of a lot of smaller activities that we have grouped together as a program. Each of those has assigned a commitment tracking number in a commitment tracking system.

Our implementing procedures have been annotated for all the ongoing commitments so there's a clear traceability from procedures back to the commitment tracking item. And future actions that have been identified, and these are the ones that exist in the list we provided to the NRC and is being issued as Appendix D, I believe it is, to the FSAR or the SER when it gets issued as a NUREG. Some of those have a future action for implementation in the future, and I'll go through an example of that.

MEMBER FORD: It's one thing to be sure that you follow it through on your commitments and that's what you're speaking about here, but are you going to look at all as to the effectiveness of those commitments? In other words, are you going to look at whether those commitments have truly identified aging problems, or are there aging issues that occur that were not surfaced by those commitments?

MR. POLASKI: The answer to that is briefly yes, because all these commitments are in existing programs. Some of them existed before, some of them are existing new, and they're all subject to our normal routine self-assessment effectiveness reviews, so we'll be looking at that, you know, as part of normal business, like we look at all of our other programs.

MR. BOHLKE: What we've got as part of our corporate structure is a strong corporate oversight function, which is different from the regulatory nuclear oversight or quality assurance organization, so senior engineers or subject matter experts as we call them, own programs like service inspection, fluid, accelerated corrosion, vessel internals, et cetera. Part of their responsibility is providing regular assessments on a station-by-station basis, and there are 10 stations in the fleet, wherein we compare the station's performance against the expectations delineated in the various program-defining documents.

That's a regular feature of what we do, as well as being able to use the Corrective Action Program to be able to clump together things that may appear to be related for the purpose of doing common cause analysis, to see if there are other programmatic or process weaknesses that surface from that route.

MEMBER FORD: So as I understand what you're saying, is most, if not all of these programs, new or augmented programs are going to -- you're not just going to wait until the end of the current license period to implement those programs. They're going to be implemented soon?

MR. BOHLKE: They will be incorporated in plant procedures. Some of those plant procedures will go into effect immediately. Others where we have committed to one-time inspections, we will have a date certain for those, and then the results will be reviewed.

MEMBER FORD: All right. Thank you.

MEMBER ROSEN: Bill, I understand what you said about corporate having an individual, a senior individual who looks at say, in-service inspection across the fleet, et cetera. Do you also have in mind having a senior person who would look at aging management throughout the fleet?

MR. BOHLKE: Mr. Rosen, we don't necessarily view aging management as a separate issue from the normal material condition maintenance of the plant. There are a lot of things we're taking care of. We're going to talk about a couple of those related to the scram discussion later, but as we move on to year 40, we're addressing issues that relate to the age of components, sometimes because of their unreliability and the threats that they provide to generation, and for other reasons. So there's -- we're getting more sophisticated all the time, but it -- I want to say that it's not our intention to segregate aging management as a separate activity, but to fold it into our daily activities for the stations, for all the stations.

MEMBER ROSEN: So for instance, that senior engineer who is in charge of in-service inspection throughout the fleet would have as part of his regimen, thinking through aging management with respect to in-service inspection.

MR. BOHLKE: Absolutely correct.

MEMBER ROSEN: Okay. Thank you.

MR. POLASKI: On slides 8 and 9 we have a list of all of the aging management activities. And this is Appendix A right out of the application. And for each one of these, you can see under the commitment tracking number, that we have assigned a commitment tracking number. Now these commitments are all listed in our commitment tracking module that's part of our plant information management system, which is a large database that we use for work orders, commitment tracking, RAD protection, a lot of different parts that go together.

Included in here are all commitments that we've made to the NRC, internal commitments we've made to ourselves, commitments we've made to other regulatory agencies, and all of the licensure commitments are in this, so these are being treated just like we treat any of our other commitments. As you can see, there's a commitment tracking number assigned to each of these.

The far right-hand column under "Future Actions", we've initiated an action request, and on slide 9, that actual number for that is there. It's A1329928 - remember that number. I'll show you that later, but that's an action request that we have identified for future actions we've not yet implemented. And each of those future actions has an evaluation item number, and the first one you see here is E19, and it goes down the list, E08, and they're all identified in our system.

Specifically, the one I've highlighted is down near the bottom, 2.9, Fire Protection Activities with a commitment tracking number T04342, and there's three future actions to that. And we highlighted the T number, and also E06, because I'm going to show you specific examples of those as we get through this presentation.

MEMBER APOSTOLAKIS: I'm just curious on slide 8. Item 1.13 is the Corrective Action Program. How does one decide that program is a good program? Is it just industry experience, or --

MR. BOHLKE: The Corrective Action Program has always been there, and it's what we do, how we make changes in the plant. And it gets evaluated --

MEMBER APOSTOLAKIS: This is what it is, but how do you decide that it's good enough?

MR. BOHLKE: By doing effectiveness reviews as a Corrective Action Program, one of which is being completed as we speak for the fleet of Exelon and Amergen plants, where we go in and look at the process to see that the process is working as we have designed it. If not, make adjustments, and then look at the effectiveness of the corrective actions themselves to see if we are solving problems the first time out of the box effectively, so that's part of an effectiveness review that's being conducted by the Regulatory Affairs people who own the process in conjunction with the Nuclear Oversight people who do all forms of oversight and assurance.

MEMBER SHACK: So the measure of effectiveness is whether the problems repeat themselves?

MR. BOHLKE: That's a negative measure of effectiveness. That's correct.

MEMBER APOSTOLAKIS: Or how long it takes.

MR. BOHLKE: That's another one.

MEMBER SHACK: I'm sure you went through this at the Subcommittee Meeting, but where would you, in fact, address aging management for the lower vessel head penetrations? Is that considered in your ISI Program?

MR. BOHLKE: That's part of the Vessel Internals Program.

MR. POLASKI: That's Vessel Internals --

MR. BOHLKE: And the BWRVIP is looking at things like that.

MR. POLASKI: One thing I'd like to note on here, on slide 8 we have listed existing programs and enhanced programs. These are all -- even enhancements for existing programs, we had to make some tweaks and minor improvements to. And as you can see, there's like 29 of them on this list. On slide 9 is new aging management activities, of which there are six, so most of the things that we're planning for license renewal already exist, and we didn't need to add a whole lot. And these programs that we added are not major programs. They're in relative size compared to some of the other ones, like ISI Program, and FAC, and water chemistry are not nearly as large.

I'd like to go on to slide 10, and this is an actual printout of our PIM System, of a plant commitment. And the first number I told you to remember, T04342, there it is. That's our commitment number, and this is out of PIM so the type of activity it's a commitment. It's for Peach Bottom. This is -- you know, the status is it's not yet satisfied and it's initiated so we haven't completed this commitment. The topic is Peach Bottom License Renewal Fire Protection Activity. All of these have a central element number of PBLR so we can go into the system and find them using our code. And then on each of those there's a description of what the commitment is. And if you look at every one of them, and start out with potentially a generic paragraph at the beginning which discusses this is a commitment for Peach Bottom license renewal. Then there's a statement of the commitment with all the details that are in it. Down lower is the scope of the fire protection activities will be enhanced, you know, things like requiring additional inspection for deluge valves and sprinkler systems. Second, perform functional test of sprinkler heads that have been in service for 50 years, so that's one of the things that we've committed to enhance and do in the future.

MEMBER FORD: So these cast iron fire protection components that are losing material due to leeching. I mean, I don't understand what components they are, and why they lose material due to leeching.

MR. POLASKI: We've got a program in place that's going to look for selective leeching of --

MEMBER FORD: What kind of components are they?

MR. POLASKI: Valves, piping.

MEMBER FORD: So they're part of the

piping. It's the water in the pipe that's --

MR. POLASKI: It's the water in the system that could cause selective leeching.

MR. PATEL: This is Erach Patel. It's cast iron and raw water systems for fire protection.

MR. POLASKI: In fact, we've already done one inspection of a fire hydrant or a fire hydrant valve and looked at it for selective leeching, and found no evidence of it so far.

MEMBER POWERS: Leeching is such a peculiar term to apply to cast iron, I'm intrigued. What are you leeching out?

MR. PATEL: I'm sorry. What is the question?

MEMBER POWERS: The question is what leeches out.

MR. PATEL: The graphite.

MR. POLASKI: Yeah. As I understand it, you can have selective leeching, and you can look at the metal and it looks like it's all there, but if you come down on it hard, it just crumples, sir.

MEMBER POWERS: How do you determine leeching? Usually that's --

MR. POLASKI: The one that we did do, we had removed the component for maintenance and we sent it to our test labs, and then ran tests on it in laboratory conditions. They checked for hardness is what they really checked for.

MR. PATEL: They checked for hardness, and they also do fracture mechanics.

MR. POLASKI: Yeah, that one -- I think they actually took that and cut it apart and looked at microbiological --

MEMBER SHACK: Then they literally replaced the head.

MR. POLASKI: Oh, yeah. Well, this was a component that was being removed and replaced, so we took the --

MR. PATEL: We took the opportunity to test it.

MR. POLASKI: On slide 11, this is the second page of the same commitment. You can see that we've listed the aging effects that are managed, so we've got fire protection, piping, sprinklers and valves, visual inspection to detect loss of material, cracking, flow blockage. And you won't find selective leeching on here because that was a separate program we initiated just for that one activity.

Some other things just to point out, sprinkler heads in service for 50 years, gone through testing to detect flow blockage. Some other examples, things like visual inspection for fire or loss of material, so we've got it all delineated in here, what our commitment is, what we're doing. And then as part of that --

MEMBER POWERS: Your sprinkler head has been in service for 50 years, but again in-service for a sprinkler head is a peculiar term because --

MR. POLASKI: Its in-service begins when they were installed in the plant, not when we started operating.

MEMBER POWERS: Well, how many times have these sprinkler heads actually been activated?

MR. POLASKI: Very, very few.

MEMBER POWERS: One would hope.

MR. POLASKI: Yeah.

MEMBER FORD: Could I just --

MR. POLASKI: We have references to each of the aging management reviews that we performed on --

MEMBER FORD: Could I just come back to this leeching question? It's not unusual degradation mode, but I don't know. Is it an approved non-destructive testing process by, for instance, the petrochemical industry, or --

MR. POLASKI: As I understand, there is debate about whether you can do it in situ with a portable hardness testing device. Some people think you can, other people think you cannot.

MEMBER FORD: But is there or is there not an approved standard for doing this?

MR. PATEL: Not as far as I know.

MR. POLASKI: Not that we know of.

MR. PATEL: It's usually a destructive test, or a --

MEMBER FORD: Okay. So you're dead.

MR. PATEL: Yeah.

MR. POLASKI: Now what we've seen so far, we haven't seen any indication of it at Peach Bottom, so I mean -- but we are going to look for it, and the metallurgists have told us based on the water conditions, they don't expect it will occur, but we're still going to check for it periodically. And it's not the kind of thing we're going to be pulling a hundred feet of piping out every year to go look at. We will take the opportunity when it arises, when equipment is removed, and when we replace to inspect it.

MEMBER FORD: But the consequence of an undetected degradation of such a pump housing, et cetera, merits that sort of approach?

MR. POLASKI: What I understand, in conditions where selective leeching can occur and it's significant, you can essentially lose the structural integrity of the body of a valve, and it would just fail.

MR. BOHLKE: So we're looking for -- in addition to looking for things that are self-revealing, i.e., leaks in water mains, we're looking for things that aren't self-revealing. This would be one of them.

MEMBER FORD: Which are latent which could go in time of a knockout, and or when they must be used.

MR. POLASKI: But these are the kind of things that -- and I'm not an expert on metallurgy and selective leeching. I understand that it doesn't happen overnight. I mean, it's a long slow process, so you've got -- if you're looking you'll detect it in your end stages. And if we find it in one valve, then we'll do more investigations to find out if we have it other places.

Taking a further look at this is part of this commitment. We also have listed implementing activities. We wanted to do maintenance procedures, check valve maintenance, and I'll give an example of that later, so there's two of these here. Go on to the next slide.

Now we're on to 93 through 100, so there's a whole of activity specifically listed here, every procedure that we have involved is listed. And the two bottom ones, 99 and 100, are listed as RT. That's a routine test for us, and it's a place keeper. These are activities that have not yet been implemented, but they're listed here as things we need to do. And this one has sprinkler heads in-service for 50 year inspection. And there is an activity number, A1329928, E06. And this is the one I showed you on the first page, so this links that commitment through the T number to this procedure, which still needs to be put in place. And it has a due date of June 15th of 2012. It's got an implementing organization which is designated to a particular group. And you could go through the details of that. It's assigned to an actual individual who has that responsibility to make sure that occurs by that date. And as part of our normal process on commitments, they're reviewed and people make sure that they're kept up to date.

MEMBER ROSEN: Now on June 15th, 2012, does a red flag, does the computer put up a red flag, or is this guy supposed to remember that that's --

MR. POLASKI: The computer puts up flags before 2012, so it will flag it well enough ahead of time. Now the other thing is it's 2012, those dates are calculated such that you've got time in there allowed to implement it before you actually get to the 50 years, so it's all built into the process.

Now remember, we started up the plant in 1973. This is 2012. That's only 40 years after plant start-up, and the sprinkler system went into effect a couple of years before that, so even if you miss 2012 by a year or two, you'll still meet your 50 year commitment, so we built that allowance in there.

CHAIRMAN BONACA: I have a question regarding all these programs are in place to address degradations that we expect to see, possibly we're checking to see that they don't occur for one time inspection. But there would be certainly some degradation of passive components that we do not expect right now, and GALL does not expect that will occur. You will identify that. You'll have a corrective action taking place on that. How does that information get communicated to the industry so that, for example, the GALL report is properly updated to recognize that things that were not expected are going to happen? I mean, it seems to me that there is an issue here on a genetic basis with other plants that recognize those issues.

MR. KUO: If I may, this will be part of our license renewal lessons learned. As soon as we find something that we say we never expected before, that we will collect the information. And if it is warranted, we will issue ISG, Interim Staff Guidance, for the industry to use basically for license renewal, and for industry for other purposes. But in license renewal specifically, we will issue the Interim Staff Guidance for this particular issue.

CHAIRMAN BONACA: But among all the degradation of the core of the plant, how does this piece of information come to you?

MR. KUO: There will be a license event report, and we will be collecting that. When we revise our GALL report the next time, we will be reviewing all this license event report throughout this gap period.

CHAIRMAN BONACA: So the burden is all on you to recognize that these are aging issues not previously recognized, and there is no burden on the licensee to identify it, and communicate that there is a degradation that is not addressed right now in the programs there now.

MR. KUO: Licensee's burden is to file the licensee event report.

CHAIRMAN BONACA: Okay. But not specific to degradation.

MR. KUO: Right.

MEMBER WALLIS: So there isn't much mechanism for degrading a sprinkler head, but you've got piping all over the plant, which leads to the sprinkler heads. And presumably, there are valves which can leak, you could have a very slow leak which goes into the line and evaporates. You wouldn't know it's there, but it's corroding the line.

MR. POLASKI: We have procedures in place to check for degradation of the wall thickness on the piping also, so the sprinkler head is just one of many.

MEMBER WALLIS: Yeah. I'm thinking more of corrosion products like rust which when you turn things on, blocks the sprinkler head.

MR. BOHLKE: Yeah, rust and leak were the two challenges for including piping systems, and we've got programs in place --

MEMBER WALLIS: You monitor that. Okay. Thank you.

MR. BOHLKE: -- to check for that.

MR. POLASKI: So let's go on to the next slide. This is an actual page out of the procedure, M3701, which is one of the first things we mentioned. The step that's here, visually examine the following for damage, excessive wear, cracks, corrosion, fitting erosion, evidence of Asiatic Clams or other abnormalities reported in the CREM, and that's part of the work order process. That CM-1,that's the commitment. That annotates that step that's a commitment that we've made, so if you go to the next slide, this is further in the same procedure down at the bottom under commitment, CM-1, Peach Bottom License Renewal Fire Protection Activities. All right. So this indicates that this is for license renewal, and there's that T04342 number. So every step that's in a procedure, or in some cases it may be the entire procedure that we've credited for licensure, and we have annotated. There's a reference back to the commitment item, and all of it's tied together.

MEMBER LEITCH: Fred, I notice that this is not unitized. Is that because this is a common system fire protection, and --

MR. POLASKI: Fire Protection system.

MEMBER LEITCH: But normally you keep records on a unitized basis. Right?

MR. POLASKI: Yes.

MEMBER LEITCH: For systems which are not common.

MR. POLASKI: Yes.

MR. PATEL: If you go here you will see, Graham, you will see the unitized one, 330-2, 370-2, 350-2.

MEMBER LEITCH: Oh, okay.

MR. PATEL: Okay?

MEMBER LEITCH: Good. Thanks.

MR. POLASKI: Onto slide 15, this is the Action Request for future activities. Here's the Action Request number. This is Evaluation number 6, evaluating organization it's assigned to, with the individual assigned, valuation requesting the -- that's the license renewal project. And then this is a description of what needs to be done for testing the sprinkler heads in 50 years in the future, so this is all documented in there. The representative sample of sprinkler heads that have been in-service for greater and required to be functionally tested. And there's a reference in here to NFPA25, which has got the requirements in there, so this documents what needs to be done in the future. So we have transferred all of the detailed information from the licensure application documents into this Action Request so that the individual who has to implement in the future, has the specifics of what needs to be done.

As far as, you know, so what else is left to do? We are -- our configuration change control procedures are being updated to address license renewal requirements. This is the implementation, 5437B. Included in this will be anything like physical plant modifications, operational changes, water chemistry conditions, that kind of thing, and other changes to the current licensing basis. And we'll address all of the 10 CFR 5437B requirements.

As far as maintenance of records, Exelon Records Management System is going to retain documents that we generated during the application, such as scoping packages, position papers we wrote, the license renewal boundary drawings and all of our aging management reviews. And in future self-assessments and NRC inspections, we're going to validate whether we've managed our commitments properly and they've all been implemented. And that concludes my remarks. Do you have any questions?

MEMBER APOSTOLAKIS: Peach Bottom was one of the NUREG 1150 plants, the PRAs that was done a long time ago. What was the core damage frequency? Does anyone remember? I think it was below 10 to the minus 4, wasn't it?

MR. POLASKI: I think it's 10 to the minus 6, I think.

MEMBER APOSTOLAKIS: It was pretty low.

MR. POLASKI: Yeah. It's pretty low, yeah.

MEMBER APOSTOLAKIS: And there was a complete PRA done, as I remember, I mean including external events. Right? Including earthquakes and EPRI versus Livermore, you know, the whole works. You were one of the plants that did the whole thing. Did all that work play any role at all here, or you followed the regulation?

MR. POLASKI: We followed the regulation. The regulation is not deterministic of what's in scope. As far as inspections, we didn't use the PRA specifically, but if we had -- I think we used some engineering judgment on low safety significant systems for amount of inspection versus a system that was more safety significant. But, you know, we try to do things like find -- if we had to do some inspections of piping, to find those areas that we thought were most susceptible to aging, as opposed to just doing a random sampling.

MEMBER APOSTOLAKIS: Are you using the PRA in other activities?

MR. BOHLKE: We use the PRAs in a variety of activities. You've seen the work we've done in support of uprates. You've seen the work we've done in support of all outage times. And, of course, it's used on a daily basis to monitor activities creating risk profiles. It is -- PRAs are embedded now in our daily work, has wide application.

MEMBER APOSTOLAKIS: Very good. Thank you.

MR. BOHLKE: So let me start talking a little bit about the scram, and I want to lead it off because in a certain sense, I have my fingerprints on it. We have been observing -- to set the stage a little bit more, we have, as you know, 17 sets in Amergen and Exelon, we have 13 GE turbine generator sets in Amergen and Exelon. Of those 13 TG sets, 10 of them have Mark I EHC systems. And they went into service in Dresden II in 1969ish, up through Limerick II, I believe, in 1990ish, `89. So we have had EHC systems in service for over 30 years. We have been observing that we are getting a rate of failure in EHC cards that is random and relatively unpredictable. And the problem with the Mark I EHC system is that they're in all our systems. They're not self-tolerant, they're not self-diagnostic, and they're not recoverable on line. So in certain failures in certain cards, we're going to flip the unit.

Since our corporate goals are 95 percent capacity factor, and basically a half percent for its loss rate, we are systematically going through our stations unit by unit and removing vulnerabilities. We established that EHC cards were a vulnerability, so in late 2001 we put together a campaign to aggressively manage the electronic cards in the EHC systems by selective and preemptive replacements. The card that failed at Peach Bottom was one of those cards that was replaced.

When we replaced the card, it had an up-amp in it which had a latent manufacturing defect, which was -- we did not test for. The card fabricator did not test that component for that failure, so therefore, it went through in the factory, and it was not identified during the burn-in cycle. We understood that preemptive replacement of electronic cards puts you at risk for infant mortality, so we have burn-in cycles to try to get us through that hump, and these cards have been burned-in. So the event basically resulted, a card failure, which opened the bypass valves, which led to a reactor trip on low pressure. Okay?

So in a certain sense, and this is ironic that we're talking about in a license renewal context, the very fact they're going to be proactive in trying to aging manage these cards led to the event because we had some barriers in place, but obviously not sufficient barriers in place to account for this replacement. So we had the scram, and then we had some complications, as you characterized it, Mr. Leitch, associated with the scram. And Gary is going to hit the high level of those. He's going to talk about a couple, and then we're going to stop. We'll go to question and answer, if that's okay with you.

MR. STATHES: Good morning. My name is Gary Stathes, and I'm the Site Engineering Director at Peach Bottom Atomic Power Station, and today I'm going to discuss the scram. As Bill Bohlke led off, we had a circuit card with a manufacturing defect embedded in that card. And our burn-in testing and tuning did not detect that failure. It had approximately 1900 hours in service before that card failed, so it was an undetected failure that caused the scram. So clearly, we are not satisfied with the equipment performance issues that were identified as a result of this scram. And we had a post scram review process that identifies and tracks equipment, performance issues, as well as operator performance issues so we can include those in our corrective action program, and make improvements.

CHAIRMAN BONACA: Excuse me, just a question.

MR. STATHES: Yes.

CHAIRMAN BONACA: Was this a defect that was from the beginning in the card, and was not detected by the testing, or was it a defect that developed in the first hours --

MR. POLASKI: It was a latent defect embedded in the manufacturing --

CHAIRMAN BONACA: It was, and the testing program did not identify it.

MR. STATHES: That is correct. The failure analysis performed on this particular sub-component identified that in the manufacturing process, some very fine cracks in the substrate existed, which allowed moisture to enter into that sub-component and oxidize the circuit in there. And that's what eventually caused the failure.

MEMBER ROSEN: Is there any corrective

action you can take to enhance your burn-in process to detect such a thing?

MR. POLASKI: We don't think that that's going to be detectible during a burn-in, because as Gary -- we're never going to burn a card in for 1900 hours. Where we are -- what, in fact, what the card fabricator is doing now is testing every opium, because we can detect this through specific component directed testing.

MEMBER ROSEN: So you've made changes to your pre-service testing process.

MR. STATHES: That is correct.

MEMBER SIEBER: The supplier of the card is not General Electric, I take it. You have a third-party supplier.

MR. STATHES: The supplier of the card is General Electric. However, the supplier of the sub-component is a third-party vendor.

MEMBER SIEBER: Okay.

MR. POLASKI: Interesting, so we'll embellish it some more. When we went into this preempted card replacement strategy, we basically ran out of this model op-amp, you now, in a lot that GE or the card fabricator had on hand, and we had to order an additional amount of these op-amps, and it was in that additional lot that this manufacturing defect existed.

MEMBER POWERS: I guess I'm a little confused. Going to test now the specific op-amp, but it sounds to me like you've got a more general inadequacy in your testing program. Isn't there more that you need to do here? I mean --

MR. POLASKI: We don't think so, Dr. Powers.

MEMBER POWERS: Is there more than a latent defect that can occur in this manufacturing except this op-amp?

MR. POLASKI: Resistors and capacitors get checks, some of the diodes also. This particular op-amp had a history of failures, and for whatever reason it was not felt necessary by the sub-supplier or the card fabricator to test it. Of course, now we know better, and this is not atypical. Now we know better. We go back and put the controls in place, but the point that Gary made and I want to reinforce is that the EHC system on Peach Bottom II went through an extensive re-tuning by Peach Bottom technicians and GE technicians prior to returning the unit to service to try to correct some longstanding issues with the performance of EHC system. So when we came out of that outage, the EHC system, to the best of our knowledge, was in as good a shape as it had been in years.

MEMBER POWERS: Yeah, but you said the same thing when you replaced the cards.

MR. STATHES: We have 157 circuit cards in the EHC system. Twenty-seven of those circuit cards have been determined to be what we call critical cards, that a failure of one of those cards would either result in a de-rate or a scram. It was those 27 cards that we were focused on. When we reviewed circuit card and life and sub-component life, we looked at those sub-components that would be susceptible to an age-related failure, and that's how we got to this population of 27 cards. The op-amp, however, was one component that did not have an age-related -- there was no age-related effects of that particular sub-component, so our process of inspecting and testing the card would indicate that if this card worked after it was installed, burned-in, tested and tuned, that the likelihood of this type of failure would be relatively low, if not zero.

One of the actions that we have going forward is to look at the opportunity to do dynamic testing of the circuit cards before they would be installed. Now dynamic testing on this system is not something that we have available to us right now, but we're pursuing.

MEMBER POWERS: The argument for the particular flaw is, you probably won't pick it up, even in a dynamic test. They're not going to test long enough. There's not going to be enough water get in there, not enough corrosion and whatnot. I'm less concerned about the specific flaw than I am okay, this manufacturer presumably could have known had he looked back at his records on those cards, that there was a flaw here, and he maybe should have tested that specific component. How about all the other things that if he now looks back at his records, he says well, are there other things that I don't test that I should have tested?

MR. POLASKI: We're not aware that there are any components like that. The op-amps had been a particular --

MEMBER POWERS: Yeah, but what I'm asking is he aware of it? I mean, you're aware of this component.

MR. POLASKI: I can't speak for the sub-supplier, but I can speak for GE because I've had this dialogue with their management, and they have committed to us and to other clients to be more aggressive about the controls they put on the sub-components as they come through.

MEMBER POWERS: That's the answer I wanted.

MR. POLASKI: For example, using mil specs --

MEMBER POWERS: That's the answer I wanted.

MR. POLASKI: Okay.

MEMBER ROSEN: Well, we love to talk about operating events, but the real purpose of this discussion is to try to smoke out what is the lessons learned for the license renewal program in general? Can you help us with that?

MR. POLASKI: Well, as I said at the outset, we were trying to be proactive on managing the lives of these cards, so there are a bunch of cards in the station that won't survive the current license. For example, we have purchased already the first set of replacements for this Mark I EHC system. We will put through -- we will replace all the Mark Is with Mark Vis, which are digital, which are self-diagnostic, which are fault tolerant, which are maintainable on line. That set of vulnerabilities that drove us to replace these cards in the first place go away, and we're going to be replacing a substantial number of other electronic circuit cards in other systems, both non-safety and safety.

In the non-safety systems, those that we need to replace with a high reliability we expect from these stations, and the safety side to try to get us into a better position with regard to how we're doing the RPS Logic Matrix Test. In other words, have the components retest itself instead of us having to test it, which will give a substantial even tech spec space, so over the next I would estimate dozen years, as more and more units come through license renewal, we'll be taking a bunch of cards out of play. But we won't be taking them all out, so from our standpoint it's how do we become ever more sophisticated in our ability to detect incipient failures so we can preemptively replace, as opposed to having them be self-revealing, and having to suffer the consequences, so our current focus is on the cards that we see a critical, critical either to safety or critical to plant reliability. So we're spending a considerable amount of money fleet-wide to take those out of play. We're doing forensic analyses of the cards that failed so we begin to learn even more about the failure mechanisms, whether they're component related or whether they're related to the age of the cards and the circuits, so we can begin getting some insights which will guide us even more specifically to look for things in areas that we haven't replaced. That's where I think we're going in this regard.

MEMBER ROSEN: Is that the kind of guidance the GALL report might need to have at some point, when it says when you begin replacing things because they are near the end of their life, or because of license renewal activities, think more about infant mortality and put in prevents to run into this thing, and then have a little reference to this event?

MR. POLASKI: I think the mechanism that will actually come into play will be an EPRI report which compiles failure data and begins to categorize them, and point to trends which can then be ported over and appended to GALL. I think that would be particularly useful. And I know that EPRI is engaged in that kind of activity right now.

CHAIRMAN BONACA: One of the reason why we asked for presentation on this issue has to do with the fact that not only was it card failure, but there were other latent failures that surfaced, and that raised two questions in our mind. The first one was what else is there? The second question is, how is it applicable to license renewal? Well, because aging typically may develop latent failures of some type or latent defects, and so we're interested in how effective your corrective action is identifying defects, and in correcting those. And that's why -- and maybe you want to comment on the other latent failures that were evidenced by this and why you feel that your corrective action program is adequate to deal with them. And you don't think that there are other issues there of significance, or --

MR. STATHES: We had several equipment failures that were identified as the result of this scram. It included RICI flow oscillations. It included one in a series of two secondary containment isolation valve dampers that did not close within the required stroke time, reactor water cleanup isolation on high, non-regen out light temperature, startup feedwater control valve that did not operate properly, so that's just a couple of the issues. So we've done a common cause analysis for our corrective action program to identify trends with this. And we concluded that our preventive and corrective maintenance programs are good; however, what we also included is that the timeliness of our corrective actions needs to be improved. So each of these equipment issues, except the RICI flow control oscillations, each one had a corrective action or an action plan that identified an issue with the equipment. However, the timeliness of our implementation of that corrective action was less than adequate, so we've gone back and we've reviewed that to ensure that our corrective action program and the timeliness of those corrective actions are appropriate.

CHAIRMAN BONACA So you're saying that some of these conditions were known.

MR. STATHES: Oh, that is correct.

CHAIRMAN BONACA: They were waiting for correction, and so, therefore, they were not latent any more.

MR. STATHES: That is correct. Now the RICI flow oscillations, we had -- RICI automatically started. There was flow oscillations around it, 600 gallon per minute injection, a control point. The operator needed to put it in manual mode after about five seconds of these oscillations, and take manual control to control reactor vessel level.

Now given the scram, we would have taken manual control of RICI anyway; however, at that time it should have operated on automatic. We went back to when this digital controller was installed and found that during that time frame, the maintenance technicians adjusted the gain setting to make the RICI controller more responsive to the test mode that they were in. It's all clearly documented, but since that time our modification process was strengthened to include a more robust review of any change that would be done in that post maintenance testing process to look at the broader effects of making a change to the post maintenance test while the modification was being installed. Other, secondary containment isolation valve, damper performance --

MEMBER LEITCH: In other words, Gary, to understand it.

MR. STATHES: Yes.

MEMBER LEITCH: Your flow line up is not the same in the test mode as it was in actual operation, and that's why the gain setting needed to be different?

MR. STATHES: Yes, Mr. Leitch. Thanks for pointing that out. When we are in the test mode, essentially it's condensate storage tank condensate storage tank flow loop and is not injection into the vessel, so injection into the vessel is a different flow characteristic. When the gain setting was adjusted or optimized by the maintenance technician, we were in the condensate storage tank flow loop, and we should have maintained the gain setting that was identified in the modification package rather than optimize it.

MEMBER ROSEN: Or at least put it back in the proper setting after the test.

MR. STATHES: Exactly.

CHAIRMAN BONACA: How many corrective actions do you have in your corrective action program outstanding, waiting to be --

MR. STATHES: Total corrective actions? I couldn't answer on the totality of that.

CHAIRMAN BONACA: Roughly, 500, 3,000?

MR. POLASKI: Somewhere between 500 and 3,000.

MR. STATHES: Well, I can make a statement regarding Peach Bottom's corrective maintenance program. We have approximately 28 corrective maintenance work orders that are outstanding, and that's 28 items that are on our radar screen for being corrected in the plant, so we do have a backlog of corrective maintenance has been on a positive trend.

And also, our preventive maintenance program or the PMs that are done --

MEMBER POWERS: You're going to have to explain to me what positive means in this context.

MR. STATHES: Okay. I'll do that. So every corrective maintenance activity means there is something in the plant that needs attention, so we've gone from a backlog of several hundred several years ago down to 28 corrective maintenance activities.

MEMBER POWERS: I was going to say 28 is a nice low number, but I didn't know what -- I wasn't sure where the slope was. I don't know what other questions --

MEMBER LEITCH: Gary, I had a question about the inability to open the MSIVs. And, of course, these are steam turbine driven feed pumps, and was that related to the fact that the -- I think there were three bypass valves that didn't immediately close, so you had excessive pressure differential across the MSIVs?

MR. STATHES: That's correct, Mr. Leitch. We had the number 2, the number 6 and the number 8 bypass valves did not go fully closed on spring pressure. When electrohydraulic control pressure was restored, they did go closed. Our investigation identified that while Pms are being performed on those particular valves, the scope of the PM needed to be broadened to capture the actuator -- to address actuator performance. Now we identified that the packing was tight on those particular actuators, and adjustments were made. They were lubricated, and they were working satisfactorily, so we have enhanced the PM program for those bypass valves and we're applying those for upcoming outages.

MEMBER SIEBER: What you're saying is the way the PM was prior to the discovery that they didn't operate this way, you were basically set up so that they would fail if you lost your hydraulic pressure. Right?

MR. STATHES: To answer that question --

MR. POLASKI: That's a safe conclusion, Mr. Sieber.

MEMBER SIEBER: Okay.

MR. BOHLKE: So that lesson learned, by the way, not only applies to Peach Bottom. We take it to all of our BWRs, which is a program we have in place to try to really get those lessons learned that are very meaningful, get a lot of --

MEMBER WALLIS: I'm trying to get a perspective. I'm sure we need to move on, but it looks to me as if there was some failure in a very small electronic card, and this led to revealing a whole series of latent errors which are waiting to sort of happen. And then one wonders what other latent errors -- is this a sort of symptom of latent errors lying around your plant?

MR. BOHLKE: Nominally it is, which is why we were pretty aggressive in establishing this common cause evaluation to see where these things might be clustered and what we had to do to upgrade the program. We were very disappointed because we -- well, we had been reducing the number of scrams. We've been happy in the last year or so the fact that the scrams have been retained, uncomplicated scrams, was a completely different character which has resulted in a lot of energy and effort being put into understanding.

CHAIRMAN BONACA: But you stated that they were not related. You already knew about deficiencies that then --

MR. BOHLKE: Right. Some of the deficiencies had been identified, but the corrective action --

CHAIRMAN BONACA: The reason why I asked for the backlog on the corrective action program is did you look at what other items there are out there which are significant, that may, in fact, lead to additional multiple consequential failures? Should you have something else happening there?

MR. STATHES: I can answer that. We have reviewed the backlog of action requests that are outstanding for equipment performance issues, and ensured that they were appropriately prioritized, that we have completed that. Additionally, that's required quarterly of our system managers to review their systems and what's outstanding on those particular systems. And we are reinforcing that now through all-hands meetings to ensure that any issue that may be out there is brought up to management level to ensure it gets the appropriate attention. But our process has it prioritized, and has it put into the system to be worked accordingly.

MEMBER SHACK: Would you have seen something -- you know, if you did an A-4 type analysis on your corrective action, would you have seen some possibility of interaction of these corrective actions, that there was somehow a cluster of corrective actions that would come together and lead to a bigger -- presumably your managers are looking at these things one at a time sort of thing.

MR. BOHLKE: I don't think I'm confident that our modeling is not sufficiently granular to have some PRA results give us that insight. You know, this is the way the models are constructed. But on the other hand, you could do almost a hand calculation to say if vulnerability is existing, and reduce the reliability, what would be the consequences? We had not done that. We've been focusing our efforts in improving the preventive maintenance program, to corrective maintenance programs to take the vulnerabilities out of play across the board, and that's where the energies are being put in at Peach Bottom at this time.

MEMBER SIEBER: I have one additional question that goes back to your basic level controller. It seems to me that the setting in any controller, proportional band and rate reset, or whatever you want to call it, the gain setting, t hose are specified, written down in your procedures. Maybe you have a scaling manual or something like that. It is not at the whim of the technician, I presume, to be able to "tune" these controls to get the kind of response he or she thinks they ought to get. Is that correct?

MR. STATHES: That is --

MEMBER SIEBER: It's more rigorous than that.

MR. STATHES: That is correct.

MEMBER SIEBER: Well, then I don't understand how this incident occurred, because it would appear that somebody decided to tune it up. And if you do that, you either throw your procedure away or your scaling manual away, and ignore it, which to me is a fundamental flaw in the way your folks are trained.

MR. BOHLKE: Well, you're right. We think that we're a lot more rigorous and disciplined, and well-trained now with respect to what adjustment we're allowed -- the range in which ITs are allowed to use their discretion to make adjustments, the settings that they're allowed to walk away from and say that's good enough. It's not abundantly clear that at the time this was done, this control was put in in the 1994 time frame, that we were as rigorous then as we are now. We've looked at that aspect of our program. We think we are in pretty strong control of settings like this now based on scaling manuals, as you suggest.

MEMBER SIEBER: But if you hadn't made that improvement, I think you would have a defect in your training and qualification programs that spread throughout your plant on every controller.

MR. BOHLKE: I agree. If we hadn't made that change to the program, we would have seen a lot more of those.

MEMBER SIEBER: To me, it's important since this is programmatic as opposed to individual piece of equipment failing. It's important to me that the attitude and the instructions that the technicians have, have this built into it. That they're going to follow the procedures, they're going to stay in range, they're going to dial onto the setting that they're supposed to, as opposed to whatever they feel like.

MR. BOHLKE: In addition to a restoration activity if they need to make an adjustment for particular testing configuration to restore for the normal accident lineup. We believe that's what our program now requires.

MEMBER SIEBER: Well, that's important.

MR. BOHLKE: Yeah.

MEMBER SIEBER: And that makes that flaw different than all these other things that happen in my mind.

MR. BOHLKE: Right. We agree with you.

MEMBER LEITCH: Is it fair to say although we're interested in the generic implications, yet it seems to me that all of these components that failed were -- could be classified as active, and therefore, were not in the scope of license renewal? Is that a fair statement?

MR. POLASKI: You're correct in that they were active. Some of them were in the scope of the rule, like the secondary containment isolation valve, but active components are in scope do not -- we don't do reviews of them for aging effects and aging management because they're covered by maintenance rule in other programs.

MEMBER APOSTOLAKIS: Well, I'm a little confused now. You say some of them were passive. Does the rule say that you should never seen any failures anywhere?

MR. BOHLKE: No. The rule says you identify system structures and components that are in scope.

MEMBER APOSTOLAKIS: Right.

MR. BOHLKE: And then of those you -- I think for the passive long-lived components that are in scope to determine what --

MEMBER APOSTOLAKIS: I understand that. But I get the impression that my colleagues don't want to see any failures anywhere, any time.

MR. BOHLKE: I think that should be the goal of --

CHAIRMAN BONACA: No. To me, actually, it's irrelevant --

MEMBER APOSTOLAKIS: What is irrelevant, what I just said, or what --

CHAIRMAN BONACA: No, no, no. Your comment is --

MEMBER POWERS: Oh, I would comment what you said too.

MEMBER APOSTOLAKIS: Might as well.

CHAIRMAN BONACA: I said the question whether or not was active or passive to me personally as a member was irrelevant because I think the focus for me was the corrective action program, and whether or not it is in fact effective in identifying flaws before some cascades and something else.

MEMBER APOSTOLAKIS: But there is such a thing as learning from experience too. I mean, you know, we can't just --

MEMBER POWERS: George, we're just trying to understand the culture here.

MEMBER APOSTOLAKIS: I understand.

MEMBER LEITCH: Can we bring the --

MEMBER APOSTOLAKIS: You used the magic word. I'm with you now.

MEMBER LEITCH: Can we bring this portion of the discussion to a conclusion here?

MEMBER POWERS: I have a little bit of a question, but I haven't figured out how to ask it without being insulting, and I'm not trying to be insulting. I get the impression that you've undergone a substantial change in the way you operate your plant over the last some years, since 1994. And that maybe you're still absorbing the lessons from that change. Could you comment on that?

MR. BOHLKE: There is a substantial change in how every unit runs, not just the Exelon units or the Amergen units. You've seen that in the way our capacity factors have gone up, and our four slot trays have gone down, and our scrams have gone down, and our performance events have come down across the industry. So yeah, there is an enormous change in how we run. There is another step change yet to come, because the techniques that got us to be able to run at 90 are not going to be able to sustain us at 95 percent capacity factor and half percent forced loss rate. We simply have to be a lot more aggressive. Every day presents opportunities for important lessons learned on how to understand how the componentry is operating, the rate at which its degrading, and what steps we might be able to take to cut those up. That, I believe, is one of the significant changes that the industry is undergoing now, even though I'm not sure we talk about it a lot publicly. It certainly has been a very focused effort inside of Exelon for the past year and three-quarters.

MEMBER POWERS: I won't argue with you when you say that the industry as a whole does a poor job of advertising its accomplishments. What I'm more interested in is you've been on a learning curve as you go through these changes. And I'm trying to understand where you stand on that learning curve. You reached a plateau and now you're ready to take this next step to get to where you want to be, or are you still on the productive part of the learning curve?

MR. BOHLKE: We have a bipolar distribution of our stations. We have some stations which are still -- which are emerging from poor material condition into satisfactory material condition, so they're still on an up-slope. We've got some plants that we can say they have adequate material condition. We never say they're excellent.

We always say they're adequate. They're poised to take the next step, because arguably we've got a little more breathing room.

MEMBER POWERS: Where do think Peach Bottom stands?

MR. BOHLKE: Peach Bottom is at the end of the up-slope, ready for plateau before they start the new efforts. They have good material condition, but not the best material condition of the fleet.

MEMBER POWERS: That's what I was looking for, because I get that impressions from what you'r saying, is that it's better, but we're still learning and absorbing lessons out of this process, and trying to learn how to work in a different environment.

MEMBER LEITCH: Do you have any concluding remarks at this point?

MR. BOHLKE: No, thanks. This has been an interesting and spirited discussion.

MEMBER POWERS: Not excellent, but an adequate experience.

MR. KUO: Mr. Bonaca, as I said earlier in the meeting, that I have requested the presence of Mr. Frank Gillespie to come to the meeting, to address -- to share some of his thoughts with regard to the concerns that the Committee Members just expressed earlier, so if you like, Mr. Gillespie can share it. He can start talking.

CHAIRMAN BONACA: All right.

MR. GILLESPIE: Yeah. It was an interesting discussion, and we kind of knew you were going to be interested in it. And Exelon, I've got to thank them, did I think a good job in answering the questions on the events.

One of the things that is going on, I think you know as part of the Davis-Besse lessons learned, there were a number of task forces and task action plans that are being developed. And one of the bigger ones which I think gets at the more generic question that you were just addressing with Exelon on how our event results -- how are the results of evaluations of events actually integrated into all of our programs, and we're not just going to pick on license renewal, but how does a reviewer integrate in that information when he develops his RAIs on any particular amendment? And that is one of the key points that the task force that's being put together as part of the Davis-Besse lessons learned effort is. And one of the things you'll see, and when you see this task action plan it goes beyond Davis-Besse.

In this case, we're actually stepping back and trying to ask the broader question, who is actually using operational data? What form are we giving it to them in? Who's not using it, and should be? And I think we're started to get to the crux of I think where ACRS is really questioning us. And it's not just the license renewal reviewer that has to answer that question, but our day-to-day reviewers and our inspectors.

How do events at one BWR get transmitted to an inspector such that we're not overwhelming them with volumes of text? So as important as getting the information out and saying it's available in Adams, that's not good enough, and we're recognizing that.

MEMBER POWERS: Why don't people be a little more factual and say it's hidden in Adams.

MR. GILLESPIE: Now I just got in trouble with the CIO, I'll get an e-mail this afternoon, so we see this as a fundamental kind of step back, and let's re-evaluate how we've been actually dealing with operational event data and operational data over the last 20 years, and it's time to ask how is it formatted? Who are we getting it to? How are they using it? Why aren't they using it, if they're not using it? And it's the guy in the trenches we need to get it to, the actual reviewer who's doing the work, and we have to get it to him in a form that's useable for him, that gives him the insight without needing to read the Encyclopedia Britannica to get it, so that's ongoing.

Terry Reese committed to me that by next month we think this will have jelled. WE're putting a Commission paper and stuff together, and we'd be happy to come back and talk on this subject specifically. And we need about another month. I think the Commission paper is due February 28th. Coming back in April and kind of giving a sense of we're beyond the Davis-Besse simple six high priority items, instead of using the checklist, and are really trying to take a broader look at exactly this kind of question, so I make that offer. And if the ACRS Staff gets back to us, Terry is more than happy to pull the right people together and come and give you some insights. And they put themselves, I think they're putting themselves on a fairly short time frame. We're not looking at a task force for two years, but I think it's in terms of months, to try to get a handle on this, and then see what kind of incremental improvement can we really make to get the right information to the right user.

Another interesting point --

MEMBER ROSEN: Could you hold on that one for a minute? I am certainly interested in how the inspectors use operating experience, but I am much more interested in how the agency uses operating experience?

MR. GILLESPIE: Yeah. They're starting at the top and saying okay, the agency has got its information in-house. What are we really doing with it? Are we just keeping senior management informed, or is it actually affecting the day-to-day decisions being made down here? And what's the latent time in getting it down to the guy making the decisions?

MEMBER ROSEN: You'll address all the levels, how the agency uses it.

MR. GILLESPIE: That's --

MEMBER ROSEN: Is decision-making process in its programmatic reviews, for instance in this case, license renewal, et cetera.

MR. GILLESPIE: That's the challenge that this group is taking on. That much broader look rather than trying to bandaid something that's been around.

MEMBER POWERS: Frank, you've succeeded in confusing me. That's not hard to do.

MR. GILLESPIE: But I do that a lot.

MEMBER ROSEN: We used to have an organization called The Analysis and Evaluation of Operational Data, and that's now part of RES. Why aren't they doing this?

MR. GILLESPIE: They are.

MEMBER ROSEN: They are.

MR. GILLESPIE: Yeah. Let me say -- I'm saying this right now representing the Staff, and in fact it's probably an even split I'm going to say, with an emphasis on both sides. NRR is the user, but for the most part if you look back at the Commission paper that split up AEOD, and there were 18 items in there, I think something like 16 of the 18 went to research. And if we haven't asked them to deliver the right thing, then they can't deliver the right thing, so we are jointly -- it's a joint effort. It's not an NRR effort. It's an agency effort, which is allowing us to put this bigger hat on it.

MEMBER POWERS: Okay. So this really utilizing those capabilities but you've added in some other people on.

MR. GILLESPIE: Yeah. What we're trying to do is say why isn't the user using it? What form does he need it in? And now let's get the generator of the data and the users together, and how do we now optimize it getting into the processes, getting into the day-to-day decision making. In a sense it's not necessarily in the day-to-day decision making as well sa we'd like it.

MEMBER POWERS: That's a good sense to have.

MR. GILLESPIE: Other question, and this was an interesting one. We were talking about with this Gene Embrow only yesterday, and Rich Barrett, and that's a question of once someone gets a renewed license, that's their license. And it becomes immediately effective. In fact, that caused us to have to realize yesterday was that our routine you might say review guidance now has to address any change at a plant that requires an amendment to the plant, has to ask the question should this have aging management connected to it? Which is an interesting change, because now as we're getting plants who have renewed license, that is their license, there may be a need now to say -- you might say the guidance we had before we stared down this avenue has to have another question put in it, which I think will capture one of the questions, I'd be hesitate to use GALL as a repository for correcting all the ills of what happens after a license.

I would suggest that what we need to do is make sure that GALL is there to basically ensure the applicant gets us everything we need that we know about when he gets issued the license, but we need to now look hard at all of our guidelines to say okay.

For Calvert Cliffs, is the review guidance we're using for Calvert Cliffs asking the question, is there an aging management aspect to this change I'm making, so we're now starting to focus on does the population of plants now have a different kind of license with a new program introduced into that licensing basis? We need to start adding that question on. And it is a slightly different question.

MEMBER APOSTOLAKIS: Now I'm confused. I mean, you've always had aging management programs at plants. Right? So if something happens, don't you ask that question? I mean, just that these additional programs now are part of the --

MR. GILLESPIE: Yeah, but it may be, George, that we've asked the question, but it's been a bit informal. I mean, literally when we talked about this with a small management group yesterday, we said we didn't necessarily realize that, to put the discipline into deliberately asking the question. It was interesting. All I'm saying is there are a group of managers in NRR who are responsible for the program who said you know what, our systems and procedures don't necessarily say ask that question right now.

MEMBER LEITCH: I think we'll have the opportunity to hear more about that in the future.

MR. GILLESPIE: Yeah. So if you'd like to - - you know, if the Staff gets to this, I will be happy to come back in a month and go over what we're trying to do with operating experience.

MEMBER APOSTOLAKIS: How to use operating experience, is that what it is?

MR. GILLESPIE: It's how to use it, how are we using it, how should we use it?

MEMBER APOSTOLAKIS: Isn't that an embarrassing question to ask in the year 2003?

MR. GILLESPIE: No.

CHAIRMAN BONACA: I think he's talking about really a programmatic approach to it.

MR. GILLESPIE: Yeah.

MEMBER LEITCH: It's always a good question to ask.

MR. GILLESPIE: Right now, George, we have kind of --

MEMBER APOSTOLAKIS: You ask it every year, is that what it is?

MEMBER LEITCH: It never goes out of style.

MR. GILLESPIE: Right now we have a dependence on basically the same group that reacts to the event as does the review. And, therefore, the knowledge transfer is the fact that it's the same group of people.

MEMBER APOSTOLAKIS: Well, this Committee has urged the former AEOD to make sure that its results are widely disseminated, and we've done it several times. And I don't know that anything came out. Dissemination doesn't mean that somebody is actually taking action.

MR. GILLESPIE: All right. Now you've got the key is disseminating a large volume of information which overwhelms the end-user, and not actually giving it to him in a form he might be able to use is a question we want to put on the table. And I think we've maybe overwhelmed people with material versus doing some digestion of that material focused on what he does for a living. That's part of the question.

MEMBER APOSTOLAKIS: I'll be curious to see whether --

MEMBER LEITCH: I think this is a very interesting topic, but I think we really need to proceed with the Peach Bottom license renewal discussion. We're in serious schedule difficulties here, David, so I would ask you to --

MEMBER APOSTOLAKIS: Well, as a Member, I would suggest that maybe you should jump into what's important. Telling us when the SER was submitted, I mean, that's --

MR. SOLORIO: Okay. Well, I'll try to skip over some of the --

MEMBER APOSTOLAKIS: Can you do that on the fly?

MR. SOLORIO: Sure, no problem.

MEMBER APOSTOLAKIS: Okay.

MR. SOLORIO: Good morning, Dr. Bonaca, and Members of the ACRS Committee. My name is Dave Solorio, and I'm the License Renewal Project Manager at NRR for the Peach Bottom project. I work in the License Renewal and Environmental Projects Program. Before I get started, I want to congratulate you all on reaching your 500 meeting milestone. I appreciate your efforts to review the SER and the efforts of your staff to help prepare for this presentation.

In the way of --

MEMBER LEITCH: I think you could skip the chronology there on that slide.

MEMBER APOSTOLAKIS: Skip it.

MR. SOLORIO: I'm not going to go through the first five bullets. I just want to mention that the final inspection was completed in December of last year, and the results were that the application and the materials on site were retrievable and audible, and that they concluded they are implementing the programs as they stated in the license renewal application.

This is just a summary of the topics that you all asked to see today, so I'll just go right passed that. Just briefly mention that as far as the previous meeting back in October, I believe a member of the Committee asked were they consistent with ISG on housings? There were three open items related to that, housings, they have various housing aspects, and they were consistent. I just wanted to point that out.

There was a concern raised by a Committee Member also at the October meeting about the scoping of non-safety-related equipment issue, you know, where was there one list of what the additional systems were? That list now resides in the section of the SER where we closed out the open item.

I was told to speak to the status of the

BWRVIPs today. Previously, back in October we gave a detailed presentation on several of the BWRVIP reports, specifically 38, 75, 76, 78, and 86. This table that I have here on the slide is actually extracted from the SER. It provides the status of the reports that we relied upon for the review. I'll point out that there is one report, 76, that the staff has not completed its review. As a result of that, we'll be conditioning the license to require the applicant to either commit to the outcome of the Staff's review of that report, or provide a plant-specific solution.

In addition, I mentioned at the previous meeting there was another license condition going to be written up to account for the fact that the integrated surveillance program for license renewal had not been established through the BWRVIP program yet, so it's expected they will be submitting that information this year is my understanding. The Staff will work with them to write an SER, if that's possible. If they can't reach a resolution on that, the license condition will require the applicant to propose a plant-specific resolution.

I mentioned the first two license conditions on this slide. That's what I just spoke of. I'll just mention that the second two are standard license conditions that we issue for all the renewed licenses, which require them to incorporate the summary description of the aging management programs that they provide in the UFSAR supplement into the FSAR proper. And also, that they need to complete their future inspections before the extended period of operation begins.

I was asked today to speak to the condition of the Torus, and/or the inspection programs used for the Torus. It was -- a question was brought up during the Subcommittee meeting back in October. Section 3037 of the SER talks about a question that we asked that got to the condition of the Torus. There were inspections performed in 1991. There were pits found at various locations. At the time, it was attributed -- root cause was attributed to the application of the coating, and also the chemistry controls weren't doing everything they should have.

The coating was repaired, chemistry program was enhanced. In `97 and `98 they went back and looked again. They found that the repairs had been effective, and the chemistry controls were improving, and resulting in a lesser wear rate, or degradation rate.

The applicant has projected that based on the rate they're seeing now, they will not exceed the minimum thickness requirement for the Torus through the extended period of operation. Inspections of the Torus are performed in accordance with ASME Code Section 11, Subsection IWE. The inspections will, of course, then continue into the future during the current period and the license renewal period. This program was also reviewed by the region during the AMR inspection conducted earlier or in mid-`02.

MEMBER POWERS: Did they look at the bellows seals on the --

MR. GILLESPIE: I'm sorry. Could you repeat that question?

MEMBER POWERS: Did they look at the bellows seals on the inlets to the Torus downcomers?

MR. GILLESPIE: I believe that question came up at the last Committee meeting on the bellows, I think --

MEMBER POWERS: You didn't get an answer to it again.

MR. GILLESPIE: I think we got back to you later saying that the bellows were within scope. Can I get Exelon to tell me if I'm getting that wrong?

MR. POLASKI: This is Fred Polaksi of

Exelon. The Torus downcomer bellows are in scope of licensure and were part of the containment boundary, and they are inspected in accordance with the ISI program.

MEMBER POWERS: And you have no corrosion on them?

MR. POLASKI: No, there's no corrosion, no problems with those.

MEMBER FORD: Could I just ask a question on the VIP reports, it's more for information. There are at least three VIP reports to do with cracking rates for stainless steels, nickel-based alloys and alloy steels. I don't see them mentioned on this list, and yet they are fundamental to the ISI frequencies. What are the status on those three reports? And to what degree are they examined?

MR. SOLORIO: A member of the staff is going to get up and respond to your question, sir.

MS. KAUFMAN: Stephanie Kaufman, NRR. I don't know the specific report you're referring to, but my understanding is these VIP reports reference those documents, and so --

MEMBER FORD: Therefore, this assumes that they are correct, those originating documents.

MS. KAUFMAN: Well, we reviewed those, as well.

MEMBER FORD: Okay. And have they been reviewed by the ACRS? I'm looking at you, Bill, because you would know, liquibase, new alloy steel and stainless steel.

MEMBER SHACK: I think we have looked at VIP 14 in the past. I don't think we've looked at the others specifically. You know, we sort of go through -- we sort of sample the VIP reports as we go along.

CHAIRMAN BONACA: I believe that we review four at the beginning, and then a number of them were reviewed as we went along, some of them did. But not the whole group.

MEMBER SHACK: But specifically whether the cracking rate reports have been reviewed, I don't think they have actually.

MEMBER FORD: By the ACRS.

MEMBER SHACK: By the ACRS.

MR. ELLIOTT: Barry Elliott. At the Subcommittee meeting we reviewed 38, as you said 76 and 75. 75 has the safe ends in it, and it would have the stainless steel welds that I think you were alluding to. We discussed --

MEMBER SHACK: I think he was thinking more like 14 and 59, which actually have the crack growth rates.

MR. ELLIOTT: But the inspection program would be in this, in 75. And that's based upon the crack growth rates, and those other documents. We reviewed that at the Subcommittee meeting, you know, as part of the Peach Bottom license renewal.

MEMBER FORD: I guess my fundamental question is these ones are according to PI and understand are being approved, but those for late cracking kinetics depend on those early reports, 14, 29.

MR. ELLIOTT: For instance, the 75 when we went through this at the Subcommittee meeting, the frequency of inspection is dependent upon the crack growth rate, and that's how we got the program. That's how the program was developed.

MEMBER FORD: Fine.

MR. SOLORIO: I was asked to summarize the inspection activities discussed in the SER regarding the diesel fuel oil tanks. They're covered in Section 30318 and 3316 of the SER. For aging management, the applicant credited the lubricating and fuel oil quality testing activities program, and they credit inspections performed once every ten years, where they drain the tank and perform multistronic testing at various locations along the bottom of the tank.

Their last inspection in `96 that we documented in the SER come from essentially nowhere, from the thinnest measurement taken. During the October Subcommittee meeting, several questions about the standby gas treatment system were raised that required me to get back to you with some information. I did that in December. I have some additional information to provide today.

The aging management of the standby gas treatment is discussed in Section 327 of the SER. Generally, aging effects for the ducting are not expected because the ambient air inside and outside the ducting is considered to be of similar temperature; therefore, there won't be a driving force for condensation. We don't expect there to be leakage into the standby gas treatment system units from the fire suppression nozzles inside of them because there's three series of valves upstream, and it's a deluge system. Since the valves have been installed, there's been no signs showing leakage into the unit from the fire head.

There's also buried carbon steel piping in the standby gas treatment system which is managed by the outdoor buried and submerged component inspection activities. There were no open issues from the staff's review of this program. The condition and records of the standby gas treatment system were examined and the final NRC inspection conducted to support the license renewal rule in December.

The inspection confirmed that tech spec surveillances have plant personnel enter the housings to replace filters and inspect the fire deluge nozzles and the filters, and it would be expected that during those entries they would see any presence of aging, since they're able to walk inside.

MEMBER ROSEN: Well, did they?

MR. SOLORIO: Yes, they have.

MEMBER ROSEN: Did they see any evidence of aging since they go inside?

MR. SOLORIO: No, sir.

MEMBER ROSEN: They saw no evidence of aging.

MR. SOLORIO: That's what the inspector is telling me from his review of the records.

MEMBER ROSEN: Maybe Exelon could comment on that.

MR. FULVIO: This is Al Fulvio from Exelon. Yeah, we do these inspections annually for the filters, and we do them every 18 months for the fire header spray nozzles in the housing, so we're going into these filters on the average, you know, more than once a year. And we do that, they do a very meticulous inspection of the entire interior of the housing and all the components and structural members in there. And no, we have not observed any evidence of any aging degradation in those inspections at all.

MEMBER ROSEN: No condensation, evidence of condensation, no dust, no distress of any kind?

MR. FULVIO: NO, that's correct.

MEMBER ROSEN: Thank you.

MR. SOLORIO: I'll just briefly mention that at the time of the previous Subcommittee Meeting we were trying to resolve the fuse holder issue. The way we resolved it was the applicant committed to the outcome of the interim staff guidance. During the Subcommittee meeting back in October, there was one open item related to top guide beams that we weren't able to resolve with the applicant as of that time. Since then we have been able to resolve the issue. The staff was concerned that multiple failures of the top guide beams could prevent rod insertion, so the applicant is now committed to inspect top guide beams during the time when they inspect the control rod housing guide tubes. They would be doing an enhanced visual inspection to examine for presence of cracks, and these inspections will begin prior to the initial -- to the beginning of the renewal term.

MEMBER WALLIS: How big a crack can you see with enhanced visual examination? What's the smallest crack you can see?

MR. SOLORIO: Is it a half mil?

MR. BOHLKE: Yeah. This is Bill Bohlke from Exelon. We can see a half mil crack.

MEMBER WALLIS: IN length?

MR. BOHLKE: Half mil in width.

MEMBER WALLIS: In width, but how long is it?

MR. BOHLKE: Well, at least a half mil long.

MEMBER WALLIS: You can see that with your visual examination.

MR. BOHLKE: Yes. WE verify that before the start of every inspection activity, that we can get that appropriate resolution through our cameras.

MEMBER FORD: When you approved that top item about the inspection time for top guide beams, cracking of them, what was your rationale for approving that?

MR. SOLORIO: Their approach for resolving the open item?

MEMBER FORD: Yeah, quantitatively, why do you think that's a good time. It's okay to leave it until then to inspect? And how would you respond if you found a crack on the top guide tomorrow?

MR. ELLIOTT: This is Barry Elliott. The issue here -- there are two issues that we're concerned about in the top guide. First, is neutron embrittlement. The second is, radiation stress corrosion cracking. The neutron embrittlement just shows -- results in smaller cracks that will cause failure, but the issue really of concern is the radiated system stress corrosion cracking which could initiate cracks. And we're not concerned about every single top guide beam. We can live with a failed top guide beam, and the control rods could be inserted.

The problem here is that in IASEC, we could get multiple failures, that there's a common cause here for common mode of failure, so we've got to -- we looked at it and we said well, we're going to look at the areas that have the highest effluent and concentrate our inspection there so that we could look and see if there is going to be a common cause problem here of radiation or system stress corrosion cracking. That's how we got to 10 percent. WE got the location because that's a high effluent location. And the period of inspection, we decided would be as part of what -- we already have a program for the CRVH guide tubes, so we incorporated that into the program, so that both inspections can be done at the same time. That was our thinking here. And to look for the common cause failure is the issue here.

MR. SOLORIO: I believe a past concern that the Subcommittee for license renewal has articulated is a belief the staff will be facing a significant challenge in the future to verify future commitments are implemented prior to the renewal period, given there will be a large number of plants entering that around the same time.

As you heard from Dr. Kuo earlier, we created Appendix D in the SER. I wanted to add that we're also attaching this list of future commitments to the post approval site inspection for license renewal inspection procedure to assist the staff in the future with this task.

I know you've already heard a lot about the event, and I'm just going to provide some information from the NRC side. The initiator, we believe, as the applicant stated, failure of a non-safety-related active component, the circuit card, which led to the main steam bypass valves going open, which led to several subsequent ESF actuations, which resulted in the reactor scram. There were also several items of equipment that did not function as expected, such as the damper, the main steam bypass valves, the RICI pumps, and they contributed to challenging the operators recovering from the event.

As you know or you may know, there was a special inspection conducted in the circumstances of this event in accordance with NRC Management Directive 8.3, Incident Investigation, and our staff, event staff and Operating PM provided me with some information on this event, and the LER also provides significant information. But because the inspection report isn't out yet, I wasn't able to review that, but we have the Senior Resident Inspector for Peach Bottom here with us today, who was also the Team Leader for the special inspection.

Based on my review of the LER, I conclude there were no failures of passive components. The information I've been able to gather regarding the equipment performance challenges, you heard a lot about the card failure. We discussed that in very good detail. I don't have anything to say different about that.

I understand now the damper failure was attributed to an actuator not functioning properly to close the damper. Earlier discussions talked about how the problem was previously known of in a prior NRC inspection report in 2206 we documented a finding that the applicant wasn't, or that the licensee wasn't doing preventive maintenance on their dampers. So as you heard from someone from the utility, they hadn't gotten around to actually starting to do it such that could have prevented the failure of this one that didn't work.

As you heard, the failure of the RICI pump was attributed to a design change during the post modification testing, and the main steam bypass valve also was a failure to perform preventive maintenance on the actuator, so you know, it's clear that if they had -- well, it's not clear, but you would surmise that if they had been performing preventive maintenance on these two components, you would have expected them to perform as required.

It's my understanding the applicant's corrective actions are underway to do the preventive maintenance activities, to ensure these similar types of equipment are ready to perform their function when called upon. Once they enhance their program, of course the license renewal rule requires them to carry their current licensing basis forward, so hopefully these programs will be more useful in the real term.

MEMBER POWERS: Let me ask you this question. You've got a plant, it's undergone some change in the way it operates, still learning that obviously having some challenges are faced in getting all these programs that they're required to carry out, carried out, including the preventive maintenance program. Now they're making commitments to you to add some additional programs in, and increase the burden on their staff. Is it fair to impose that additional burden on them at that time, or should we wait until they've had a chance to work out all these changes they're making in the plant now? And apparently, additional changes that they're planning to make in the future. Can they carry out these additional programs with the efficiency and the effectiveness that you think they ought to do?

MR. SOLORIO: So if I understood your question, why should they be implementing these activities for license renewal now on top of what they're trying to improve now? Because maybe it's -- okay. Well, it's really up to the applicant to decide when they want to implement these activities, you know. Albeit, they have be doing them before the end of the renewal period, so the rule doesn't allow us to force them to do it at a particular time, but I understand they have demonstrated to you they had some challenges today, but I think it's much better if they start doing things now, because they're going to provide a lot of baseline data that they're going to be able to use for the renewal term. So while they, as you suggested, may have trouble getting some of these programs right, I think the benefit outweighs the negative.

MEMBER POWERS: I guess I'm more concerned that programs that they have now may suffer because they're diverting the sources and attentions to these new things that you're --

MR. McMURTRIE: Dr. Powers, Tony McMurtrie, Senior Resident Inspector at Peach Bottom. If I can speak here, and I'm not going to speak specifically for Exelon, but I would say these issues, these aging management commitments are going to be added into their normal program and processes which they already have established, so as they show here --

MEMBER POWERS: Yeah, but they're not getting them out very well.

MR. McMURTRIE: And I would say that this is not going to be any more of a significant challenge than it was for the PECO Corporation to implement all of the fleet-wide Exelon processes and procedures that they have just recently gone through in bringing the fleet to a common standard that they're now using. And I welcome Exelon to, you know, speak as to why they think or would not think that they could add these items into their processes and be additional challenge with that. I don't see it as any more of a challenge than any of the other things that they've got ongoing at this current time.

MR. BOHLKE: Dr. Powers, Bill Bohlke. What we're doing to ourselves in trying to change our culture to be able to run at these high capacity factors is actually a lot more arduous, and the additional requirements being layered on by these aging management programs, so overall I believe that we'll be able to accommodate them, or we'll make the appropriate adjustments in resources to be able to accommodate them.

MEMBER POWERS: I guess I wouldn't have expected any different of an answer. I'm struggling to know how I gain that same confidence.

MR. McMURTRIE: Can I just --

MEMBER POWERS: And again, it has nothing really to do with the aging management programs. What I'm more concerned about is the current programs may suffer, and consequently, the safety of the plant may suffer.

MR. McMURTRIE: Well, I can tell you, Dr. Powers, that we look at through our reactor oversight program. I mean, you know, we're there doing the inspections, doing the routine inspections. If there are issues, if they're starting to be safety-significant items out there, there's findings that are identified, and those go forward, and it's handled within ROP.

MEMBER POWERS: Well, to be quite blunt, you did not identify that they failed to do some preventive maintenance.

MR. McMURTRIE: That is correct. I mean, we didn't -- until they started happening, let's say dampener failures that they had, you're right, but we did see the trend of those, identified those forward to the licensee. You know, we look at the surveillances, the other things that they have, you know, but we are focused too on the risk-significant and the safety-significant items there at the plant. Many of these items that they had there were not as risk-significant, for example, the closure of the turbine bypass valves, where it's also identified that they were not performing preventive maintenance on those actuators.

MEMBER ROSEN: Well, as long as you brought up the Reactor Oversight Process, that was one of the questions we asked to have some view from the Staff about where Peach Bottom units are in the ROP.

MR. McMURTRIE: ROP-wise they're in the regulatory response ban, which means that they have one white finding now in the emergency planning arena. And everything else is green, so they're in the regulatory response column of the action matrix.

MEMBER ROSEN: So the ROP gives us no insight into issues that may be relevant to the license renewal right now.

MR. McMURTRIE: Well, I would say that the ROP tells you that they do not have significant degraded safety-related or risk-significant components that are out there that's been identified in the process.

MEMBER ROSEN: Okay.

MR. SOLORIO: Well, as they go forward in their, under the ROP if there are procedure problems that reach a certain significance level, then the ROP would require --

MEMBER ROSEN: Yeah. I'd want to restate what I said before. Not that it gives us no insight, it just does not raise a signal to us that there are some issues that are relevant to the decision on license renewal.

MR. SOLORIO: Other than perhaps you might be able to say, as you've been trying to say, some of the members have been trying to say that, you know, their performance -- if their performance isn't good in implementing the procedures, then you need to ask, you know, how far does that go.

MEMBER APOSTOLAKIS: ROPs aren't going to tell you that. The ROP is looking at results.

MR. SOLORIO: Right, but you're looking at them because of a risk-significance. And then you start looking into their corrective actions, and what was the cause.

MEMBER APOSTOLAKIS: Silence does not mean agreement. Okay?

MEMBER LEITCH: Anything -- have you finished your presentation, David?

MR. SOLORIO: That concludes my presentation.

MEMBER LEITCH: Very good.

MR. McMURTRIE: If I can add one other

thing.

MR. SOLORIO: Yes, Tony, please.

MR. McMURTRIE: I would add that we did find during this inspection that there were some low-tier issues that they were not identifying in their corrective action program. We had identified that previously. We do routine problem identification resolution inspections, and we have identified the trend of this before. I will add that they -- I think they issued a water shed CR, what I'll call water shed CR in January of 2003, where they identified that in a corrective condition report, that the maintenance personnel were not writing CRs for corrective maintenance issues that were unexpected that they found out there in the field, so they're going back. They're going to look to retrain and change their processes and programs to make sure that the folks are doing this. So we think that on some of these low-tier issues that you saw here, that the station was not doing a real good job at tracking and trending those issues, and that may have been a big contributor for some of the low-tier issues that they identified during this scram.

MEMBER APOSTOLAKIS: The next item on the agenda is the Reactor Oversight Process. Will you be here?

MR. McMURTRIE: I will stay, yes.

MEMBER APOSTOLAKIS: Okay.

MEMBER LEITCH: Okay. Thank you, Tony. Dr. Kuo, do you have any concluding remarks?

MR. KUO: Well, thank you, Mr. Leitch. This concludes the Staff's presentation. According to my note here, we will have a take-away action, that is the commitment to come back to the Committee to talk about events in general. This will be probably in the next one, two, or three months time frame.

MEMBER LEITCH : I would like to thank the Staff for their presentation, as well as thank Exelon for their presentation, and turn it back to Dr. Bonaca.

CHAIRMAN BONACA: Okay. Thank you. And now we'll take a break until a quarter of 11.

(Off the record 10:32:46 - 10:49:02 a.m.)

CHAIRMAN BONACA: Okay. We are getting back in session, and now the next item on the agenda is Reactor Oversight Process. And Mr. Sieber is the -- will take us through his presentation.

MEMBER SIEBER: Cognizant Member, right? Thank you, Mr. Chairman. The Reactor Oversight Process is relatively young, and I would say a still evolving process, whereby the Commission seeks to get insights into the performance of individual licensees based on performance indicators and the risk-significance of incidents and violations that may occur at their plant, so as to make a judgment as to how or if the Commission or the Staff should respond, and at what level. And you will recall that we had a multitude of meetings and a presentation in December, which is now 15 months ago, before the Commission. And I'd like to point out to you that the documentation, you've received all these letters from time to time, but the documentation is Tab 3 in your book, which is -- and the most recent response from the staff is on handwritten page 5. And I think that was a easy to understand response, but I'd like to go through the fact that we have had a number of letters on this subject, including an SRM which isn't addressed to us, but we will attempt to respond to. And our first letter is October 12th, 2001, which was a lengthy letter, and pointed out a number of deficiencies.

The Staff, under the signature of -- or over the signature of Dr. Travers, responded but did not respond in a way that fully accepted every piece of advice that we gave them. And so there is another series of letters back and forth that identified some more important of those issues which occurred within the next two or three months.

We have had a couple of Subcommittee meetings on this process, and some other meetings on the record between our staff and their staff, and they've had a reorganization change in the process, which complicates things, but actually hasn't impeded the process.

The most important document that I would like to point out is a December 20th, 2001 document, which is a Staff Requirements Memorandum that was prepared by the secretary based on our December 5th, 2001 meeting with the Commission, where we had four topics and the bulk of the Staff Requirements Memorandum addresses itself to the Reactor Oversight Process.

We have all seen this, and it's been copied and recopied so many times now that it's almost illegible. On the other hand, I would point out that the cogent paragraph says, and I quote, "The Staff with ACRS input should provide recommendations for resolving in a transparent manner" - and I'm not exactly sure --

MR. SATORIUS: We've got it right there.

MEMBER SIEBER: Yes, I know. We'll, I'm going to read it anyway. I notice in your latest letter you address the "transparent manner" issue, between apparent conflicts and discrepancies between aspects of the revised Reactor Oversight Process that are risk-informed, for example, the significance determination process, and those that are performance-based, for example, the performance indicators. And that was the highlighted portion of the second round of letters that followed our initial letters on the Reactor Oversight Process.

And with that, our last meeting of the Subcommittee was about six months ago, and so now we're going to get an update where the Staff will tell us where they are, what they have already done, what they plan to do in advance, and hopefully provide us with sufficient information to draft a response from our viewpoint to this SRM. I presume that the Staff will respond on its own. You do an annual report on the ROP, and I presume that annual report will be your response to this SRM, or perhaps some other document. You can tell me which way it is you're going to do it.

So with that, what I'd like to do is introduce to you Mark Satorius, who will make the bulk of the presentation. And so, Mark, go ahead.

MR. SATORIUS: Thank you very much, and thank you, Committee Members. Before we -- I'm going to turn it over to Ron Frahm here in just a second, and he's going to outline some of the -- a little bit more detail what's already been outlined, and provide some Staff perspectives, but he's also going to outline what we think is the most important thing, and those are the Committee or the Subcommittee concerns that we feel have not completely been resolved. And we want to share with you the Staff's view on what our position is on those throughout this presentation. But before I turn it over to Ron, Bill Borchert, who is the Acting Deputy Director of the Office of Nuclear Reactor Regulation is here with us today, and he's at a side table there. And I think, Bill, you had wanted to start the meeting with a few remarks yourself.

MR. BORCHERT: Yeah. Thanks, Mark. Staff and nearly every stakeholder that we engage with agrees on one thing about the Reactor Oversight Program, and that is that it's an improvement over the previous inspection program, and especially the SALP Program, Systematic Assessment of Licensee Performance. But there are three, in my view, very significant aspects of the Reactor Oversight Program. And the first of those is the manner in which the

Reactor Oversight Program was developed, the stakeholder, public, industry involvement in the creation of that program. And in the design of the Reactor Oversight Program that has eventually been implemented, and in the decision making process for the many factors that led into that design.

The second is the ongoing transparency of the process, and the accessibility of the information to the public. This new Reactor Oversight Program is far more transparent, and predictable than the old Senior Management Meeting SALP Program, which Graham Leitch can give you more details on than even I, probably. But I think it's agreed to that anyone can look at the input going into this program and arrive at the same answer, and understand which column of the action matrix a plant would be in, and why the NRC is taking the regulatory actions that it is.

The third, and perhaps the most important aspect of the new program is that it's a dynamic and living process, that it is by no stretch of the imagination perfect today. It wasn't anywhere near perfect several years ago when we first put it into practice. I think it's better today than it was three years ago, and three years from now it'll be even better than it is today.

The ACRS has focused on several issues that we think are very good examples of what makes the current process not perfect. If we could solve them quickly and easily, we would certainly do that. The problem is, they don't have easy solutions. I agree with the comments that the Committee has raised, that if we can fix these, it will make the process better. But in order to effect those changes, I believe it's equally important that we do it in the same kind of open transparent manner that we did during the initial creation, so that that almost guarantees the change will not be fast. But nonetheless, these are very valid issues that the Staff wants to continue to work on. We thank you for you input, and I'll go back to Mark and Ron.

MR. SATORIUS: Okay. Thanks, Bill. And with that, Ron is going to, as I mentioned earlier, give a short synopsis of kind of how we ended up here today, and to focus more than anything else probably on those matters that we believe are still issues, and still issues to be discussed and resolved between our understanding of the Subcommittee's view and our own views. So, Ron, would you go ahead.

MEMBER SIEBER: Let me interrupt this for a second. One of the reasons why this process of making these changes is slow is because there is a lot of stakeholder involvement. You have licensees and investment analysts, and all kinds of people who look on a regular basis at the ROP process, so making a lot of changes, particularly ones that involve fundamental theoretical principles, I think will cause some confusion amongst those licensees and members of the public, so I can understand why you want to be very thorough and very careful, and move forward deliberately so you can bring the stakeholders along with you. And I think that's something we need to keep in mind on this Committee, that we can't make and demand instant changes and expect them to occur just because the inertia of the process in the involvement of all these stakeholders. So with that --

MEMBER ROSEN: I'd just like to go ahead and make one point though, and that is that it is not just the Subcommittee's views. I think you're dealing with the Full Committee's insights.

MR. SATORIUS: I understand. I guess I was referring to the fact we've met with the Subcommittees and we captured a number of those views, but I'd like to point out just before we go on, that that's a very, very good point. And we're living through that currently, and I'll talk about it a little bit more later on in the presentation as we attempt to risk- inform the performance indicator that measures unavailability and unreliability for the mitigating systems cornerstone. And we're just ending a pilot program. I believe the data collection ended in February, and we'll be analyzing the results of that, but that was over two years in the making so it -- as we risk-inform rigorously some of these performance indicators, it is a daunting effort. So, Ron, would you go ahead, please.

MR. FRAHM: Sure. Good morning. Thank you, Mark. As many of you are aware, I'm Ron Frahm, and I've been the Staff Lead in coordinating with the ACRS to try to come to a common understanding, and hopefully resolution on certain issues and apparent inconsistencies --

MEMBER APOSTOLAKIS: You got this in management, or --

MR. FRAHM: I'm not sure why I got this assignment. I'm still trying to figure that one out. But what I'd like to do this morning very briefly is just recap where we've been, and our understanding of what the Committee's remaining concerns are based on all of our previous discussions and letters.

As Mr. Sieber pointed out, we've met with the Subcommittee a few times. WE met in September, 2002 to discuss our plans to address the SRM that Mr. Sieber quoted regarding apparent conflicts between aspects of the ROP that are risk-informed, and those that are performance-based. We then provided a detailed written response in December, 2002, that we believe specifically addressed those concerns, that were noted during that September briefing, as well as in the previous ACRS letter of February, 2002. Then we met again with the Subcommittee in January of this year to address those specific concerns as detailed in the December, 2002 letter, and to give our status on those issues, and our position.

That was actually and all-day briefing and a significant portion of that briefing involved bringing in subject matter experts from several of the different cornerstones across the ROP to discuss examples of greater-than-green findings, and performance indicators, and to help demonstrate the basis for why these thresholds were what they were, and the resulting regulatory response associated with these thresholds.

Needless to say, we don't intend to go into the level of detail today that we have in these previous Subcommittee briefings. Instead, we wanted to just summarize our understanding of the open issues, and the continuing concerns of the ACRS to the best that we understand them, and our response to those issues. So this first slide represents a summary of the issues that we developed as a group based on pouring over the previous transcripts from the meetings, and the previous letters between the ACRS and ourselves.

First, there are elements of the ROP that are more risk-informed than others, such as those in the reactor safety area that are based on PRA analyses, and others that are more performance-based, such as those in the emergency preparedness, public radiation safety, occupational radiation safety, and safeguards areas. And these elements are not quantifiably equivalent - that's quite a phrase - based on an actual value. We don't have a number that we can compare Apple 1 to Apple 2 and say that they're definitely equitable. We've been struggling with that since day one, and we continue to do the best we can to make them equitable.

MEMBER POWERS: I mean, it seems to me that the incongruity among the various levels within cornerstones, some of which have quantitative measures associated to it, some of which have performance measurement is more striking than that. I mean, I was at one plant in which the plant vice president was a very articulate fellow, and said oh, my God, you can have all of these plant scrams, but God help you if somebody fails to show up for his briefing on emergency preparedness. I mean, the two just don't seem to balance, even on an apples and oranges basis.

MR. FRAHM: Well, we have competing priorities within the ROP, and we try to be as risk-informed as we can be, where risk insights are available. But at the same time, if you're living three miles outside of a site, you know, how do you explain to that person that it's more important that a pump works, for instance, in the mitigating systems area than it is that you will be able to evacuate the area in case of an emergency? I mean, these are equally important in protecting public health and safety with regard to how we respond to these issues.

MEMBER APOSTOLAKIS: But then if you do that though, you're not risk-informed any more. See, that's the perennial problem here, you know. In one case, in the case of emergency evacuation, you assume that events that are extremely unlikely have occurred, and you have to evacuate. In the case of the pump, you're talking now about the event itself, you know, that you may actually cause an initiator. So from the risk perspective, you should clearly worry more about the pump. Right? And this agency itself, when it allocates in other context risk, clearly we consider preventing core damage frequently roughly to be a thousand times more important than the containment. We have a goal of 10 to the minus 4 for core damage frequency, and we have a goal of .1 for the containment, and that's risk-informed. It's a policy issue and so on, so this is the dilemma here. I mean, are you trying to please the guy who lives near the plant, or are you trying to be risk-informed?

MR. SATORIUS: We're trying to approach it in a balanced manner. WE think that we need to look at the person that needs to -- that lives near the plant. That's our public. They have a certain stake in this to understand how safe the plant is being operated. But this all gets back to, and I was going to address this just a little bit later, but it all gets back to irrespective of whether a cornerstone is -- the thresholds are established by a risk-informed tool or a performance-based tool, the importance is the threshold. Once the threshold is established, that simply tells the staff to go and do certain things, and to learn more about the event, to do supplemental inspections, that provides us further information so that we can better characterize it, and take steps that are necessary from that perspective.

MEMBER APOSTOLAKIS: Yeah, but another thing that you told us last time we met was that in areas where there is very little risk information, you really rely on domain experts in this case, for example, for the sirens you had people who are experts, emergency planning and preparedness. And those people don't necessarily think in a risk-informed way. I mean, they --

MR. SATORIUS: That's true, but we asked those -- we posed the question to those expert panels. We said given this set of circumstances, whatever the set of circumstances may be, the number of sirens that work or don't work, what would be the appropriate regulatory response from an inspection perspective? What type of response do you want from the Staff so that you can learn more about this event, so that the Staff can go forward and take the appropriate actions. That was the question that was posed, because the purpose of the action matrix and the purpose of the thresholds are to generate staff response at the appropriate level, so when we empaneled these expert panels that was the tasking, that was the charter. We want you folks to sit down and figure out what level of regulatory response we should have for these performance-based issues, so that was the charter. And that was the reason why they came up with the percentage of sirens or whatever performance-type activities we use for those performance-focused cornerstones.

MEMBER SIEBER: I guess I shouldn't try to help the Staff along, I guess. On the other hand --

MR. FRAHM: That's okay.

MEMBER SIEBER: On the other hand, having worked in power plants for many years, from the standpoint of the public, the public sees the things that they do as far more important than your safety injection pump. And the politics of all this gets involved in that too. You've got the governor of the state who's trying to making decisions as to whether there is a state of emergency or evacuation. And because of that, there are maybe artificial, but nonetheless, they're real to the people we're bound to protect, which is the general public. And they see things in a different framework than the risk implications would imply. And so I can sort of appreciate why there is great emphasis on things like the ODCM requirements for -- and also emergency planning and operating sirens, and classifying events, and evacuation plans, and all of those plans, because that's the way the public sees it. And they don't see it in risk metrics.

MEMBER APOSTOLAKIS: But then the agency though goes back to the significance determination process.

MEMBER SIEBER: That's right.

MEMBER APOSTOLAKIS: Determines this action based on risk, so we're trying to have it both ways.

MR. SATORIUS: I'm not sure I understand what you just said, George, but I think you said that we'll get a preliminary color based on a performance indicator that is performance-based, and then we'll turn around and try and risk-base that decision. And we don't try and do that, you know. We have cornerstones that either have risk-informed inputs to determine what the risk, or what the threshold should be, and we have those that are performance-based. And we don't -- we acknowledge that there's a clear divide between the two, and we never try and mix the two based on a specific issue.

For example, the siren issue. That, as long as the performance indicator, and that type of review criteria remains in place, that will always be performance-based until we can either figure out a way to risk-base it, or I'm sorry, risk-inform it, or we figure out a way or we don't, and we keep it performance-based. We never mix the two.

MEMBER APOSTOLAKIS: But the action matrix does mix them.

MR. SATORIUS: That's true, but the action matrix only tells the staff at what level of engagement we should go out and engage the licensee. Now for those that are risk-informed, for those cornerstones that are risk-informed, we have risk insights that talk towards CDF and other thresholds that tell us when we should go out and engage. But when we don't have those risk insights, based on expert panel inputs, we decide the level of staff involvement, at what point in time based on X number of sirens not being able to function do we want this staff involvement, so you're right, but we do have two inputs, both performance-based and risk-informed. But the output it staff response.

MEMBER APOSTOLAKIS: And how does that help?

MR. SATORIUS: Because the staff response then is typically in the form of meetings with licensees, additional supplemental inspections depending on what the color of the findings are. And those supplemental inspections allow us to gather additional information so that we can further frame the issue and decide whether the licensee is responding in a manner that is acceptable or unacceptable such that additional resources that are needed to be applied can be so applied.

MEMBER ROSEN: The way I see it is you say to the applicant, you've just broke two of our thresholds. One of them was in Universe 1, risk-informed, and the other is in a whole other universe, Universe 2, which is performance-based. It's not good to break our thresholds in any of our universes, so come talk to us about why you broke these two different thresholds in two universes.

MR. SATORIUS: Yeah, that's right. You nailed it.

MEMBER ROSEN: They're not the same though. They're not the same universes, and the metrics -- if you think about each universe differently, as Jack was leading us to earlier, saying well this Universe 2, let's just say emergency preparedness, there you're looking at it from outside in, let's say, from outside the plant in, and worrying about what the public, and how they perceive it, and their needs. In Universe 1, which is now the risk-informed, you're looking at from inside the plant out, thinking about sequences and analysis, and core damage frequency, and LERF and all of that. Two different universes looked at from two different directions, but the Staff response is always, Mr. Licensee, come here and tell us what you're doing about the fact that two of your -- the universes that you're responsible for you have created tracks on the wrong side of the threshold.

MR. SATORIUS: That's true, but it's important to point out that we all understood as we put together ROP in the beginning that notwithstanding the fact that there would be these two universes, that we would treat them from a response perspective as the same, that the staff would, irrespective of whether they were risk-informed, or performance-based, the staff from our reaction and to go out and ask the licensees to tell me why you're outside of your universe, the reaction would be the same. The response would be the same.

MEMBER ROSEN: And doing that, is not a matter for technical analysis, in my view. Doing that reflects your value system, value system of the agency.

MEMBER APOSTOLAKIS: Actions always reflect values, yes.

MS. CARPENTER: Well, it would reflect the value system of all the stakeholders because there's thresholds at which the agency responds, set by a number of stakeholders, a wide variety of stakeholders.

MR. SATORIUS: It was at the last Subcommittee briefing that -- and I don't recall which one of the Subcommittee members it was, but an observation that was made was that, you know, that the staff may not always have equal findings as a result of PRA, but these yellows in two separate universes or cornerstones, by going and looking at those, they give you perspectives on licensees' performance and their safety perspective. And from that perspective, we were gaining information so that we could appropriately regulate these facilities.

MEMBER LEITCH: The thing I think we have to be aware of is that licensees are operating with limited budgets, and this process is influential to a great extent, and where those limited funds can be spent. And I know that a number of licensees are spending large amounts of money to completely replace siren systems, for example, we've been talking about sirens. And I'm not by any means saying that money is ill-spent. I think it's good that they're doing that, but I guess my question is always, are we skewing the appropriations in that area at the expense of perhaps more safety-significant improvements elsewhere?

MR. SATORIUS: I think what you're pointing out is the classic dilemma, that we are faced as regulators that we must balance. Those areas that we focus or ask, or regulate licensees to focus their investments upon. And we think to large part, we're not too far off the mark. It's one of our strategic - - it's one of our very major goals is reducing unnecessary regulatory burden, and that falls right into that category.

MEMBER LEITCH: Yeah. And it's a difficult decision to make.

MEMBER SHACK: Well, on our standard hobby horses, let me get back to the one that this is to evaluate performance. It's not to evaluate plant safety. I don't even like setting the thresholds for the risk-informed ones the way we do it. That's how we wend up with the yellow/red thresholds for the scram.

CHAIRMAN BONACA: Because it doesn't make sense.

MEMBER SHACK: You look at one indicator, and you drive that sucker off to some Delta CDF, and you end up with a result that you don't like. I personally would feel comfortable if all of the thresholds were set on an expert judgment performance-based criteria.

MEMBER SIEBER: Well, that goes back to the old SALP system then.

MEMBER SHACK: Read on them ahead of time, they're quantitative and they're defined.

CHAIRMAN BONACA: Because if you did it in fact on an expert system, you would have a means of using the same meter for all of them. That's an expert system, and it's a common one. You can't use --

MEMBER APOSTOLAKIS: See, that's what bothers me.

CHAIRMAN BONACA: You cannot use the risk-informed one for all of them because you cannot apply that emergency -- I mean, you can make certain considerations. For example, that yeah, it's a very unlikely event, but of course, if you have a general emergency and you didn't have your emergency plan working, you may have, you know, a lot of consequences, very significant and then the political issues that Mr. Sieber was talking about. But the fact is yes, I mean you could have a common meter for this, but it would have to be an expert judgment-based.

MEMBER APOSTOLAKIS: See, the mixing of risk-based thresholds with performance, that has bothered me from day one.

MEMBER WALLIS: Why does it bother you? I was shocked.

MEMBER APOSTOLAKIS: Because they're two different things.

MEMBER WALLIS: No, but we have a program in which our students take courses in engineering and they take courses in the business school, and we give them a degree. We just accept that if they get As in the courses in one or the other, they're equivalent. Who cares?

MEMBER KRESS: No, no, no. Except in this case they're not, because when you ask for developing a threshold in risk-based space, you ask a different question.

MEMBER WALLIS: No, you ask when do you take action? That's the only thing that matches.

MEMBER KRESS: No. You ask what effect

does it have on CDF or LERF.

MEMBER WALLIS: No.

MEMBER KRESS: That's what they do.

MEMBER APOSTOLAKIS: That's what they do.

MEMBER KRESS: But when you do it in a performance-based you ask the correct question, which is at what level would I take action? And I think that's the whole problem. I mean, you're asking the wrong question in the risk-based --

MR. SATORIUS: But I would offer that we're -- I would agree with you on the one hand that we're asking the question in a risk-informed manner that would beg the answer, at what Delta CDFs do you trigger? But you have to look a step beyond, because the step beyond is at what -- what does that mean? What level of staff involvement and follow-up inspections does that mean, that's where the two come back together, because the whole purpose of the action matrix is to do just that, to arrive at the appropriate staff response.

CHAIRMAN BONACA: But let me just give you a good example, I think. If this system had to go in place in 1990 rather 2001 or 2, I daresay that the trip threshold between, you know, from green would have been probably six scrams a year, because it was the average -- and through PRA you would have determined that that's not significant risk associated with that. I think that the number is down to three or whatever it is, one, two, three, because the average performance is there, and is below that. So to some degree, I mean you have to use judgment, expert judgment and you have faced -- you have looked at the actual situation.

MEMBER KRESS: Yeah. Once again, what you really should be looking for is a detrimental change in performance. And that not necessarily does not necessarily mean something causes a CDF change so much. That's where we're going wrong.

MEMBER APOSTOLAKIS: Let's take Davis-Besse. I mean, you're still in the process, I understand, to determine the color, or have you done that?

MS. CARPENTER: There's a preliminary significance determination out that it is preliminarily red.

MEMBER APOSTOLAKIS: It's preliminarily red. So that depends a lot on the strength of the liner, doesn't it? I mean, if it's a risk-informed thing, you have to decide what is the probability that I will have core damage. Right?

MR. SATORIUS: I have to say that I'm not familiar with the SDP, but what you're saying is absolutely right.

MEMBER APOSTOLAKIS: Okay.

MR. SATORIUS: That would have to be part of the analysis.

MEMBER APOSTOLAKIS: So let's say that the liner, to make life simpler, was triple the thickness that it actually was, so it could withstand all sorts of pressures. So then it would come down to maybe green, or maybe even, you know, what is it white? Yellow. And yet, it's a universal agreement, there is a universal agreement that the performance there was atrocious, so risk cannot be a measure of performance.

MEMBER KRESS: That's what I said.

MEMBER APOSTOLAKIS: Risk cannot be, and we're mixing them. Now you said earlier that the sirens are important to the public, so we have to put the appropriate colors, but then two minutes later you said well, we have to live with those until we're able to risk-inform them. Well, these are conflicting objectives. Either you want to risk-inform them or you don't. You say no, I will keep the white and yellow thresholds because the public is there, and I really care about them, worry about them, what they think. Or I will risk-inform it, and give it a perspective of risk, so mixing the two makes some of us uncomfortable, that risk is not something that would tell you that performance is bad. I mean, it will tell you that, but in some cases it will tell you it's okay when you know it isn't.

MEMBER WALLIS: But you use your sense, common sense. You're going to use risk information and performance information in --

MEMBER APOSTOLAKIS: So let's take the action matrix and put another into there, common sense. I mean, as Churchill said, the problem with common sense is that it is not common. And this integrated decision making process is another way out, in a different --

MEMBER WALLIS: You don't need a universal yardstick.

MEMBER APOSTOLAKIS: But what's wrong with doing it right? I don't understand that. What's wrong with doing it right? Just because we've done it.

MEMBER WALLIS: There's a right way to do it?

MEMBER APOSTOLAKIS: Yes, performance.

MEMBER WALLIS: Well, it's all performance when it comes down to it. It's just that the performance just has more risk impact, you're going to weigh more heavily.

CHAIRMAN BONACA: The whole issue is that -- here the whole issue of the regulation, as you know, is to preserve the regulatory margin in the deterministic system.

MR. SATORIUS: That's true.

CHAIRMAN BONACA: And now we're putting in risk but, you know, you may have for degradation of a barrier to the point where your regulatory margin isn't affected at all. And that's why you get in that kind of conflict, that you have risk increase really, if you really quantify it to some degree, or maybe -- but you still have preserved the regulatory margin that was really minimum requirement. And maybe that's -- that's why I think it's hard to use risk.

MEMBER APOSTOLAKIS: But this is not the objective of this process, is it?

CHAIRMAN BONACA: No. That's why I'm saying that maybe that's one of the difficulty we have, and I agree that performance would be the issue really, and --

MEMBER WALLIS: I don't understand George's problem. Then you're going to say that this risk has nothing to do with performance, and let's not consider risk at all in all of these --

MEMBER APOSTOLAKIS: Risk is at a higher level. According to what they are saying is that they are dealing with noise. I mean, are you really deviating from accepted industry performance or practice, and then if you do, let's find out more about it. We'll talk about it. You know, it's at the low level, risk now is higher where serious things are happening.

MEMBER WALLIS: Well, I think you would be the advocate of using more risk information, rather than --

MEMBER APOSTOLAKIS: I've been trying for two years now to understand the objective of this. I've given two or three explanations, one was maintain the current level of risk. People didn't accept that. Look at performance. Fine, then look at performance only. And I'm giving you the example of Davis-Besse. The risk level may be very low, and yet the performance was terrible.

MEMBER WALLIS: The objective is neither of those things. The objective is to decide what's an appropriate response to a situation, and that situation has different aspects to it, some of which involve risk, some of which do not.

MEMBER APOSTOLAKIS: But then you have to understand, you know, what's going on there. You can't justify everything by saying well, you know, I really worry about this. I mean, some sort of consistency has to prevail, some sort of technical --

CHAIRMAN BONACA: Well, I think the process is risk-informed in the sense that, of course, initiators have to do with risk, and so on and so forth, so the elements -- that's the risk element of that.

MEMBER SIEBER: Yeah, and that's only three of seven cornerstones.

CHAIRMAN BONACA: Well, I understand that, but the point is -- well, it cascades down, and now they're doing a lot of work to see what else could be included so far as indicators, so it is risk-informed in that sense. The thresholds is the problem really about --

MEMBER APOSTOLAKIS: Sure.

CHAIRMAN BONACA: That's the issue.

MEMBER APOSTOLAKIS: And, you know, we've identified that fundamental flaw, as we called it, that, you know, you are trying to change one thing to see what leads to CDF, when you know that the agency will never let them go there, never let them go to 15 scrams a year. You guys will take action way before that.

MR. SATORIUS: Well, absolutely, because after they exceed three scrams, we do a 95001 and do a follow-up inspection to understand it more thoroughly.

MEMBER ROSEN: You're in the action matrix already.

MR. SATORIUS: That's exactly right. And after you exceed seven, we go out and do a 200 hour inspection, a 95002 and understand further why it is that they've had seven scrams in 7,000 critical hours.

MEMBER APOSTOLAKIS: In the discussion, let's say your green to white now is three, I believe, isn't it?

MR. SATORIUS: Yes. And once you have the fourth, you're in white.

MEMBER APOSTOLAKIS: Yeah. So the matrix could show only that, but in the background in the text you could say now, just to give you an idea of what three means, in order to see a significant change in CDF you would have to go to 23, and leave it at that. Don't put it in the matrix. That's a way out, but it gives me a perspective of what three means.

MR. SATORIUS: I would argue that it would give you a better perspective of what three means, is if you see the white/yellow threshold and the yellow/red threshold, because then you see a perspective -- because, first of all, the scram -- if we're going to talk about that, the scram PI, both the two higher thresholds, the yellow/red and the white/yellow were based on risk studies, so those are risk-informed. The green/white was more of -- we looked at outliers. So I would argue that when you balance all the stakeholders, and both our internal stakeholders and external stakeholders, including the public, it becomes a balancing as to is public confidence probably going to carry that day here, and the staff believes that public confidence carries the day, because if you show, visibly show the yellow/red threshold if it's at 25 scrams, then that is indicative to somebody out in the public that the plant that's two miles down the road is running two scrams, or if it's running three and they know that the NRC is initiating an inspection to review those, that the staff is responding appropriately, there's a lot of margin left as far as the risk-significance is concerned, and I think we've done the right think.

MEMBER KRESS: Excuse me. I think there's a fallacy to that argument, and the fallacy has to do with just what we're talking about. You're basing your assessment of the performance of the plant, when we get to that level, on the basis of it's change in risk. And we're saying that's inappropriate, that that plant that got to some level well before that, has a degraded performance that should have raised a flag long before you got there, and that you're sending the wrong message when you include that in the matrix.

MR. SATORIUS: Well, you know, the other thing that we've realized as we've matured in the ROP is that, first of all, we haven't seen plants with over three or four scrams in 7,000 critical hours, but when we see those, when we see them getting close, we see other -- if you've got problems that cause that many scrams, those are going to manifest themselves in other problems, and in other cornerstones, such --

MEMBER KRESS: That's an assumption we've never seen validated, but --

MEMBER APOSTOLAKIS: But it seems to me, following on what Dr. Kress said, you are sending the wrong signal to the public, because if they feel that they are safe because the number of scrams is two, versus the 25 it takes, you're sending the message that what matters in the risk space is the number of scrams, which is not true. It's not the number. You could have one scram that really does you in, right? Because it depends on a lot of what other things happen. It's not the number. And if you look at any PRA in the dominant contributors, I challenge you to find me one that says that the number of scrams is a dominant contributor. It always says losing electric power, and then this, and then that, losing this, and then this, and then that. It's the sequences, so aren't you really sending the wrong message to the public?

MR. SATORIUS: No, I don't think so because the scrams you just described, George, the loss of off-site power, the hard scrams, those are going to events that we're going to follow-up from an inspection perspective, and we're going to do an SDP on those issues, and we're going to deal with those.

MEMBER APOSTOLAKIS: Why don't you say that then? Why don't you say this is really what --

MR. SATORIUS: We do. WE do say that.

MEMBER APOSTOLAKIS: But you bring in the issue of scrams, and then I really can't miss this opportunity to address Dr. Wallis' concern. It seems to me that he is a member who for the last four or five years has been raising the issue of the informed technical groups as being stakeholders, so it seems to me that the informed technical groups, for example, the decision theories who looks at this, should be able to say well, you know, it's not ideal, but at least it's --

MEMBER WALLIS: No, I would say --

MEMBER APOSTOLAKIS: You find mistakes.

MEMBER WALLIS: No. I would say you risk-inform as part of your information, but you know if a plant has three scrams, it's going to be in the newspaper each time there's a scram, and that's going to cause a big sensation. That's important information. You can't ignore that, retreat into risk space and do nothing because it's not risk-significant.

MEMBER APOSTOLAKIS: But that's not what we're saying. We're saying make everything performance-based. WE're not saying ignore --

MEMBER WALLIS: With all the information you've got to make a sensible decision on what you think --

MEMBER APOSTOLAKIS: You think in terms of levels. They're dealing here with the mud down here. You're deviating a little bit from good performance.

Risk analysis will never really show you anything there. Right?

MEMBER ROSEN: If I was --

MEMBER APOSTOLAKIS: It takes more serious things --

MEMBER ROSEN: If I was an informed member of the public who had the first 15 years of my career post graduate career done PRA, and then became a water color artist, and moved to one mile from a nuclear plant, and paid no attention to Nucleonics Week or anything like that, what the thing I would want to know is how many complicated sequences the plant has been in, not how many scrams, so this goes to the issue of what is really significant to the informed member of the public.

MEMBER SIEBER: It's the SDP that picks that up.

MR. SATORIUS: I think that's what I was trying to refer to a little earlier. For those complicated scrams that involve mitigating systems that are expected to start that don't start, or a loss of off-site power, those are ones that we go out and do an inspection on.

MEMBER ROSEN: But the thing in the ROP, this hypothetical member of the public, all he did was once every month went into the website and checked the ROP status, and it tells him how many scrams the plant he's living next to had, if he knows nothing. But if it told him instead how many times in the last three years the plant had entered sequences of -- dominant sequences and how far they had got down the road, then he'd know something.

MR. SATORIUS: And I think the best way we - - you know, we also gather information on scrams with loss of normal heat normal, because those are what we considered to be somewhat complicated scrams. The other ones that we talked about, like the loss of emergency diesel generators, or loss of mitigating systems, we cover those under the inspection program, so we make an effort to gather this information and differentiate between what - my words - relatively normal scrams, were equipment responds as expected, to those that they do not, so that's an effort to differentiate between the two.

We've had some challenges, quite frankly, with the scrams of loss of normal heat removal, and PIs, we have problems and challenges with all the Pis that we aren't able to set up in a relatively simple manner, such that they're easily counted.

MEMBER SHACK: You know, when we do the

A-4 we sort of got away from looking at things one at a time, that you realize that it's a complicated system. You have to look at them all together. When you do the Pis you're looking at one thing at a time, and you're just driving that sucker all the way down the road. And to me, that's a meaningful measure of risk. When you say you're risk-informed, I'd say that's mis- risk-informed.

CHAIRMAN BONACA: Well, I contend for the thresholds of importance, which is like the one between green and yellow, rather than yellow to red, you're already performance-based, in my judgment, because again the example I made before. If we had set up the system 10 years ago, that number wouldn't be one to three. It would be five to six, because it would reflect what was acceptable at that time. And still, you know, your PRS base, clearly you would assume there isn't much of an increase in risk. And I think for those thresholds that I'm talking about, already we are there. You know, it's really when you get down to the yellow/red and the number is 23 that it becomes kind of peculiar.

MEMBER SIEBER: Well, for the average person when you see the red threshold for scrams at 25, I think it's 25.

MR. SATORIUS: It is.

MEMBER SIEBER: Then what that tells you -- what it tells me is reactor scrams aren't very risky, and that's because the plant is built to shutdown that way.

MEMBER ROSEN: A scram is a safety action.

MEMBER SIEBER: But you measure something because it does represent things to the public, because they can see the cooling tower, if you have one, and when it quits steaming, they know something happened at the plant. On the other hand, if you would take something like Davis-Besse, and you'd say well, here's the risk status of that plant from three cornerstones, the first three, you know, initiating events, mitigating systems and barrier. On the other hand, if none of their sirens work, what do you think the newspaper would write about? Okay. So the emergency plan, and the sirens and classification, and effluents and how you treat your workers as far as radiation dose are concerned, are relatively equal in importance. Each of those cornerstones, and it was the judgment of the regional administrators to say, you know, if you create this risk situation in a plant by equipment failures and so forth, that's worth this much response to me. But if the governor is calling me saying these sirens don't work, that's a political event for him, and that's worth that same response. And that's how you end up mixing the apples and oranges, and bananas and everything in the matrix.

MEMBER APOSTOLAKIS: But you can make everything bananas by acknowledging that you are dealing with --

(Several speaking at once.)

MEMBER WALLIS: I'm really puzzled what this Committee is trying to achieve. I mean, the Staff conclusions, I look at slide 7, is anything going to change as a result of all this talk? What are we trying to achieve? Does George want to remove the word "risk-informed" entirely from this whole process? What are we trying to achieve?

MEMBER APOSTOLAKIS: For three years now I've been complaining that I don't understand the objective of these classes. And I find it odd that three years later, I still don't understand it. Performance. I'm willing to accept that. Let's make sure then the action matrix and everything we do deals with performance. Risk, let's make sure it does. But to start mixing the two and saying, you know, we're going to show a yellow/red, or white - I'm confused now - threshold that will give the public some idea about the level of risk, I think that's actually misleading.

MEMBER SIEBER: But see, that's different than what the Staff was told to do. There is an SMR that's way back there that told them to develop a revised Reactor Oversight Process.

MEMBER APOSTOLAKIS: And they did.

MEMBER SIEBER: And it should be risk-informed. And you can't risk-inform things that don't have risk associated with them.

MEMBER APOSTOLAKIS: The SDP, it seems to me, is a good example of risk-informed approach, because it deals with compound events as, you know, if you're going to be in trouble, that's how you're going to get into trouble. And they do a decent job evaluating the risk.

MR. SATORIUS: But I want to make sure that you understand that there are certain SDPs that are not risk-informed.

MEMBER APOSTOLAKIS: Yes, we know.

MR. SATORIUS: Okay.

MEMBER APOSTOLAKIS: We know that, but then that's a different issue. They try to risk-inform them. I mean, that's a more technical issue.

MEMBER SIEBER: That's the same thing as the performance indicators. Some of the performance indicators have risk-information in them, and some do not.

MEMBER APOSTOLAKIS: Was Davis-Besse green before the incident?

MR. SATORIUS: Yes.

MEMBER SIEBER: It was green.

MEMBER APOSTOLAKIS: It was green, so it seems to me in clear terms, that the ROP has failed. That's the only test I know, real life.

MEMBER SIEBER: It's not a predictor.

MEMBER APOSTOLAKIS: Green, and you have a major incident on your hands.

MEMBER SIEBER: It's not predictive, though.

MEMBER APOSTOLAKIS: Well, I mean, do you have any other measure of success?

MR. SATORIUS: Well, you're judging success that the ROP in this specific instance was not predictive.

MEMBER APOSTOLAKIS: Yeah. But if you call it in this specific instance, you are really downgrading it. I mean, that was a major instance. And to have all green when something like that happens worries me, worries me a lot.

MR. SATORIUS: Well, I think it concerns the Staff, as well. We --

MEMBER APOSTOLAKIS: It should.

MR. SATORIUS: A high group of folks that went through the Lessons Learned. We have a task force as a result of that. We are moving forward.

MEMBER APOSTOLAKIS: But the task force though is looking at different things, looking at corrosion issues, and looking at what happened, and so on. This morning Mr. Gillespie told us that the agency is going to have a White Paper on how to use experience to change its processes. I mean, if there is a prime example where we have to do that, it's this one.

MEMBER POWERS: George, I hasten to remind you of the saying among the legal brethren in this world that tough cases can make for bad law. And I'm wondering if you really wanted to use Davis-Besse as the test for the ROP.

MEMBER APOSTOLAKIS: I'm having a big problem, Dana. I have an Oversight Process that's supposed to warn me about bad performance, and I have this major event on my hands now, where my process was telling me everything was very nice. I'm really disturbed by that. Whether I want to rewrite the law to make sure, you know, that the Davis-Besse thing is there, I don't know.

MEMBER POWERS: Well, I think I'd worry more about it if Davis-Besse had involved something that was anticipated, that was something that people inspected for, that there had been past experiences with. I'm much more concerned when I see the Oversight Process not catching the fact that preventive maintenance was not done correctly, or that systems were not returned to the proper state after tests had been done. Those things concern me much more as a standard for comparing the ROP --

MEMBER ROSEN: What concerns me about Davis- Besse is that the corrective action system, which we rely on in so many ways, was not effective.

MEMBER APOSTOLAKIS: It was not effective.

MEMBER ROSEN: That is why I --

MEMBER POWERS: I agree with you. That's the kind of point that I would go after, not the fact that the incident actually occurred.

MEMBER SIEBER: Actually, when you look at it --

MEMBER APOSTOLAKIS: They're related though, aren't they?

MEMBER SIEBER: Well, the ROP was never intended to be composed of leading indicators. He's really reporting on history and what the agency's response to that history should be. And there is an underlying presumption that if you have a lot of issues in your plant, that it somehow is riskier than if you don't have a lot of issues. And that's why you look at initiating events, mitigating systems and so forth, but it will not predict, the same way the PRA did not predict Davis-Besse, because the phenomenon wasn't long enough.

CHAIRMAN BONACA: Well, but I think Davis-Besse, in the sense that here we have a case where again those nozzles were never inspected, the two nozzles up there. Okay? That, for example, would be what would give a very poor mark to the plant, that both the plant and the agency, and NRC were not monitoring that issue, so there was -- that's what I keep saying there's an oversight implied about the whole context under which the CRDM cracking has been tracked, so it's a difficult thing to do. I mean, there were filters that were being clogged. I mean, there are performance issues there that could have led to a lot of --

MEMBER WALLIS: You can't argue against

George on the basis of predictability. There were a lot of things that went on for years which were happening, which should have been detected. It's not a question of would you predict what was going to happen.

MEMBER APOSTOLAKIS: This process is not predictive. Nobody is asking the --

MEMBER WALLIS: They should have caught these things.

MEMBER APOSTOLAKIS: Exactly.

MEMBER WALLIS: Which performance indicator failed to catch them, is the question, and what can you do about it?

MR. SATORIUS: Well, it goes beyond performance indicators alone. I think our view thus far of what's happened at Davis-Besse has revealed some inspection performance issues that we need to address, and are addressing, so --

MEMBER ROSEN: But fundamentally, the inspection agency is not primarily responsible. The licensee is responsible. The fact that you didn't catch them is a whole other story, but they should have caught it themselves.

MR. SATORIUS: The fact that we may not have caught them is something we're looking at, is something on our plate.

MEMBER APOSTOLAKIS: It's easy to get lost in the details and start arguing, you know, do you need the yellow/red at 25 or whatever. The only way that we have to know what's going on at the plants is through the Oversight Process, is it not?

MR. SATORIUS: Yes.

MEMBER APOSTOLAKIS: Yes. Essentially that's what it is.

MR. SATORIUS: The Oversight Process and related, but yes, I would agree with you.

MEMBER APOSTOLAKIS: So it seems to me that we have the bigger issue here, that we had such a major incident, near major accident on our hands, and our process did not identify the performance issues, so why did that happen? Are we looking at the wrong things? You know, maybe we are also busy now trying to be green that we are missing the big picture, and that's what bothers me.

MEMBER SHACK: I think, you know, the lesson I get is that the ROP is still not doing a good job of characterizing the corrective action program.

MEMBER APOSTOLAKIS: That's very true.

MEMBER SHACK: And that's what I'm concerned about. You know, we're off basing -- you know, our effort seems to be on performance indicators that have nothing to do with the Corrective Action Program, and it would seem to me, you know, that after -- you know, the biggest priority is the SDP, which everybody seems to be working on, and I'm assuming that's improving at a rapid rate, but I don't see any concerted effort to, you know -- what are we going to do, you know, how can we improve our oversight, or monitoring, or indicator of the Corrective Action Program, which would seem to me, you know, we all agree that's an absolutely fundamental way to track performance in the plant, and yet it's the one that somehow --

MR. SATORIUS: Well, we agree with you that it's an absolute necessity to track that, and it's part of our baseline inspection.

MS. CARPENTER: Right. It is one of the Action Plans.

MEMBER SHACK: And I understand that. It's just that it seems to me it deserves even more attention, you know, that somehow -- you know, that's where we would have seen Davis-Besse, you know, that somehow we didn't -- we weren't assessing the effectiveness of the Correction Action Program, whether it's through the inspection process, the performance indicator. But I guess that's what, you know, I would like to see in the ROP, if I had my druthers as to what I see as the most important development, is to go back and look at the Corrective Action Program again, and some better way to track its performance. That's, you know, a deficient performance.

MR. FRAHM: That is exactly what the fourth concern on this slide gets at. That's why we put it on this slide. We agree that that's a big concern, and we're looking at making changes across that area.

MEMBER ROSEN: The issue being Corrective Action System --

(Simultaneous speech.)

MEMBER ROSEN: Yes, those three things. Think about Davis-Besse. Those three things is where it was at.

MR. SATORIUS: It was a direct result of that that we have taken these crosscutting issues and folded them into our SDP Improvement Project Plan, where we're going to look at additional activities that we need to take into crosscutting areas. In other words, inspection findings that crosscut cornerstones, and we're considering whether we need to take additional actions for those licensees that have identified crosscutting issues, and whether that includes additional inspection, additional meetings, or a response on the docket following the end-of-cycle letter as to what their plan is to improve their Corrective Action Programs, or human performance, or safety conscious work environment.

MEMBER ROSEN: The unpleasant discussion, the unpleasant thing about this discussion is that we have spent 90 percent of our time talking about 10 percent of the issue, and 10 percent of our time talking about 90 percent of the --

MEMBER WALLIS: Not just the issue, but what's actually going to come out of this discussion? I've learned now that you are doing something that's substantial and meaningful on bullet four. I'm not sure that anything substantial and meaningful has come out of the discussion of the other bullets.

MR. SATORIUS: Not as yet. I will admit we got somewhat sidetracked.

MEMBER WALLIS: So what other substantial and meaningful things are likely to come out of this discussion today?

MR. SATORIUS: Maybe we ought to just go to the next slide, and talk about each of these four bullets.

MEMBER SIEBER: But there is a fundamental issue that we might as well note right now, is that there are some among us that are concerned about the conflict between risk information and performance information.

MR. SATORIUS: We are clearly aware of that. That might have been an understatement. We are very clearly aware there are members of the Committee that --

MEMBER SIEBER: Well, it's a hurdle we're going to have to solve one way or another.

MR. SATORIUS: If I can just talk about the first issue that we had on that bullet, which was risk-informed and performance-based differences. First of all, the Staff agrees with the Committee, and the assertion that risk-informed PIs and SDP results are not equitably qualifiable with performance-based Pis and SDP results. We agree with you that it would be a more intellectually legitimate if such methods were able to be developed. Arguably, it would result in a crisper approach to responding to plant issues if the risk-informed findings were equitably qualifiable. At least from an academic perspective, it would be more scrutable, repeatable, and objective, and risk-informed. But in considering the Committee's position and our discussions with the Subcommittee, and the many stakeholders involved, as well as the basis for why the ROP was developed in the manner that it was developed, we consider our current approach to be acceptable, but we recognize that it must continue to make an evolutionary process.

CHAIRMAN BONACA: What does it mean, the "evolutionary process"?

MR. SATORIUS: We need to continue to work towards making our process more risk-informed, to the extent that tools exist or can be developed to make it more risk-informed. We believe it's more scrutable if it's risk-informed.

CHAIRMAN BONACA: Okay. Because there is a difference in our response, if you say we agree that, you know, this connects here, and inconsistencies, and we cannot do anything, but we'll think about it, versus what I heard in the beginning, that it takes time and we're striving for that, and we will converge with you as time allows, and so on. I mean, for a response, because in that case, I can understand that maybe we can say time will bring us together, but --

MR. SATORIUS: And I think it is the

latter, because what we're trying to say is today based on the tools we have available, we're unable to move into this -- to a more risk-informed in some of the cornerstones, but we have action plans underway with coordination of the Office of Research, but today we're not able to do more than what we have in place today. And we want to quantify that by stating that we believe that we're pretty close to the mark.

We believe that the plants that need additional inspection because of performance problems that relate back to either performance indicators or inspection findings that are either performance-based or risk-based, they're getting the more inspections, and the ones that are performing better are getting less inspections.

MEMBER WALLIS: I object to the use of the word "academic" in a pejorative sense, but what you imply is that academic means over-emphasizing some theoretical aspect to the detriment of the decision making process. And in engineering school, we teach how to make sensible decisions based on all the information we have, and based on the limits of that information, the uncertainties and the public response, and everything else, so I hope your final decision is a very good academic one.

CHAIRMAN BONACA: I still think there is a divergence from what -- I think you heard from this Committee that we believe that a solution of this issue is to accept the fact that these are performance indicators, of which the safety-related ones are risk-informed, and that those attributes are risk-informed. Okay. But the solution for us to go in a direction where all these indicators are performance-based, not performance. I mean, they are -- well, that they're performance indicators. I'm sorry, they're not risk - - and I hear you say that you're striving to make all of them instead risk-informed.

MR. SATORIUS: I don't think I said that.

CHAIRMAN BONACA: Okay.

MR. SATORIUS: I think to the extent that tools are available, that we can make our indicators more risk-informed, we are working towards that goal.

MEMBER ROSEN: And in the cases where they're not, it's perfectly acceptable, in my view, to explain the reasons why you are not doing it. I think the issue here is explanation and communication, more than the need to drive the performance indicators, the ones that are based on performance towards risk. It's just a matter of you're dealing with apples and oranges, and we all, both the regulator -- the regulated and the general public needs to understand the difference on how they're being used. I think risk communication, and overall communication would help a lot.

MEMBER SIEBER: This gets to the issue of transparency to some extent, and in your most recent note to us, you indicated that you're trying to achieve transparency through the basis document, which I haven't seen yet.

MS. CARPENTER: We've issued that I think several weeks ago, that was signed.

MEMBER SIEBER: Maybe we could get it.

MR. SATORIUS: I believe it was sent over when we sent our memo in December. Is that right, Ron?

MS. CARPENTER: Actually, it was before that. The draft was sent to the members back in November. But we have signed that out now.

MR. SATORIUS: It's been signed out within the last week or so, so we can get an official copy to you.

MR. FRAHM: I don't believe it changed much from the draft though.

MR. SATORIUS: I'm just going to -- I think you understand the direction that we're headed on that particular issue. Why don't you go to the next slide, Ron, please.

MEMBER SIEBER: Well, I guess there's one final question from the, again the academic standpoint. We need to conclude whether it's correct or incorrect to mix and match risk information and performance information, because that's the crux of the problem. And if we just now go out passed that, I can't write my letter.

MR. SATORIUS: Well, we're not sure today whether we can ever get to a fully - and I don't think we'll ever get to a fully risk-informed process.

MEMBER SIEBER: Well, it would be incorrect for you to say that you could, because in a couple of the cornerstones it's impossible.

MEMBER APOSTOLAKIS: Well, actually I think it shouldn't be risk-informed. It's performance.

MEMBER SIEBER: I don't think -- well, you would like everything performance-based, I presume.

MEMBER APOSTOLAKIS: Yeah.

MEMBER SHACK: It's a moot discussion. Are we all happy with the green/white thresholds?

MEMBER APOSTOLAKIS: But these are performance-based --

MEMBER SHACK: Nobody is ever going to get passed those.

MR. SATORIUS: WE realize that the ROP isn't perfect, but we think that it's a process that appears to be working. We have a confidence that it's doing for us what we want it to do; and that is, to give a cue as to what is the right level of NRC response.

MEMBER APOSTOLAKIS: Did SALP look at the Corrective Action Program?

MS. CARPENTER: Yes.

MR. SATORIUS: Yes, it was one of the several functional areas.

MEMBER APOSTOLAKIS: So are we really justified in saying this is an improvement over SALP?

MR. SATORIUS: The Staff certainly believes it is.

MS. CARPENTER: And I think the industry does also.

MEMBER ROSEN: I think it is definitely an improvement, but we have this question about the ROP failing to warn us about a significant event. And so don't be too confident. It's okay, it's better, but it failed to warn us about a significant --

MEMBER WALLIS: Can we put this risk-informed --

MEMBER APOSTOLAKIS: See, predictability has -- the value of predictability has been exaggerated, grossly exaggerated. I mean, the fact that we have the columns and all, it allows everybody to be green and everybody says well, this is great.

MEMBER WALLIS: Can we put this risk-informed thing to bed? I mean, if we took the word "risk-informed" away from this regulation, would it suffer in any way? Would it improve in any way?

MEMBER APOSTOLAKIS: It's not just the words.

MEMBER WALLIS: What's the problem?

MEMBER APOSTOLAKIS: You have to change the action matrix.

MEMBER WALLIS: You receive information as appropriate. What's the problem?

MEMBER APOSTOLAKIS: You have to change the action matrix.

MEMBER SIEBER: Well, the SDP process --

MR. SATORIUS: The Commission has given Staff Guidance to the extent that it can be made, and then it's assumed that the guidance on risk-informing the regulations in general.

MS. CARPENTER: You know, the agency's

policy statement in 1995 says we should risk-inform to the maximum extent possible, and that's what --

MEMBER KRESS: There are a lot of ways to interpret that statement. And one way to interpret it is, you chose areas to look at that are going to have some impact on risk. That's all the risk-informing you need to do with it.

MEMBER APOSTOLAKIS: And you have done it.

MEMBER KRESS: We've done it to the best extent possible, and that's how we should have done it.

MEMBER APOSTOLAKIS: You don't have to use performance indicators.

MEMBER KRESS: That's right.

MEMBER WALLIS: So the mistake was to start to try to use metrics like 10 to the minus 6, 10 to the minus 5, and like that.

MEMBER KRESS: That's what we're saying. Yes.

MEMBER WALLIS: That's right. And I think that has been downgraded though in importance. It's not emphasized so much now, that there's a risk level associated with these color changes?

MR. SATORIUS: For the risk-informed SDPs and Pis there is a color change associated with changes in the core damage frequency.

MEMBER WALLIS: It's not an exact line.

MEMBER APOSTOLAKIS: Well, it's not a bright line.

MR. SATORIUS: A lot depends on the analysis, and the assumption, and the quality of PRAs and the quality of our SPAR models.

MEMBER ROSEN: I am not going to sit here and agree or let the record say that I agree to the idea that risk-informing those indicators that could be risk-informed was a mistake. I don't think it was. I think it was the right thing to do, but trying therefore to make everything else risk-informed is probably pushing it too far.

MEMBER APOSTOLAKIS: Finally, this Committee reached the point where it says there is a limit as to how risk-informed something can be.

MEMBER ROSEN: You can't risk-inform things that are not fundamentally risk-informable.

MR. FRAHM: And we agree too, and that's really what this third bullet gets at, is that we have the objectives of being as risk-informed as we can. At the same time, we're trying to be predictable, understandable, objective, and meet the four strategic performance goals that everybody is aware of, so there's competing priorities and objectives.

MEMBER KRESS: There's still a fundamental problem, and that is trying to say that there's a correlation that we know between Delta risk and Delta proponents. And that's where the mistake is, where we differ.

MEMBER WALLIS: Has anyone said that's the case?

MEMBER KRESS: Yeah. George and I have been saying it.

MEMBER APOSTOLAKIS: The action matrix.

MEMBER WALLIS: Anyone said there is a performance -- there is a correlation between the two?

MEMBER KRESS: Oh, I thought it was implied in using risk to set the thresholds.

MEMBER APOSTOLAKIS: Yes.

MR. SATORIUS: I want to get to crosscutting issues. Let's go to consistency and transparency. Again, the Staff agrees with the Committee's assertion that the PI an SDP thresholds could be made more consistent and transparent. We've done a number -- taken a number of steps to meet those goals. Ron had mentioned we published a Basis Document that clearly lays out where we started from, and where we've gone to get where we are today, so that Staff and the public can understand the road that we've traveled, and increase the transparency, how we make decisions, and how we arrive at how the ROP should be put together, and how it should be operated.

We're working hard to develop more risk-informed performance indicators. And I mentioned earlier about the mitigating systems performance index. I don't think I need to go any further, other than just to point out that it's not easy stuff. We've run into a number of stumbling blocks that we will have to deal with.

Thirdly, I had indicated also earlier that we've established an SDP improvement plan that works directly towards improving consistency and transparency within the SDP process. Again, the Staff, although we agree with the Committee's position, we maintain that the base process works sufficiently well to produce consistent and acceptable results, and the results are, as I pointed out before, the level of Staff involvement that they need to take with a licensee as a result of their performance, whether it's from a risk-informed performance indicator, SDP, or performance-based performance indicator or SDP.

MEMBER WALLIS: Well, you won't really

know how well it's working until you get more data. You haven't had enough events to tell.

MR. SATORIUS: Well, that's true. We don't have as much run time. Usually you like to see four years or more.

MEMBER WALLIS: If you had another Davis-Besse which was traceable to you not having detected things for five years, then that would really shock you in your statement that this is working.

MR. SATORIUS: I agree with you, we probably need some more run time.

MEMBER APOSTOLAKIS: So Davis-Besse itself doesn't shock you?

MEMBER WALLIS: Yes, it does.

MEMBER ROSEN: I think you're right, it does affect the statement. It's shocking, and if there was another one, it would be shocking squared.

MEMBER APOSTOLAKIS: Then you would be shock shocked.

MEMBER WALLIS: But whether it's risk-informed or not wouldn't have saved you from Davis-Besse.

MR. SATORIUS: Next slide please, Ron. This is one that we know is still squarely in front of the Committee's plate, and we have looked at it, as well. I think we all agree that ever reaching the yellow/red threshold is highly unlikely. What is the right number from a pure risk perspective? The right number is what the number is, 25. And I think we've discussed this sufficiently probably in this meeting, and it's our position that we're going to leave the yellow/red threshold in place for the reasons I think we've described earlier. We are going to put it in our queue for consideration at some point in time, but it's down the line. We've got more important things we think to deal with on the short term.

MEMBER ROSEN: You wouldn't be surprised if the letter that we wrote on this might say something about this.

MR. SATORIUS: Not at all.

MEMBER APOSTOLAKIS: It's not a matter of only what the threshold is. The question is whether you need the red at all. You don't have to worry about the threshold. You might have a green/white. It could be white and something else, and forget about higher levels because you know you'll never get there.

MR. SATORIUS: But having the red there does stay consistent to the way we've approached the other Pis. To the extent that we have risk information available, we will put all of the thresholds on there. The reason why you don't see yellow information on some of the other Pis is that they're performance- based. There's no risk information to tie it to, so we just didn't feel we had a justification for asking the expert panel to come up with a threshold when they had really --

MEMBER APOSTOLAKIS: But I would -- I don't think that the yellow/red threshold issue applies only to scram indicators. It applies to all safety performance.

MEMBER SHACK: I think it applies to bullet two, that doing the thresholds the way you've done one indicator at a time does not provide a gauge of relative risk and demonstrate the --

MEMBER APOSTOLAKIS: But it's not only for the scram.

MEMBER SHACK: It's not only for the scram. It's the way the yellow/red threshold --

MEMBER APOSTOLAKIS: A very simple solution.

MEMBER SHACK: And hence, they're working on the MSGI.

MEMBER APOSTOLAKIS: An extremely simple solution, just take it out. How long does that take? No reds.

MEMBER SHACK: They've heard the message.

MEMBER ROSEN: No. I think my point, I'd like to make it again. I think you're working on the MSPI, what's that called, Multi -- Mitigating System Performance Indicators would go a long way to help in this area.

MR. SATORIUS: We think it will too. Although, realize that this is an initiating event.

MEMBER ROSEN: Yeah. It's only initiating events. Well, again, see that's the problem.

MR. SATORIUS: Okay. And now to Mr. Rosen's topic, crosscutting issues.

MEMBER ROSEN: Not my topic. It's the issue about what we think the Davis-Besse -- where I think the Davis-Besse thing was, why the ROP failed us. Because the things about Davis-Besse were just the ones we enumerated before, Corrective Action Program, safety conscious work environment, and human performance. And that if we had an ROP that was very good in those areas, and had all kinds of page after page of indicators on that, they'd have -- if the inspections had been done right, we'd have had all kinds of -- we've have green, orange, yellow across the board. Maybe even red in some of those indicators, and it wouldn't have been in March of

2002. It would have been in 1999, perhaps, or 2000. We'd have seen colors changing. That's what we need. That's where we need to be.

MEMBER APOSTOLAKIS: But is it really the Corrective Action Program only, when they see those filters being replaced every other day, and they don't ask why?

MEMBER ROSEN: No, that's the Corrective Action Program. Somebody writes we're now replacing them every other day when we used to replace them every four months or every four years. What's going on here? And that condition report goes right up to management in a week, and there's a full stop, and everybody figures out what -- all hands try to figure out what's going on. That's a Corrective Action System. It's got a low enough threshold to bring events --

MEMBER APOSTOLAKIS: Would SALP have caught that?

MEMBER ROSEN: SALP?

MEMBER APOSTOLAKIS: Yeah.

MEMBER ROSEN: I don't want to say anything good about SALP.

MEMBER APOSTOLAKIS: I know you don't, but would it?

MEMBER ROSEN: No, I don't think it would.

MR. SATORIUS: The Staff does not think that the old program would have.

MEMBER APOSTOLAKIS: Why not? You said they had evaluated the Corrective Action Program.

MEMBER ROSEN: Yeah, but they do that under both programs. But what's not visible -- and there are lots of indicators that utilities use to -- that are brought to their management and their off-site review boards to examine the health of their Corrective Action System, dozens of them. The question is what ones does the ROP want to use?

MEMBER SIEBER: The problem is that every one of them differs from every other plant. They're not consistent, and to try to get the industry to abandon what they're doing and change to a industry --

MEMBER ROSEN: Don't try to solve a problem here, Jack. It's way too big a problem to solve, but I will say that they are all working on the same thing. They have components and people who make -- components that fail and people that make mistakes, and programs that don't work. And they're supposed to be writing those up in condition reports or failure reports, and dealing with them, correcting them promptly, and dealing with the generic issues raised by them, and precluding recurrence. That's what they're all supposed to be doing. What they call things and how they do it - sure, that's different - but at the bottom level, they're all the same. They're all trying to do the same thing from the same sort of inputs. WE can have Corrective Action Program indicators in ROP. We just haven't done it.

MEMBER APOSTOLAKIS: What?

MEMBER ROSEN: We can put Corrective Action System Program indicators in the ROP.

MEMBER APOSTOLAKIS: Indicators.

MEMBER ROSEN: Indicators. It just hasn't been done. I think it should be. I don't know how to do it. I mean, sitting here it might take me a day or two to figure it out.

MR. SATORIUS: I will have to -- this was probably before my time within the branch, and I'm not using that as an excuse, so I can't address your question directly. I was wondering if maybe there was a member of the Staff that is available that could towards it. I know there has been some effort --

MEMBER APOSTOLAKIS: You're not asking for answers now.

CHAIRMAN BONACA: They already told us that they consider it --

MEMBER APOSTOLAKIS: Yeah, this --

CHAIRMAN BONACA: The indicators are the ones that are not really being used right now.

MEMBER APOSTOLAKIS: And in all fairness, I mean there isn't really separate indicators that you guys have been negligent to use. It's a tough problem. It's a tough one. We're not asking you -- we've come close though to asking you to create life.

MR. SATORIUS: You're on the right track there.

MEMBER ROSEN: That's about corrective action. We should talk about human performance and safety conscious work environment too. Those were the other two.

MEMBER APOSTOLAKIS: Okay. Are we done?

MEMBER ROSEN: No. I'm asking them to talk.

MEMBER APOSTOLAKIS: To talk about what?

MEMBER ROSEN: What they're doing on the crosscutting issue.

MEMBER APOSTOLAKIS: No, he says they will do it.

MR. SATORIUS: Well, what we're going today on the crosscutting issues is, and maybe as a way of a 30 second background. What we do today on the crosscutting issues is that at the end of every ROP cycle each region analyzes all of their licensees, and we have a series of meetings with senior staff and the AARM, and before that in the end of cycle meetings. But regions analyze all of their licensees and come up with licensees that they determine to have crosscutting issues in one of the three areas. These are identified and we discuss them at high levels. And then it's decided collegially amongst the Staff that these specific issues do exist. They're communicated with a licensee in a letter, the end of cycle assessment letter. That right now is the extent of what happens to them. They are -- let me finish, if I could.

They are used as a cue for the baseline inspection that looks at Corrective Action, the DINR as areas that need to be looked at and dissected during that inspection process.

MEMBER ROSEN: So there's this back room, I will call it, evaluation going on that could lead to further inspection of a Corrective Action System. But I'm trying to -- what we're saying here, and we'll be saying perhaps later in this meeting, that it ought to be -- you ought to have indicators that are more visible. As a result of this discussion that you obviously are making judgments, well what are they based on? That ought to be in the ROP.

MR. SATORIUS: And that's a tough nut to crack.

MEMBER ROSEN: Yes, I agree.

MR. SATORIUS: To move on as to what we've taken from the Davis-Besse Lessons Learned Task Force, is that we realize that we need to have a tool such that a more active role in identifying and solving, and pointing out to the licensees and then following up needs to be available. And we've worked that into the Task Action Plan such that we're looking at, and I think I mentioned this earlier, looking at the possibility of either having additional inspections for those crosscutting issues, to look closer to give us an opportunity to gather information on problems, small problems before they become large problems. A second option is to have a regulatory meeting with the licensee so we can understand what they're doing, or what they're not doing for these crosscutting issues. And then the third option is to have the licensees respond on the docket to the end of cycle summary letter, to explain to us on the docket what they're doing, and what they plan to do over the next several months or years to correct these problems in the crosscutting areas.

Now you can use them singularly, or use them jointly, and using them jointly can be quite effective. You can have them respond on the docket, and then perform an inspection to see if they're doing what they say they're going to be doing. So those are actions we've taken to try and beef up our oversight of crosscutting areas.

MEMBER LEITCH: So then this oversight of crosscutting areas then as I see it has many attributes of the old SALP process, doesn't it? In other words, what you're really doing is, it's an area where there's a fair degree of subjectivity, and you're looking at these three crosscutting areas, and forming a subjective opinion, rather than performance indicators or anything like that. You're trying to subjectively assess the licensee's performance in these crosscutting areas.

MR. SATORIUS: You're right. There are no performance indicators in this area. We do give fairly rigorous guidance within the assessment manual chapter as to what issues would constitute a crosscutting issue. And we have raised the bar to a certain extent because frankly, we were mindful of what has happened in the past, especially under the

SALP and Senior Management Meeting process, and we -- and some of the criticisms from that period of time I think were probably applicable, that there was decisions made not in the public light. And to the extent that we can, and the ROP has always been put together to be as open to the public and scrutable as possible, so we have public guidance out there in Inspection Manual Chapter 0305 that gives a relatively high bar. But on the other hand, we don't want to make it such a high bar that we don't let the precursors allow themselves to show so that we can act on the precursors, because it's the precursors that give you the insights that let you uncover and peel that onion, and find the deep-seeded problems early.

MS. CARPENTER: And it's also more transparent, because when these findings are entered - - they're entered into the plant issues matrix, the PIM. There is a block in there that they identify that this was a crosscutting issue, so as you go through that Plant Issues Matrix, you can see well, they've identified this issue as having Corrective Action or problem identification and resolution issues. So what the 0305 Manual Chapter does, it takes a look at all of those a little more collectively at the mid-cycle and at the end of cycle meetings. And then it puts down the criteria of what is that bar, and they can see what those issues are.

MEMBER APOSTOLAKIS: But I think something that is perhaps unique to the crosscutting issues, is that identifying a problem is not sufficient, because people -- do people know what is a good Corrective Action Program, or is it something that we declare it when we see it?

MEMBER ROSEN: There is an INPO document that is very specific about the principles of a Corrective Action System.

MEMBER APOSTOLAKIS: I tell you what, I will never accept that argument again. I've accepted over the years, there is an INPO document. Did INPO catch Davis-Besse? No. So the INPO documents don't mean much for me any more.

MEMBER ROSEN: Well, that's because you haven't read them. If you read this one --

MEMBER APOSTOLAKIS: No, I'm looking at performance. I'm completely performance-based.

MEMBER ROSEN: You asked is there a standard, and I say there is, and it's in an INPO document that was developed by the utilities, of course.

MEMBER APOSTOLAKIS: I have to see what --

MEMBER ROSEN: I could bring you a copy of the document.

MEMBER APOSTOLAKIS: I mean, usually these documents are --

MEMBER ROSEN: George, you asked if there was a standard. I said yes, and I told you what it was.

MEMBER APOSTOLAKIS: No, it's not a standard. It's an INPO document.

MEMBER ROSEN: It's not a ANS standard.

MEMBER APOSTOLAKIS: It's an INPO document.

MEMBER ROSEN: It's not an American Nuclear Society document, but it was written by the people who run the Corrective Action Systems with a lot of outside influence, and I think it's excellent.

MEMBER APOSTOLAKIS: So if that had been implemented, Davis-Besse wouldn't --

MEMBER ROSEN: Right. If the Corrective Action System at Davis-Besse had met the requirements of that document, it would be different.

MEMBER APOSTOLAKIS: Well, INPO should be making their documents public.

MEMBER ROSEN: That document is a public

document, INPO.

MR. SATORIUS: We have a biennial baseline inspection in PINR that gives I consider very good criteria on what areas to look at, what areas to sample, and gives inspectors the guidance that we feel is necessary for them to perform an inspection, to be able to conclude that a Corrective Action is doing an adequate job.

MEMBER APOSTOLAKIS: Anyway, I'll wait until I see more specifics.

MS. CARPENTER: All right. So we understand your concerns, but we do believe that the ROP is working, and that it is working effectively. And we believe when we look at the plants, that the plants are receiving the appropriate level of oversight. We also understand now that it is a work in progress, and we need to continue to make improvements. And we have identified improvements in each of the four areas of the ROP, and we're working on each one of those. And Davis-Besse Lessons Learned, the SDP Task Group, the performance indicators, we recognize that we need to continue to make improvements to the ROP, and make it an even better program.

We don't right now have any plans to

revise what we call the fundamental basis of the ROP, and that is that the elements are performance-based, and to the maximum extent possible they're risk-informed. But we also recognize that the ROP has to remain transparent to all of our stakeholders, and that we need to maintain consistency with what was the fundamental principles of the ROP on which it was built.

Now our Division Director would like to make a few concluding remarks, if that's okay with you. Bruce.

BRUCE: Cindi, you covered a lot of them, but basically, you know, we've tried to represent that we have had a mission underway to try and make our assessment of licensees and our allocation of agency resources transparent to everyone so that the agency would respond to a given set of conditions in a particular way. And that's what we think we've achieved through the action matrix.

What Cindi has just said is that we have to sift through this. There's a lot of activity still ongoing. The Davis-Besse Lessons Learned Task Force or the Davis-Besse event was a real eye-opener, and there's a lot of things that we need to do. But beyond that, we also have items that we're working on in the significance determination process, through other interactions with stakeholders. There's a lot of activities that we need to bring to finalization. I don't think we'll ever get there, but we're going to make changes. I'm sure that we're going to have the opportunity to meet with you again so that we can discuss those changes and, you know, we've tried to be responsive to your interests. And that's about it.

MEMBER APOSTOLAKIS: So essentially then, you are not going to do any of the stuff we raised in that letter of 14 months ago.

MS. CARPENTER: Well, we are. When you look at crosscutting issues, as Mark has already stated, there are a number of things that we intend to look at under the area of crosscutting issues. This was the Davis-Besse issue, and the SDP Task Group brought this issue up, and so we are going to take a look at that area. We are going to -- right now we're saying that we're going to maintain the yellow/red threshold on initiating events, but this is some -- you have brought it to our attention. It is something we're going to address with the industry, and it was, in fact, on the agenda for the last meeting that was cancelled due to the weather.

It is something we'll look at. We're also looking at improvements in the mitigating system --

MEMBER APOSTOLAKIS: But, Cindi, it has been 14 months.

MS. CARPENTER: It has been 14 months, but there are a lot of things that the Staff has been working on. The SDP is a process that we're also looking at, so we are making improvements in a lot of the areas, and I think we have addressed a lot of the areas. But as for the fundamental basis of whether we should risk-inform, have risk-informed, that we should maybe separate the risk-informed and the performance-based, the Staff believes that the ROP is working, and it's working pretty good. And we are going to continue making improvements --

MEMBER APOSTOLAKIS: For the record, I don't understand how you reach that conclusion. I really don't.

BRUCE: It's based on a lot of input from stakeholders.

MEMBER APOSTOLAKIS: And the stakeholders are the industry.

BRUCE: No, sir.

MS. CARPENTER: The stakeholders are -- we have private citizens, we have public interest groups.

MEMBER APOSTOLAKIS: Inspectors.

MS. CARPENTER: Inspectors are a part of the stakeholders, but so are some of the private citizens groups. And we just conducted a survey, we're in the process of evaluating that right now, so we have a lot of stakeholders out there who have looked at the ROP. They do believe it's a better process than the old process, and we do believe that it is working. We do believe when we look at where the plants are falling in the action matrix, that the plants are receiving appropriate regulatory attention.

MEMBER WALLIS: What are the measures of success apart from the way people feel about the program?

MS. CARPENTER: We have a number of performance metrics. There are quite a few. We've issued an Inspection Manual Chapter on that, and there are about 30, 40 performance metrics, and we measure ourselves against -- some of them come from internal, some of them come from external, some of them very objective performance indicators, and we measure the ROP Program against t hose performance --

MEMBER WALLIS: And against objective measures.

MS. CARPENTER: Yes. Some of them are, yes. And some are subjective.

MR. SATORIUS: Most are objective.

MEMBER WALLIS: Such as? What's the most important objective measure?

MR. SATORIUS: I can give you just a list of things that --

MEMBER WALLIS: What's the most -- one of the most important? Just give me an example, an objective measure that's important.

MR. SATORIUS: One of the objective measures might be we look at performance indicators, and see that how many performance indicators in the course of the year jump two columns in the action matrix. In other words, what -- because -- that's indicative or it could be interpreted that it's indicative of a plant --

MEMBER WALLIS: I'm looking for an indicator which says this is really working to improve safety.

MR. SATORIUS: I guess I'd almost have to go to one of the agency's strategic goals then.

MEMBER WALLIS: I'm not sure you have any. I'm not sure there is a measure of how well this is achieving safety, except things like Davis-Besse. What's the measure? Yo don't really have a good measure yet.

MS. CARPENTER: I think when you look at the -- you look collectively at all the performance metrics that we have, and all the different ways that we've gained the input for those performance measures, I think that's a way for us to say that we think the program is working good, but we still do need to improve.

MEMBER APOSTOLAKIS: We are raising issues and objectives that are, in my view, peripheral. I mean, the number one priority is to catch evolving situations before they become serious accidents. Transparency is of secondary importance, and yet we are always saying transparent. Of course, the industry is happy, but that's not the primary objective here. The primary objective is to catch Davis-Besse.

MS. CARPENTER: And we recognize that, and we did a very, very hard self-assessment, and we recognize that there were weaknesses in the inspection program.

MEMBER ROSEN: But then you need to be a little less self-congratulatory.

MEMBER APOSTOLAKIS: See, that's my problem.

MEMBER ROSEN: Your first bullet says the current ROP is working, that it's receiving an appropriate level of --

MEMBER APOSTOLAKIS: That is --

MEMBER ROSEN: What it ought to say is we think the current ROP is working better than the previous program, SALP. And we think plants are receiving appropriate levels of oversight, but we are worried about the signal we get from Davis-Besse.

MEMBER APOSTOLAKIS: I do have belief that I never saw any real argument. I know you guys -- why is it better?

MS. CARPENTER: Because this --

MEMBER APOSTOLAKIS: It's transparent.

MS. CARPENTER: It's your objective. SALP was their objective. This is much more -- if this -- if you cross this threshold, this is the action. It's very defined. These are the actions that the Staff intends to take. You can see by where you're at where the agency and how the agency will respond.

MEMBER APOSTOLAKIS: But there is a lot to be said about subjectivism too, and we have resorted to subjectivism in 1174. We have integrated the decision making process, because you can take into account things that we don't know how to measure. Right? Loss of defense-in-depth and so on, so we shouldn't really malign subjectivism that much. I think maybe those guys when they were behind closed doors at a Senior Management Meeting, and they were making a decision, they were taking into account things that are not in the process now.

MEMBER WALLIS: I don't malign it at all, but I think we were entirely subjective. I'd be very unhappy, and I --

MEMBER APOSTOLAKIS: I'm not saying we should go back. I'm not saying we should go back, Graham.

MEMBER WALLIS: That's subjective.

MEMBER APOSTOLAKIS: I'm just saying that we are rushing into these conclusions. This is better, and working, and all of that.

MEMBER WALLIS: Well, I'm saying there isn't really much evidence for this conclusion, so don't be too self-congratulatory.

MS. CARPENTER: We understand, but --

MEMBER POWERS: Can I just ask a question related to something you said, you said you've been working on the significance termination process. Can you tell me where we stand on the fire SDP?

MS. CARPENTER: I don't know. They are working on it, that I know, last time I heard. Yeah, come to think of it, Russ Gibbs can answer that question. Peter can answer that. Okay. They are -- I think they're on track to have it issued later on this year, but Peter knows exactly what the status is.

MR. KOLTAY: Peter Koltay. What I would like to suggest actually is in sometime early summer or late spring they should have a meeting addressing just fire protection. The complexity of that SDP I guess has surpassed all the other processes that we have, and right now I think together with the industry and other stakeholders, we're going down a path where we actually have seven subcommittees in each of the important fire protection areas, and they're working on -- working driving towards that new formula that's going to give us a better --

MEMBER POWERS: At the conclusion of this process, will I know where the parameters come from, and the inputs that go into the calculation?

MR. KOLTAY: And each of the seven subcommittees are each on those parameters.

MEMBER POWERS: And the Fire Protection Subcommittee will take this up with you.

MR. KOLTAY: Absolutely. That's what I'm recommending. It's a complex issue.

MS. CARPENTER: But there are a number of improvements we're making in the SDP area.

MEMBER POWERS: Yeah. I mean, it was just one that I never knew how to use, because I couldn't figure out what inputs to put into it, and I don't know where the coefficients came from. And so, I had no clue how to -- I couldn't get an answer.

MR. KOLTAY: We have periodic public meetings, I think every couple of months, and I'm not sure if you've attended some of them. The last one was at the Ramada up in Rockville, and perhaps it would be good if you attended the next one.

MS. CARPENTER: So I think what we're saying is based upon the things that we've learned, all four areas of the ROP, we have a number of initiatives ongoing to continue to improve the program. And we're going to continue to work those initiatives, and to make the program even better.

MEMBER SIEBER: Any comments or questions from any of the members at this point? If not, I'd like to --

MEMBER WALLIS: We are writing a letter on this?

MEMBER SIEBER: Yeah, we are. WE're going to have to decide what that letter is going to say. We have two different viewpoints, so somebody gets to write the letter, somebody gets to write added comments. In any event, I'd like to thank our speakers for your well-prepared discussion. Mr. Chairman, thank you.

MS. CARPENTER: Thank you.

CHAIRMAN BONACA: If there are no other questions or issues by the members --

MEMBER POWERS: Maybe you should remind the speakers of Commissioner Dykus' comment about 500, all the abuse that's occurred in the 500 meetings, who should be honored for that, not the ACRS, but the Staff.

MS. CARPENTER: We are. Thank you.

CHAIRMAN BONACA: No. We were trying not to abuse them too much today.

MEMBER ROSEN: The Staff thinks we had 1,000 meetings.

CHAIRMAN BONACA: With that, we'll take a recess for lunch.

MS. CARPENTER: Thank you.

(Off the record from 12:32 p.m. until 1:32 p.m.)

CHAIRMAN BONACA: Okay. We are back in session. We are going to review now Vessel Head Penetration Cracking and Vessel Head Degradation. And

Dr. Ford will guide us through this presentation.

MEMBER FORD: Thank you, Dr. Bonaca. The topic matter for today's meeting was to be based on information that was to have been given at a 1-1/2 days subcommittee meeting earlier two weeks ago, which was canceled.

And during that meeting there were to be extensive discussions of various VH degradation issues from both the staff and from MRP, and they had a list of questions that we had sent them prior to that so that it would be a very productive meeting.

As you know, the meeting was canceled, and it will be rescheduled for the 22nd and 23rd of April. As a consequence, today the only presentation that will be given will be by the MRP, who will give an overview of what was to have been given two weeks ago, and which will be given in April in detail.

There will be no presentation from the staff, but they will be present to ask questions if appropriate. This is for information only, and it has not been approved currently by the staff. Larry.

MEMBER POWERS: You indicated that it is for information only. What are we collecting information in anticipation of?

MEMBER FORD: Of the meeting -- what will they be collecting information of, or --

MEMBER POWERS: No, I mean, is there some grand strategy here that we are working for, or is this just for idle curiosity?

MEMBER FORD: It is not for idle curiosity. I think what Larry would appreciate is any input that we may have that might make the subcommittee meeting in April more productive, and it is my hope that in May that we will have this topic covered by the ACRS, and potentially maybe a letter.

MEMBER WALLIS: You offer no explanation for why the staff was ready to speak to us two weeks ago and is not ready to speak to us today.

MEMBER FORD: I will ask the staff if they are present to make any comments.

MS. WESTON: One of the reasons that they are speaking to us today is that as you will recall the subcommittee meeting was a day-and-a-half, and we only have two hours here, and it was not possible to have all of them cover the material that they were supposed to cover in two hours, as opposed to a day-and-a-half.

MEMBER FORD: The topic matter that is to be covered at the subcommittee meeting, Dana, goes to Davis-Besse, lessons learned, task force, the --

MEMBER POWERS: Yes, I am still struggling with -- well, you said we are going to write a letter on what, that we don't like VHP cracking?

MEMBER FORD: No, we are not writing a letter today.

MEMBER POWERS: No, but you said eventually.

MEMBER FORD: Well, eventually. Once we have the information that merits any comments, but we will not receive that information today.

MEMBER POWERS: How better is it to say that we do or don't like cracking?

MEMBER FORD: I doubt that we will say that we like it. Larry.

MEMBER POWERS: I am still trying to find out what we are going to do today.

MEMBER FORD: We are not writing a letter today and that is the main point. We will as appropriate at some future date write a letter.

MEMBER WALLIS: Are we going to hear any -- are we going to have any data or results presented today, or is this just going to be --

MEMBER FORD: Maybe, Larry, you could answer that.

MR. MATTHEWS: It is pretty much an

overview of a summary of statistics and stuff like that on inspections and all, but it is all we could do in a couple of hours.

MEMBER WALLIS: But you remember some data which you could perhaps tell us about if we asked questions?

MR. MATTHEWS: Maybe.

CHAIRMAN BONACA: Well, going back to the question of Dana's, my understanding as that if we had come to the meeting a week-and-a-half ago that we would have also had insights in the changing expectations of the staff regarding inspections?

MEMBER FORD: That's right.

CHAIRMAN BONACA: And we would come to some kind of recommendation at some point in the near future, and with respect to the time that when we will provide comments?

MEMBER FORD: Yes. We will not receive enough information today to write anything, even if it is --

CHAIRMAN BONACA: If it had supported this today, it would have been on the Federal Register in part, and so really today is more for informational purposes?

MEMBER POWERS: The staff is going to come out with something that says that we don't like cracks, and when you find them, do something about them? And we will say that sounds good to us.

CHAIRMAN BONACA: Well, hopefully it will be more than that.

MEMBER POWERS: Oh, okay.

MR. MATTHEWS: I am Larry Matthews, and some of you know me. I am the Chairman of the MRP Alloy 600 Issues and Task Group, and I work for the Southern Nuclear Operating Company. I am the manager of the inspecting and service -- I'm sorry, we changed it.

I am the manager of the Material Inspection Services Group at Southern Nuclear. I have got a couple of three things that I want to try and cover today, and like you said, it is all pretty much at a high level.

This is the first part of the topic, and it is based on kind of an overview of the inspections that have taken place, and then what we know of the plans for the spring outages. This is --

MEMBER FORD: I'm sorry, but you will not be talking at all about the MRP research plan, or an overview of the MRP research plan which you talked about in June of last year?

MR. MATTHEWS: I don't have much in here on that. I can talk about some of the things that we are doing and I will talk about some of those.

MEMBER FORD: But that would have been covered two weeks ago, and it will be covered in April at the subcommittee meeting?

MR. MATTHEWS: Yes. If you can read this, this is a neat chart.

MEMBER WALLIS: Do we get a prize for reading it?

MR. MATTHEWS: Yes.

MEMBER WALLIS: I can read that the red is a leaking nozzle.

MR. MATTHEWS: Right.

MEMBER POWERS: I have read enough to see that there is an entry error on at least one of the columns.

MR. MATTHEWS: Which one? Show me and I will see I can fix it. We sorted all the -- this has all 69 plants, CWRs in the U.S., sorted by their effective degradation years at the time way back in February of '01.

MEMBER WALLIS: And the lowest EDYs at the top?

MR. MATTHEWS: No, the highest is at the

top.

MEMBER WALLIS: The highest EDYs?

MR. MATTHEWS: Right.

MEMBER WALLIS: At the top?

MR. MATTHEWS: Right. Now, some of these plants, they have accumulated EDYs at slightly different rates since then.

MEMBER KRESS: The --

MR. MATTHEWS: Right. At 600 degrees with a --

MEMBER POWERS: Because it is high at the top, and then you keep coming down, and then all of a sudden it jumps up and there is 10.7 in the middle of the thing. I mean, it is a non-continuous function there.

MEMBER WALLIS: Where is the 10.7, Dana?

MR. MATTHEWS: That is the number that was reported for South Texas, and South Texas did --

MEMBER POWERS: You know Texans can't tell time.

MR. MATTHEWS: They went back and reevaluated their head temperature, and when they did, they had 10.7 that was in our table in February of '01, but when they reevaluated it, it dropped way down because their head was running considerably cooler than they had initially reported.

MEMBER POWERS: No kidding. They must have the plant turned off.

MR. MATTHEWS: Well, it is not that bad, but it certainly slowed down the accumulation of EDY. And there is a lot of other information on this, and which I agree that you may need a magnification glass to read it.

I intended to bring a gigantic folder or I mean poster, and it is neatly folded up and in a folder laying on a table in Denver because I forgot it there.

MEMBER WALLIS: Well, could you tell us what we ought to notice that is important?

MR. MATTHEWS: Okay. What you ought to notice is all of these different types of inspections. The yellow inspections are some form of volumetric inspection, across the colored blocks, which represent individual nozzles on each plant.

So every nozzle on every plant is represented on this chart, and this is based on their latest inspection results. The red represent, I believe, the leakers, and there is not enough light up here to -- well, that is the leaking nozzles, and it is based on their visual inspections.

And the real thing that we are trying to show with this chart, and we intend to keep it updated as further inspections go, is that all of the leaking nozzles and the circumferential cracks, which are the black squares, and then any wastage that has -- if any significant wastage has occurred, almost all of that has taken place in the very high EDY plants.

And so although everybody recognizes that time and temperature correlation was a very simplified approach, at least based on the inspection results today, it seems to be bearing out in general something, where the susceptibility of the plants are.

MEMBER FORD: Larry, the wastage is -- the cracking is a precursor to the wastage?

MR. MATTHEWS: Right.

MEMBER FORD: You said incidents, plural, of wastage. I can't read this. Is there more instances of wastage than just Davis-Besse?

MR. MATTHEWS: There were two nozzles that had the wastage.

MEMBER WALLIS: It was only Davis-Besse, I guess.

MEMBER FORD: Only Davis-Besse?

MR. MATTHEWS: Yes.

MEMBER FORD: Okay. I am jumping the gun

here, but that is good news. But the bad news is that we don't know from the physics of the relationship as to why Davis-Besse underwent wastage once it had cracked.

Will you come to that later on as to how we can predict the cracking at a specific plant?

MR. MATTHEWS: Predict cracking?

MEMBER FORD: I'm sorry, wastage.

MR. MATTHEWS: Wastage? We are working on a model, and we had kind of a phenomeological qualitative model that was part of the basis for our initial MRP 75 inspection plan, and we got comments from the NRC on areas that needed to be beefed up.

And we also had that reviewed by an expert panel of people, and they came back with further comments on areas that we needed to perform work. And quite a bit of work is planned in our research plan in the area of boric acid wastage, and we are working on putting together plans for how we will do that lab test and bench test.

And then ultimately if it is justified, then full-scale mockups.

MEMBER FORD: It has been a year since Davis-Besse, and that work has not started yet?

MR. MATTHEWS: The detailed corrosion

testing hasn't, no. It should start fairly soon. I think we have RFPs in on some of that work.

MEMBER FORD: Well, there is one out already from EPRE for boric acid corrosion studies.

MR. MATTHEWS: Yes.

MEMBER FORD: What is the essence of that RFP? Will you be coming to that later on?

MR. MATTHEWS: I am not sure if that is in here, that level of detail.

MEMBER FORD: Okay. Will it be covered in the subcommittee meeting?

MR. MATTHEWS: Yes, and just kind of off the top, we were doing lab tests to look at the various pieces of the model. Our model showed a progression from an initial crack, all the way through to a cavity formation, and we will be doing tests to quantify the rates, et cetera, at the various phases of that progression.

MEMBER KRESS: Who is developing that model, EPRE?

MR. MATTHEWS: Yes. It was EPRE. Dominion Engineering put the phenomenological part together, and then we are going in and we are going to be doing tests of the various phases.

And one of the things that we got comments on was that we needed to consider flow assisted corrosion and impingement more than apparently the initial model.

MEMBER FORD: And what is the intended outcome from this, specifically from an engineering point of view?

MR. MATTHEWS: The intended output is to try and quantify how fast some safety significant wastage could develop were a crack to go through a wall.

MEMBER FORD: As a function of?

MR. MATTHEWS: Of time.

MEMBER FORD: And presumably geometry of the --

MR. MATTHEWS: Yes, the geometry and the interference fits, and the various parameters that are part of the model.

MEMBER FORD: And so from that you will have some relationship which will show why Davis-Besse is the only to have shown one inch per year wastage, compared with all the other ones that have cracked; is that right?

MR. MATTHEWS: Well, what we are going to try to do is try and quantify the wastage rates that can occur, and in these situations with cracks through the nozzles and through the welds.

MEMBER KRESS: Will we get a chance to see these models sometimes? I am quite interested in the details of that.

MR. MATTHEWS: Well, yeah, I think so. I mean, it was part of -- the phenomenological part was presented to the ACRS, I believe, in --

MEMBER FORD: Yes, in June.

MR. MATTHEWS: And when we had it reviewed, basically the panel pointed out where we needed the data to back it up, and so we are going to try and gather that data.

MEMBER POWERS: When I compare what I think is your chart here to -- and a much more simpler and much more legible chart that the staff has, they look like they rate high, or you rate high.

Is there any significant disagreement between you and the staff on what the vulnerable plants are, or the susceptible plants are?

MR. MATTHEWS: I don't think there is on the --

MS. WESTON: Let me --

MR. MATTHEWS: Go ahead.

MS. WESTON: Let me explain what he is talking about. On page 24 in your book under Tab 4, there is a susceptibility list that was included with the order, and it is the susceptibility list from the staff as of February 12th, 2003, and that is what he is talking about.

You don't have it, Larry, and I will give you my copy for you to see.

MEMBER FORD: Page what?

MS. WESTON: Page 24.

MR. MATTHEWS: I don't think in general that there is a disagreement as to how we should -- basically, the NRC has said that recognizing that it is not perfect, the time and temperature is what we have got right now, and they are using our --

MEMBER KRESS: Well, aren't they both based on the same equation?

MR. MATTHEWS: Yes, they are both based on the same type of equation. In fact, it is the same equation I believe.

MEMBER POWERS: Somebody might have drawn the threshold that took place.

MR. MATTHEWS: Yes, we initially drew the threshold for high susceptibility up around 18 EDY, and the NRC has pushed it down to 12 based on some inspection results from -- I guess at Millstone and back-calculating from Davis-Besse and that sort of thing.

But if you will notice, most of the flaws that we see are in the higher end. There has been a couple of cracks down on the lower EDY. But most of the flaws have been at the higher end of the EDY range.

MEMBER FORD: Larry, could you put it down then as -- and both Tom and I especially, and I am sure someone else, would like to know more of the details and what you are going to do scientifically in this boric acid mechanism, because it is crucial that we understand some of the predictive way as to why one nozzle will crack, and waste from the other one will crack, and not waste?

MR. MATTHEWS: I understand, and we would like to understand that, too, and in better detail than we do today, and that is the point in the boric acid corrosion research program. We are launching a fairly large program and we respect the head wastage or the corrosion from the head to the nozzle, and we will be prepared to present those kinds of details.

MEMBER FORD: I can't read on this, but does grade mean inspected and no cracks seen?

MEMBER KRESS: It means no nozzle inspected. A crack and no nozzle.

MEMBER POWERS: Yes, I hope.

MEMBER WALLIS: What are the other nozzles on the right there?

MR. MATTHEWS: The ones on the right are the instrument nozzles. There is some small instrument nozzles.

MEMBER WALLIS: A J-groove or something like that?

MR. MATTHEWS: Yes, the instrument nozzles, and if you recall in Oconee-1, I believe it was, had eight instrument nozzles around the periphery, and they are out on the edge, and they are smaller. They are like one inch diameter nozzles, as opposed to the four inch diameter nozzles.

MR. WOOD: There is a second red bar on the far right --

MR. MATTHEWS: I believe it is TMI model one.

MR. WOOD: So it has got a whole lot of leaks at those nozzles?

MR. MATTHEWS: Yes, essentially all of those nozzles have been -- there is only two plants that had the nozzles, two B&W plants that had those kinds of nozzles, and I am trying to figure out what all these others down here are.

I guess there are other nozzles, similar type smaller nozzles at some of the CE plants also if I am reading this right. There is just not enough light up here with my trifocals to read my own chart.

MEMBER FORD: This is the smallest print that we have ever had to read, but however it is amazingly precise. I mean, it is not smeared, and it is not double printed. It is actually legible. It is incredible.

MR. MATTHEWS: Yes, you just need a magnifying glass.

MEMBER FORD: It is a very good quality reproduction.

MEMBER POWERS: If you get the PDF file and you set it at 400 mg, it works real well.

MR. MATTHEWS: Yes, you can blow this thing up, and I really did intend to bring a big one, but I left it in Denver. And the point is that most of the plants -- and I will get into -- well, why don't we go to the next slide, so that I can talk about what is on there.

It shows graphically the extent that we have inspected the plants to date, and it shows where the cracking has occurred, and the leakage, and any wastage that has occurred only at Davis-Besse.

And where those cracks were occurring on the head, and there is other columns there with key operating parameters, like head temperature,and that sort of thing.

Also, if you look closely, and it would have to be closely, there is a refueling outage schedule, and current outage plans at the time that we put the charts together.

MEMBER WALLIS: Can I ask you about the leakers now? Now, this was visual inspection, and they looked for popcorn; is that what they did?

MR. MATTHEWS: Yes.

MEMBER WALLIS: So that there is no distinction made between the very small leak with a little bubble of popcorn, and the big leak with a mountain of popcorn. There is no distinction made there.

MR. MATTHEWS: Right.

MEMBER WALLIS: There is nothing about the extent of the leakage.

MR. MATTHEWS: Well, almost all of the leakage, except for perhaps what was occurring at Davis-Besse, has been extremely small.

MEMBER WALLIS: It has all been very small. There has been very small amounts of popcorn?

MR. MATTHEWS: Yes. Some of them, you know -- and I don't know that I have seen any golf balls if you will.

MEMBER WALLIS: So there is no indication of liquid. There is no indication of rust flowing, or anything like that?

MR. MATTHEWS: There has been some of the nozzles that had the small amounts of popcorn, when they did the inspections, it would look like there was a little trail of boric acid.

MEMBER WALLIS: Well, I am trying to make the distinction between dry popcorn and something wet under the popcorn, which actually dissolves the steel, and you might see some rust streaks or something?

MR. MATTHEWS: There have been small amounts of rust, I believe, on some of these. I couldn't recall off the top of my head which nozzles or which plants.

MEMBER WALLIS: That is an important transition from a dry leak to a wet one isn't it?

MR. MATTHEWS: Yes, it is, and the important thing there I believe, and according to our model anyway early on was that the leak rate. If the leak rate gets to be sufficient, you can get enough evaporative cooling taking place even with a 600 degree head that it can cool down to a local area and maintain a liquid state.

Also, it is not really clear what happens when you have, as you say, a mountain of boric acid. Do things get trapped underneath it? Do they maintain humidity in the area that causes other problems, and that is some of the stuff that we want to try and look into.

MR. ROSEN: Larry, you say that it shows, that the table graphically shows the extent to which the fleet has been inspected, but I can't see it well enough. So if you will go back to the previous slide and tell me what the colors mean, I might even know what it says.

MR. MATTHEWS: Okay.

MR. ROSEN: There is yellow, and green, but I can't read --

MR. MATTHEWS: The white re the nozzles that have not been inspected.

MR. ROSEN: Okay.

MR. MATTHEWS: And the green are the nozzles that have received at least the top of the head, bare metal visual. The yellow nozzles have received some type of under-head NDE.

If it has a "W" stamped in the middle of the block, it also means that the weld was examined either by PT or (inaudible).

MEMBER WALLIS: I'm beginning to see this clearer every moment. I am getting used to it.

MR. ROSEN: And the gray means what again?

MR. MATTHEWS: The dark gray to the right means that there is no nozzle there. It is -- you know, we just numbered the nozzles sequentially.

MR. ROSEN: There is a gray over there under South Texas, for instance, all the way over on the left. What does that mean?

MR. MATTHEWS: I think that means that those four locations, number wise in their numbering sequence, don't have nozzles there. Whereas, a similar plant did have nozzles there.

MEMBER SIEBER: They broke off.

MR. MATTHEWS: No, they didn't break off. Not yet. They were never installed. Let me see if there are other things. The kind of yellow orange, and it does not show up very well at all on this, are flaws that were left in service. They were flaws that were detected and left in service.

And the main ones were Millstone-2, which is about the fifth plant down in the middle box; and Cook. Well, Cook might show a repair. Yes, Cook-2, it shows that it was left in service and then it was repaired later, but it never made a through wall.

That is the third plant up from the bottom of the top box. There were also a few nozzles with cracks that were left in service at North Anna-1, and one thing that is not on here is that I just heard yesterday that nozzle 50 at North Anna was determined to be leaking after running for one cycle.

It was questionable the previous cycle, and they determined that it wasn't leaking, or that was the call at the time, and then they went back when they just had the refueling outage, or they are in the middle of it now. And when they relooked at it that nozzle was leaking.

MEMBER FORD: Is that the one that was repaired?

MR. MATTHEWS: No.

MEMBER FORD: At North Anna?

MR. MATTHEWS: North Anna-2 had some leaking nozzles, and repaired those that were leaking. I am talking about North Anna-1.

MEMBER FORD: Wasn't there a nozzle at North Anna that was repaired?

MR. MATTHEWS: Yes, North Anna-2 had at least one nozzle that was repaired previously. It was leaking in a previous cycle in the fall of '01, and then they repaired that nozzle.

Then when they shut down in the fall of '02 to examine it, that nozzle was again leaking.

MEMBER FORD: And what was it repaired with?

MR. MATTHEWS: it was repaired with an overlay technique, where they welded six 152 or 52 over the weld itself.

MEMBER FORD: Well, isn't that 152 or 52 weld supposed to be the replacement, non-cracking resistant weld?

MR. MATTHEWS: Right. One of the things that we don't know on that nozzle is what the leak path was, and when they went back and redid some very thorough looking at the nozzle, it was determined that the overlay that they put on the weld itself in all of '01 did not actually cover all of the 82-182 material that was there.

And so the hypothesis is that the crack came up through the part that was not covered by the overlay.

MEMBER FORD: So you are relying on the butter to be the barrier?

MR. MATTHEWS: Well, I think that was

probably what happened with that overlay that they did at North Anna. But another part of our research is the North Anna-2 head now is sitting on the ground in Utah, and we are evaluating proposals today.

MEMBER FORD: Well, what concerns me, Larry, is that we have been told that Alloy-690, 52, and 152, the replacement alloys of construction, are immune to stress corrosion cracking.

And immune has got a whole range of definitions, but it doesn't crack, and it especially does not crack in the fair condition in one fuel cycle.

MR. MATTHEWS: And the belief is that that overlay itself did not crack, and that the crack that did occur was in the part of the 82 or 182 butter that was not overlaid, because they did not completely understand how far out when they did the overlay design and did the overlay application, the overlay did not go all the way to the stainless steel clad, and so there was still some exposed (inaudible) type material.

MEMBER FORD: When will the inspection be done?

MR. MATTHEWS: We are evaluating bids this week for removing the sample from the head, and then we also will shortly be out for proposals for the DE NDE on those heads. And that particular nozzle is one of the nozzles that we are going after.

They did a BOAT sample on that nozzle anyway, and the BOAT sample was limited and did not determine what the actual leak path was. We intend to try and find that leak path.

MEMBER FORD: Okay.

MEMBER SHACK: Larry, on that nozzle 50 that you said is now leaking, was there a UT call that there was a crack there that was not through wall?

MR. MATTHEWS: It's probably, and I don't know if I ought to be speculating in this environment, but it is probably a similar situation to what they had on North Anna-2 on the one that was repaired and then leaked, and that when they did the exam, the visual exam -- and I don't know if you have seen the pictures, and I don't have one with me.

But they had just a little white boric acid. It wasn't even popcorn at that point, right around the intersection of the nozzle. They did a UT on the tube, and as I recall there were no flaws on the tube. In fact, they went and cut the thermal sleeve out so that they could do a thorough UT.

And they did (inaudible) on the nozzle,

and the only thing they found were some indications which at that point in time they believed were far enough away that they were in the stainless steel cladding of the vessel and not in the alloy-82 or 182.

And based on the results from the North Anna-2 repair that was subsequently leaking, I think there is a strong possibility that those indications that they thought were in the cladding were actually in the butter itself.

And it is speculation, you know, but it would be consistent with the results from the North Anna-2 repair.

MEMBER SHACK: I had one more question. Have any through-wall cracks been found by the volumetric that were not detected by the bare metal visual?

MEMBER SIEBER: Through-wall.

MR. MATTHEWS: Through-wall? There were certainly flaws of concern that were detected by the volumetric, and in particular North Anna-2, the NDE indicated there were some nozzles that had circumferential cracking at or near the root of the weld, but not above the root of the weld.

And again this is something that we are going after those nozzles to try and nail down, but the initial speculation is that it was a weld flaw that prorogated up through the weld, and when it encountered the edge of the nozzle below the root of the weld, it turned circumferentially into the nozzle and was in the process of growing in the nozzle.

And which is a significant finding, because that could eventually have led to a circumferential flaw that would have been of great concern and that would not have necessarily been leaking had it not been --

MEMBER WALLIS: You might have lost a control rod before it leaked.

MR. MATTHEWS: Yes. I mean, that is the concern.

MEMBER WALLIS: This is the sneaky stealth crack, which is a real problem, but doesn't show up as a leak.

MR. MATTHEWS: Right. That is the one, and that is the concern. And that is part of the reason or one of the main reasons that we pulled back the MRP 75 inspection plan, which was based primarily on visual examination as the recommended exams.

And when we saw the North Anna-2 results, we said, okay, that is a surprise, and we should not be basing it a hundred percent on visual exams. So now we are going back and regrouping, and trying to put together another inspection plan, not unlike the staff's, but different in significant ways.

And that we will then be working with the staff to try and convince them, the staff, that ours is adequate. We revise this table periodically. It is in electronic format, and so you can blow it up as big as you need to.

MR. ROSEN: Where is it? I mean, on the web, on the MRP website?

MS. WESTON: I will get a copy and provide it to you.

MR. ROSEN: Electronically so that we can have --

MS. WESTON: I will get a copy and provide it to you, a large copy.

MR. MATTHEWS: Right.

MR. ROSEN: A large copy.

MS. WESTON: Yes.

MR. MATTHEWS: Well, electronically, you can make it as big as you need.

MR. ROSEN: Well, if I don't know what URL it is --

MR. MATTHEWS: Right, we will send it to you.

MS. WESTON: I will send it to you.

MR. MATTHEWS: And as detailed as this is, this is not all the information that we have. I mean, we have all the information and we have access to all the information in even more detail.

So we are going to use that information as we try and work on things like what is the probability of leakage, et cetera.

MEMBER FORD: Larry, somewhere on that graft there is denoted Davis-Besse wastage, and there are two other instances we understand of wastage, minor, which was reported to us I think at the end of last year. Where are they on that graft?

MR. MATTHEWS: I guess they are probably not on here, because they were so minor, and one of them was at Oconee, one of the Oconee units as I recall.

MEMBER FORD: I can't remember.

MR. MATTHEWS: And it was a very minor little bit right at the top of the head, and I don't believe that is marked.

MEMBER WALLIS: Well, there is minor, and then there is minor compared with the size of the Davis-Besse crater.

MR. MATTHEWS: Right.

MEMBER WALLIS: And there is minor compared with the thickness of the clearance, which is not so minor, and that is a very small thing, but it is still significant because it opened up a hole.

MR. MATTHEWS: Yes.

MEMBER WALLIS: So I don't know what you mean by minor.

MR. MATTHEWS: And I guess we don't have the details on that wastage. We know that what was measured on the top surface, which was as I recall a very minor or a half-an-inch.

MR. ROSEN: Yes, minor from the standpoint of depth, but I am not sure that the world minor applies from a phenomenological point of view, because if you tell me a quarter-of-an-inch of the head was wasted away, I want to know how did that happen.

And what was the mechanism, because I thought with boric acid coming out on the surface of a hot head would flash and have a little bit of popcorn, and so I don't get it.

MR. MATTHEWS: Well, when it does flash, the first thing that happens is that half of it goes to steam, and half of it goes to water, and saturation conditions. Then you have to boil that water off.

And if your leak rate is sufficient, that evaporative cooling of the half of the water that is left behind is enough to cool the head temperature locally down to the point that you can --

MR. ROSEN: I can't believe it. I mean, maybe -- well, I just have to look at the thermal calculations, but the head is six inches thick, and with all that residual energy in the head, do you really think that --

MR. MATTHEWS: Yes.

MEMBER KRESS: I think you can probably neglect that evaporative cooling. What you have got is a temper distribution through the head, and it is hot at the bottom, and colder at the top.

MR. MATTHEWS: Well, it is pretty hot.

MEMBER KRESS: It is pretty hot all the way, but what you have to do is you have to concentrate the boric acid and for the liquid to waste away that head.

So what you are doing is you are putting in a low concentration, and it is steaming off the top, and as it steams, it concentrates the stuff behind. And if you have a way to keep that liquid in there and only let steam escape, that will go on concentrating over time and time.

MR. ROSEN: The big if is if you have

something to keep it there.

MEMBER KRESS: Yes.

MR. ROSEN: But if you don't --

MEMBER KRESS: And I suspect that may have to do with that ton of stuff on top.

MEMBER WALLIS: With the forms of boric acid and the boiling point elevation, and all that.

MEMBER KRESS: And then you have the solution dissolution of the metal into the concentrated boric acid, and then either way that depends on temperature and concentration.

So I could see how they could develop a fully mechanical model, and you could probably use it as a parameter the way it which it steams out the top of the --

MR. ROSEN: Well, we have evidence that my intuition is wrong. I mean, it did dig away some in the plate.

MR. MATTHEWS: Well, at Davis-Besse.

MR. ROSEN: Well, not just Davis-Besse. I am talking about these other small ones.

MR. MATTHEWS: Well, we did some heat transfer calculations as a function of the leak rate, and in the range of .1 to .2 GPM, we were showing that you could if it is coming from that annulus that .1 to

.2 GPM was enough to cool the area right there on the OD surface of the head down to saturation temperature.

MEMBER FORD: And was that a calculation, or was that an experiment?

MR. MATTHEWS: That was a calculation. It was a 3-D finite element model of the head with the heat transfer, and the cooling from the flashing.

MEMBER FORD: I suspect that at the subcommittee meeting in April that you will get a lot of questions on not only the calculations, but also the qualifying data to support that.

I have seen a lot of suppositions, both in the June meeting from Dominion, and in the various documents since, relating the idea of wastage to leak rates, and I have yet to see any supporting data.

MEMBER WALLIS: Well, what we are looking for is theory of an experiment, which is put together with high academic quality.

MEMBER FORD: But you guys have got those people at EPRI, and John, and other people can do it.

MR. MATTHEWS: Yes, John is involved. John Hinkley is involved.

MEMBER FORD: So we would like to see that.

MR. MATTHEWS: We don't have the

experiment, but we do have --

MEMBER KRESS: Basically, you don't really need an experiment. You have got all the data that you need put together. You have got to have a boric acid concentration in liquid to have the steam, as opposed to if it is pressure.

And you have got the relationship between how boric acid, at a given concentration level, dissolves steel. Now, those are the two things that you need, and you have to put it together with a model of temperature distributions, and flow rates, and --

MEMBER FORD: I am just surprised that in the year since we have had this that this has been not even attempted, because I am awake at night thinking that tomorrow we might find another Davis-Besse.

MEMBER KRESS: Well, we suggested that that model be put together at our very first meeting I think.

MEMBER FORD: Yes, sure.

MEMBER KRESS: And I applaud them for doing it, because it is likely to tell you things about whether there is some potential for it happening in some of the others.

MEMBER FORD: Exactly. I want to know what the margin is.

MEMBER KRESS: Well, it is a good thing for them to be doing.

MEMBER POWERS: You indicated that you calculated the dissolution rate?

MR. MATTHEWS: Yes.

MEMBER POWERS: And has the stability constance for ferric borate been measured?

MEMBER KRESS: There is data, and I have seen a lot of data for the -- well, the data that I have seen is concentrated boric acid dissolving without the ferric included in it. I don't know how much of the -- you know, it is the pure boric acid on pure metal, and that is the way that I have seen it.

You are right though, that it may change that when you put enough of the iron into it.

MEMBER POWERS: As soon as you corrode it a little bit, you are saturated in that kind of a model if you don't put the ferric borate in.

MEMBER KRESS: Yes, I think that is correct.

MR. MATTHEWS: You are just flushing it away.

MEMBER FORD: I think you will have trouble, Tom, doing more --

(Simultaneous conversations.)

MEMBER FORD: And watching steam coming through this stuff, and it is quite a complicated process going on in there, and it is not just --

MEMBER FORD: I get your message, Larry, and in April, we would like the hypothesis and supporting data.

MR. MATTHEWS: We had a model, and it was kind of a phenomenological model.

MEMBER FORD: That's right.

MR. MATTHEWS: And we were told that we need data to back up certain parts of it, and we are in the process now of going to get that data, lab data.

We already have a lot of data on boric acid corrosion rates, and some of them are quite high in the boric acid corrosion guideline. But we are going after specifically what is happening in the crevice type environment.

MEMBER WALLIS: You are going to simulate the pressures and the flashing, and all that stuff?

MR. MATTHEWS: Yes. This is just a bigger chart to read, and it is all the nozzles that have had cracks. So if you are interested in nozzles that have cracks, then the next one is a further and bigger still of all of the nozzles that have had circumferential cracking at or above the degenerative weld.

And there is a limited number of plants that have had circumferential cracking, and so I can get bigger type on a small sheet of paper.

MEMBER SHACK: So on North Anna-2, you inspected 65 and 42 were cracked?

MR. MATTHEWS: North Anna-2?

MEMBER POWERS: I am looking for 42. Where is that?

MR. ROSEN: Number 9.

MEMBER WALLIS: Number 9.

MR. MATTHEWS: Oh, this is on the big chart.

MEMBER WALLIS: It is in the welds.

MR. MATTHEWS: Yes. The cracks are in the welds. Most of the welds in North Anna-2 had cracks in the welds of one size or another.

MEMBER WALLIS: Well, that stands out as being so much bigger than all the others.

MR. MATTHEWS: Yes. It is a different manufactured head, and we don't know if we can attribute it to that or not. It was made by Rotterdam, and there is only like 7 or 8, or maybe 9, heads in the U.S. that were made by Rotterdam.

And all of the welds, or not all of them, but there were a couple of welds that had no indications, but most of the welds at North Anna-2 had some type of early indication in them.

MR. BATEMAN: This is Bill Bateman from the staff. I would like to clarify that an indication is not necessarily a crack. Those indications were not explored to determine whether or not they were cracks.

So I think it is unfair to say that 42 at North Anna had cracks in them. We can say that they had indications, but that is all that we can say.

MEMBER WALLIS: Well, in the column, it says number with weld metal cracks, and you are saying that is wrong?

MR. BATEMAN: Well, that is a misnomer. That is wrong. It should be indications and not cracks.

MEMBER WALLIS: So something was there that looked like a crack, but you don't know that it was a crack?

MR. BATEMAN: In order to determine if an NDE indication is a crack, you have to explore it. And North Anna opted not to explore 42 different penetrations that would take a lot of time and radiation exposure, and they opted to just replace the head once they found that one was available.

MR. MATTHEWS: We are going after some of those nozzles in particular to look at those weld indications and try and quantify what the NDE is telling us relative to are those --

MEMBER SHACK: Is there any current technique that other people have used without producing --

MR. MATTHEWS: Very similar to a current technique to what Robinson used on all of their welds and got no indications.

MEMBER FORD: Larry, can you give us some idea of what the leak rates are from these nozzles? Leak rates in terms of gallons per minute?

MR. MATTHEWS: I think all of these leak rates are very, very low, except possible the Davis-Besse leak rate.

MEMBER FORD: An order of magnitude value.

MR. MATTHEWS: A millionth of a gallon per hour, or something like that.

MEMBER FORD: Okay.

MR. MATTHEWS: A very low leak rate. Very low leak rates.

MEMBER FORD: The reason that I am asking the question is that our disposition curves for circumferential cracking, you have quoted that it would be less than .004 gallons per minute.

Therefore, those disposition curves to be applicable --

MR. MATTHEWS: To use that factor, too, on the crack growth rate, yes.

MEMBER FORD: And so all of these leaking situations here are well below that limit that you put on those disposition curves?

MR. MATTHEWS: I am not sure about Davis-Besse. The ones that developed wastage, wherever they are, were probably leaking at a sufficient rate to have cooled the area enough to maintain a liquid to concentrate and waste the head.

But those are very, very few. If you had any kind of significant leak rates going on, you would not have popcorn. You would have mounds of boric acid.

MEMBER FORD: Right.

MEMBER SHACK: So a thousandth of a GPM gives you 15 pounds of boric acid per year. So it piles up.

MEMBER WALLIS: It does pile up.

MR. MATTHEWS: It piles up.

MEMBER FORD: Okay. Larry.

MR. MATTHEWS: Okay. Slide Number 6 has the nozzles that had the circ loss in the base metal of the nozzles, and all of these, except North Anna, were in the B&W plants.

Slide 7 kind of covers some of the overall statistics, and in the U.S. we have 3,871 CRDM nozzles, and 1,090 CEDM nozzles, which are the same thing for CE plants.

And 94 in-core instrument nozzles, and in 69 units. Bare metal visual and/or non-visual inspections have now been performed on approximately 81 percent of those nozzles, or the other type exam, or both. And about 47 have been found to be leaking.

Almost 8 percent of the nozzles in the B&W plants have leaked, but leakage in the non-B&W plants have been North Anna-2, and Surry-1, and now it looks like North Anna-1 also has it.

MEMBER WALLIS: You said that North Anna-2 was a Rotterdam fabrication?

MR. MATTHEWS: Right.

MEMBER WALLIS: And are there other Rotterdam fabrications which are in the lower categories of susceptibility?

MR. MATTHEWS: Yes, there are.

MEMBER WALLIS: So maybe they should be looked at more carefully?

MR. MATTHEWS: And I think that those plants are taking that into account.

MEMBER WALLIS: All right. But is the staff taking that into account?

MR. MATTHEWS: You would have to ask the staff.

MR. BATEMAN: I think if you look at our orders that dictated the inspection requirements the answer would be yes.

MEMBER WALLIS: But I don't have to look at them for the answer to be yes. If the answer is yes, it does not imply that I have to look at them. The answer is yes, right?

MR. BATEMAN: Yes, and not specifically because they were Rotterdam heads, no.

MR. MATTHEWS: And we have not yet said that these weld flaws are a Rotterdam problem.

MEMBER WALLIS: But obviously you look for any kind of a clue that something is different.

MR. BATEMAN: Yes.

MR. MATTHEWS: Yes. And that is the difference that all of the welds flaw -- well, they had a preponderance of weld logs.

MEMBER WALLIS: It is such a huge number, and you can't ignore it.

MR. MATTHEWS: Yes.

MEMBER WALLIS: This is Rotterdam, Holland?

MR. MATTHEWS: The stockyards in Holland, yes.

MEMBER WALLIS: Do they build French heads?

MR. MATTHEWS: I don't believe they did, no. And the French have gone back and looked at several of their decommissioned plants and they have not seen the kind of weld flaws that the B&W plants in North Anna, or at least that is the last that I heard from the French, that they had not seen any, or at most one, weld flaw.

MEMBER POWERS: When you think about the chemistry at the top of the head, and there is boric acid, and you have liquid up there, what kind of rates do those boric acid experience on the top of the head during normal operation?

MR. MATTHEWS: Dose rates, gamma neutron?

MEMBER POWERS: Yes.

MR. MATTHEWS: The neutron is going to be very low, and it is so far away from the fuel. Gamma would be the contamination that you have got in the coolant, and in 16, and in 13.

MEMBER POWERS: In the crud.

MR. MATTHEWS: And in the crud, and all of that stuff. If you crawl under the head, it can be a thousand mR per hour under the head in gamma.

MEMBER KRESS: That can be part of the chemistry --

MR. MATTHEWS: A thousand mR per hour, but that is at shutdown and after it is has taken off, and it is probably quite a bit more than that with the other stuff going on during operations with the gamma dose rate.

MEMBER KRESS: That can strongly affect your chemistry.

MR. MATTHEWS: Yes.

MEMBER POWERS: When you look at the chemistry of boric acid do you take into account radioloysis?

MR. MATTHEWS: I am not sure that we had.

MEMBER POWERS: There is an awful strong oxidates to it.

MR. MATTHEWS: Yes.

MR. ROSEN: I couldn't understand what you said, Dana.

MEMBER POWERS: I said awful strong oxidates.

MEMBER SIEBER: Our transcriber is having trouble hearing you.

MR. MATTHEWS: I will get back to our folks on that.

MEMBER POWERS: Sure.

MR. ROSEN: So, you said a thousand mR per hour if you craw under and remove the head, or 1r per hour?

MR. MATTHEWS: Yes, or more than that.

MR. ROSEN: How much more, 10?

MEMBER SIEBER: I remember numbers like five several days after --

MR. ROSEN: 5r per hour.

MR. MATTHEWS: And it is mostly combination. There is not a lot of activation of the steel that distance from the core, and --

MR. ROSEN: There is a shield between it and the core.

MEMBER POWERS: Very persistent combination though on the handle and nozzle.

MEMBER SIEBER: You have to sandblast it to get it off.

MR. MATTHEWS: Continuing?

MEMBER FORD: Yes.

MR. MATTHEWS: It looks like about half of the plants in the category that the NRC would call high susceptibility in a third of the nozzles that are in the moderate will have received or have had non-visual examinations performed on them.

And about two-thirds of the nozzles in the B&W plants, and 25 percent in the non-B&W plants, and that is going up rapidly as we enter another outage season and more plants are doing examinations.

MEMBER POWERS: Is this -- I mean, suppose you examine them and it says they are fine. How long do they stay fine?

MR. MATTHEWS: They don't stay fine forever. We certainly don't assume that. And we will be determining -- we had recommended a reinspection on some periodic basis, and the NRC staff for the high category in the orders had said every refueling outage.

We think cracks don't grow that fast or to be that significant, and so we are going to be looking to how fast you would need to come back in. It could be on the order of every other refueling outage or something like that for those plants.

MEMBER POWERS: It's a chore.

MR. MATTHEWS: It's a chore, and it is expensive, and so people are replacing heads in plants right away. I mean, there are plants that are replacing heads that have found no flaws, just to avoid the expense of having to go in every cycle, or every other cycle, or whatever due to those experiences, and do the examinations.

MEMBER POWERS: I believe it.

MEMBER WALLIS: Do they assume what they put in now, is that susceptible to flaw than the one that was there before?

MR. MATTHEWS: Yes. It's 690, and the staff does not assume that, except for Davis-Besse, who has replaced with another Alloy 600 penetration head.

And the staff has not given us any credit, and I think that they believe that the material is less susceptible, but we have to gather the worldwide data and make the case, and we are in the process of doing that right now.

Plus, we will probably be doing other types of testing to further bolster the case that 690 is a better material. I mean, clearly it has performed better I think in steam generators, and the hypothesis would be that it would be better also in these, but these are thick wall applications.

MEMBER WALLIS: And all these new heads have stainless steel alignments?

MR. MATTHEWS: Yes, they do.

MEMBER WALLIS: And about the same thickness as Davis-Besse?

MR. MATTHEWS: I think they are, yes.

MEMBER POWERS: That's good.

MEMBER FORD: Your data collection for 690 will also include alloys?

MR. MATTHEWS: Yes. Further on, what has been done, about 19 percent of the inspected B&W plant nozzles have shown some kind of base metal cracking, either OD or ID, and we are not trying to pin it on B&W, because the B&W plants, if you look at the chart, were all the ones that had the high time at temperature, and so you may have both going on there. And I don't think we have enough data to try and say, well, it is their problem. And I don't want to go there anyway.

The base metal cracking in the non-B&W plants. I guess we may have trouble showing this, but I will lay it up here. It has got more information that you want to get, and here is a big copy of that chart and you can come up and look at it.

MR. ROSEN: Pass it around.

MR. MATTHEWS: It has to be that big, and we print them out and plot them out that big so that we can look at it. It says that base metal cracking was in the Millstone and Cook-2, and I thought I remembered another novel. Maybe not.

North Anna-1 and 2 have experienced some cracking in the base metal. North Anna-1 had some shallow cracks that were left in service. North Anna-2 had cracks that were coming in from the OD.

I think they may have also had some shallow cracks on the ID. Currently scheduled for the spring, we have got 20 units having outages, and three of those units will replace their heads this spring.

North Anna-1, Surry-1, and Aconee-3 intend to replace their heads this spring using Alloy 690 nozzle material and weld metal. The other 17 units are performing either the bare metal visual or under the head non-visual, depending on their susceptibility category, and how much degradation years they have.

All the plants greater than 12 will have performed a non-visual baseline examination by the end of the spring outage season. And I believe what we are going to get through in the spring is going to be most of the commitments that people made in 2001-01.

There is only two units that will have done at least the bare metal visual, or I mean will have not done.

There are only two that will not have done some type of examination, and I believe those plants were on two year cycles, and they just have not gotten back around to their outages.

And 20 out of the 28 are in the NRC's high susceptibility category, and there may be 29 or 30 now as time has progressed, and will have done the baseline non-visual, or replaced their heads.

After the fall, all 69 units will have done some type of head examination, and 27 of the 28 units with greater than 12 EDYs will have completed baseline non-visual by the spring '04 outage.

MEMBER POWERS: When you go about replacing a head, how do you inspect? I mean, you just take on faith that 690 is better, right, no matter how it is fabricated?

MR. MATTHEWS: Yes. We watch how they do it, and 690 is the better material.

MEMBER POWERS: Yes, but you don't know what you are looking for. So, I mean, you can watch until the cows come home.

MR. MATTHEWS: That's true. Pretty much. I don't know that plants are putting any kind of particular specs on Alloy 690 other than they use Alloy 690.

MEMBER FORD: How about specs on the welding procedure and the effect that has on the residual stress --

MR. MATTHEWS: I am not sure of the details of the specs.

MR. BATEMAN: Bill Bateman from the staff again. I can only speak from the observations of the trip that myself and several other staff made up to B&W Canada, where they are fabricating these new heads using Alloy 690.

And they are taking much more care in designing the process for applying the welds.

MR. ROSEN: And including such things as shrink fitting the tubes?

MR. MATTHEWS: The whole process is much more controlled, but in particular the welding. I actually saw them where they are running experiments by machine welding and applying the beads, and taking stress measurements and that kind of thing.

So I know that they are being a lot more careful in developing the -- that is B&W Canada, and I have not been to Framatone and maybe I can get a trip over there, Peter.

MR. HEISER: This is Alan Heiser of the staff. The design of some of the joints has been improved to reduce stresses, and reduction of weld volume, and trying to make the welds more symmetric to reduce stresses. Some surface conditioning, and those are some of the things that Oconee had pointed out to us almost two years ago when they first initiated their head replacements.

Now, we have some indications from one vendor regarding advanced reactors is that they are using the same designs for advanced reactor heads, and they are just changing the material out. And that may not provide as good a performance hopefully as we will get from the plants that utilize all this experience that we have had over the last few years.

MEMBER SHACK: Are these thermally treated? Do they dump carbites on the grain boundary, the nozzles? I mean, is it Alloy 600TT as we would say in the steam generator tube?

MR. MATTHEWS: I don't know.

MEMBER WALLIS: What is the weld material?

MR. MATTHEWS: It is 152 or 52, depending on whether it is automated or --

MEMBER WALLIS: Same as the weld material before?

MR. MATTHEWS: No, it is alloy to be consistent with the Alloy 690 base metal.

MEMBER FORD: I would like to follow up on Dana's comment, which was a good one. And that is what sort of control do we have over the fabrication process?

When you said you looked at it and it looks good, and your processes lower the stress, those are all engineering judgments?

MR. MATTHEWS: Yes.

MEMBER FORD: Has there been any work done for BWR heads or TWR heads, sorry, in which there is a correlation between the observed residual stresses and fabrication parameters, such as weld heat input, and speed, and geometry, shrink fit, all this business?

MR. MATTHEWS: I am not sure of the details of what the fabricators are doing in their set-ups and all. I am just not that close to that right now.

MEMBER FORD: The fabricators are the controllers, and not the buyers, in terms of setting up the specifications?

MR. MATTHEWS: Again, I think each buyer would have its own spec, and what he is writing into it, and I am not that familiar with what --

MEMBER FORD: Well, with Dana's comment, are we not just heading into -- we might come up with bad material, and we don't know what we are looking for in the material specifications, and we know what to look for in terms of microstructure, but not in terms of detailed specification composition.

And 690 looks as though it might be better, and what is the factor improvement by going to these controlled welding procedures, and we don't know. So how do we know that we are any better off?

It seems to me that we are not controlling the process. We are going by engineering judgment.

MEMBER SHACK: You are not going to wait to replace your head and solve all these problems.

MR. MATTHEWS: No.

MEMBER FORD: No, of course not, and I can't believe that the PWR world have not done some residual stress measurements to calibrate their finite element analysis.

MR. MATTHEWS: I think they have.

MEMBER FORD: Okay, then, great.

MR. MATTHEWS: On 600.

MEMBER FORD: So that is the answer.

MR. MATTHEWS: I think they mocked up the

690 to big mock-ups to do that. There may be some with the fabricators that I am not familiar with.

CHAIRMAN BONACA: I have a question regarding -- you said before that 19 percent of the B&W plant nozzles show metal, base metal cracking, and for this you have a significant debate, because they did a UT of all of them.

But then you say that for the others, there is very few that had base metal cracking. But for the others, we had much more visual inspections, right?

MR. MATTHEWS: Well, there has been quite a bit of volumetric examination that has been done, and --

CHAIRMAN BONACA: Well, wouldn't it be true that as they do more and more volumetric that we are going to find that it is more than just a few?

MR. MATTHEWS: Well, there may be other flaws out there, or we may find other flaws in the future inspections. I am not saying that we won't. And we are not trying to draw a conclusion from this that there won't be any problems.

CHAIRMAN BONACA: Well, it sounds like the problems would only be in B&W plants.

MR. MATTHEWS: No, we are not trying to

draw that conclusion. There have been other plants that have done the inspections and have not seen them. Several plants have done volumetric examinations, and so of them are almost to the same EDY as the Oconee units, and have seen no problems in their baselines, or in the welds either.

I would like to move on to the process that we are going through.

MR. GILLESPIE: I was about to point out that we are halfway through, and you are about a third of your way through, if that, through your total stack. So maybe --

MR. MATTHEWS: I will try to speed it up.

MEMBER FORD: Well, actually, to help you in areas that you think you might need some help from us, and suggestions that you could cover in more detail in April?

MR. MATTHEWS: Yes.

MEMBER FORD: Would that help you?

MR. MATTHEWS: Yes.

MEMBER POWERS: I hate to slow it down, but is it true that Farley-2 has the same bad heat that we have for the famous five nozzles at DB?

MR. MATTHEWS: Farley-2, or 4 of the 5 nozzles at DB as I recall, and most of the nozzles at

Oconee-3, were all from the same heat. It is also true that Farley-2 had almost all of the nozzles from that heat.

Farley-2 did a volumetric examination and found no flaws, and there were quite a -- they are not as high in EDY.

MEMBER SIEBER: But they are still around 19 though, right?

MR. MATTHEWS: Well, they are more like 18 or 17.

MEMBER SIEBER: I was close.

MR. MATTHEWS: No, actually, maybe more like 16, but they are in the high to moderate, or up in that range, and they found no flaws. In Robinson-2, it is not the same heat, but they are way up there, and they found no flaws.

MEMBER FORD: Before you get to the next subject, too, you mentioned that quite a few of the stations were replacing the heads. At the same time, some of them were repairing the heads; is that correct?

MR. MATTHEWS: Yes. I mean, a few --

MEMBER FORD: Are there any code restrictions on the size of these repair welds that are being proposed, and is there any control over the welding process?

For instance, if for instance the cracking at North Anna turns out to be a hot short cracks, there aren't just corrosion cracks. Are there any welding process specifications being imposed on the repairers, and what are they?

MR. MATTHEWS: I don't know the details of them, but yes, those processes and those welding or repair processes are controlled quite closely.

MEMBER FORD: Have there been mock-up tests done prior to North Anna?

MR. MATTHEWS: On the weld overlay?

MEMBER FORD: Yes.

MR. MATTHEWS: I believe that Westinghouse had demonstrated that weld overlay process on a spare head, and I believe they had. I am not absolutely certain, but I believe they had just in the process of tooling development.

MEMBER FORD: Will this be covered in April?

MR. MATTHEWS: On the controls for the repair?

MEMBER FORD: Yes. Again, it is going back to the same thing. Are we just working our selves into another problem?

MR. MATTHEWS: Well, most of the plants that have done a repair have immediately instituted plans to do a replacement.

MEMBER FORD: Well, maybe it would be a good idea to do a destructive examination of those to see if there is a hot short crack?

MR. MATTHEWS: Well, on the North Anna repair, we are going after that nozzle in particular, and that is one of the ones that we will be doing DE on.

I want to talk a little bit about the process that we are going to use to revise our proposed inspection plan, and cover the overall safety assessment process, and this transitioned from where we originally were recommending visual exams to a combination baseline inspection, and covered a little bit about the (inaudible) and inspection analysis, and we are trying to avoid surprises in the future in the schedule for issuing revised inspection plans and safety assessments.

This is again hard to read, but it is kind of a new process that we are going through here, and we are going to start on the left with the failure modes and effect analysis and try to determine every possible failure mode.

And then through evaluations then go into determining what the appropriate inspections are, and that would all be part of our safety assessment, and put out inspection guidance, and then the plants would perform inspections.

And if we are bounded by our safety analysis, okay, and if we are not, then we have got to feed back in to our revised inspection plan and guidance. Hopefully we won't be revising it much in the future.

MEMBER FORD: But this essentially apart from the head wastage evaluations, this is essentially what you proposed in June of last year; is that correct?

MR. MATTHEWS: We were not proposing a failure mode effects analysis and starting over. In June of last year, I think we were still to the point that we were recommending as our base inspection a bare metal visual inspection on top of the head, and that is what was in the RPM 75.

North Anna-2 made us question that presumption if you will, and so we are going back to do a complete failure modes inspection analysis, and what can fail, and how can it fail, and what are the consequences.

And where can you draw the appropriate inspection lines to cut it off before you get to anything significant.

MEMBER SIEBER: Doesn't the existence of the order change your plans?

MR. MATTHEWS: Well, the existence of the order clearly changes what individual plants are having to do as they go into their outages.

MEMBER SIEBER: Right, and how often they do it.

MR. MATTHEWS: And how often they do it. If we come up with a plan that is less -- I will use Brian Sheren's word -- onerous for the high susceptibility plants, and yet a completely acceptable plant, we would be presenting that to the staff and working with the staff to convince them that it would be appropriate to change that order, or as we work into the code to work and get a set of inspection criteria in plans that would be more appropriate for those plants.

Our new approach recommends a combination of baseline inspections. We pulled MRP75 from review by the staff, but then in December, we sent a letter -- the MRP sent a letter to all the plants recommending a series of baseline inspections.

And even though the low susceptibility plants should do baseline volumetric inspections, and the timing of those inspections and the reinspections as we move forward will be based on technical evaluations that we put together, and it will be in combination with more frequent bare metal visuals.

In fact, our bare metal visuals were not every cycle even for high susceptibility and MRP75. Looking at the wastage issue, et cetera, I believe we are going to be changing those recommendations for the high susceptibility plants to go even more frequent on the bare metal visuals.

The safety assessment that we are putting together starts like I said with a failure mode effects analysis and it will include many of the tools, and analysis tools that we already have done analysis, and we are working on as the technical basis for MRP75, but we need to step back based on recent inspection results and see if those inspection results have impact on our previous analysis.

MEMBER WALLIS: Now, this safety assessment is not a risk assessment?

MR. MATTHEWS: Risk is part of that assessment.

MEMBER FORD: Since you brought this

subject up, in April, will we be reviewing again the utilities view on calculation of delta-CDFs? You heard it for the Oconee and for Davis -- well, we have not heard it from Davis-Besse, but we have been given to understand that it is very similar to the Oconee justification, in terms of small delta-CDFs.

MR. MATTHEWS: Yes.

MEMBER FORD: Are we going to hear a reevaluation of that approach?

MR. MATTHEWS: Well, it is certainly part of the plan. We won't be through with the reinspection plan by that point in time.

MEMBER FORD: No, but in April will you be reviewing again the rationale for your delta-CDF calculations?

MR. MATTHEWS: I don't believe it was in what we were going to present. I think we already went over part of that at one point in time.

MEMBER FORD: Well, in June when we brought this question up, in June of last year, when we brought this question up, you said, oh, we are working on it, and we will get back to you, or we will be getting back to you.

MR. MATTHEWS: Oh, okay, and we did not discuss it in detail back then?

MEMBER FORD: No, you said we don't have much to report and it was in June, and you said that we don't have much to report. But I guess you have more to report now.

MR. MATTHEWS: Well, we had more when we submitted MRP75, but like I said, we have to go back to --

MEMBER FORD: Well, it has not been given to us. We have not seen it.

MR. MATTHEWS: And we are going back and we are going to reassess what that really meant, and what the inspection results might do. And the main driver for those would be -- well, it show you model the crack propagation for one thing.

MEMBER FORD: Correct.

MR. MATTHEWS: And then also what is the probability of leakage, which was one of the input parameters to that. And those things are going to be in and are being reassessed to assess what impact that would have on the core damage frequency.

MEMBER FORD: Okay.

MR. MATTHEWS: We are going to use the results of the FMEA to help us establish the required technical evaluations that we need to do, and ultimately the inspection detectability requirements.

We believe that our current calculations that we have been doing show that the non-visual inspections do not have to be performed every refueling outage to ensure safety.

But we have to put together the story for the staff in an manner that they can review and --

CHAIRMAN BONACA: For all plants, irrespective of the susceptibility?

MR. MATTHEWS: Yes. We don't believe that even the high susceptibility plants need to do a hundred percent NDE on the nozzles every cycle to assure a lot probability of nozzle rejection.

CHAIRMAN BONACA: You would have to convince yourself that wastage cannot --

MR. MATTHEWS: Well, part and parcel with that is coupled with bare metal visuals every refueling outage to make sure that you don't have wastage going on, along with the technical arguments that you cannot develop safety significant wastage conditions in one cycle.

If you can, then we have got to reassess that, too.

CHAIRMAN BONACA: So you expect then a visual inspection every cycle?

MR. MATTHEWS: Yes, that is our current or that is going to be our recommendation. I am pretty sure of that, and I am pretty sure that is where we are going for the high susceptibility plant.

MEMBER FORD: So, in April, you are going to go through and give some examples of this and this data, et cetera?

MR. MATTHEWS: Examples of?

MEMBER FORD: Well, you are saying existing calculations show --

MR. MATTHEWS: Yes.

MEMBER FORD: I mean, it is a bullet sized statement.

MR. MATTHEWS: Yes. If we are through to the point that we can review it with the staff, et cetera. I said that we need to back off and make sure that what we put together on this crack growth, and the reinspection interval, is rigorous, very rigorous.

And so we are going all the way back and looking at all of the assumptions that we are putting into it, and I don't know if we will be through with it by April.

MEMBER WALLIS: When you say it is a significant wastage, you mean making a hole that compromises the integrity of the head, or one that compromises the ability to hold on to the control rod?

It seems to me that is a different thing.

MR. MATTHEWS: Either one.

MEMBER WALLIS: Davis-Besse compromised both, but it is not clear that you have to have a big hole in the head in order to compromise the integrity of holding on to the guide to, because you could waste the welds, or the waste around the weld in some way that would --

MR. MATTHEWS: Well, I think we could easily show that it wouldn't launch without a fairly decent -- I think we could show that even if you had an interference fit of minus a half-an-inch, or more, that covered the whole weld, it still would not launch from a structural standpoint.

CHAIRMAN BONACA: And the other concern that I have is not -- we used to say that wastage cannot happen. So therefore we excluded it, and we were all worried about cracks and accidents, and we said, oh, a system operational crack can happen. So we worried about those.

And we find wastage now and we say, okay, now we understand it all. So we have to demonstrate that if a leak starts the day after you start the plant, and over a two year period, which is until the next shutdown, nothing will happen of risk significance here.

Well, I am not sure that we understand all the aspects of this process by which we have cracking, and leakage, and wastage.

MR. MATTHEWS: Well, that is the point, and that's why we have said that we are not going to base our future inspection recommendations if you will on what has happened.

We are gong to go and do a rigorous failure modes and effect analysis on what can happen, and what should we inspect to make sure that the safety issues don't happen.

MEMBER WALLIS: Well, we do know where the wastage starts, and does the wastage start on the top, or does it start at the bottom, and there is a cavity and there is a cave. Does it start at the bottom of the cave, or does it start at the top? Do you know that yet?

MR. MATTHEWS: No.

MEMBER WALLIS: So you may have difficulty understanding how much wastage you can tolerate if you have enough down there then it might weaken the weld wouldn't it?

MR. MATTHEWS: Well, you can't have a significant volume of wastage without something being there on top of the head. The stuff is bigger than steel, and it is not going back through the crack.

MEMBER WALLIS: Well, you are saying that you don't know how the wastage proceeds.

MR. MATTHEWS: Right.

MEMBER WALLIS: So how much wastage could occur between cycles.

MR. MATTHEWS: That is the point of the boric acid corrosion testing that we are going to be doing in the modeling, et cetera.

MEMBER WALLIS: Well, since we don't know how wastage develops, we can't quite tell how much and where and how significant the wastage could be between cycles.

MR. MATTHEWS: Well, that is what we are going to try to quantify in the lab and through this model.

MEMBER WALLIS: Well, it would be important that you do it pretty rapidly, right?

MR. MATTHEWS: Yes.

MEMBER FORD: Could you put 15 up again, please.

MR. MATTHEWS: If I can find it.

MEMBER WALLIS: Because I think what is throwing everybody at this point here is if you look at the second bullet, the first subbullet, you say that calculations show a extremely low probability of nozzle ejection and significant wastage.

And I think what people are questioning right now is right now, you don't know how you can substantiate that conclusion and get wastage.

MR. MATTHEWS: Well, we are going to have to, and number one, it is based partly on the fact that we are going to be recommending a visual exam every cycle.

But I recognize that we have to be able to demonstrate that you cannot get safety significant wastage in that one cycle of operation, even if the leak started when you first started up.

MEMBER WALLIS: Okay.

MEMBER KRESS: But those probabilities come out of your FMEA?

MR. MATTHEWS: No, they would be coming out of our probablistic fracture mechanics, parts of it, and also we had a probablistic model for wastage which requires tuning, we understand.

MEMBER KRESS: Well, FEMAs generally quantify probabilities by expert opinion and I just wondered if that is how you arrived at these particular bullets.

MR. MATTHEWS: No. No, in fact some of these are deterministic conservative, deterministic calculations, which will show that the crack growth is going to be significant, you know.

And I don't have the calculations. We are not through with them. But we feel pretty confident based on crack growth rates that we believe should be used that we can reach these kinds of conclusions. We have not documented it yet. We haven't done it yet.

MEMBER WALLIS: I just really wonder if you know. If you have got a very small leak squirting out a jet of boric acid which is concentrating as it comes out, there is all kinds of things going on there that can cause pretty rapid wastage locally.

And I am not sure that you have much of a handle on those things.

MR. MATTHEWS: Well, there have already been quite a bit of experiments done on various wastage mechanisms from hot streams impinging on hot steel, or cold streams on hot steel and that sort of thing have already been done.

And you can get significant wastage rates under certain conditions. And we have used that information to build this phenomenologic model last summer that was in our basis for MRP75.

Our experts have told us though that we need more data to back that up in certain areas, and that is what we are going after in our lab tests. Am I half through? The letter that we had sent out is basically as far as the types of inspections that we are recommending under the heading in DE.

We are pretty consistent I believe with what was in the orders and the Bulletin 2002-02. And the timing is not terribly inconsistent either. We may be a few months off, but the letter that we sent out in December is pretty much saying when low, and medium and high plants ought to be doing these types of inspections.

We are still looking at time and temperature to form the basis for the susceptibility groups. We still don't think we have enough information to conclusively start to subcategorize plants.

What we have recommended and I think the order is putting it in place that it is not expected any more and that it will happen, and the high susceptibility plants will perform some kind of volumetric exam by the next outage. Moderates around 2005 at the latest, and the lows around 2007 at the latest.

MR. ROSEN: And TQM.

MR. MATTHEWS: Well, I didn't make this slide, but I think that is where FMEA supposedly started. We built these tables of all the possible failure mechanisms and track them through to the ultimate consequence, and look at relationships.

I think that there is a chart in here, and I think we put it in, yes, later. There are three basic failure mechanisms that they postulated at this point, although they are not ignoring anything else that could happen. Nozzle ejection due to the circumferential flaw that leads to ejection. Cladding blowout due to wastage, and --

MEMBER WALLIS: Well, what is that?

MR. MATTHEWS: It is a rupture of the cladding surface area because you have wasted down on top of the head. Davis-Besse's is only a little bigger and so that it erupts.

MEMBER WALLIS: You mean the stainless steel?

MR. MATTHEWS: Yes.

MEMBER WALLIS: And the liner is the cladding?

MR. MATTHEWS: Yes, the stainless steel cladding. And then another possible safety significant issue is some RCS damage due to lose parts generation if the bottom part of the nozzle gets in enough pieces and goes in the wrong places, and all of that is going to be included.

There is lots of different failure mechanisms, or levels, and if you will look at the next chart, if you can read it, and I realize that it is pretty small, too. But across the bottom is the initiation type of events, and how they progress as you go up, ultimately leading to core damage as the high level.

At various points in this progression, you can insert inspections, and some of the things that you can't do anything about because there is no way to know that it is happening. Others you can do an inspection to stop that pathway if you will.

And this is kind of the framework in which we are trying to assess the overall thing of what inspections, and what timing, et cetera, we ought to be putting out.

MEMBER FORD: And this is conceptual, and how close is it to reality?

MR. MATTHEWS: Well, some of these things have happened.

MEMBER FORD: Does failure to SCRAM come

into this thing? Have you launched a control rod into other controls?

MR. MATTHEWS: Yes, that would come under the consequential damage up in the --

MEMBER FORD: So there is a SCRAM somewhere in there?

MR. MATTHEWS: Well, that would be up under the consequential damage evaluation, the second line from the top.

MEMBER FORD: The reactivity transient, is that what you are saying, that it would be under that?

MR. ROSEN: Or damage to other mechanisms.

MR. MATTHEWS: Damage to other mechanisms would be --

MEMBER FORD: I just wondered if it was not worth a box by itself.

MR. MATTHEWS: Well, all of those consequential damage things would have to be evaluated. Each of the conditions would be classes and not credible, and not actionable or actionable, and you need a very strong case to say something is not credible.

MEMBER WALLIS: Well, if it has been used before.

MR. MATTHEWS: Not credible?

MEMBER WALLIS: Yes. Credible has been used before.

MR. MATTHEWS: Well, you need a very strong case.

MEMBER POWERS: You are just overly credulous.

MR. MATTHEWS: That's why it has to be a very strong technical argue to say that anything on this chart would be not credible.

MEMBER WALLIS: The other thing is a finite probability of occurrence, and I think we know that.

MR. MATTHEWS: Well, credible has a definition that is not zero, I think, and so --

MEMBER WALLIS: Is the point of all of this just formalizing a life management or degradation management technology?

MR. MATTHEWS: It really is. What we have been doing in the past was what have we seen, and how can we show the plants are safe based on what we have seen, and I think I said here, and I know that I have said it in other forums, every outage season we were surprised by a new inspection plan.

MEMBER WALLIS: And so as more things become credible?

MR. MATTHEWS: Yes, or things become thought of anyway.

MEMBER FORD: So would this be used in some sort of proactive way that --

MR. MATTHEWS: That is the intent, is to say we are not just going to look at what has happened. We are going to look at everything that can happen, and trying to assess its likelihood, and trying to assess what inspections we might be able to do if we need to do it to prevent it, and to interrupt that chain to core damage if you will.

MEMBER FORD: And what would the role of the NRC be in this? Would you have to approve this, or is this purely a -- I am asking you for more information.

MR. MATTHEWS: Well, this would be part of our technical basis for an inspection plan that we might put together or will put together that might differ from the orders, and would be the basis hopefully of what goes in ultimately into the ASME code as the long term inspection program.

And the NRC would certainly have to buy off on anything like this, and the overall process, and the overall plan, to modify the orders --

MEMBER FORD: So this would be the basis

of the relief from the order?

MR. BATEMAN: The staff's long term plan, given that we can reach agreement with industry within a reasonable amount of time on this, is just as Larry has said. In fact, we have representatives on the co-committees that are working to get this in the code.

Once it gets in the code, and we are all in agreement with that, then of course we indorse that through 55A, and in that way get it into the regulations, and it becomes a regulatory requirement. That is our goal at this point.

MR. MATTHEWS: And right now we have the orders in place, and people are going to have to live with those orders, unless and until they can provide the technical justification for any kind of relaxation that they might be going after individually.

Or we as an industry can put together the arguments and convince the staff before the code has codified the new rules that the order merits relaxation in certain areas.

There is a list of other factors that will be considered in the overall process that we are going to go through. And then proceeding along with part of the overall process, we will be assessing the frequency of occurrence, and that will be based primarily on the inspection results to date.

And we will also be using crack growth rates from MRP 55, and addressing all the small and medium break LOCA analysis, and consequential damage assessments, and then also loose parts damage, and that is all part of that whole process.

And we intend to put together this comprehensive safety assessment, and it will be the basis for our revised inspection plan. It will reference other documents that have been put together. We still need to do and revise some of our calculations, and some of the models that we used in MRP 75, but much of that work is pretty good the way that it stands, maybe with minor revisions.

MEMBER WALLIS: And this medium break LOCA analysis, do we have a medium break LOCA analysis that includes the fact of this high velocity stuff on the control rod drive mechanisms, and the various other things up there which are above the head?

MR. MATTHEWS: It would be coupled with the consequential damage assessment, which I believe is the next line on the slide.

MEMBER WALLIS: So that is part of that?

MR. MATTHEWS: Yes. And we will couple all of that together to try and figure out what it does to the core damage frequency.

MEMBER WALLIS: And has that been done yet or is that to be done? Do we have a handle on it yet?

MR. MATTHEWS: We have done some looks at what the consequential damages are, and it doesn't look like there is a lot of consequential damages that lead to an increase in contributions to the core damage frequency.

You could cut a lot of cables, but that is not going to hurt you because the rods are going to go in, and that sort of thing.

CHAIRMAN BONACA: Going back to the fact that you are going to recommend that not in every outage that you have to have a visual inspection, wouldn't you want to have a baseline inspection for each plant?

MR. MATTHEWS: We have recommended that every plant do that.

CHAIRMAN BONACA: But the baseline inspection is not necessarily really --

MR. MATTHEWS: No, it is. It is. We have recommended that every plant do an under the head NDE inspection, and some of those are on a time schedule comparable to what the staff has recommended, and so the low susceptibility plants may be a few years away, but we have recommended that everybody do at least a baseline.

CHAIRMAN BONACA: Because, I mean, if you have that, and then you detect some perceived cracks, but no leakage, you can refer to some kind of growth rate over a cycle, and then support a strategy of just visual inspections or periodical. Otherwise, I don't see how you can do that.

MR. MATTHEWS: Well, we have recommended a baseline volumetric exam or NDE exam, and it could be any current full weighted surface for everybody.

MEMBER WALLIS: Well, if you have done such a wonderful job, I wonder what the staff has to do?

MR. MATTHEWS: Well, they do one and we do one, and then they do one, you know. So we are kind of hand-in-hand if you will, although they have not approved ours, and we don't have any choice on theirs.

MEMBER WALLIS: Well, this is an interesting example, and if you guys did a really fantastic job on this, they wouldn't have to do much would they?

MR. MATTHEWS: Exactly, and if we had done some of this stuff much earlier, or recognized that we needed to do some of this stuff much earlier.

MEMBER WALLIS: If you had done your homework right at the beginning, the professor would not have had to intervene.

MR. MATTHEWS: Some people would say that, yeah.

MEMBER FORD: In the second to last bullet, you say prepared to discuss the contents. Is that discuss with the ACRS?

MR. MATTHEWS: It was with the staff, but certainly whatever we have discussed with the staff at the appropriate time we can come back to the subcommittee.

MR. ROSEN: First the staff and then the ACRS, please.

MR. MATTHEWS: Yes. That is kind of what I was trying to say,

MEMBER FORD: I see that you are saying to have a revised inspection plan by the summer of 2003. And steps to that time line are presumably your boric acid prediction work.

MR. MATTHEWS: That certainly is going to factor into it. I am not sure that it is the -- if we are going to be doing experiments, we probably won't even be through with those experiments in time for that, but I think the main driver here is going to be the calculations on crack growth rate and that sort of thing.

MEMBER FORD: You checked the boric acid corrosion as the one that has given us the biggest pain.

MR. MATTHEWS: Well, it has all been a pain to me. One of the things that you had asked about, or I believe you had asked about, was the status of our inspection demonstration activities. And Tom Alley from Duke is the Chairman of the Inspection Working Group within the Alloy 600 ITG.

And he was going to make the presentation at the subcommittee meeting, but I have got a subset of his slides. What he was going to cover is a little bit of background, and the top of the head visual examination guidance that we issued, although I don't think that wound up in the summary in any detail.

MRP approach to NDE demonstration for these penetrations, and then the process we had in '01 for demonstrating the techniques and the results from that, and then the '02 demonstration process, and then what is planned for the future.

The original 97-01 demonstration, we have had a demonstration program operated by the EPRE NDE center on head penetrations all the way back to the mid-'90s as a result of the Bougeis crack.

At that point in time, everybody was concentrating on ID axial flaws, or ID flaws, and the techniques that were in use were current for the detection of the ID of the tube only, and UT for sizing if something was detected.

And there were programs put together back then to bring the vendors in to qualify them to do -- well, qualify may not be the right word. But to have them come in and demonstrate their techniques for doing those exams.

The OD tube cracking and the weld cracking showed up and we needed to modify those techniques. The visual evidence of leakage on top of the head wound up being vastly different than what people had thought we would see as a result of a through wall flaw.

And so our visual examination recommendation need to be change changed, and the first phase of the MRP demonstrations subsequent to the OD cracking were available to support the fall '01 outages, which was -- how long ago was that? A year-and-a-half ago.

And it was aimed at detecting safety significant flaws in the tube material, and the second phase was put together and performed during the summer of last year to support those fall inspections, and in that demonstration process we had J-groove weld flaws so that vendors could demonstrate techniques for inspecting the J-groove welds, and we had more base metal flaws for evaluation and the capability of depth sizing them than we had originally had in our program.

MEMBER FORD: I seem to remember in the original FEN work that you are talking about in June, that you had probability of detection figures in that. Is that correct?

MR. MATTHEWS: Yes, they were estimates.

MEMBER FORD: Well, so they didn't come out of this study?

MR. MATTHEWS: No, we don't have enough flaws and enough samples to really come up with a rigorous probability of detection, and so those were based on estimates at that point in time.

MEMBER FORD: So they are conservative estimates?

MR. MATTHEWS: I am not even sure. That is part of the other thing that we have got to evaluate. I am not sure how conservative those estimates were. For the visual, I think they were quite conservative.

You know, it is like 60 percent detection of a leak on top of the head, and if you missed it the first time, you are like down to 12 percent the next time. So those were pretty conservative for visual, but then the volumetric, I think that the folks had just pulled some curve from other types of UT data inspections.

MEMBER FORD: So they were not specific to this geometry or necessarily fit --

MR. MATTHEWS: No, I don't think they were at that point in time. One of the other parts of the demonstration program back in '01 was that we had cutoff nozzle segments from the bottom of the Oconee nozzles, which had actually PWSCC flaws in those nozzles.

The original demonstration blocks used these type of flaws, and used these actual flaws, for vendors to demonstrate their capability to detect.

MEMBER WALLIS: This is a real nozzle?

MR. MATTHEWS: Yes.

MEMBER WALLIS: And are those veins or flaws?

MR. MATTHEWS: Yes.

MEMBER WALLIS: If I had anything in my house that looked like that in my piping system, I would get pretty nervous.

MR. MATTHEWS: Well, they cut it off and repaired it, yes.

MEMBER WALLIS: There were things that were very difficult to see, and there were only a few of them, and --

MR. MATTHEWS: Well, you are probably looking at PT bleed out here, and you are probably not looking at a visual of the flaw. This is probably a PT bleed out.

MEMBER WALLIS: Well, it is highlighted by the --

MR. MATTHEWS: Yes, highlighted by dipenetrative tests.

MEMBER WALLIS: It must be.

MR. MATTHEWS: And I am pretty sure, or I am almost positive that the bottom one is.

MEMBER SIEBER: Varicose veins.

MR. MATTHEWS: Yes.

MEMBER WALLIS: And even so, it is riddled with flaws one could say.

MR. MATTHEWS: Well, a lot of these were shallow, although there is one there on the bottom that was certainly ID connected. But these were used to demonstrate the capability to detect the tips on actual PWSCC flaws, and then the mockups were built.

And at that point in time, we were not implanting flaws. We were using notches, and the mockups were more to demonstrate the capability of the tooling to deliver the sound to the geometry.

And the flaws weren't used to demonstrate the capability to detect the flaw. In the 2002 mockups that we put together, we called in a Tiger team of people to come up with let's build a nice mockup for a blind test.

It was going to be blind, and it would demonstrate the sizing capabilities, full-scale, and establish what kind of thresholds that we could and could not see.

We didn't have enough to determine the probability of detection. We just don't have enough flaws and samples. But we were also working to get practice blocks so that the vendors could come in and practice and not just hit them cold with a blind thing that they had never run on a real flaw.

And then we included the effects of the ID crazed cracking that had been seen before, and how that might mask the ability of the detection to see the significant flaw underneath it.

All the demos that had been performed had to fall in characteristics that were blind, and the vendors did not know where the flaws were, and how big they were, and what their orientation was.

The team put together the flaw design, the mockup design, and it has been held pretty close so that the vendors couldn't do it. It was a procedure demonstration though. It was not a test of -- like PDI, where you are qualifying an individual to do it.

It was a procedure demonstration, and so it didn't have acceptance criteria, and it was to show what you could do, and demonstrate what the best techniques were able to do, and measure the limits on what they could detect.

MEMBER WALLIS: What techniques were used? UT?

MR. MATTHEWS: A wide variety; mostly UT and EDY current in various transducer sizes, shapes, angles, beam paths, et cetera.. The demonstration protocol was that a vendor would collect the data on the mockup without knowing what was there, and produce findings.

And then it would be evaluated, versus what we knew was in the mockup, and its ability to detect, and figured out his ability to locate with respect to the pressure boundary in the weld. And sizing results were documented, and false call performance was documented.

And also in the process the evaluation process that the vendor was going to use on the UT or any current data had to be documented in the procedure, and it was captured by the process.

So that then we could go back and make sure that it is the same process that is being used when they are in the field. And then the results of all of those demos have been provided to the utilities as they are going into doing demonstrations or examinations.

This is a complicated examination volume to try and do, and the vendor UT inspection procedures include many techniques in probe combinations. There is an open tube probe that can be used if there is no thermal sleeve or dry shaft in the tube, and you have the whole open ID to put a round probe up in it.

You can mount a good number of transducers and EDY current coils on, and where you have thermal sleeves, the blade probes are used, and many of those are designed to accomplish a specific purpose, like query the OD region for axial flaws, or the OD region for circumferential flaws. They are focused at different bits, et cetera.

MEMBER SIEBER: You can't do the root with the blade type probe though, right?

MR. MATTHEWS: I believe one vendor has demonstrated some capability in that arena.

MEMBER SIEBER: Because that is where the stress concentrations are going to be.

MR. MATTHEWS: The root of the weld?

MEMBER SIEBER: Yes. Well, the root -- you are going down an annulus with a blade, right?

MR. MATTHEWS: No, we are coming up from the bottom with the blade and in contact with the ID of the tube, and looking into the tube.

MEMBER SIEBER: Right.

MEMBER FORD: So when you made up this experimental matrix, what input did you have from the vendors in deciding on that experimental matrix, and was there any lessons learned from the French experience by Framatome?

MR. MATTHEWS: Oh, you mean the matrix of where the flaws would be located?

MEMBER FORD: Well, the matrix of the whole procedure, and how you went through this demonstration process, and the procedure, and the experimental matrix, and what input did the vendors have, and into that input was there any experience gained from that from France?

MR. MATTHEWS: Well, the overall protocol from doing the demonstration, the basic protocol was established even back in the '90s when we did the ID axial flaw demonstration. That it is going to be blind, and you are going to record in your least sensitive mode first.

Like you are going to have two different scan rafters, and one is five and one is three, and you have got to record the five first, and report the results, and then record the three.

Those kinds of processes. I believe that basically the NDE folks at the utilities and at EPRE put that process together for how to demonstrate.

MEMBER FORD: And did it draw on experience from France?

MR. MATTHEWS: I am sure that as the original protocol was put together that there was lots of communication with the French people. The French really have not done a whole lot on UT qualification I don't believe. Theirs has been mostly ID.

But they do a lot of inspections in the process, and those processes were very similar to the process that was used in the U.S. for doing the examinations, and I guess they have never seen any OD axial or OD flaws and that sort of thing.

So I guess I am not sure where you are trying to go with your question.

MEMBER FORD: Well, I just wanted to make sure that -- well, this is a critical area, and I just wanted to make sure that all information available world-wide was being used in both the definition of the experimental matrix that was used for this demonstration.

MR. MATTHEWS: Well, as far as the techniques, the UT probes, and the UT probe angles, and the scan patterns, et cetera, we did not dictate those. Those were developed by the vendors, and it was the vendor procedure and the vendor process that was brought in to demonstrate.

We were more of a demonstration source, and we have a mockup and come show us what you can do. We know what is in there and you don't. Tell us what you can find, and they come in and use their best processes.

And over time their processes have been modified and enhanced to make them better as a result of the initial demonstrations a little later. Some results. The blade probe UT. And the results from the vendors are quite similar from the ones that have done the demonstrations. Flaws ranging from about 15 percent to a hundred percent through wall, and equivalents have detected when the flaws were oriented perpendicular.

MEMBER WALLIS: You mean some flaws, or all flaws?

MR. MATTHEWS: It means that it is almost all flaws, I believe. There were flaws missed, and we have all the detail on every flaw and every mockup, and on every technique, and what the vendors did and how well they did it. This is just kind of a high level --

MEMBER WALLIS: I think the measure of success would be so that, let's say, that 95 percent of the flaws, or 99 percent, or something, were detected. The fact that some were detected doesn't tell us very much.

MR. MATTHEWS: Okay. We have the details.

MEMBER WALLIS: I noticed that it is later on.

MR. MATTHEWS: Yes.

MEMBER WALLIS: First of all, I thought you were detecting only 15 to a hundred percent of the flaws, and that is --

MR. MATTHEWS: No, no, 15 to a hundred

percent through wall, and on the blade probe, you will notice that it is about the same -- whether it is oriented perpendicular to the beam angle, or horizonal to the beam angle, and that is because it is a tip diffraction technique, and the defracted pattern comes back in all directions.

And so it should really -- both patterns were fairly good at detecting these things. The open tube rotating probe is essentially the same kind of capability. It is just tabled to deliver more probes faster because they are all on one mechanism.

MEMBER WALLIS: A flaw and crack are synonymous here?

MR. MATTHEWS: Yes, except that the flaws here were probably squeezed notches and other things that we have worked with the NRC on in demonstration processes.

MEMBER WALLIS: These flaws are typical or are they representative of the real cracks and the real thing?

MR. MATTHEWS: They are not the real thing, but they are mocked up to give very, very similar UT responses by the way they are put together, very tight cracks that are then hip-squeezed and demonstrated that the signals are very similar to the type that you would see from a real flaw.

MEMBER LEITCH: Are false positives an issue with this type of process?

MR. MATTHEWS: Pardon?

MEMBER LEITCH: Are false positives an issue? Do they identify flaws where there are none?

MR. MATTHEWS: Yes, we track that on their demonstration, and that is one of the things that we did, and we would call it a false negative.

MEMBER LEITCH: You would find a flaw that is not there?

MR. MATTHEWS: Exactly and we track that, too, as part of their demonstration process and that is reported, too.

MEMBER LEITCH: Is there a great deal of that?

MR. MATTHEWS: No, I don't think there was a great deal. There was some. There was some, but especially for reporting small flaws that weren't there. I am trying to remember. There is one -- if you look on the next slide -- well, let me finish this one.

The open tube root rotating probe, one of the vendors tried to demonstrate his ability to see beyond the tube OD into the weld, and he could, and that vendor was at least able to demonstrate that for the law flaws that went all the way through to the annulus, to the triple point, and he was able to detect those.

But if they are any significant distance into the weld, and not up next to the tube --

MEMBER POWERS: Well, forgive me, but a triple point to me where they dissolve the liquid and the gas are in equilibrium.

MR. MATTHEWS: It is at the triple point where three different kinds of metal are coming together, and air, and it is the root of the J-groove weld.

The next slide is just an example of the kinds of information that was recorded from each one of the vendors as they went through, and the different techniques are down to the left, and the different flaws are across the top. And then how well they did on each particular one.

MEMBER WALLIS: I think it would help if you said something about the information included the numbers of flaws, or the size distribution, or something, because simply saying that they were detected doesn't tell me whether there were a sample of 4 or 5, or a sample of 400, or what it was.

MR. MATTHEWS: Well, it certainly was not 400. We only had a very few mockups, but each mockup had a great number of flaws.

MEMBER WALLIS: So, what, hundreds of flaws, or --

MR. MATTHEWS: No, it wasn't hundreds. There were probably 10s of flaws in each one, and oriented in each kinds of different --

MEMBER WALLIS: And they were all detected?

MR. MATTHEWS: No.

MEMBER WALLIS: Almost all?

MR. MATTHEWS: Most of them were in the base metal certainly. They were in the weld metal, and UT was not seen into the weld, and so it is not an effective technique for querying the weld metal from the ID of the tube.

MEMBER WALLIS: So again you say that three flaws were missed, and that does not tell me much unless I now that 97 were detected, and if it is 3 out of 3, that is very different from 3 out of 10, or 3 out of a hundred.

MR. MATTHEWS: It would likely be most -- well, where are you looking?

MEMBER WALLIS: It says four flaws less

than 24 percent were totally missed. Now, does that mean that those were all the flaws less than that size, or --

MR. MATTHEWS: It was probably. It might have been all of them. I would have to go and get information on that.

MEMBER WALLIS: Well, that information needs to be represented somehow here.

MR. MATTHEWS: And that information is available as we get ready to do an examination. As far as the weld metal or the weld surface exams, especially in the EDY current arena, you can imagine that the detection is very sensitive to the surface condition.

For welds that were ground smooth, they detected very short flaws and fairly tight flaws, and those were pretty effective in detecting those things. But if you get on to the unground condition, they were able to detect one flaw that was half-an-inch long and they then missed one that was 1.42 inches long.

MEMBER WALLIS: The width is an average width or something?

MR. MATTHEWS: Yes, I think so.

MEMBER WALLIS: I mean, they are not a constant width?

MR. MATTHEWS: No, it is probably an average or a max, but I am not exactly sure how that was reported. I must say that this unground mockup in the demo was -- it was a rough, rough weld. I am not sure there are any in the field that were as rough as that one.

But it was kind of bounding, and if you got a smooth one, they were really good, and if it was really rough, there was the potential of missing some stuff.

MEMBER WALLIS: This is the bigger one, and there was more than one, but they did miss that big one. And it was parallel to the weld beads, and you have got dips in the weld, and it might have lifted off. I am not exactly sure. Or it could have been that their analysis procedure was calling it a bead interface, as opposed to a crack, and it was really a crack.

MEMBER FORD: Are these surfaces normally ground?

MR. MATTHEWS: In some plants they are ground, and in some plants they are as welded.

MEMBER FORD: And corroded.

MR. MATTHEWS: Well, they are all corroded probably, too.

MEMBER FORD: I guess my question is whether this is a pristine surface, which is then ground, or have these surfaces been corroded beforehand?

MR. MATTHEWS: I don't think so. I think the unground samples were probably as welded and cleaned up as you would clean up a weld. I don't think that these have been operated in any kind of environment. They were not field samples actually.

We have future demos going on and planned, and Tecnatom from France, or I guess Spain, I guess it is, is planning to come in this year and demonstrate their capability on the attachment welds.

Framatome was supposed to do a demonstration of ET on the attachment weld this last month, but I think that has been delayed a little bit.

WesDyne is doing or coming back for more demonstrations on UT of the tube weld interface, and ET attachment weld, and they are also looking at a technique for the welds of some sort of thermal imaging.

And I am not sure exactly what that process is, and maybe they are going to flash an infrared scan or something. I am not sure. And Framatome has another process for weld surface areas that they are wanting to look at.

MEMBER SIEBER: Do you know who did the past demos?

MR. MATTHEWS: WesDyne and Framatome had been the two that have come in and demonstrated various parts of their technique for various things.

MEMBER SIEBER: Thank you.

MR. MATTHEWS: B&W Canada also plans to come in this quarter and do some demos. They are being asked to bid on pre-service on some of the heads that they are manufacturing, and they have been asked to demon their capabilities, too.

In the future, we are building new mockups still, and the existing mockups will hopefully be made available to the vendors for practice. We will tell them what is in there and let them practice, and improve their techniques.

We are also looking at what the inspection requirements might be for new heads, and are they different. One of the things that we are looking at is the metal equivalent studies, and does sound behave the same at 690 as 600.

If it does, then the demonstrations that have been done on 600 would be appropriate for 690. If it doesn't, then we may have to go build mockups.

MEMBER WALLIS: How can it be different?

MR. MATTHEWS: Well, it is a different crystal. It is a different alloy, and we are talking how noisy it is. Every type of metal has got a different sonic characteristic.

MEMBER SHACK: Grain sizes change.

MR. MATTHEWS: Yes.

MEMBER WALLIS: I thought the speed of sound in steel was about the same in all steels, but maybe you need to --

MR. MATTHEWS: No, it's not.

MEMBER POWERS: Speed is.

MR. MATTHEWS: Yes, but you have to put that into account, and is it simulated, attenuated, and how much backscatter you get off of grain interface, and that sort of stuff.

MEMBER SIEBER: Sometimes it is swamps out what you are looking for.

MR. MATTHEWS: Yes, like cast dust in stainless steel is very difficult to examine. We are also planning very shortly to put out -- it says requirement, but it would certainly be a recommendation on what pre-service everybody ought to do on their heads before they put new heads into service.

And as a baseline before they go into operation to get ready for future exams, and now what is there. We are also at this point taking a look at the bottom mounted instruments and those nozzles on the bottom head of the vessel.

At this point it is taking a look and seeing what has been done. We know that the French have done some examinations, and we want to figure out what tooling they have, and what the capabilities are that currently exist for looking at those, besides just visual on the bottom.

Lots of people are doing visuals on the bottom head now, but if you had to go in and do a volumetric on it, we want to find out what is out there, and that is something that we are looking at right now.

MEMBER SIEBER: Let me ask a question. When a licensee buys a head, and even if it is 690, you are going to be under the same inspection program because there is no 690 danger or not enough to say that it should be any different than 600.

So do they do anything like electropolishing the clad and so forth so that they can decontaminate the head surface, and have a better interface with the --

MR. MATTHEWS: I know that Oconee is talking about electropolishing the whole clad, or some people are anyway the whole underhead clad surface --

MEMBER SIEBER: That is what I am talking about.

MR. MATTHEWS: -- and that kind of thing. I know that people have done it to their steam generator channel heads.

MEMBER SIEBER: Well, it made a big difference as far as radiation is concerned, and it is not that expensive when it is clean than when it is new.

MR. MATTHEWS: I am not exactly sure. Some people have jumped through hoops to get heads and have gone at a more leisurely pace to replace their heads. So whether the guy is doing in '07 or '08 might be a little different than what Oconee or North Anna is doing.

MEMBER SIEBER: Right.

MR. MATTHEWS: One more slide, and it looks like I might be finished.

MEMBER WALLIS: On the first bullet here, it seems to me that you have done a lot of work, and I am very impressed by all these activities, but I do not see the intellectual backbone that says how much do I need to do, and what does it mean, and how do I interpret it, or is there an analysis that backs it up and all that kind of stuff.

So I am looking for a more academic intellectual backbone of this really good experimentation and investigation of things. I don't know how many of these tests you need, for instance, to reach a conclusion and that sort of thing.

MR. MATTHEWS: And we have expertise at EPRE,a nd we have expert panels that we have called on and Mr. Shack participated in some of the crack growth expert panels.

MEMBER FORD: But, Larry, I understand that in April that you will be getting all this academic background stuff to support these conclusions. That was the understanding, I think, and I look forward to that.

I thank you very much indeed for coming, and look forward to seeing you in April, along with your colleagues. Thank you.

MR. MATTHEWS: I will bring some help next time.

CHAIRMAN BONACA: Thank you very much for the presentation, and at this point we will take a break, and let's get back again at 10 of 4:00.

(Whereupon, at 3:32 p.m., the meeting was recessed and resumed at 3:55 p.m.)

CHAIRMAN BONACA: Okay. We are back in session, and we are going to review the draft final revision-1 to Regulatory Guide 1.180, DG-1119, Guidelines for Evaluating Electromagnetic and Radio-Frequency Interference in Safety-Related Instrumentation and Control Systems.

And Jack Sieber will take us through this presentation.

MEMBER SIEBER: Thank you, Mr. Chairman. I would point out that if you look in your notebooks that it is Tab 5 and is the information that has been made available to us, and represents the foundation, mainly the Oak Ridge reports, and the draft reg guide, that we are going to discuss this afternoon.

If you thought that the last one, which was the environmental qualification for microprocessor-based equipment was difficult, this one is about an order of magnitude or more difficult I think, or in my opinion.

MS. ANTONESCU: I don't think so.

MEMBER SIEBER: It is complicated because you have to go to metal standard.

MS. ANTONESCU: We just have to remind

everybody that this reg guide was already issued in January of 2000, and we are just having some revisions done on it.

MEMBER SIEBER: Yes, I understand that. In fact, at the last subcommittee meeting I could find on this issue was back in 1992, and so everything has been basically done by the paperwork group.

And so without further ado, I think I would introduce to you Christina E. Antonescu, who is from the Research, and in charge of this project. Christina.

MS. ANTONESCU: Good afternoon. My name is Christina Antonescu, and I work in the Engineering Research Applications Branch in the Division of Engineering, within the Office of Research.

And I have worked at the NRC for the last 11 years in the I&C area. And I am here today to present to you DG-1119. Also, I would like to introduce to you some other division members in attendance. Steve Arndt is our I&C section leader, and Mr. M. Soske (phonetic), who is the acting deputy director in the Division of Engineering.

And also two representatives from supporting contractors are here to participate in the presentations. They are Dr. Richard Wood and Dr. Paul

Ewing of Oak Ridge National Lab.

Dr. Wood is the project manager for the IEC projects that we sponsored at Oak Ridge National Lab, and he has his Ph.D. in nuclear engineering from the University of Tennessee and has 20 years of experience with IEC technology.

Dr. Wood is an internationally recognized expert in the application of digital IEC for nuclear power and he is currently contributing to an advisory committee of IEC micro studies providing research recommendations to the Office of Nuclear Energy in the Department of Energy.

And Dr. Paul Ewing is the principal investigator for the MRFI and power search guidance projects, and he has an MS degree in electrical engineering from the University of Tennessee and has over 20 years of experience working with electrokinetic phenomena.

Mr. Ewing is presently the leader of the MRFI microwave system both in Oak Ridge National Laboratory, and some of their activities include characterization of electromagnetic effects, developing robust wireless communications for harsh environments, and developing mobile ad hoc wireless sensors and RF tagging, and tracking systems.

He has served on the IEEE EMC Society, PC-4 committee, and the ANC standards committee. I will present an overview of this draft guide, and Dr. Wood will describe the technical basis supporting this guide.

And we do appreciate the opportunity to appear before you today, and we look forward to receiving the benefit of your insights, and if there are no questions, we would like to proceed with the presentation.

And before then, I would like to remind you that this draft guide describes an acceptable method for electromagnetic compatibility at nuclear power plants, and it was released for public comment on November 8th, 2002 and received four submissions from the public.

After interaction among the staff, the technical support contractor, and industry stakeholder, and the draft was revised to reflect resolution of the public comments.

So our purpose here today is to present you the guidance contained within DG-1119, and that is updating Reg Guide 1.180; and to request a letter from the committee endorsing publication of the final guide.

And also I would like to mention that the NRC and industry stakeholders have interacted on this IEC guidance, and at the close of the public meeting period, the NRC staff and the NRC contractors briefed the EPRI working group on this guidance.

So the outline of our presentation, again I am going to provide you with an overview of DG-1119, followed by the technical basis for electromagnetic capability, and a presentation by Mr. Richard Wood; and a third part summarizing the value and the benefits of DG-1119.

So what is DG-1119? It describes the design installation and implementation practices to evaluate and minimize the impact of EM/RFI, and power surges on I&C systems.

And the scope covers analog, digital,a nd hybrid equipment, and in all locations within the plant. It addresses emissions, susceptibility, and surge withstand testing, and describes grounding and shielding practices.

MEMBER WALLIS: So compatibility means it is robust when subjected to these surges or radio frequencies, and that is what compatibility means?

DR. WOOD: It also means that it does not adversely --

MEMBER WALLIS: There is no loss of function or bogus signal release, or anything like that?

MS. ANTONESCU: Yes.

MEMBER SIEBER: And it is also not fitted to microprocessor face.

MS. ANTONESCU: For all equipment.

MEMBER SIEBER: Yes, digital and analog on IEC, because the other electrical equipment is not covered under this.

MS. ANTONESCU: That's right.

DR. WOOD: That's right.

MEMBER WALLIS: When you say EMI/RFI, does that mean EM and RF, or is RF a subgroup of EM, or RF is a subgroup of EM, or what?

DR. WOOD: RF is a subset of EM.

MEMBER WALLIS: So you mean all EM really.

DR. WOOD: Yes.

MEMBER KRESS: Is there a lot of sources of EM in a power plant?

MEMBER SIEBER: Yes, there is.

MS. ANTONESCU: Yes, there are.

MEMBER WALLIS: People walking about are sources.

DR. WOOD: There is detailed communication devices, and there is --

MEMBER KRESS: And there is just EM in --

DR. WOOD: Right.

MEMBER KRESS: And t.v. stations and stuff.

DR. WOOD: And lighting in the area.

MEMBER SIEBER: But the more important thing is the opening and closing of breakers.

MS. ANTONESCU: Right. Switching.

MEMBER SIEBER: Because that gets reflected through the system, the power supply system, and if it is at least digital equipment, it can really reek some havoc if it is not taken into account in the design.

MEMBER LEITCH: Welding machines can also be a source, a transient source as well. I mean, it is here today and gone tomorrow, and it is sometimes hard to figure out exactly what occurred.

MEMBER RANSOM: I assume these do not include electromagnetic pulses, like from nuclear weapons, or that science?

DR. WOOD: That is not specifically accommodated within or was not a specific target within the guidance, although some of the effects that might result from an EMP, such as the surges that would occur, could be addressed through the surge withstand testing. It is a question of level.

MS. ANTONESCU: Very high EMP.

MEMBER LEITCH: And what about solar flares?

DR. WOOD: We did not specifically cover solar flares. We did not go through and try to write the guidance to address individual sources of emissions or the potential interference, but the phenomena would be addressed, the eradicated susceptibility or if you conducted susceptibility or surge withstand.

MEMBER SHACK: Is there corresponding industry guidance, EPRI?

MS. ANTONESCU: There is (inaudible) that was endorsed from an FTR by NRR.

MEMBER SHACK: Sot he reg guide then is an alternate to that, or --

MS. ANTONESCU: It is an acceptable method, just like ESE. Also the draft guide applies for new safety related IEC equipment, either existing or in future nuclear power plants, and applies to voluntary modified systems and existing power plants.

Also, DG-1119 endorses the testing guidance in IEC 6100, and the technical basis is well documented in the enhanced basis, which is the updated NEUREG CRs 5609, which covers signal lines, and 6782, which shows the comparison between the military standard and IEC 6100.

MEMBER WALLIS: Excuse me, but this also covers electrostatics, or a buildup of sparks resulting?

DR. WOOD: No.

MEMBER WALLIS: It doesn't cover that? A spark is a source of EMR. A spark would be, but just the electrostatic itself is not covered?

DR. WOOD: Right. The specific electrostatic event is not covered. Any secondary effects would be covered.

MEMBER SIEBER: In our references, NEUREG CR XXXX is 6782.

MS. ANTONESCU: Right. And existing guidance that that provide already given technical basis in the past are three NUREG CRs, 5941, which is an earlier version of the technical basis endorsing IEEE 1050, and also Military Standard 641C and D, which are earlier versions.

And 6431, which is endorsing the operating envelopes and 6436, are documenting the plan data there that we took.

MEMBER WALLIS: I'm sorry, but minimizing the impact doesn't mean anything to me. Do you mean to make the impact tolerable, or allowable, or prevent the --

DR. WOOD: You cannot absolutely guarantee that there will never be an event that can occur.

MEMBER WALLIS: But presumably this level of minimization has to be calibrated against the kind of events that you expect or something?

DR. WOOD: Exactly. And that was the purpose of the measurements.

MS. ANTONESCU: To validate.

MEMBER WALLIS: So there must be some sort of standard event here protecting against, and not above that, is that what it is?

DR. WOOD: There are certain levels that you have to demonstrate the robustness of your equipment. If events occur above those levels, then you don't have any evidence that your equipment won't have enough --

MEMBER WALLIS: What you mean by minimize impact means no detectable effects on performance?

DR. WOOD: There is reasonable assurance that upsets will not occur.

MEMBER WALLIS: And will not affect the

performance?

DR. WOOD: That's right.

MEMBER SIEBER: Now --

DR. WOOD: We can't give an absolute guarantee.

MEMBER SIEBER: -- existing equipment is not affected by this Reg Guide.

MS. ANTONESCU: It is not --

MEMBER SIEBER: And it seems to me that EMI/RFI tolerance in existing equipment is sort of trial by test more or less, and each item was licensed on an individual basis, and that is why in the older power plants there is a lot of restrictions on whether you can use cell phones, and walkie-talkies, and things like that.

MS. ANTONESCU: Right.

MEMBER SIEBER: And I also take it that it is not acceptable to attack the problem of spikes and surges on the power system by conditioning the power system, and you really want the instrument itself conditioned for surge withstand and so forth. There is two ways to look at the problem.

DR. WOOD: Actually, there is a lot of benefit to power quality control.

MEMBER SIEBER: Absolutely. It is

cheaper.

DR. WOOD: Exactly. This Reg Guide does not address that, though when we talk about the technical positions, I will mention how you can take credit for your power --

MEMBER SIEBER: Oh, you can? Okay. Thank you.

MS. ANTONESCU: So what is our motivation for DG-1119? The purpose of it is to update Reg Guide 1.180, and to respond to a user need and also to endorse the test methods from most recent military standards, like 461E.

And also comparable EMC standards that are available in IEC 61000. And also to address those issues that were not covered by previous guidance, and specifically conducted susceptibility for signal lines, and susceptibility in emission testing for frequency ranges above 1 gigahertz.

And also to provide some relief concerning operating envelopes as warranted by enhanced technical basis.

MEMBER LEITCH: Just so that I understand, what is the age of Reg Guide 1.180? In other words, is this 20 years old?

MS. ANTONESCU: It was released in the

year 2000.

MEMBER LEITCH: So that is quite new.

MS. ANTONESCU: Yes, January of 2000.

MEMBER LEITCH: Okay. So it is quite new and we are revising it based on these criteria.

MS. ANTONESCU: Yes, it was pre-existing, and it was accepted.

MEMBER LEITCH: So it is not reflecting digital instrumentation particularly. In other words, that must have been already included in he IEC 61000.

MS. ANTONESCU: Yes.

MEMBER LEITCH: Okay. Very good. So I understand.

MEMBER WALLIS: So what triggered the new for revision?

MS. ANTONESCU: That is what we will be showing in our presentation.

MEMBER WALLIS: Okay.

MS. ANTONESCU: And these were some of them that I responded to; updates in military standards, and which is in 461E, and that is the latest revision.

And we wanted to provide an alternate testing practice and we included IEC 61000, and also some additional issues that were not included in the previous revision of 1.180, and we are covering now susceptibility for signal lines, and also we are trying to cover susceptibility in emission testing for frequency ranges above 1 gigahertz, because of the use of cells phones and wireless communications.

And also we are trying to relax some of the test limits. So we received four sets of comments, and --

MEMBER KRESS: We are always interested in who you receive comments from, and are these all just from industry reps?

MS. ANTONESCU: There were four sets, and one of them was from I believe Jim Shank, and ES&G, and EPRI, and TVA, and STARS. And we grouped the public comments into general categories that you see listed here; in operating envelopes, and testing 1 gigahertz, and providing surge testing for signal lines, and some relation with previous guidance, the ones that you just mentioned, EPRI's 1022 and 1023; and test methods and exemptions.

So Rev-1 of DG-1119 reflects the resolution of these comments. And now Mr. Wood will provide you with the technical basis for electromagnetic compatibility guidance.

MEMBER KRESS: Just one question on your

last bullet.

MS. ANTONESCU: Yes.

MEMBER KRESS: Do you always feel constrained to -- well, is the resolution of a comment, is it an acceptable resolution to say that that we don't agree with you?

MS. ANTONESCU: Yes.

MEMBER KRESS: So you don't have to do something with the comments?

MS. ANTONESCU: Well, we like to --

MEMBER KRESS: And explain maybe why you don't agree?

MR. ROSEN: At a minimum, you have to say why.

MS. ANTONESCU: We explain why.

DR. WOOD: Frequently what you will see is either them interpreting it in a way that we didn't intend them to interpret it, which frequently results in adding clarifying language, or saying use it this way and don't use it this way, as opposed to simply saying use it this way.

But sometimes you are right. They will have a technical issue that we just don't agree with, and then we will say --

MS. ANTONESCU: But we will provide an

explanation.

MR. ROSEN: But why we don't agree with it and cite either our technical basis in the NEUREGs or specific data, or whatever.

DR. WOOD: I will try to mention some examples.

MS. ANTONESCU: And for this presentation, Dr. Wood is going to let you know what changes were done. Some of the positions were not changed from the previous revision.

DR. WOOD: So I will begin by giving just a quick overview of electromagnetic compatibility and then track that a little bit with environmental qualifications, which we talked about last month.

Electromagnetic compatibility is establishing the compatibility of your equipment with the environment, and making it able to accommodate the environment, and minimizing its effect on the environment.

So you have design and implementation approaches that are intended as minimization practices to enhance the immunity of your equipment, and also minimize its effect.

And then you have emissions testing which are intended to control the environment so that you don't inadvertently create adverse conditions. And then you have two kinds of basically susceptibility testing.

There is EMI susceptibility testing, and then there is surge withstand capability susceptibility testing, and those are intended to ensure the robustness of your equipment, and its ability to withstand the expected environment in which it will be implemented.

And that is sort of the element of EMC that that is equivalent to qualification, and that's why that was mentioned in DG-1077 last month and this guide was referenced.

But has a larger scope and qualification. The guidance that is in DG-1119 deals with analog, digital and hybrid versus simply microprocessor-based as in the case of last month, and it applies for the entire plant and does not make a distinction between harsh and mild environments, and try to separate the guidance into those kinds of categories.

The basis for DG-1119 and the basis for Reg Guide 1.180 are the U.S. industrial experiences, and that was used to adopt and enhance a systematic approach to EMC.

And then it also in DG-1119 also offers an international standard option that can be employed to increase the flexibility of the guidance. It endorses commercial standards for design and installation practices, and the IEEE standard 1050.

And it endorses well-established testing standards; IEEE standards, and IEC standards, and the latest version of the MIL standards.

MEMBER WALLIS: MIL standards that did not exist at the time of the previous reg guide?

DR. WOOD: The IEC standards had just been released in a complete form, and so there had not been time to review them and evaluate them, and the purpose for getting Reg Guide 1.180 out on the street is that it contained some benefits, although what was in EPRI's 1023.23, and there was some motivation to have that alternative out on the street, and then revise it and add the IEC standards at a later date.

MEMBER SIEBER: Question. The electrotechnical standard is obviously different than the U.S. standards. How do you reconcile the differences? One has to be in some respects easier than the other.

And so if you adopt -- let's say, for example, that the U.S. standard, if you adopt that and it is tougher than the electrotechnical standard, have you taken steps to allow flexibility in the use of the more difficult standard to relax the requirements?

DR. WOOD: That's why it has been a 3 year period before we submitted this revision, because we went to great pains to try to identify what are the differences, and is there just a general value judgment that you can make that IEC might be easier or more severe than MIL standards.

And you can't make an across the board type of assessment like that. And what we did is that we tried to -- we did some conformity research, where we developed a (inaudible) artifact and tried to demonstrate that you got comparable results given the differences in the test methods.

And we looked at what the test limits were for the MIL standard and tried to identify comparable test limits on a sound technical basis for the IEC.

MEMBER SIEBER: And I talk it that it is the test methods is where the differences occur for the most part?

DR. WOOD: Yes, and it is not in every case. There are a few cases where there are some significant differences in the way that the tests are implemented, and in many cases the tests are varied somewhat.

MS. ANTONESCU: And this comparison is shown in your Reg Guide CR 6782.

MEMBER SIEBER: Okay.

DR. WOOD: So the other thing that this guide has, which also Reg Guide 1.180 had, were tailored test limits or we call them operating envelopes, that are adjusted to reflect what you might expect to see in a nuclear power plant.

There were some modifications in this version of the guide and I will talk about the changes that were made. And then there were also some exemptions of some of the tests, depending on certain conditions, technical conditions that might be met.

These are the major differences between DG-1119 and Reg Guide 1.180. There is enough data for the endorsement of the no-standard test methods so that it endorses the current version of the MIL standard, the E version as Ms. Antonescu mentioned.

It provides the alternate testing options using the IEC 6100 test method. Another thing that it provides and makes more explicit is that it was possible under the previous guidance, but not explicitly identified, is that there are certain conditions under which the FCC will assist for certification for emissions and satisfy the requirements.

And then one thing that it clearly adds, although Reg Guide 1.180, is the signal line conducted susceptibility test methods, and also extending the frequency range for radiated emissions and susceptibility testing above 1 gigahertz.

MEMBER WALLIS: Up to what?

DR. WOOD: For susceptibility up to 10 gigahertz for --

MEMBER WALLIS: So a big change?

DR. WOOD: A big change.

MEMBER WALLIS: Why is this? Is it because this is a range that you are expecting it in a power plant?

DR. WOOD: Because of cells phones.

MEMBER WALLIS: Okay.

MEMBER SIEBER: Or any kind of portable. The frequencies keep going up, and up, and up.

DR. WOOD: Yes. And then there is some enhanced guidance on the surge withstand capability operating envelopes, and that I will describe in a little more detail.

Now, why did we need to address these two additional issues; the signal line conductive susceptibility test methods, is because the MIL standard at the time that the technical basis was developed for Reg Guide 1.180 did not address signal line susceptibility.

MS. ANTONESCU: The earlier revisions of the MIL did.

DR. WOOD: So it is these updated versions that now address signal line susceptibility, and then the technical need for EMI or EMC above one gigahertz is increased in these recent years.

So what I will do is step through the various positions, and tell you whether or not there was a change between Reg Guide 1.180 and DG-1119, and then tell you what kind of comments were received on that position, and what was the resolution.

And by position what we mean are the conditions, clarifications, or exceptions that are applied to establishing an electromagnetic compatibility program.

And position one basically is unchanged from Reg Guide 1.180, and it identifies what could be characterized as a road map for electromagnetic compatibility. But the changes that did occur were just updating that road map to include the new guidance.

There were very few public comments and

they mostly related to editorial changes. Position 2 deals with the design and installation practices that are covered in IEEE Standard 1150-1996, and there were no changes between Reg Guide 1.180 and DG-1119, and thee were no public comments.

The one thing that I will note is that there is one exception taken to the guidance that is in IEEE 1050, and that exception has been submitted to the IEEE committee that is considering the revision of that standard, so that perhaps could be addressed.

During the development of Reg Guide 1.180, there were four exceptions. The 1996 version which occurred addressed three of those exceptions, and the fourth one still remains and we are hoping that that will be addressed in the pending revision of the standard.

MEMBER KRESS: And the continuation of (inaudible) --

DR. EWING: It actually varies and if you have a magnetic field, a magnetic field source, and you are very close to it, it falls off as 1 over R-cubed, and if you have an electric field source, and you are very close to it, it falls off as 1 over R-squared.

But in the far field, the magnetic field and the electric fields both fall off at 1 over R. And then in the standard it did not make that that clear, and so we actually took exception to it.

DR. WOOD: And Position 3 changed considerably from Reg Guide 1.180 to DG-1119, mainly because of the addition of the alternate test options that were included in it.

The things that changed were the option for the IEC test, and also the option for making use of the FCC Part 15 Class A certification. So those were intended to add more flexibility in the implementation of the guidance.

The left-hand side, which shows the MIL standard and with the box with four test methods, that is the baseline method. It is identical to the previous version of the guide.

The only difference, or the only significant difference is that it updates the reference standard from the previous versions of the MIL standard to the E-version.

And also these exemptions that you see at the bottom. You can exempt the CE101 test if power quality is employed, power quality control, and you can exempt the RE101 test if your equipment is not going to be installed in the proximity of a magnetic field emitters.

The options. We looked to see if there could be an equivalent set that could be just generally applied from the IEC. Unfortunately, they don't have test methods that correspond to the low frequency tests that the MIL standard has.

So these options are only applicable if the exemptions apply. So if the exemptions apply, then you can either perform a reduced set of tests from the MIL standard, which eliminates two test methods, and also reduces the frequency ring coverage of CE102, because you can exempt the low frequency portion of it.

Or you can do the IEC61000-6-4, which is essentially the CISPR 11 Class A emissions test; or you can use the FCC Part 15 Class A certification. So there is a great deal of flexibility if the exemptions apply.

And those exemptions are identical to the exemptions that existed in Reg Guide 1.180. The public comments that were received, many of them on this position dealt with the operating envelopes for the emissions tests, and they were basically a carry over from the previous set of public comments on what became Reg Guide 1.180, and there still was not a technical basis for changing those emissions envelopes, but we did try to clarify those envelopes.

And then in the IEC limits, there were some comments about those because there was an impression that we were developing customized limits for IEC, which is not typically the way that the IEC test methods and criteria are applied, when in fact we were actually endorsing standard test limits out of the IEC that were comparable to the limits that were tailored for nuclear power plants for the MIL standard.

And so we clarified the designation of those limits, and so it was clear that those are standard test levels from the IEC. The major changes that we made from the version that went out for public comment to the version that you see before me, is that this figure was added to try to clarify what is equivalent, and when you can use those alternate options.

Position 4 deals with the EMI/RFI susceptibility tests from the MIL standard and the IEC, and it presents the associated operating envelopes.

And it also changed from Reg Guide 1.180 to DG-1119. It is more comprehensive, in that it addresses signal line susceptibility, and it has got some added flexibility, and that it has the option, the alternative, of the IEC test methods, and also there are some enhanced operating envelopes that resulted from the public comments.

MEMBER WALLIS: Can you assure us that the alternative method measures just as well what you want to measure as the baseline method?

DR. WOOD: We feel that there is a strong technical basis that says that.

MEMBER WALLIS: It is essentially equivalent?

DR. WOOD: It is essentially equivalent, and you won't get exactly the same. But it is not a general, across the board, one is stronger than the other.

What existed in this and Reg Guide 1.180 are the two tests under the power line, or the baseline set under MIL standard on the left-hand side, and the two tests under the radiated box.

Those methods are unchanged, and what has changed is the reference standard has been updated to a new version of the MIL standard, and the other change that was made is that the operating envelope for CS114 was relaxed because we were able to develop a technical basis that would justify that.

So it is less restrictive. What has been added are the signal line test methods which were not in Reg Guide 1.180, and then the alternate IEC option, and there is no restriction on which of the two options you use. You just pick one and use all IEC, or pick the other and use all MIL standard.

You have a mix between the two, because this is a consistent phenomena that depends on the complimentary nature of the different sets of tests within it.

MEMBER KRESS: Things that are bold are things that were existing before? What is the difference between bold and not bold?

DR. EWING: That is just an artifact of --

DR. WOOD: This is part of the figure. That is an understandable inference. Maybe it is an EMI effect. I don't know. Okay. The public comments dealt with three technical areas.

One was the necessity of certain test methods, and one was a repeat from the comments on what became Reg Guide 1.180, and one was a new one dealing with the IEC. But there were technical reasons for having those tests there, and those are covered in the response to public comments.

Other questions dealt with the operating envelopes, and we received a set of comments that said the test limits that were being identified for signal lines were too lax in certain situations.

And upon reflection, we agreed with that, and we updated those operating envelopes so that there was a general limit that is applied under conditions where you have got signal lines that are interior and short runs, and then there is another set of operating envelopes that you apply if your signal lines are of great length or connected to external power lines, or your system is connected to an external power source.

All of the triggers are covered in the language of the guidance. The other question still has to do with CS114, wanting some further relaxation, and then also there were questions about the IEC limits.

Again, this issue of customized versus standardized limits, and so we clarified the designation of the limits to make it clear that they were the standard IEC limits.

And then there was the question on whether or not surge testing was necessary on signal lines, and what we did is that we looked at the technical basis and found phenomena where a surge could be induced on a signal line even if it is not a long signal line that you can buy a strong emitter, like switch gear or something like that.

But the operating envelopes are basically half of what the operating envelopes are for power lines. The changes that we made in response to public comments is that we added this figure to try to illustrate what are the two alternate fits, and then we enhanced the signal line limits to address the comments that under certain conditions they might be too lax.

Position 5 deals with surge withstand capability testing, and it also has changed in the transition from 1.180 to DG-1119, and it has added flexibility through the addition of the IEC test option, and also enhanced operating envelopes.

Previously in Reg Guide 1.180, we had tried to develop operating envelopes that would cover the vast majority of situations in the nuclear power plant, and what we have done now is relaxed that envelope for most locations, but there is a slightly stronger envelope for locations in medium surge exposure areas.

And the standard has a definition of what constitutes those kind of exposure areas. The IEEE standards, the IEC C62.41 ring wave or combination wave, and EFT, are the baseline case, and they are identical to what was in Reg Guide 1.180.

What are added are the IEC options, and the test methods are identical to the IEEE test methods. The public comments dealt with the surge operating envelopes, and it was pointed out that in relaxing the envelope we had failed to cover some of the few locations where there is a high surge activity or medium surge activity.

And so we added the discriminate, and I will show it on the next side what the difference is. And then there was a question about the necessity of one of the wave forms, and that was a repeat from comments that had been received from what became 1.180.

The change that was made in response to the public comments were enhanced operating envelopes for surge, and if we look at the next view graph, what went out for public comment was basically two kilovolts as your operating envelope.

And because of the comments noting that there are some locations in some situations where that is not likely to be sufficient, and we had discussed that with our colleagues in NRR, and had intended to make that change anyway after the public comment period, but we were heartened that our commenters also made that point, and weren't just as would be human nature to expect asking for relief.

Here in this case, and in the case that I mentioned about signal line limits, they were pointing out that there needs to be strengthened guidance. So in cases where there is a medium exposure, then 4 kilovolts would apply.

And then in any I&C system that is placed out in the switch yard or an external area, then 6 kilovolts would apply. And the definitions of those exposure levels are in the standard.

MEMBER LEITCH: How does the standard deal with what I would call transient situations? In other words, the upgrading envelope in a normal situation is one thing, but particularly of portable welding equipment, and like a welder comes and fires up his welding machine and goes to work, is that just prohibited?

DR. WOOD: In Position 1, not getting into the details on that view graph, but there is a formula that can be applied to determine an exclusion zone around safety related equipment that would guide so that there would be administrative controls about where the welder could be located and under what conditions.

MEMBER LEITCH: So the I&C equipment is not hardened against that, and the solution to that problem is an administrative control.

DR. WOOD: It is hard enough to assert a level, and that is what the exclusion zone is intended to maintain, that you don't exceed that level by putting your portable source too close to it.

MEMBER LEITCH: Okay. Thanks.

MEMBER WALLIS: The six kilovolts is what, a peak or something?

DR. WOOD: Yes, that is the peak.

MEMBER WALLIS: And it says nothing about the length of the pulse or anything?

DR. EWING: It varies with the ring wave and the combination wave, and the EFTs. All of them have different pulse shapes.

DR. WOOD: The pulse shape is included in the guide as part of the standard.

MEMBER WALLIS: My sheep fence has six kilovolts, and if I put my sheep fence selector on here is it going to damage something?

DR. WOOD: For those categories, the combination wave form is intended to represent direct lighting discharges, or --

MEMBER WALLIS: Well, that is a much bigger energy than my sheep fence.

DR. WOOD: Right. Exactly. So the change in response to public comments was that enhanced guidance was given for the operating envelope. Position 6 is a position that didn't exist in Reg Guide 1.180 and that is intended to account for electromagnetic compatibility in the frequency range above one gigahertz.

So it is a new element that is intended to address new technologies that are being introduced into the plant. The emissions tests is applicable above one gigahertz, for up to 10 times the highest intentionally generated frequency within the equipment under test.

It is not intended to test intentional transmitters. It is intended to test things like high frequency digital devices that might have a very fast clock speed and emit about one gigahertz.

I should note that in the survey of the events of Y2K a lot of embedded microprocessors were discovered, and those potentially could become sources of emissions.

MEMBER KRESS: You don't have to answer

this unless you want to, but our wanting to impart damage to a plant by a saboteur, would this be a good way to do it, with artificial EMI sources?

DR. WOOD: Yes, let's just not answer that.

MEMBER SIEBER: It is hard to set up.

DR. EWING: It is actually hard to do. It depends on what side of the main transformer you are on.

MEMBER SIEBER: You can't send it in.

DR. EWING: Right. It is actually harder sending it in because the level on the pulse itself will also drop with the voltage levels.

MEMBER KRESS: Are you guys thinking about that when you are in this program?

MS. ANTONESCU: We started this program a long time ago, and that was not --

DR. WOOD: EMP at the time or during the primary technical phase of the project was excluded as a research focus, because it was primarily related to certain devices. But as a secondary effect to things like lighting strikes, those kinds of things are addressed.

MEMBER SIEBER: This is sort of a general question, and I don't recall exactly who all the commenters were, but did I&C companies comment?

MS. ANTONESCU: There were four commenters.

DR. WOOD: There weren't any comments from any system suppliers.

MEMBER SIEBER: I would think that those would be the folks that would comment, because they have to meet the standard unless they sell you anything, and force you to meet the standard by exception.

And if that is the case, that is not a real good deal from an equipment procurement standpoint.

DR. WOOD: They just did not reply whether that was -- whether they were comfortable with what was in it, or whether that was because --

MEMBER SIEBER: Maybe they don't read the Federal Register.

DR. WOOD: That may be. But we have on other guidance received things from the system suppliers, and so at least in some cases they read it.

MEMBER WALLIS: Do they explicitly have to meet these standards or does it require a lot of redesign?

DR. WOOD: You don't have to redesign

anything because they don't apply to existing systems.

MEMBER WALLIS: No, but I mean if I were t now get some new system like the existing system, would it have to be substantially redesigned to meet these standards, or is this essentially describing essentially what is already there?

DR. WOOD: There might be some -- if you were to try to purchase some of a Legacy system, there might have to be some modifications in the implementation to enhance its immunity.

But model systems might already be designed for this kind of environment.

MEMBER WALLIS: Well, that doesn't tell me anything.

DR. WOOD: I know. I can't give you any antidotal evidence of difficulty. I know that when I visited Korea and talked with Ken and also talked with Cary, we had a great deal of interaction on EMC, and they have shared with me some of their experiences.

They have had to make some modifications to certain systems, and mainly their own signal lines to pass some of the tests. But I don't have any antidotes about systems that went in and passed every test and never had to have a change made.

That doesn't mean that it doesn't exist, but it just means that I am not aware of it, but this is also relatively new.

MEMBER SIEBER: Well, you test based on a systems approach, as opposed to a component?

DR. WOOD: Yes. You are essentially testing a card, and you are not taking into account the shielding that might be provided.

MEMBER SIEBER: By the case, or you may substitute shielded cable.

DR. WOOD: Exactly. And there are commercial systems that can satisfy the MIL standard. So it is not like it is an impossible feat. The other thing is susceptibility testing, and that has to do mainly with high frequency communications protecting against those.

The public comments, the only substantial public comment had to do with -- and what was issued had only susceptibility testing, and they noted that there should be some testing for emissions because of the higher speed digital devices.

So that was the change that was made after th response to public comments, is emissions testing guidance was added. And then finally Position 7, which deals with documentation. There was no change.

MEMBER WALLIS: I really am intrigued what administrative emissions are. Are those the things that come from John Larkin?

DR. WOOD: No, administrative emission control, which would be the enforcement of the exclusion zones for portable sources and things like that.

MEMBER SIEBER: That's why you never find a cigarette butt inside containment.

DR. WOOD: That's right. And now we will return to Ms. Antonescu and she can describe to you some of the benefits and the value of DG-1119.

MS. ANTONESCU: To summarize what we believe the benefits of DG-1119 are is that it provides a comprehensive guidance on acceptable methods for electromagnetic compatibility of safety-related I&C systems.

And it provides endorsement of current national and international EMC standards, and Military Standard 461E, and IEC61000. It gives some specific guidance to address previously unresolved issues, such as the issue on susceptibility for signal lines, and emission susceptibility testing above 1 gigahertz.

It provides some additional relaxation if test criteria in Reg Guide 1.180, where technically justified, like in operating envelopes and finally under some conditions licensees can take credit for FCC or CISPR emissions certification.

What did we do about the public comments? We addressed them in the revised draft reg guide DG-1119, and specifically the IEC test limits were being endorsed. The illustration of alternate test options were added.

We added some figures to improve the clarity, the ones that you saw that were presented under Positions 3 and 4. We enhanced the operating envelope guidance for surge to address additional location environments, and we addressed emissions testing above 1 gigahertz for addressing high frequency for digital equipment.

And in conclusion we believe that the revision of 1.180 will contribute to achieving NRC goals, and for maintaining safety by providing an enhanced approach for establishing electromagnetic compatibility for safety-related I&C systems in nuclear power plants.

And reducing regulatory burden by providing alternate testing suites and relaxing selected test criteria where technically justified; and for improving regulatory effectiveness. We made the guidance more comprehensive by addressing the issues on signal lines and the emission testing above one gigahertz.

CHAIRMAN BONACA: And did NRR review this document?

MS. ANTONESCU: NRR has reviewed it.

CHAIRMAN BONACA: And do they agree with the recommendations?

MS. ANTONESCU: They have.

DR. WOOD: They also attended the EPRI/EMR working group meeting.

MS. ANTONESCU: Last December of 2002.

CHAIRMAN BONACA: Okay.

MEMBER WALLIS: Did you show them the portion of the document that we have to look at?

DR. WOOD: No.

MEMBER WALLIS: There are pages that are completely garbled.

MEMBER SIEBER: It goes and up and down, and around.

MEMBER WALLIS: And figures are missing.

MS. ANTONESCU: I sent them an electronic version and so I am not sure what happened.

MEMBER SIEBER: And that is what we got.

MEMBER WALLIS: I think it was subject to some sort of EMI.

DR. WOOD: We don't have a guide on printer drivers yet. If you would like to put that in your letter.

MEMBER SIEBER: This, I presume, was a figure?

MS. ANTONESCU: Yes.

MEMBER SIEBER: I would sort of like to understand better what the process is for this and what in the NRC is research that does the reg guide updates and revisions. Research usually doesn't do anything unless it has a user need. Is that correct?

MS. ANTONESCU: No, in some cases we can do --

MEMBER SIEBER: So who decides, well, I think we ought to update this reg guide? Is that Research or NRR?

MS. ARNDT: The process is the following in general. As industry standards get revised, or if there is a new technical issue, and in this case above 1 gigahertz, or any other things, the idea is to maintain our regulatory guidance up to date with the current regulatory standards.

We actually have a directive from the President to try and do that whenever possible. So as things change, a decision gets made usually by the program office that updated guidance is necessary, and then they will put forth a user need.

There can of course be a lot of consultation, and hey, this has been changed twice and isn't it time to renew it and those kinds of things. Or if through operational experience, say LERs or some major event or something, it becomes obvious that the guidance is not current based on some new experience that we found or some new emerging technology or something, that can also trigger an update.

And in this case, as was mentioned, there was new guidance that was provided, as well as a new technical issue. We had a user need and we did the research to support the technical position.

We evaluated the changes in the guidance things, and we wrote it and we put it forward.

MEMBER SIEBER: And it is Research that does this for reg guides I take it?

MR. ARNDT: For reg guides, it is research's responsibility that if you are going to change a CFR, the actual CFR, it is NRR's responsibility. But we work together on both of them.

MEMBER SIEBER: And either by yourself or with the contractor develop a draft guide which you send out for public comment?

MR. ARNDT: Right, but we send out for public comments.

MEMBER SIEBER: And you get the comments back and you prepare a document that resolves those comments, which sooner or later becomes a public document.

MS. ANTONESCU: Right.

MR. ARNDT: It becomes the effective guidance when it gets published in the --

MEMBER SIEBER: So when you publish it, the resolution, the comments go with it?

MR. ARNDT: Right

MEMBER SIEBER: And on the other hand the implementer, that goes into the standard review plan typically?

MS. ANTONESCU: Right.

MR. ARNDT: Right.

MEMBER SIEBER: Or it can be called out by licensees and applications and so forth, and whether it is being properly used or not is NRR?

MR. ARNDT: Correct.

MEMBER SIEBER: Somehow or another there has got to be an agreement?

MR. ARNDT: Right.

MEMBER SIEBER: And how does that happen?

Do you have a memorandum of understanding or --

MS. ANTONESCU: We send a package to NRR.

MEMBER SIEBER: And could they turn around and say don't issue it?

MR. ARNDT: yes, and they frequently say we are uncomfortable with the issue, and then we have to sit down and have a discussion, either at the staff or management level.

MEMBER SIEBER: Okay. So you can work it out if that occurs?

MR. ARNDT: That is the idea, yes.

MS. ANTONESCU: In this case, the NRR has already approved the Reg Guide 1.180.

MEMBER SIEBER: And so you are hoping that they will approve this?

MS. ANTONESCU: They have already reviewed it already, and they agreed with the changes.

DR. WOOD: We don't come to you until our counterparts in NRR have given some kind of an agreement.

MEMBER SIEBER: Well, the question --

MS. ANTONESCU: And in this case we are providing more flexibility by providing alternate options for test methods presented in IEC standard and international standards, and updated revisions of existing current standards.

MEMBER SIEBER: How do you deal with comments that are internal to the staff? For example, you may have a staff person that says that I don't really care too much for this, and I would like to comment. Do you treat it and process it like you would a public comment?

MR. ARNDT: It depends on when it comes in the process, and what the comment is, and how contentious it is.

MEMBER SIEBER: Well, it could end up as a EPV.

MR. ARNDT: Well, there is nothing wrong with EPVs and that is part of the process.

MEMBER SIEBER: But on the other hand it would be better to deal with it than let it emerge out of the woodwork.

MR. ARNDT: Exactly, and like anything else, if someone brings up an issue, a technical issue or an implementation issue, or whatever, we will deal with it internally within the process, either between NRR and whichever staff or whatever.

MEMBER SIEBER: And that would all take place before it comes to us?

MR. ARNDT: Generally.

DR. WOOD: I can state that on this one and the one from last month that we gave several technical briefings to NRR on each of these.

MEMBER SIEBER: Yes, I understand. I actually know what has happened. But I wanted to clarify the fact that I think that for us to be able to give an opinion on all these issues have to be out in the open for us.

MR. ARNDT: Right.

MEMBER SIEBER: So when you send us a document package, which really ought to come 30 days in advance of the meeting, as opposed to Federal Express 3 days before he meeting, that would help me.

MR. ARNDT: Yes, we understand.

MEMBER SIEBER: With these issues at least exposed, and then I would be in a better position to deal with them and if that could happen in the future, that would be great.

MR. ARNDT: We do our best, and we will continue to try and improve on our performance in that area.

MEMBER KRESS: And I could see how you could get the military standards and these other alternative standards and study them, and see how they compare, and make some judgments as to equivalents, but do you have test apparatus where you actually subject these devices to these things?

MR. ARNDT: Yes.

MEMBER KRESS: And does that show up in these reports?

DR. WOOD: Yes, it is in the reports.

DR. EWING: It is in NEUREG 5609. There is also NEUREG 6406 that describes an experimental digital safety channel that was developed and put through not just EMI/RFI testing, but also other environmental testing to determine the kinds of failure mechanisms that might be --

MEMBER KRESS: Is that the one that you are going to use to test the effects of smoke?

DR. EWING: We did that.

MEMBER SIEBER: But the standard itself really describes the test methods and criteria, as opposed to being application oriented. Before I open it and start to read it, I expect that we would be designing airplane parts or radar systems, but that is not the way that those standards are written.

So it is generally applicable to any kind of instrument and control system and describes the box that it has to fit in is my way of thinking of it.

DR. WOOD: Yes.

MEMBER WALLIS: I have a question. I am now reading the reg guide here and I see various codes which I suppose are the various pulses and combination waves, and so on, and I see a curve. Now, is this the curve that they are supposed to use and is there an equation that goes with this curve? Are they somehow supposed to copy the curve?

MS. ANTONESCU: Which curve are you on?

DR. WOOD: That is a standard wave form from --

MEMBER WALLIS: Why isn't there an equation or something that describes it? It is just a figure here.

MS. ANTONESCU: What page are you on?

MEMBER WALLIS: I am on page 33, and then there is a figure, and there is something called duration, 20 microseconds, and the other durations are the width of the half-peak, but this duration doesn't make any sense to me.

DR. EWING: It actually has equations with it, but it must be part of the standard.

MEMBER WALLIS: I hope so, and there is something called a front time of 8 microseconds, and it seems that has nothing to do with the actual shape of the curve as far as I can tell. So all of this is somehow unequivocal in the real world?

DR. WOOD: This is the standards wave form.

MEMBER WALLIS: You must choose this wave form and it has an equation?

DR. WOOD: Yes. It just didn't repeat all the details.

MEMBER KRESS: Well, when is it that you impose all these things on your equipment? Is there also a standard input that you are dealing with, and you are looking at the effect on the output? Is that part of this thing?

DR. EWING: Yes, it is. It is a coupling device which is described in the standard for certain test methods.

DR. WOOD: For susceptibility testing. If it is a pass or fail criteria, it depends on the functional specification of the equipment under test, but it has to be able to perform its function.

MEMBER KRESS: So there is a number of inputs that you would use in that and check it out?

MEMBER SIEBER: If I recall properly the test equipment that you use generates these standard curves?

DR. WOOD: Yes.

MEMBER SIEBER: So it is not like you have to figure anything out. You just dial it in and put the parameters on it, and hook it up and press the button.

DR. WOOD: These things are not rocket science, though they might be used for such.

MEMBER SIEBER: But they are.

MEMBER WALLIS: Why do you need to define things like waste time and front time, and duration if you have an equation?

DR. WOOD: Whose are the things that are defined in the standard as characteristic of the curves.

MEMBER WALLIS: But the curve is the standard and so the fact that it has a duration of 20 microseconds doesn't mean very much. That is the curve. You can't use anything with a duration of 20 microseconds.

DR. WOOD: I believe that some of those parameters have variability.

MEMBER WALLIS: Well, the way they are defined depends on the curve as far as I can see. I am just trying to see what the real standard is. So they have to use the curve for some specified equation?

DR. EWING: Yes, into some specified load.

MEMBER WALLIS: So these words about front time is just descriptive, and they don't define anything.

MEMBER SIEBER: There is some protective device that trigger on rise time.

DR. EWING: Yes, and the test apparatus has to be able to generate a pulse with a certain rise time and a certain fall time.

MEMBER WALLIS: But there are all kinds of shapes that have those characteristics.

MEMBER SIEBER: I thought they were standardized.

DR. WOOD: There is some standard test equipment.

MEMBER WALLIS: Well, how close do you have to be to this curve is what I am trying to understand. When you have a curve like this, you are not going to get exactly the same curve out of some test equipment. How close do they have to be?

DR. EWING: And if you took the test apparatus into a known load, it should about that same shape. When you plug it into the equipment under test, the shape varies somewhat though.

DR. WOOD: But this is what the pulse is

supposed to look at into a known load.

MEMBER WALLIS: Look like. Isn't it supposed to follow --

DR. WOOD: This is what the pulse is supposed to be into a known load.

MEMBER WALLIS: Well, that is not very clear to me and if you have a standard, what type of standard is it if it allows flexibility in the shape of a pulse?

MR. ARNDT: It doesn't.

MEMBER WALLIS: Is it exactly on the curve?

MEMBER KRESS: For applying it to a known load.

DR. EWING: And in the standard it has a little tolerance in there as well, plus or minus 5 percent.

MEMBER SIEBER: And the ring wave is just a resident circuit. It is an LC circuit which comes out the same wave each time.

MEMBER RANSOM: How does the current equipment in nuclear power plants or existing nuclear power plants -- would it satisfy the standard?

DR. WOOD: Some of the equipment has been tested to the MIL standard test methods, and some to the previous version of the IEC, which was never fully completed.

Those things were done on a case by case basis, and based on a site measurement at that specific location, which developed the test limits and then an application of the test method on the equipment.

So in some nuclear power plants, these tests have already been employed and for the systems that were addressed in the review of the Tricon system and the Common Q system, those systems, they have an EMI program included in their qualification package as well. So they have been demonstrated to pass these kinds of tests.

MEMBER RANSOM: Is there any thought that this might be applied retroactively to existing plants?

DR. WOOD: No.

MEMBER RANSOM: What about replacement equipment or upgrading?

DR. WOOD: Upgraded equipment that are voluntarily initiated by the licensee, this would apply.

MEMBER SIEBER: A modification.

DR. WOOD: A modification, right, a

modification of the equipment, this guidance could apply.

MEMBER SIEBER: If it comes out as a design change, then the new standard applies, whether you purchase something new or change something old.

MEMBER POWERS: So in other words, we are going to inhibit anybody from upgrading their equipment to comply with a new standard?

MEMBER SIEBER: Actually, meeting these standards is not a bad idea. There was a time when we didn't have sufficient surge protection and it prevented our diesels from starting up, and that was an extremely bad situation.

DR. WOOD: Well, what you had before, if there was anything done, would be that an upset would occur, and there would be an investigation of the cause of the upset, and then some of the minimalization practices were employed to address that.

MEMBER SIEBER: And that is what we ended up doing.

DR. WOOD: This is just intended to take care of that up front, rather than having you go through the upset.

MR. ARNDT: And also, Dana, the ability to use the FCC and the CISPR certifications will give particularly our European counterparts a more expeditious way to qualify than was previously available.

MEMBER WALLIS: So you are saying go ahead and do this?

MR. ARNDT: Yes, we would.

MEMBER WALLIS: Now has any one of my colleagues read this guide so that I can be assured that it meets some sort of basic quality standards and makes sense?

MEMBER SIEBER: Well, I can't read figures.

MEMBER WALLIS: So how do you know?

MEMBER SIEBER: Well, some of these figures you don't know, because they didn't come out right.

MEMBER WALLIS: So we are endorsing something that we really don't quite know what it is.

DR. WOOD: In our public meetings, we found that a lot of the utility practitioners didn't quite know what 1023-23 was, and I remember one coming up to me and saying thank you for your presentation. Now I understand how I am supposed to use this kind of stuff, because it is an incredibly complex set of things that you must do. But it has a definite payoff.

MEMBER SIEBER: This is one of the -- even though no one believes me, this is one of the more complex fields that I think in instrument control.

DR. WOOD: As opposed to the other environmental stressors, where the physics are well understood, and the causes of changes in that environment are well understood. This is essentially -- it has a natural element and a man-made element, and it has a lot of transient or random characteristics.

So this kind of an approach has a long history with the military.

MEMBER SIEBER: In the practical application in the power plant, it is unusual because, for example, combinations of circuit breakers opening and closing will generate different surges, depending on what is on the bus at the time.

Or how dirty the contacts are in the circuit breakers, and most of those are ring waves because it is conducted.

DR. WOOD: In assessing your opinion on this guide, I would like to point out that those figures that you can't see, that in the vast majority of cases are identical to the figures that are in Reg Guide 1.180.

The changes were made in adding test methods to cover a phenomena that weren't covered before and making some adjustments.

MEMBER WALLIS: I think what will also be the case is that if these figures are identical to what is in some of these standards, and the figures have been pulled right out of a standard and written down. So it is not your words.

DR. WOOD: In the surge testing, that is exactly the case.

MS. ANTONESCU: And also they are identical to DG-1110,. Rev. 0.

MEMBER SIEBER: But the difficulty is that they don't copy the standard, because if somebody changes the standard the reg guide is incorrect. What they do instead is endorse it, and then you go and buy your own copy and get the figures from the standard prepared.

DR. WOOD: I can give you a quick synopsis of the basis for those operating envelopes. The operating envelopes are tailored for nuclear power plants per the MIL standard application.

For the IEC application, they are the

standard test levels and there were no changes made to those test levels. You go to the standard and look at class or whatever, level or whatever, and that is what you find.

The MIL standard tends to have a more customized approach, depending on the application, because they have full ground facilities for submarines, for aircraft, a variety of conditions.

What we did is that we sent to the military standards and looked at the different categories, and military ground facilities were the most common and had the most in common with nuclear power plants.

And then we looked at the technical basis, the rationale for those operating envelopes, and where there was a basis that clearly didn't apply for nuclear power plants, like it was intended to protect sensitive receivers, or it is intended to account for radar, or things like that, then we looked for other bases to adjust those envelopes, and that is where the measurements came in, and that is where looking at commercial limits came in. So these envelopes have a very strong pedigree.

MEMBER WALLIS: But the reason that we don't need to proofread this very much is that it looks to me that a great deal of this is simply pulled out of these standards.

DR. WOOD: Yes.

MEMBER WALLIS: And just were written down again. So we don't have to worry about them.

DR. WOOD: Right. We tried to pull out the things that we thought could help the user find what they need, because some of those are very complex and there are a lot of options, and so tell them which option is the one that is appropriate for nuclear power plants.

MEMBER SIEBER: All right. Any additional comments that you would like to make?

MS. ANTONESCU: No, that's all. We just would like to thank you for the opportunity to present this presentation, and if possible we would like to receive a letter from you with your comments and endorsement of this revision of 1.180.

MEMBER SIEBER: I just happen to have one, and all I need is votes.

DR. WOOD: Well, anytime you are lonely and want an interesting technical discussion, feel free to let us know.

MEMBER SIEBER: We appreciate the discussion and the information you provided. I did mention a couple of things in the process of doing this, and if we could fix that a little, it would make it easier for us.

MEMBER KRESS: I have one parting comment though. Go Big Orange.

MEMBER SIEBER: Mr. Chairman, unless anybody has any questions or comments, I think we are finished.

CHAIRMAN BONACA: Are there any questions or comments? Thank you for your presentation, and I think we can go off the record now.

(Whereupon, at 5:12 p.m., the hearing was recessed.)