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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

513th MEETING

+ + + + +

WEDNESDAY,

JUNE 2, 2004

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ROCKVILLE, MARYLAND

The committee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B3, 11545 Rockville Pike, at 8:30 a.m., Mario V. Bonaca, Chairman, presiding.

COMMITTEE MEMBERS PRESENT:

MARIO V. BONACA, Chairman

GRAHAM B. WALLIS, Vice Chairman

GEORGE E. APOSTOLAKIS, Member

F. PETER FORD, Member

THOMAS S. KRESS, Member

DANA A. POWERS, Member

VICTOR H. RANSOM, Member

STEPHEN J. ROSEN, Member

WILLIAM J. SHACK, Member

JOHN D. SIEBER, Member

ACRS STAFF PRESENT:

JOHN T. LARKINS, Executive Director

SAM DURAISWAMY

MARVIN D. SYKES

ALSO PRESENT:

STEVEN A. ARNDT

KURT COZENS, NRR

JERRY DOZIER, NRR

FRANK GILLESPIE, NRR

DONNIE HARRISON, NRR

HOSSEIN G. HAMZEHEE

P.T. KUO, NRR

DAVID MATTHEWS, NRR

EILEEN McKENNA, NRR

TONY PIETRANGELO, NEI

TIMOTHY REED, NRR

STEVE WEST, NRR

JERRY WILSON, NRR

I-N-D-E-X

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

(8:30 a.m.)

CHAIRMAN BONACA: Good morning. The meeting will now come to order.

This is the first day of the 513th meeting of the Advisory Committee on Reactor Safeguards. During today's meeting the committee will consider the following: Draft Final 10 CFR 50.69, Risk-Informed Categorization and Treatment of Structures, Systems, and Components for Nuclear Power Reactors; revised license renewal review process; discussion of topics scheduled for meeting with the NRC Commissioners; digital instrumentation and control system research activities; and preparation of ACRS reports.

In addition, the committee will meet with the NRC Commissioners between 1:30 and 3:30 p.m., at the Commissioners' Conference Room, One White Flint North, to discuss items of mutual interest.

Dr. John Larkins is the Designated Federal Official for the initial portion of the meeting.

We have received no written comment or request for time to make oral statements from members of the public regarding today's sessions. A transcript of portions 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, you have in front of you a package with items of interest. You may note in the first enclosure in the package is a Staff Requirements Memorandum directing the staff to recover the MSPI index. You may be interested by that SRM.

This package also contains a number of speeches and correspondence, and among the correspondences should be interested by the letter from Chairman Diaz to the Chairman of Vermont Public Service Board committing the staff to perform a special review of Vermont Yankee. And in that commitment, there is also a statement of the role that the ACRS will play, so you may want to go into that and look at that.

I also would like to make two announcements. First, Mr. Cayetano -- or "Tany" -- Santos has joined the ACRS staff on June 1, 2004. Prior to joining the ACRS staff, he was working for the Office of Nuclear Regulatory Research as a Materials Engineer. He has a B.S. degree in Materials Engineering from the University of Florida, and an

M.S. degree in Materials Engineering from the University of California-Santa Barbara. He will be replacing B.P. Jain, who left ACRS staff to join RES.

Welcome, Mr. Santos.

(Applause.)

Also --

MEMBER APOSTOLAKIS: Do we have any materials issues? Why do we need Mr. Santos?

(Laughter.)

CHAIRMAN BONACA: Yes. He's going to be a victim of our Materials Subcommittee. I mean, he's going to work very hard to --

MEMBER POWERS: Hopefully, he can straighten that committee out.

CHAIRMAN BONACA: Also, I would like to welcome Dr. Flack, who will be joining the ACRS as a senior staff -- senior technical advisor on July 11, 2004. Dr. Flack is currently the Branch Chief for the Advanced Reactor and Regulatory Effectiveness Branch in the Office of Nuclear Regulatory Research.

Dr. Flack has over 22 years of nuclear safety experience and first joined the NRC as an ACRS fellow in 1984. In 1986, he was transferred to the Office of Nuclear Regulatory Research as a Risk Assessment Engineer, and later led the NRC review of

licensees' individual plant examinations.

In the mid 1990s, he served as Acting Branch Chief of the Probabilistic Safety Assessment Branch in NRR, and later as Branch Chief of the Regulatory Effectiveness and Human Factors Branch in RES.

Dr. Flack received a B.S. degree in Mechanical Engineering from Richmond College, New York, an M.A. in Physics from Queens College in New York, and a Ph.D. in Physics from the University of Hawaii.

Dr. Flack, welcome aboard.

DR. FLACK: Thank you.

(Applause.)

CHAIRMAN BONACA: With that, introductions are over, and we can move to the first item on the agenda. That is Draft Final 10 CFR 50.69, and Professor Apostolakis will lead us through.

MEMBER APOSTOLAKIS: Thank you, Mr. Chairman.

The purpose of our meeting today is to review the draft final rulemaking package for 10 CFR 50.69. 10 CFR 50.69 has been developed to permit licensees to implement an alternative regulatory framework with respect to special treatment where

"special treatment" refers to those requirements that provide increased assurance beyond normal industrial practice that structures, systems, and components perform their design basis functions.

Under this framework, licensees use -- using a risk-informed process for categorizing SSCs according to their safety significance, can remove SSCs of low safety significance from the scope of certain identified special treatment requirements.

Report NEI 00-04 was written in support of the rule, and the staff has conditionally endorsed it in Regulatory Guide 1.201. The focus of today's briefing will be on the regulatory guide exemptions, issues raised during our subcommittee meeting of February 19, 2004, and resolution of public comments as discussed in Section 2 of the statement of considerations.

The committee's most recent action on this matter was review and comment upon draft rule language for 10 CFR 50.69 and proposed industry guidance in Revision B to NEI 00-04. The committee's letter dated March 19, 2002, had several conclusions and recommendations, which include the following.

Criteria used by the integrated decisionmaking panel for categorizing SSCs should be

made explicit and should include consideration of risk metrics that supplement core damage frequency and large early release frequency, such as late containment failure and inadvertent release of radioactive material.

Materials degradation is not directly assessed in NEI 00-04 Revision B. We recommended that the aging phenomena and the management of degradation must be considered in the IDP deliberations concerning affected SSCs and passive system components.

NEI 00-04 Revision B shied away from providing guidance or encouragement for licensees to perform uncertainty analyses, and relied heavily on sensitivity studies. The committee recommended that uncertainty analysis should be performed where possible.

The committee felt that the justification for increasing failure rates in NEI 00-04 Revision B was weak and better justification was required.

We also refer to our earlier report dated October 12, 1999, where we commented extensively on the decisionmaking process and the need for guidance and training in conducting expert panel sessions, and we also had some comments on the limitations of importance measures.

After today's briefing, we are expected to write a report to the Commission with our comments on the draft final 10 CFR 50.69.

And with that, we can start now. Tim?

MR. REED: Thanks George.

I'm Tim Reed from NRR, and I have with me today Donnie Harrison, also from NRR, and quite a bit of help in the room -- Tom Scarbrough from Engineering and others here to help out. So I think we have enough people to answer any question that the committee might have.

As George already mentioned, the objective today is to achieve a letter of endorsement from the ACRS full committee on 50.69 as we go forward to provide the rulemaking to the Commission here on 6/30. The discussion also, consistent with what George has mentioned, will focus on any changes that have occurred in the package since we last talked to the ACRS, which was back in February of this year, 2004, the Subcommittee on PRA and Risk. And we'll focus on any changes that occurred in the package since we provided the package that's before you on May 17th.

And then, the focus of the discussion will be primarily on the Reg Guide 1.201, formerly 1121, and the remaining issues we have with the

implementation guidance N00-04. So that's what we intend to focus on today, but, of course, we can answer any questions that the committee might have.

George mentioned we met with the committee on February 19th, the Subcommittee on Reliability and PRA. That briefing focused on public comment review and its resolution, as well as on the NEI 00-04 review status and our efforts to develop a draft Reg Guide.

With regard to the public comment review, and the responses and the issues that we presented on those slides, the positions that we took on those slides have all been implemented in the package without any changes. So you should see all those in the package, and there have been no changes at all in those technical positions.

So that's the first agenda item. I wanted to point out that we're consistent with what we said back in February.

We do have one noteworthy change, though, to the package, since we provided it to you on May 17th, and that is with regard to who may adopt 50.69. During the concurrence process, and a little more in-depth analysis, we identified one pretty difficult issue to resolve. And that involves applicants for a Part 52 design certification, so

right now we're going to not allow those to adopt 50.69.

And this is really a result of some fundamental discontinuities, if you will, between Part 52 and 50.69. I'm sure this committee is familiar with Part 52 and the way it works in design certifications, and the way that it has become a rule basically in Part 52. And there are some very tight change control restrictions in Part 52, and the thought here and the concern here is if a vendor were to take that design all the way past first -- first, two initial criteria to adopt 50.69 must be a light water reactor; and, two, must be designed from safety-related and non-safety-related as a first start in 50.2 of Part 50.

The next thing, though, once you're past that, then you're in the door. You can actually consider 50.69 now. In Part 52 now, if the vendor were to go all the way to -- past safety-related and non-safety-related, and take it to the -- what I call the overlay, the 50.69 overlay, and put the SSCs actually into the four boxes, it is our concern that Part 52 would lock those into those four boxes, because of the nature of change control in Part 52.

As the committee is aware, 50.69, on the

other hand, is a living regulation, and a very, very important part of 50.69 is the monitoring and feedback in paragraph E, and its PRA updates and the performance information that can be fed back as you go through time.

Both of those can result in SSCs changing boxes, and we would expect that to occur but not to any great extent. But nonetheless, it can occur. That seems to be diametrically opposed to Part 52, so this is a problem that as of right now we don't have a solution for.

But if we get interest from a design certification applicant who wants to go take it that far and apply 50.69, we'll have to address it at that time on a case-by-case basis, and would probably take some pretty clever rulemaking language, at a minimum, to solve it. And then we'll have to revisit and see whether we can fix Part 52 or 50.69 at that time. But as of right now, we'd have to do that on a case-by-case basis.

MEMBER APOSTOLAKIS: So let me understand this process. When somebody submits an application for design certification, do they actually identify safety-related and non-safety-related SSCs?

MR. REED: They can, yes. I mean,

certain --

MEMBER APOSTOLAKIS: But they don't have to.

MR. REED: They don't have to. Jerry, start correcting me if I'm off the path here. But, yes, they certainly can. I think we have several designs right now that do, in fact, do that that are approved.

MR. WILSON: This is Jerry Wilson, NRR. The answer to your question is yes. As you understand with 50.69, it's basically a two-step process. First, you have to categorize your equipment in safety-related or non-safety-related, and also retaining the design bases.

And then, if an applicant referencing a certified design chose to adopt the 50.69 process they could voluntarily do that, and then they would do the additional categorization into the four boxes.

MR. REED: Yes. What Jerry is talking about is --

MR. WILSON: We have to go through those steps.

MR. REED: -- actually the second bullet I have up here, which says combine operating license applicants -- in fact, can do this.

MEMBER APOSTOLAKIS: So they would have to do it after they receive it.

MR. REED: Right, exactly. They're exactly analogous to a current licensee. I look at the COL guys as the current licensee, and the vendor for the design cert is like the --

MEMBER APOSTOLAKIS: Okay.

MR. REED: -- today, you know, and basically they would apply it the exact same way. The problem happens is when the vendor designer puts it in the boxes, in the four RISC boxes. That's the problem, because it locks it in in place, according to Part 52 change control restrictions.

MEMBER APOSTOLAKIS: Well, but --

MR. REED: And that's the problem right there.

MEMBER APOSTOLAKIS: They can apply 50.69 after certification.

MR. REED: Yes. Yes.

MEMBER APOSTOLAKIS: But, I mean, why don't the restrictions of 52 apply then?

MR. WILSON: Jerry Wilson. The design information that's supporting the design certification restrictions do apply to that. But this additional process in the recategorization would take place

during the combined license review and be in the additional information with the combined license application, and, therefore, would not be controlled by the special restrictive change process for design certification, but rather would be controlled by the normal change process you would have for other operating plants.

MR. REED: Yes. I look at it as like -- as if the design cert would control what I call design basis functional requirements. That's what we understand today in Part 50.

And then the COL guy would be able to do the overlay. That works.

MEMBER APOSTOLAKIS: But 50.69, though, preserves the design requirements, right?

MR. REED: Absolutely.

MEMBER APOSTOLAKIS: So it doesn't really matter.

MR. REED: For COL. For COL guys. The problem -- it's actually a regulatory discontinuity between Part 52 and 50.69. If the applicant for design cert puts them in the boxes, that's when the problem results.

MR. HARRISON: See, because what you could have happen is you could have -- the vendor puts it

into the four boxes as part of the design cert. Those now are locked into those places. So if I do a PRA update in the future, and something needed to move, I couldn't move it anymore.

MEMBER APOSTOLAKIS: Why not?

MEMBER ROSEN: Why is this a problem at all? Why don't you just say --

MEMBER APOSTOLAKIS: I don't understand it.

MEMBER ROSEN: Why don't you just say you can't do that, you have to apply for --

MR. REED: Well, that's exactly what we've done.

MEMBER ROSEN: Well, I've heard design certification, you get it, and then if you choose to you could ask for a license amendment, just like an operating plant, to apply 50.69. And it would likely be granted, and then you go ahead and do it.

MR. REED: And that's the solution path we've taken.

MEMBER APOSTOLAKIS: But what does it mean you can't move it? I mean, 50.69 does not affect the design functions, does it?

MR. HARRISON: Well, what happens is is the -- it may be -- I don't know -- a terminology

problem, but once you say something is RISC-3 --

MEMBER APOSTOLAKIS: Yes.

MR. HARRISON: -- in design cert, under Part 52 it's RISC-3, and it's got that -- it can't go back to RISC-1.

MEMBER APOSTOLAKIS: But isn't that in conflict with what Tim said about 50.69 being a living --

MR. REED: No. Again, this is --

MR. HARRISON: That's exactly the conflict.

MEMBER ROSEN: That's the disconnect between Part 52 and this Part 50 --

MR. REED: The way Part 52 works and locks things into place, if it's an approved design certification, versus 50.69, so the way to do it is to have the COL applicant take the approved certification off the shelf and reference it, and then they can use it. It's just --

MR. MATTHEWS: Let me interject here. Let me interject. This is David Matthews. I'm the Director of the Division of Regulatory Improvement Programs.

I think the trouble comes when these -- when they say "locked in," what they mean is that when

we certify a design under Part 52, we issue a rule certifying that design, and that's the problem. The design, if it were to go so far as to adopt the terminology and the categorization of Part 50.69, then those design attributes, okay, that would result in risk categorization would be included in the design certification rule.

And where the restriction comes in is once you get a design certification rule, the restrictions in the rule are such that it can't be changed. So the Commission decided, as some protection against backfit provisions, okay, to have very restrictive change mechanisms on design certification to protect the industry from the NRC's inclination to want to change.

But it also restricts the industry, if they choose to want to change their design certification rule from changing it, other than through another rule change, which would be a petition for rulemaking.

So that's what they mean by "lock in." And so if somebody goes so far as to apply 50.69 I'll say prematurely, before they get their design certification, then their design certification locks them into their categorization. If they wait until after their design certification, and sell it to an

applicant, then that applicant can apply 50.69 to its implementation.

MEMBER ROSEN: But nothing prevents the designer from asking for design certification and doing the categorization work up front, simply not asking for the change. He could show that to his clients.

MR. MATTHEWS: Absolutely.

MEMBER ROSEN: He can say, "This is where we're going to end up."

MR. MATTHEWS: Absolutely.

MEMBER ROSEN: "As soon as you buy this plant from us" --

MR. MATTHEWS: He can do that work ahead of time.

MEMBER ROSEN: -- "a license, we'll apply for 50.69." And then all of this equipment, which is currently safety-related, will stay safety-related. But it will be not risk-significant or low safety significance.

MR. MATTHEWS: Right. And that work can be done ahead of time. He just has to be careful about asking our endorsement for it in the design certification rule.

MEMBER ROSEN: Right.

MEMBER APOSTOLAKIS: But is the PRA during the design certification process complete enough to allow for a categorization? Without having a site --

MR. REED: That's an excellent question, because I think you'd have to have, for example, in the pressure boundary categorization -- you'd have to have a lot of information about the plant --

MEMBER APOSTOLAKIS: Right.

MR. REED: -- for example, to be able to do that piece of it. I don't know exactly how -- to be honest with you, Jerry, maybe other people familiar with Part 50 know how good these PRAs are, whether they're good enough.

MR. WILSON: Well, for the purpose of the design review, they've been sufficient. But until you've procured the equipment, I mean, the reliability information is an assumption. So it would work much better if you knew that --

MEMBER APOSTOLAKIS: So it seems to me that that would be a major reason for not applying 50.69 to --

MEMBER ROSEN: George, you wouldn't have the details of the cooling water supplies, especially essential cooling water, which was likely to be high risk-significant and safety-related, because you don't

-- that depends on the site. And so you --

MEMBER APOSTOLAKIS: You wouldn't have the external events.

MEMBER ROSEN: You wouldn't have the external events.

MEMBER APOSTOLAKIS: You wouldn't have --

MEMBER ROSEN: You wouldn't have any knowledge of that either. So the logical time is after the site is designed and certified, and the site is identified, and then you do a -- do the remainder.

MEMBER APOSTOLAKIS: Well, yes, I understand that.

MR. REED: Right. That's what we allow.

MEMBER APOSTOLAKIS: I was confused about what 52 does and 50.69 can do. But I guess it's okay. I mean, if it --

MEMBER ROSEN: No, this doesn't trouble me at all. If this is the way --

MEMBER APOSTOLAKIS: It doesn't trouble me either. I'm just trying to understand it.

MR. REED: All right.

MEMBER APOSTOLAKIS: Okay. Let's go on.

MR. REED: Well, that's the one noteworthy change. Basically, everything else in that package that has changed since May 17th has been editorial,

and there have been no significant technical changes. So what you've reviewed is, in fact, what remains to this day.

And as of right now, all offices, with the exception of OGC, have concurred, and they are actively looking at it right now to consider whether they concur or not. And I don't know of any legal objections, as of right now, to the package.

What we've got remaining, then, also is we are right now interacting with CRGR to determine whether we're going to meet with them. If we do meet with them, it will be on June 17th. Of course, there are no backfits in this package. This is an alternative -- voluntary alternative, and so we are trying to get that CRGR meeting weighed for that basic reason.

We are scheduled to provide this rulemaking package to the EDO on June 23rd, and then the EDO is, in turn, supposed to provide it to the Commission on June 30th. We are currently on schedule to do just that.

As I think the committee probably has recognized, the package contains Reg Guide -- now Reg Guide 1.201. It's our intent as of right now to issue that for trial use and update and revise it with the

lessons learned from Surry and the Wolf Creek pilots, which are ongoing pilots.

And that brings me to the next speaker, which will focus on the Reg Guide 1.201 issues, what remains, and what we plan to do with that.

Before we go to Donnie, I guess I'll just ask if there's any questions on what I've presented so far to the committee.

MEMBER APOSTOLAKIS: Well, yes, I have a question.

MR. REED: Sure.

MEMBER APOSTOLAKIS: The rulemaking package goes to the Commission the end of the month, and then presumably the Commission will vote on it some time afterwards, right?

MR. REED: I would anticipate that the Commission probably 10 days later will issue it for public -- make it public. And then, at some point, the Commission will vote on it. In the past, it has been -- it has taken quite a bit of time, to be honest with you. The last two times it has taken on the order of about six months.

I don't think the Commission will take that long this time. I expect them to act reasonably quickly, but I do expect them to let -- put it in the

public domain and get some feedback there, I would expect. But that's just speculation on my part.

MEMBER APOSTOLAKIS: Now, the regulatory guide, though, you said would be issued for trial use. So that means what, that maybe a year later the guide can be revised, but the rule will be the rule, right?

MR. HARRISON: Right. Right, yes. The expectation is is we'll -- we'll learn a few things, we'll maybe close the loop on a couple of things, and come up with maybe a template for submittals, provide a final NEI -- a final final NEI 00-04 that will endorse into a final reg guide.

MEMBER APOSTOLAKIS: So how long will this process take?

MR. HARRISON: I really haven't tried to estimate the time. It --

MEMBER APOSTOLAKIS: Two years?

MR. HARRISON: No, it shouldn't take -- we're actually working with NEI I think fairly closely in closing up the gaps that we do have. It's more of -- Surry is supposed to come in this fall as part of the PRA quality pilots. We're going to look at it at that time, so I'm guessing probably early next year that we'll be coming back with a -- to close up the final pieces of it.

MR. REED: In fact, NEI is -- the last time I spoke to NEI they were -- and they can speak to this later on -- they were planning on actually providing another version of NEI 00-04 this Friday. So that may close some of these issues.

MEMBER APOSTOLAKIS: That would be Version E?

MR. REED: I'm not sure what they'll refer to it as.

MR. HARRISON: Were on final draft, so --

MR. REED: Final final --

MR. HARRISON: -- this would be final final draft.

MEMBER ROSEN: -- final final draft, I guess. That's up to NEI. And --

MEMBER APOSTOLAKIS: Final-squared.

MR. REED: And I think we'll hopefully close a lot of these issues off at that point, and we'll try and switch out at that point and clean it up.

MEMBER APOSTOLAKIS: So you will tell us what the issues are today, right?

MR. HARRISON: Yes.

MEMBER APOSTOLAKIS: Okay.

MR. HARRISON: And to be honest with you,

there's really only one truly technical --

MEMBER APOSTOLAKIS: Yes, you should be honest.

MR. HARRISON: Yes, I'll try to be honest. There should be only one technical issue. You know, actually, that brings up a key point, if I can make it. I was reading the --

MEMBER APOSTOLAKIS: Honesty does?

MR. HARRISON: On honesty, actually. Only in a society where you don't trust people do people have to say they're going to be honest.

MEMBER APOSTOLAKIS: Let's not start a philosophical --

MR. HARRISON: Just a little, you know, side remak.

MEMBER APOSTOLAKIS: That's fine. That's fine. We make side remarks all the time.

MEMBER KRESS: In such a society, who would believe such a statement?

MR. HARRISON: There you go. That's the point of that point. Okay.

MEMBER APOSTOLAKIS: Now, how come your name is not on the cover page? And the --

MR. HARRISON: You could argue maybe I'm trying to, you know, disappear in this process. No,

I just -- that was just the way I did the slide.

By the way, I'm Donnie Harrison. I'm in the NRR PRA Branch, and I've been working on this since I think Draft C of NEI 00-04. So actually for me it's good to hear you talk about Draft B, because it's a long time since I've even read that stuff.

We received the final draft in April. The final draft that we got from NEI incorporated a lot of changes that we had made on Rev. C, back probably almost a year ago or so, and some of the -- they also created a Rev. D kind of as an interim piece before the final draft came out.

They either addressed our positions directly within this revision, or in some cases we actually have changed our position that was in the DG-1121, because now we understand better what the process is doing in NEI 00-04.

The example that I would give for that would be in the Rev. C we had made the comment that if a component was determined to be high for any reason, including the sensitivity studies, then it should be considered high safety significant.

With now our understanding of how the process actually flows, we've backed off on that and said, "No. If it's low in the base case, but a

sensitivity makes it high, that information should go to the IDP. The IDP should look at it, consider the reason why it goes high, and then they can make the final call on if it's high or low." So that's --

MR. REED: I think that's the only opportunity for the IDP to have that discretion, right? Is that --

MR. HARRISON: Those are the situations where the IDP will actually -- if something is high because of a sensitivity study, they will evaluate it and make a decision.

MR. REED: I think otherwise the IDP cannot make anything --

MR. HARRISON: Right.

MEMBER ROSEN: -- low in any other situation.

MR. HARRISON: They can't force it low.

MEMBER APOSTOLAKIS: So it has to start low.

MR. HARRISON: It has to start low.

MEMBER APOSTOLAKIS: The sensitivity --

MR. HARRISON: It has to raise it.

MEMBER APOSTOLAKIS: -- which now places a lot of burden on the sensitivity studies, does it not? I mean, a sensitivity study is very arbitrary.

I mean, I can raise it by a factor of three. I can take the 95th percentile, as the document recommends.

MR. HARRISON: Right.

MEMBER APOSTOLAKIS: Whose 95th percentile? You know, there are --

MR. HARRISON: Right.

MEMBER APOSTOLAKIS: -- many PRAs out there. I can pick one that suits me. So I -- I don't know if that -- why it --

MR. HARRISON: Well, and again, that's -- there's multiple levels of, I guess you would say, judgment control that are in the guidance. That even -- even if I do the sensitivity studies, and I make things low, I still then have to do the risk sensitivity study, which elevates all of my lows by a factor, and then I have to show that that still comes up with an acceptably small delta risk.

So there's -- there's little checks and balances in the process.

MEMBER APOSTOLAKIS: Now, the sensitivity studies I don't remember. You are raising --

MR. HARRISON: HRA --

MEMBER APOSTOLAKIS: -- everything, or just individual classes?

MR. HARRISON: It's done by class on the

function. It's -- it would be like maintenance on availability, set them to one, or set them to zero.

MEMBER APOSTOLAKIS: Yes.

MR. HARRISON: Human reliability, and leave the rest as they are. So it's done on the class of -- or grouping of topics.

Also within there is, if there was a peer review finding that raised a question on something, they could do a sensitivity study to address the peer review findings.

MEMBER APOSTOLAKIS: Now, the sensitivity is not only on parameters, right? Not on models.

MR. HARRISON: Not just on the model.

MEMBER APOSTOLAKIS: It's not done on the model at all, is it?

MR. HARRISON: I guess I'm not following the question.

MEMBER APOSTOLAKIS: Well, I mean, again, we talked last time about having two or three different ways of modeling seal LOCAs.

MR. HARRISON: Right.

MEMBER APOSTOLAKIS: Would that be part of the sensitivity study?

MR. HARRISON: Not unless it was brought up as part of a peer review finding.

MEMBER APOSTOLAKIS: Why would the peer reviewers comment on this?

MR. HARRISON: Well, it wouldn't be surprising, actually, if someone did a reactor coolant pump seal model that wasn't, if you will, a standard approach, or if a peer reviewer would raise a question about the use of a certain model that maybe wasn't one that had been accepted by the industry. So you could get to it at that point.

MEMBER APOSTOLAKIS: I mean, what is the logic behind increasing the failure rate of something, and not waiting for the experts to comment on that? But when there is model uncertainty, we rely on the peer reviewers to tell us that their alternate models here are --

MR. HARRISON: Well, that's only one aspect. There's also an aspect in here, which is a position we've taken, which is a couple slides from here, which talks about they still need to address uncertainty. They still have to talk about model uncertainty, identify their key sources of uncertainty, and the process --

MEMBER APOSTOLAKIS: I understand that. But, I mean, since they are doing some sensitivity studies already --

MR. HARRISON: Right.

MEMBER APOSTOLAKIS: -- wouldn't those be naturally -- natural candidates to be included? I mean, there are not very many model uncertainties in Level 1. Now, in LERF there may be many more.

MR. HARRISON: You know, I would have agreed with you until I looked at some material the other day and --

MEMBER APOSTOLAKIS: What material?

MR. HARRISON: This is part of the PRA quality pilot, so the -- the generation of what the key sources of uncertainty -- may be a topic that within the PRA quality pilots we're going to have to look a little harder at, just from the material I started looking at as part of that pilot. They're creating a large list of --

MEMBER APOSTOLAKIS: Right.

MR. HARRISON: -- uncertainties.

MEMBER APOSTOLAKIS: But, again --

MR. HARRISON: And then toning down and -- what they're coming down to is not what I --

MEMBER APOSTOLAKIS: Who is "they"?

MR. HARRISON: This is in the Columbia pilot. Again, this is part of the Columbia diesel generator AOT, risk-informed AOT pilot.

MEMBER APOSTOLAKIS: Who is doing the analysis?

MR. HARRISON: Well, the licensee did the submittal, with support from a contractor. We have an internal NRR research team reviewing the material, and they created a large list of uncertainties that they then pared down for the submittal. And just a point -- it's just a point of observation that their final list of what they considered to be the key sources of uncertainty for that submittal was not the same list I would have thought of off the top of my head, what would have been on that list.

MEMBER APOSTOLAKIS: So why are we relying on the peer reviewers, then, to think of it?

MR. HARRISON: Well, this came out of their peer review process, actually. So I'm just saying that that's an evolving thing. I think before I started looking at this material I probably would have agreed with you. Now I want to take the --

MEMBER APOSTOLAKIS: So there are going to be uncertainties due to modeling assumptions? Is that the conclusion from this study?

MR. HARRISON: Well, it turned -- yes, what's turning out is there are some uncertainties that need to be addressed. What you typically end up

with is no impact, but -- or the impact is small. And so it just -- I'm just saying the topic, like on a BWR that says recirc pump seal LOCAs, is a -- becomes a key uncertainty. I'm not sure if that's really a key uncertainty for that plant, you know, for a BWR.

MEMBER APOSTOLAKIS: Yes. But you also have human reliability model uncertainty.

MR. HARRISON: Which wasn't on the final list. So, again, this is just --

MEMBER APOSTOLAKIS: I'm not saying that these are critical uncertainties, but at least could someone show us a study that demonstrates that they are not significant? See, now I have to speculate. I read the paper, which I'm sure you have seen by Blye and the other guys, that shows how they handle model uncertainty in some PRAs, and the impact was not insignificant.

Then, you are telling me somebody else did a study that shows that actually these are not significant uncertainties. And now I'm confused. And we seem to be paying too much attention on things that are fairly straightforward, but then the other things that require a little bit more innovative thinking we push aside, and especially in Level 2 LERF. I mean, even there we just raise failure rates. I don't know

what we do then.

MR. HARRISON: Well, again, that's going to depend on the approach the licensee takes. But for the most part, you will be doing just that.

MEMBER APOSTOLAKIS: I mean, this agency sponsored NUREG-1150.

MR. HARRISON: Right.

MEMBER APOSTOLAKIS: All these uncertainties were identified, and so on. Are we taking advantage of this?

MR. HARRISON: Well, again, I think -- I think we are. It's just that some of, again, what I saw just, you know, a few days ago is making me want to take a step back and -- and look at what the industry has done and saying -- if it makes sense what they've done, then it changes my view on some of the -- you know, I think for PWR reactor coolant pump seal LOCA we would all agree it is a key source of uncertainty. The way we model it is conservative for the most part. And so it's --

MEMBER APOSTOLAKIS: Donnie, I'm not doubting these answers. All I'm saying is I haven't seen them.

MR. HARRISON: Okay. Fair enough.

MEMBER KRESS: But with respect to the

sensitivity studies, it's been my observation that sometimes they use one sigma, and sometimes they use two sigma and other values, and sometimes they do it one -- one parameter at a time, and sometimes they do it with all parameters or several important parameters at a time.

Is there any -- and you could get a -- get different results with respect to moving one component out of a low to a high, depending on how you did that. Is there any guidance in this NEI 00-04 on how to do sensitivity studies and --

MR. HARRISON: What they've done in NEI 00-04 is provide, within each topic -- so if we're doing a fire PRA sensitivity, there's a list of sensitivities that you will do as part of that. Or for the internal events --

MEMBER KRESS: One at a time?

MR. HARRISON: Actually, the way I read it it was, again, by collective group. So you will move the human reliability values to their 95th.

MEMBER KRESS: And the 95th they identify as being two sigma, or do they have -- actually have the distribution --

MR. HARRISON: That would be the distribution that comes out of the methodology they

apply. And, again, that becomes -- different methods can get you different distributions.

MEMBER APOSTOLAKIS: If I use one method, and I come up with a distribution, that doesn't mean that the distribution I develop includes the results of other methods.

MEMBER KRESS: Right. I agree.

MEMBER APOSTOLAKIS: Or at least there haven't been any studies that show --

MEMBER KRESS: So why not just -- if you have that level of distribution detail, why not just do an uncertainty?

MEMBER APOSTOLAKIS: Well, why not?

MEMBER KRESS: I mean, we know we've got the 95 percentile.

MR. HARRISON: Well, and again, one thing is the licensee will have to do an uncertainty analysis as part of this, in doing the delta risk calc.

MEMBER KRESS: Why do you need a sensitivity if you have an uncertainty analysis?

MEMBER APOSTOLAKIS: I don't need that.

MR. HARRISON: Well, again, the sensitivity here is used as part of -- you readjust your -- you go like to your 95th percentile, or to

your 5th percentile. You recalculate your RAW and Fussell-Vesely's, and you see if, based on your criteria, one of those moves into a different box.

MEMBER APOSTOLAKIS: Right.

MR. HARRISON: Right. That's really the purpose of the sensitivity is to see if anything is just barely missing the threshold, that if you tweak it a little it would move across the board into the other box. It's really -- that's the intent is to make sure we're not either masking a result or something that's sensitive to a slight change will actually move.

MEMBER APOSTOLAKIS: Okay.

MR. HARRISON: So I don't want to get maybe too focused on that.

MEMBER APOSTOLAKIS: So if the regulatory guide -- I mean, say -- you said by early next year Regulatory Guide 1.201 will probably be finalized. Is that what you said?

MR. HARRISON: Sometime next year. I'm not going to give you a real date, because --

MEMBER APOSTOLAKIS: Sometime next year. Sometime next year.

MR. HARRISON: -- I haven't tried to --

MEMBER APOSTOLAKIS: Sometime next year.

MR. HARRISON: -- figure out a schedule.

MEMBER APOSTOLAKIS: Will it include, then, considerations like the ones we've been discussing the last 10 minutes?

MR. HARRISON: Boy, that's a hard thing to ask what I'm going to do, you know, six months from now.

MEMBER APOSTOLAKIS: Well, presume --

MR. HARRISON: Right now, I don't see the -- we wouldn't change the criteria unless something came up that said there's something wrong with it, and we need to adjust that. I --

MEMBER APOSTOLAKIS: But you will not know that there is something wrong with it unless you try it.

MR. HARRISON: Well, again, that's -- we've got Surry coming in. They're going to try it. They're going to show us what they get from their results. We'll be able to kind of work with it, and then we'll kind of -- and Wolf Creek has done the -- their IDP recently. So we'll be able to --

MEMBER APOSTOLAKIS: Surry is coming in, you said?

MR. HARRISON: Surry, yes. They're part of the PRA quality pilot.

MEMBER APOSTOLAKIS: Which of their 15 PRAs are you using?

(Laughter.)

MR. HARRISON: Well, we'll find out when they submit it. You know, it's -- we're not sure. But we'll have an opportunity to look and learn. And, again, if we find out that the criteria needs to be adjusted, we'll seek that with NEI if -- right now, off the top of my head, I can't imagine it changing unless, like I said, we get surprised by something.

MR. REED: Is it a fair statement, Donnie, to say that the way we've structured this process right now it's conservative in the sense that it results in more SSCs staying up in boxes 1 and 2 as a result of the way we structured the whole thing, including what we allowed the IDP to do or not do?

And perhaps it's not as rigorous as some might want it to be. But nonetheless, for regulatory purposes, it results in a conservative answer. In other words, special treatment is staying on more SSCs as a result.

MEMBER APOSTOLAKIS: But, you see, that's where I have a problem. I mean, why are we saying that? How are we convinced that it is conservative? I mean, there are a lot of things that are

conservative. I don't doubt that. But how do we know that the whole process is conservative?

MR. HARRISON: The point here is, again -- I'll go back to where I started with -- is that there's multiple checks that are going on. So there's the check up front that -- and with the sensitivity studies, to look at the -- how you are categorizing into the components. That feeds into the IDP.

After that's done, you still do a delta risk calc to make sure that there's not a greater than small change. And if there is, you have to go back and adjust your categorization process again. Even after that, if I'm implementing and there's a problem, there's -- we've now got corrective action feedback loop that says, you know, either my PRAs change or something has happened that makes me want to go back and change things, so then I can go back there.

So we've tried to establish enough checks and balances to assure ourselves that whatever results we get will be -- we'll still be in a round that's still safe. We're not going to get out of --

MEMBER SHACK: Let me try a slightly different approach.

MR. HARRISON: Okay.

MEMBER SHACK: You know, in your external

events PRA, you've been concerned that the conservatisms in there will mask the importance factors. You still have conservatisms in your internal events PRA that are really part of this model uncertainty. How are you sure that you're not masking an importance factor with those conservatisms?

MR. HARRISON: Well, and again, part of the sensitivity is to try to get at those -- at that part of that question is to say, if something is driving my answer high or low, let's adjust those factors and see what effect is has. You know, if I have a component and I do the adjustment and I don't move, that's confirmation. If it does move, I need to think about it.

And, again, that piece goes to the IDP to say, you know, when I adjusted the factor, it moved. You know, it went high on me when I made this change in the model. And then let them actually consider all of the information that you have and make a final determination.

MEMBER APOSTOLAKIS: Yes. But the sensitivity studies are based on what is already in the baseline PRA --

MR. HARRISON: Correct.

MEMBER APOSTOLAKIS: -- which may be a

problem.

MR. HARRISON: Right.

MEMBER APOSTOLAKIS: Well, you remember from the IPEs that some licensees really use the very, very low numbers for human actions.

MR. HARRISON: Right.

MEMBER APOSTOLAKIS: So the peer reviewers are expected to catch that?

MR. HARRISON: Within the internal events there's a -- we've got a standard now that we're -- that's out for trial use. Either the peer review or the self-assessment is supposed to look at the standard of how they do things or what's required and see if they meet that standard.

If they meet the standard, we then will look to make sure we agree with that as part of this process. And we'll move on from there. It's -- I can't guarantee you that a peer reviewer is not going to miss something or is not going to --

MEMBER APOSTOLAKIS: This seems to be a recurring problem, and I'm wondering why we have to talk about it all the time. Why is there such reluctance to address it head on and say maybe the conclusion you gave us earlier -- it doesn't matter, or if this thing appears tomorrow and we handle it

this way, what's the problem? Why don't people --

MR. HARRISON: Well, I think that does happen, though. I mean, my experience with license submittals -- they address the peer review comments exactly that way. If a peer reviewer makes the comment, then they respond to it.

MEMBER APOSTOLAKIS: But I don't want to rely on the peer reviewers. I want the agency to have something -- to have some documentation that we have looked into these things, and we have satisfied ourselves that there is no problem. Or if there is a problem, we take care of it. Why should I rely on peer reviewers that -- I don't know who they are. I don't know what their backgrounds are.

And after all, 20 years ago everybody thought human error was not important. Well, that's the truth. So why would I expect them now to know that the French have done something that shows that the numbers are higher. You know, I mean, very few people know these things.

So I'm really surprised that there is such reluctance to get into this thing, which I -- I don't think it's -- it shouldn't be such a big deal.

MEMBER ROSEN: I don't think you're characterizing it right, Donnie. The process, as I

understand it -- when the licensee comes in and asks for approval to categorize his components, you're going to look at his PRA, and you're going to look at how he has treated, for example, human error.

MEMBER APOSTOLAKIS: Right.

MEMBER ROSEN: If he's using those very low numbers that we've seen used in the past, these guys will pick that up right off the bat.

MEMBER APOSTOLAKIS: I understand that. I mean, if they say it's 10^{-6}, probably that would raise a flag.

MEMBER ROSEN: Right. And then the licensee will have to correct that before -- so I think it's embedded in the process.

MR. HARRISON: That is correct. It's not like we turn a blind eye. I mean, when we do license amendment reviews now, if we know a licensee has traditionally used small values, we'll look at that.

MEMBER APOSTOLAKIS: But, you know, when I read that paper by Blye and the other guys, they said one -- they found that one significant model uncertainty that affected CDF was the HVAC success criteria. I didn't know that. I had no idea. Why did that find that? Not because they're very smart; because they looked. They did a few things.

And I'm wondering why we can't do the same thing and look at a few things and say, you know, this appears to model, this appears not to model. Why would the reviewers know this, unless they have read the paper?

MEMBER ROSEN: Well, George, I think that the reviewers I'm counting on are just the same ones you want to count on -- the staff review. The peer review is helpful, don't misunderstand, but for regulatory purposes the -- all the regulators are going to do is know there's going to be a peer review.

But they're relying a priori on their own expertise and knowledge, and they will know what we do in some circumstances.

MEMBER APOSTOLAKIS: No, because --

MEMBER ROSEN: HVAC, for instance, in the auxiliary buildings -- electrical auxiliary buildings, in particular -- can be very important and very -- very risk-significant in certain loss of power scenarios. Those buildings overheat very quickly because of all of the heat sources in them, and they can lead to unavailability of key safety components.

So HVAC figures in a lot of risk-significant sequences, if the PRA is done right on those circumstances. So it's not a surprise to me to

hear that, so I'm relying on the staff expertise. I think they have it.

MEMBER APOSTOLAKIS: Now, remember, the staff will approve the process, right?

MR. HARRISON: Right.

MEMBER APOSTOLAKIS: They will not review individual --

MR. HARRISON: We won't look at individual submittals or individual system pieces, but we will, as part of our process review, look at the PRA quality piece of that. So I would expect that the reviewer would look at --

MEMBER ROSEN: Wait a minute. Wait a minute. What I don't want to be hearing here is that you're going to go what we used to call "procedure-dumb." You know, we're going to get process-dumb in the NRC. All I do is follow this procedure. I'm not -- I don't have to engage my brain. All I have to do is follow this -- in this case a licensing procedure. No, no. We don't hire guys who know about PRA not to use their PRA expertise.

MR. HARRISON: Right. Right. Now --

MEMBER ROSEN: We can hire anybody that -- anybody can be procedure-dumb. If we just give them the procedure and say, "Follow this," that's not the

point.

MR. HARRISON: Right.

MEMBER ROSEN: We want to give the people who know something about the subject matter a procedure to follow, just so that we can organize the work. But we expect them to use their knowledge and experience.

MR. HARRISON: Right. And the way we do the review would not be if someone -- if a licensee came in, said, "I'm applying this to System X, service water, and that's the only system I'm going to do right now, I can back and do later, here's my categorization process."

We will review and approve the categorization process. We will not just look at service water with a blind eye and say, "Is the PRA related to service water acceptable?" We will look at the whole PRA, because we don't know where he's going to apply it in the future. So --

MEMBER ROSEN: Are you going to look at what systems come out significant-- risk-significant?

MR. HARRISON: What we would do is we'd look at -- well, we may not know the answer to that, but what we'd do is we'd know within the -- again, the PRA quality review of that would be to look at, does

their PRA meet the standards that are out there?

MEMBER ROSEN: I mean, that's the -- when you say you won't know the answer, that troubles me.

MR. HARRISON: Well --

MEMBER ROSEN: It seems to me that the first question you ask after you understand that they did the PRA in accordance with the standard, and blah, blah, blah, the peer review and all of that, they did internal events and they did external events, and so and so, you know, the structure, the first question you ask is: what systems come out risk-significant? And what are the functions that are risk-significant?

And if you get answers to that that are generally consistent with your understanding of the plant design, then you can go on to the next thing. But if they come out and say, for example, that service water is not risk-significant, well, you say, "What? It always is risk-significant." Electric power -- auxiliary -- I mean, onsite electricity is not risk-significant.

Well, it may not be, but you need to explain it. You know, some plants with very, very robust offsite power networks may not have risk-significance because of onsite power.

MR. HARRISON: Yes.

MEMBER ROSEN: But it would require some discussion. It's not something you'd give an A priority. So I'm counting on the staff to ask at least those threshold questions. At least in my model of what -- how this was going to work, the staff was not going to go licensing procedure-dumb and just follow the procedure. They're going to get knowledgeable to some level of -- some degree on the substance of the PRA they're looking at.

MR. HARRISON: No. And I agree with your premise. The only point I would make is that the categorization process can be selective. And when they make their submittal, they don't necessarily have to say, "We've already done all of the calculations to tell you what we've determined is high or low." Odds are if it's high, they're not even going to categorize that system. They're just going to leave it, right? There would be no benefit, unless they can find components within the system to make low.

MEMBER ROSEN: Which is typically what happens.

MR. HARRISON: And --

MEMBER ROSEN: If function in the system is high, even though the system is high, there's lots of stuff in it that isn't --

MR. HARRISON: Right.

MEMBER ROSEN: -- and that's what you're trying to find.

MR. HARRISON: Right. Now, the first cut through would be at the system level, if they can make whole systems low. That would be the key. But, again, we're not -- it's an approval of the categorization process with a review of the PRA to make sure we have confidence that it will generate the results that then they can use.

So I'm not going to say -- we would have expectations -- if something showed up low that we thought would surely be high, we would have those expectations. But we may not -- the licensee may not tell us that, "Oh, I've gone off and made my, you know, RHR system low" with their submittal, because they may not have categorized RHR. So we wouldn't have the information at that point.

MEMBER APOSTOLAKIS: Okay. Let's move on.

MR. HARRISON: Okay. Now, just a point, that really hasn't changed since February.

MEMBER APOSTOLAKIS: Well, has anything changed since February?

MR. HARRISON: A couple of things.

MEMBER APOSTOLAKIS: Like what?

MR. HARRISON: We'll get to that on the next slide. One thing that is a change is more -- this is more of an editorial change. We moved up the last bullet her from -- it was a comment in the prior Rev C as a specific comment.

We moved it up into the general positions dealing with common cause failure and degradation mechanisms to point out that, really, that's a pass-through through the process. It's not necessarily something where they're going to adjust the risk sensitivity study to address degradation mechanisms.

They need to maintain those systems -- or maintain those programs, known degradation mechanisms, so that when they do the risk sensitivity study it's still valid. They don't take off a MIC program and then six years from now we start finding failures due to MIC. I mean, it's that type of thing. That program should carry through.

So that -- that's the point that it's trying to get at in the last bullet. So we just elevated it from a specific comment into the general positions.

The other three were from the last round. You know, if you --

MEMBER APOSTOLAKIS: So uncertainty -- oh,

I'm sorry. Go ahead.

MR. HARRISON: Go ahead.

MEMBER FORD: At the last meeting -- maybe this is related to the comments that came up in the February meeting about degradation. In 50.69, it says quite specifically you had to take into account aging mechanisms.

MR. HARRISON: Right.

MEMBER FORD: And yet in the NEI 00-04 document it says nothing at all about guidance as to how you treat them.

MR. HARRISON: Right.

MEMBER FORD: So from what you just said, could you just tell me again how that --

MR. HARRISON: Okay.

MEMBER FORD: -- is covered.

MR. HARRISON: Right.

MEMBER FORD: Where is the guidance, specifically?

MR. HARRISON: What we're dealing with there is -- is in the rule, I think it's in Section B on the submittal, the fourth part of that talks about needing to address common cause failures and degradation -- known degradation mechanisms.

I think you're right. When you look at

NEI 00-04, there's not a discussion of that. What we've done is said, as a position, you need to maintain those programs that address known degradation mechanisms and pass that through, so that on treatment -- you've identified those programs, so that on treatment you know to maintain them.

So that's why -- I refer to it as a pass-through. They're not really going to touch those programs.

CHAIRMAN BONACA: Let me just expand on these issues, because you've been -- we've been discussing right now three of the five or six recommendations we had in our letter of 2002.

In a response to the letter, we were told that these issues would be discussed and dealt with in the final, you know, development of the rule. And we haven't seen a discussion of these items. That's why they are being resurrected here. We are all begging for an answer about issues we raised two years ago, and nowhere we have found resolution in the sense of an answer to that.

So when I was preparing for this meeting at home, I began to look at the public comments. You know, each one of the public comments evidently was deserving of an answer in writing. But we haven't

seen an answer in writing for the comments we asked of the staff two years ago. At least -- I don't know if you've seen them anywhere. And I think this is really probing, again, on the same issues, and I'm puzzled. I was puzzled by it.

MR. REED: On the last issue, I think it's a matter of the way you look at it. I mean, NEI 00-04 and our Reg Guide are fundamentally looking at categorization. The issue of common cause failure and degradation is a treatment issue. Okay?

Now, the IDP and expert panel needs to be aware of that. Okay? When you -- if you're going to put something in box 3, okay, and it does have degradation, basically what you're doing is you're crediting something to maintain that. Okay? If it's a MIC program, or whatever, you are essentially crediting that program.

So the IDP has to pass that along and say, "Look, you know, in treatment you need to basically maintain this on that in order for us to maintain the assumptions consistent with the categorization process -- a rule requirement."

So that's -- I think that's what Donnie is trying to say. So if you look at NEI 00-04, or if you look in our Reg Guide, you're not going to see

treatment. It's not there. It's in the rule. Okay? And RISC-3 treatment is at a high level in the rule. Okay?

That's from the day one, basically, all the way back to basically 2000 -- or 1999 even. We've determined that we weren't going to get into the specifics on treatment and reviewing and approving that. So we've stayed at a high level.

We had several public comments on degradation and common cause failure, and we have in 90-some-odd pages of responses -- I'm sure we have some answers in there. I don't -- apparently not to the satisfaction of this committee, but --

MR. HARRISON: And, again, I guess I would say that the answer we'd try to give you for that from the last two years -- on this particular topic is that you're going to maintain that program.

MEMBER ROSEN: Well, with respect to treatment and degradation mechanisms, I think you have given a satisfactory answer. 50.69 is not set up to deal with the issues that Dr. Ford and Mario properly raise. I mean, the issue is, are you going to maintain the plant and deal with the known degradation mechanisms? But 50.69 wasn't set up to -- you know, to deal with that.

Those are programs that are in place. The only thing we want to worry about with 50.69 is that somehow it doesn't -- those programs don't inadvertently get taken off or somehow deemphasized. And that's the issue.

And I think you've properly said that's passed through, that -- IDP has to make sure that some sort of treatment for the service water system -- it might have MIC or some other form of active degradation. It isn't because someone decides that a piece of it goes in RISC-3. It isn't removed for that component or function.

MEMBER FORD: So does that mean -- if that's the -- you're nodding. Does that mean on the IDP panel there will be a materials expert?

MEMBER ROSEN: No, not -- no. But available for the IDP.

MEMBER FORD: So you could have a situation -- for instance, in this example, that BWR core shroud could be designated a RISC-3 component. And yet if it degrades, as it does, in a plant-specific manner, it need not necessarily be a RISC-3 component. So who is going to make that decision?

MR. REED: Clearly, if it degrades in the performance information, however you acquire on this

-- on this component, however you would do that, and if it did degrade and its performance wasn't consistent with the assumptions made in the categorization process, then you either must increase the treatment and make it consistent again and/or put it back up in the box 1. Not a good situation to put something in the -- back to box 1, if you're a licensee, after it's been in box 3 for a while. So it's something they certainly want to avoid.

MEMBER FORD: If I understand the rules for RISC-3 is that you -- you're no longer carrying Part 52, but you have the quality control release on RISC-3. So you could be building this core component, which is now said to be a RISC-3 category, out of what we really know are inferior or not adequate materials.

MR. REED: Nonetheless, the component must have design basis capability. It's really pretty specific about that. So I think if you knowingly build it out of something that clearly would not have that capability, you would pretty quickly be in violation of 50.69.

MEMBER APOSTOLAKIS: Now, in Section 7 of the Regulatory Guide --

MR. HARRISON: Okay.

MEMBER APOSTOLAKIS: -- you address these

issues.

MR. HARRISON: Right.

MEMBER APOSTOLAKIS: And you say on page 6, "The appropriate factor to use in the risk sensitivity study to represent the potential reduction in reliability due to the relaxation of special treatment must be determined in concert with the consideration of the potential for cross-system common cause failures and known degradation mechanisms."

MR. HARRISON: Right. Now, the parenthetical -- there's a parenthetical in there.

MEMBER APOSTOLAKIS: Yes.

MR. HARRISON: It says, "And retain defense against."

MEMBER APOSTOLAKIS: Right.

MR. HARRISON: So the point of that parenthetical it says, "If I maintained my program, then I can basically say that program is addressing that degradation mechanism. So my risk sensitivity study doesn't need to address it directly."

If someone were to want to come in and play with that program, or to back it off on a system, he would then need to look at that and say, "If I back off on that program, I'm going to have to adjust the fact -- I'm going to have to make sure my risk

sensitivity study accounts for that degradation mechanism potential."

MEMBER APOSTOLAKIS: But you go on and say here that the licensee has to demonstrate an understanding of the effects, an understanding of the programmatic activities, and c) to factor this knowledge into both the treatment applied to and the factors used to the RISC-3 SSCs.

MR. HARRISON: Right.

MEMBER APOSTOLAKIS: Now, the factors are the sensitivity and --

MR. HARRISON: Sensitivity. Well, this is the risk sensitivity study.

MEMBER APOSTOLAKIS: Is there any guidance on how this should be done?

MR. HARRISON: Beyond this, no. What we're saying is you should have -- you should have the knowledge that sets up, so that you can pass this information on -- on to the treatment side. But, no, we're not giving specific guidance on how to do that or what -- if you did -- if a licensee did say, "I'm backing off on my FAC program for this component, because it's low," we're not telling them how to derive that factor.

But I can tell you if someone did choose

to do that approach, we would be -- we would be looking with a finer tooth, you know, microscope or whatever, to take a look at that.

The expectation is most plants will not do that.

MEMBER APOSTOLAKIS: I know.

MR. HARRISON: And will pass it through. If someone does, we're going to have to look at it.

MEMBER APOSTOLAKIS: On Section 6, you say that the NRC notes that the draft --

MEMBER ROSEN: What page are you on?

MEMBER APOSTOLAKIS: 5.

MEMBER ROSEN: Page 5.

MEMBER APOSTOLAKIS: The NEI report does not address modeling or data uncertainties explicitly. The applicant or licenses must address uncertainties consistent with Section 2.215 of Regulatory Guide 1.174. Do you think they're going to do that? Has anybody ever done what the Regulatory Guide says?

MR. HARRISON: Well, the --

MEMBER APOSTOLAKIS: I don't think so.

MR. HARRISON: The expectation here is is that, yes, that will be done. And we will --

MEMBER APOSTOLAKIS: But you just argued earlier that nobody needs to worry about model

uncertainty.

MR. HARRISON: Well, no, I -- I wasn't arguing that. What I was arguing was -- was in a particular case the uncertainties -- their impact was insignificant for their submittal.

MEMBER APOSTOLAKIS: And nobody doubts that.

MR. HARRISON: But you have to walk through that rationale. Well, and again, that's -- as part of this rule, they're going to need to do that. And what this position is is, at least the attempt is to point -- make it clear that we want a discussion of the key sources of uncertainty. We want to know modeling uncertainties, and we want those addressed.

MEMBER APOSTOLAKIS: But isn't the purpose of a regulatory guide to give guidance? Just telling them --

MR. HARRISON: Well, I think the guidance in Reg Guide 225 --

MEMBER ROSEN: Section 225.

MR. HARRISON: Section 225 of Reg Guide 1.174 I think is clear enough for people to know what they need to do. This is just saying, "Go do that. As part of this application, you need to go do that."

MEMBER APOSTOLAKIS: Anyway, why don't we

go on, because we have to save some time for NEI.

MR. HARRISON: I'll speed up. We'll just go to the specific comments. These are just the categories we had. We had a number of interpretations, clarifications. Many of them carry over from what we had made -- these clarifying comments on Reg Guide -- on Draft Guide-1121.

There were a couple of additional things added in that were what I called regulatory or legal clarifications, where the use of the phrase "important to safety" was pointed out to be -- from the Legal Department, it was incorrectly used. So we've provided a clarification of what we -- in this context what was meant by that phrase.

There were a number of technical clarifications. Here's a few examples of those. Just real quickly, when you do a seismic PRA, you can screen out buildings and piping and large components because of their seismic robustness. They are so robust you don't even model them. That fact needs to be captured by the group that comes in and does the sensitivity studies on seismic PRA, to know that some things are inherently robust. And so by definition, they are high, because you're counting on that robustness not to model them.

If those components get called low, then you've inherently established a design criteria on that component to -- it's got to have that seismic robustness, because you took credit for it.

The other one is just there was a piece that was missing in the NEI guidance where it talked about peer review findings. There's also the need to do a self-assessment, and so those findings have to be addressed.

And then there was just some additional -- there's a list of five items that the NEI guide had on IDP considerations. We suggested some tweaks to those five, and then added another four as part of the IDP consideration of components.

And then the last one is -- that's the technical objection that we had. In the final draft there was a discussion in a paragraph on the risk sensitivity factor that's used, and we basically have said that we disagree with the way that factor is derived and implemented. And the point here is this is really an implementation issue. It's not necessarily a categorization issue. It's --

MEMBER APOSTOLAKIS: Can you tell us a little more about this?

MR. HARRISON: Yes. If you -- it's in

Section 8, and --

MEMBER ROSEN: Of? Section 8 is --

MR. HARRISON: -- of the --

MEMBER ROSEN: NEI guide?

MR. HARRISON: -- of the Reg Guide 1.201.

MEMBER ROSEN: Section?

MR. HARRISON: The paragraph is in Section 8, too, so -- but there was a paragraph in there that talked about how they would look at future performance of the SSCs. And if they had expected, in a group of SSCs to have five failures that -- and they used a factor of three in the risk sensitivity study, that then this wouldn't be an issue for that group until they got to 15 failures. And the staff has said that that's not -- that's not an appropriate way to look at how to do this.

And then we provided what we believe a program should have, which is when I have a failure -- again, we're passing through this degradation mechanisms and the common cause failures, if I have a RISC-3 component fail, we're not saying go out and do an exhaustive corrective action program on it, but we're saying look at it and assure yourself that this is not a common cause failure potential, or that it's because I did something that's affecting my -- my

performance globally.

Do that look, if you can assure yourself it's just a random failure, you know, the lightbulb blows, then fine. But if you think it's a potential common cause failure, or a fact of I took treatment off and now the failure is exactly because I took the treatment off, I should go back to look at the rest of that group and say, "Is there a problem here?" And I should address it at that point. I shouldn't wait until I get 15 failures before I start asking those questions.

MEMBER APOSTOLAKIS: They didn't object to the limit of 20 for RAW for common cause failures?

MR. HARRISON: No. We've discussed that with the industry a number of times over the last two years about how to deal with common cause failure and the importance measures, because what happens with that is you end up getting a system-level -- if I'm looking at a component but I use common cause failure, I'm really getting a system-level importance. I'm not getting a component importance.

And so it was discussed back and forth how to properly address the RAW value for that, and --

MEMBER APOSTOLAKIS: I don't understand that. Why? I mean, isn't that an event like any

other?

MR. HARRISON: Gareth Parry is laughing at me now. So --

(Laughter.)

You know, it's -- there's a number of ways you can look at it. You could say this is a -- the common cause failure modeling is a convention of convenience. It's a mode of failure that a group of components can have, but the way we model it in the PRA is as a basic event, as if it were a different component, right?

There are a number of different proposals of how to deal with that, from ignoring it completely to addressing it as just part of the component, to using it -- if you use a multi-Greek letter, to use the beta-gamma if it's a three-component system, and let that represent the component, recalculate your RAWs from that.

It was proposed to go this route, where if I have a RAW of two, and a typical system gets you about a factor of 10, then a raw of 20 would represent what a common cause --

MEMBER APOSTOLAKIS: I didn't follow that.

MR. HARRISON: If I have a single train, and I go to a two-train system --

MEMBER APOSTOLAKIS: Yes.

MR. HARRISON: -- that I should gain an order of magnitude reliability in that. Okay? So if I'm looking at trying to figure out the component level, the rationale that's behind all this, then I increase my RAW value by 10 to represent the change from a component level to a system level, or a train level to a system level.

MEMBER APOSTOLAKIS: I don't understand that at all. I have a PRA, and the purpose of the importance measures is to tell me that if I change this to always down, what happens to core damage frequency? And if it's more than two, I think I just look at it. But when it comes to common cause failures, if I change it, and I say the thing is always down, and the CDF is multiplied by 10, I say, "No, I'm not going to look at it." Why not?

MR. HARRISON: Again, that -- part of this may be as an artifact of also how we're doing this. If the baseline analysis gets you a RAW that's over 20, it's high, and it will be high. If I do my sensitivity on common cause failures, and I push it over that threshold, now the IDP can look at it and consider it.

MEMBER KRESS: I think George is saying

that it seemed like you should have divided by 10 instead of multiplied to get the threshold for things subject to common cause effect.

MR. HARRISON: No. You would have to do it -- if you're going to do anything, you'd have to go to a higher RAW value to represent it correctly. Again, because if you did this on a beta-gamma, you would have moved upward. You wouldn't have gone down. So --

MEMBER KRESS: Well, let --

MR. HARRISON: But, again, this is the convention we settled on.

MEMBER KRESS: I mean, you're wanting to take -- you're wanting to include those things subject to common cause, and they're safety-related because they have a big effect. And so the threshold you choose -- you say these things -- you take a bunch of them out and say, "These are subject to common cause failure." If the RAW for each individual one is two divided by 10, then you're including a lot more of them, because they have a bigger effect. It seems to me like you ought to divide to get the threshold.

MEMBER APOSTOLAKIS: I have to think about it.

MEMBER KRESS: Well, think about it. It

looks to me like --

MEMBER APOSTOLAKIS: Yes, but it --

MEMBER KRESS: I might be looking at --

MEMBER APOSTOLAKIS: The counter argument may be that it's a flaw of RAW, because in RAW, in the risk achievement worth, you take a probability and you set it equal to one. And you can make an argument that here, you know, it's a failure of a system. The probability is very low, and now you are setting it equal to one. You've lost a whole system.

MR. HARRISON: Right. That's essentially what you do.

MEMBER APOSTOLAKIS: I mean, you do expect an impact on the CDF. Now, how high can you tolerate? And I think that's an argument that they are coming from, yes. Maybe -- I don't know, it's the way it's modeled as a separate event. Perhaps that's the problem.

MR. HARRISON: That's part of the problem is is because of -- the way we do the modeling creates the problem. But --

MEMBER APOSTOLAKIS: But why 20 and not 19?

MEMBER ROSEN: Well, in fact, other --

MEMBER KRESS: Why two?

MEMBER ROSEN: The prototype for this was that we used 10 for that -- that SDP, not 20.

MEMBER APOSTOLAKIS: Oh, 10.

MEMBER ROSEN: Yes.

MEMBER APOSTOLAKIS: Yes.

MEMBER ROSEN: So the answer is you can use a different number. What you're trying to find out: is this component going to be sensitive, create a sensitivity for this common cause failure on it?

MEMBER APOSTOLAKIS: I think --

MEMBER ROSEN: And the answer, if you use 10 or 20, is either yes or no. And it goes to the IDP. The IDP has to decide, oh, well, we could lower this to RISC-3, but because of the potential, what we know about the way we do work around here, etcetera, the potential that this component could result in some sort of common cause failure is high enough in our view that we're not going to move this to RISC-3.

MEMBER APOSTOLAKIS: I think the root cause for all of these discussions is that we were never presented with some study, some analysis. Like what Steve just said -- they used 10. They did certain things and convinced themselves that it's a reasonable number.

We always have to take what you guys are

saying on faith, that this is important, this is not important. What we're doing is conservative, and we have to say, "Yes, you are." Why is it so difficult?

You know, for two years now, to come back here and say, "We did these studies. We took a number of 9, 12, 13, 20, and here are the results. Here are our reasons 20 is a good number." We've never seen that.

MEMBER KRESS: Except you have to do that for a number of plants, because it's going to be plant-specific.

MEMBER APOSTOLAKIS: Yes. So, you know, that would be part of --

MEMBER KRESS: It's not a trivial job. It's --

MEMBER APOSTOLAKIS: Yes. And the other thing about model uncertainty, the other thing about the sensitivity studies, we were never presented with anything like that that is convincing, that, yes, what we're doing is okay.

MEMBER ROSEN: That's a Research effort. And I think as Tom points out, it's plant-specific, it's maybe system-specific, and may be common cause-specific.

MEMBER APOSTOLAKIS: What do I do now that

I have none of these analyses? You see, that's the thing. I mean, it's a little involved to do the analysis perhaps when you have to think about these things. But that's much better than having to take it on faith now.

MEMBER POWERS: George, do we have anything coming out of NUREG-1150 that would give us -- I mean, what you're looking for is not whether it's 19.1 or 20.678. But, rather, is it generally in the region around 20? Is it generally in the region around 10, or what? And do we have that kind of information coming out of NUREG-1150?

MEMBER APOSTOLAKIS: I don't know.

MEMBER POWERS: What I'm pretty sure is that it would not be an enormous chore to get that out of 1150. It's all there.

MEMBER APOSTOLAKIS: Everything is there, yes.

MEMBER POWERS: The software is all set up to do that sort of thing.

MEMBER APOSTOLAKIS: We have all of the PRAs now. I mean, it --

MR. HARRISON: What I would offer on that is on some of these points, again, I think you're making an argument, again, for why it would be good to

put this Reg Guide out for trial use. It would be an opportunity to go out, especially like on the Surry pilot, and ask, "How many things showed up in your CCF that's greater than two but less than 20? How many things showed up in that range? And how many things showed up at, you know, 1.9 or just barely below that range?" It would give us an opportunity to actually do that.

MEMBER APOSTOLAKIS: Well, I don't know. I mean --

MR. HARRISON: At least you'd have one -- one study that did that. But --

MEMBER APOSTOLAKIS: So you have 10 minutes.

MR. HARRISON: Okay. We'll jump real quickly then to IDP considerations, and then we'll maybe skip the trial use piece, or we'll talk about it briefly.

I just put this slide up because I know this was a topic that came up at the last February meeting. And I just want to say that, in just looking at this, the rule requires that the IDP be staffed with expert plant-knowledgeable members. That's all it says. It doesn't give you any specific knowledge beyond that.

The NEI 00-04, Section 9.1, provides additional information. Some of this, again, I would expect during the review of the categorization process that the staff would review this material and make sure it's agreeable to us, that this forms the expert panel.

The licensees are supposed to establish specific requirements to ensure and maintain adequate expertise. The key areas of expertise that's emphasis is the specific plant and experience with the plant-specific risk information, and also they are supposed to have described an informal plant procedure, including training and qualifications of the members.

So with that, the last bullet just points out that after the meeting last February I was aware that the ASME/ANS standards development organizations got together, and this was one of the things that came up in that meeting. I know they're forming an oversight or a management group to look over the standards development. This might be something that they consider in the future. Is there a need for IDP guidance -- standardized guidance?

So I'll just put that out there.

We'll go to trial use real quick. This was our rationale for trial use. There remains the

one technical issue on the use of the risk sensitivity study, the factor in there. There is also some supporting documents that the NRC and the industry haven't come to closure on, and I just throw up an example. Here is the N-660 guidance still in process.

We don't expect any major changes through the trial period, but we definitely are going to learn some things. And, again, if we get surprised by something, we'd have the opportunity to --

MEMBER APOSTOLAKIS: How many pilots will you have?

MR. HARRISON: We have not actually established formal pilots. We refer to pilots -- it's really -- like Surry is already in process doing this, and they're part of the PRA quality pilot. So we would -- if you will, we're trying to piggyback on top of that to learn lessons here.

And Wolf Creek is also doing work. Right now, they -- like I said, they just finished their IDP a month ago or something like that.

MR. REED: Yes. Westinghouse Owners Group is supporting both Surry and Wolf Creek. And what I referred to in this package as a submittal pilot for 50.69 purposes, where they provide a submittal, we'll look at it. You know, this is sort of -- pretend this

is how it's going to work. They have provided a submittal review and approve it kind of thing.

And, of course, in doing that we would have to address some of these key issues that have been bouncing around the committee this morning. And we hope in the resolution of that we'll close some of these holes in the Reg Guide.

MEMBER APOSTOLAKIS: The first bullet, "Remains number one technical issue," what is it that remains number one?

MR. HARRISON: Oh. Remains one technical issue -- that's just my shorthand. That's the issue that the staff had on the risk sensitivity factor that --

MEMBER APOSTOLAKIS: Oh. You mean there is one technical issue that remains.

MR. HARRISON: Right. Thank you.

MEMBER APOSTOLAKIS: Okay.

MR. HARRISON: One of these days I'll learn English.

MEMBER SHACK: That's great, George. He just puts it backwards.

MEMBER APOSTOLAKIS: We figured it out, didn't we?

MR. HARRISON: Shorthand. Okay.

And just in summary, again, there's the one technical issue we have, and we're working with NEI on it. We're going to continue to work with NEI as they develop additional final versions of NEI 00-04, so that hopefully we can endorse it, and the issues that we've raised here will go away. And we'll continue to work with staff through the early implementation of --

MEMBER APOSTOLAKIS: Let me ask you a couple of questions. With respect to treatment, Tim told us earlier that the rule itself is -- gives high-level guidance. Do you expect in the future to have some regulatory guide or something -- guidance document or you will approve them on a case-by-case basis or --

MR. REED: We're not reviewing and approving RISC-3 treatment, and at this point in time we do not expect to have any regulatory guidance on RISC-3 treatment.

MEMBER APOSTOLAKIS: So the licensee will decide what to do.

MR. REED: Yes. If we get into that, it would be through inspection. And even there, our inspection program would tend to look at the safety significant aspects of the 50.69 program, and would

tend not to look into the RISC-3 treatment, except for common cause and those kinds of things, which can make RISC-3 become --

MEMBER APOSTOLAKIS: Okay.

MR. REED: -- significant.

MEMBER APOSTOLAKIS: And the request for a letter today, do the rule and the Regulatory Guide go together? Or do we have to make separate recommendations? Or is it up to us? Well, what are you requesting? You are requesting approval of both, right?

MR. REED: I'll leave it to my management.

MR. MATTHEWS: Given that we've written the regulatory -- this is David Matthews, Director of Regulatory Improvement Programs. Given that we've written the Reg Guide as if we were going to endorse with conditions, we would like your endorsement of that -- that combined package, which is the rule -- the Reg Guide endorsing 00-04 with conditions, and I want you to look at our conditions -- okay -- with the expectation that we would hopefully end up with a final NEI document that would absorb those conditions and agree with them, such that we could issue a Reg Guide later that would be a blanket endorsement.

But either way your view would be that the

staff's position with regard to NEI 00-04 is the appropriate position. Okay? And we would like a letter that would endorse both that position and the rule.

MEMBER APOSTOLAKIS: Okay. Any questions for the staff before we move on?

MEMBER SHACK: Just one. The risk sensitivity always keeps coming up. The one I'm concerned -- you know, you -- when they're sort of doing the final delta CDF to assure that the overall risk is small, we have the two to five factor. And then there's the statement that, you know, you have to really pick the factors, so that you can detect it.

And, you know, since we're looking at reliability under design basis events that we don't expect to happen very often, has anybody actually looked at the practical implications of, you know -- does that really mean reliability under the design basis events, or sort of the nominal reliability that are -- that's in this thing in the first place?

Is it a practical thing to do, what's being asked?

MR. HARRISON: Yes. The way to interpret that is it's the nominal. We're not saying go off and do a design basis, you know --

MEMBER SHACK: So we're looking at the wrong reliability.

MR. HARRISON: Well, it's the only reliability information you're going to get. It's not necessarily the wrong reliability. It's the information that's available, that you can do, because when --

MEMBER SHACK: Well, it's like saying, okay, I'm going to solve the problem I can, even if it's not the right one.

MR. HARRISON: But, again, remember Tim's piece about you still have to make sure you have design basis functionality. So it's got to be designed to work under those conditions. When we go out and we test a component, we don't test it necessarily under full design basis conditions -- or we can't do that test. So we test it, and we get the information we can get from that, and we use that information. It may be a practicality point on that is --

MR. MATTHEWS: On occasion, it's inferential information --

MR. REED: I mean, that has certainly been an issue --

MR. MATTHEWS: -- with what we have.

MR. REED: That has always been an issue, trying to understand what the reliability of these components are under true design basis conditions. I think there's a pretty significant level of uncertainty involved there. That would continue and probably increase for RISC-3, and I think that's part of the -- part of this framework.

MR. HARRISON: That's a current issue.

MR. REED: And we can deal with that uncertainty increase, but I can't solve it. I guess that's not a good answer, but that's the truth.

MEMBER APOSTOLAKIS: Any other comments? Questions?

Well, gentlemen, thank you very much.

Now we will give the floor to Mr. Pietrangelo of NEI.

MR. PIETRANGELO: Good morning. I didn't think we'd have a lot to say this morning. The slides on the rule package certainly weren't chock full of information. Based on the discussion, I think I can fill up my time here this morning.

Let me start with a Part 52 discussion. All right? I'm not an expert on Part 52. I haven't worked on it directly. Obviously, that's a design certification rule for advanced plants. 50.69 is not

a design rule. It is a treatment rule. So right off the bat I have a problem seeing any relevance whatsoever.

Second, there has been no prior discussion with us certainly on this aspect of the rule. It's been in the proposed rules. We didn't have any comment on it before. So it's a little bit disconcerting that this is coming up now at this late stage of the game.

50.69 was viewed as a means for future plants to potentially reduce costs associated with a new plant, so it's important. This isn't a trivial matter. And to put that on the licensee after the COL -- after the design certification is done I'm not sure accomplishes that purpose very well.

So, again, I don't know the exact language that's in Part 52. I know 50.69 doesn't change any design requirement, so I'd ask you to look at that again. It be an issue that the staff needs to tee up for the Commission. Obviously, we haven't seen the thing and haven't had any discussions with them on this, nor have our people working on Part 52.

So I'm just a little bit concerned that, a) it's coming up now, and b) what the potential implications are for future plants.

MEMBER APOSTOLAKIS: So you disagree with what the Staff --

MR. PIETRANGELO: This is the first time we've heard the concern.

MEMBER APOSTOLAKIS: So you don't know. You don't know whether it --

MR. PIETRANGELO: Because it's 50.69 doesn't do anything with the design. I have a hard time seeing the connection there. I mean, you're going to still have safety-related and non-safety related SSEs for a Part 52 design certification. 50.69 does not change. They're still either safety-related or not safety-related. They're either just RISC One or RISC Three, and that only applies to treatment requirements. I have a hard time seeing how anything we do in 50.69 would undo anything in Part 52.

MEMBER APOSTOLAKIS: That was my question to, the money. But I guess your position is that we shouldn't even talk about 52 and 50.69 in the same meeting.

MR. PIETRANGELO: Well, I'm just saying i don't see the connection. This has just come up now.

MEMBER APOSTOLAKIS: I understand.

MR. PIETRANGELO: We haven't had any

discussion with the staff.

MEMBER ROSEN: You're saying that it is always in your view the option of the people who are proposing the plant, be it just a vendor or the vendor applicant combination to go right through into 50.69 as part of the submittal.

MR. PIETRANGELO: I'm worried about the potential benefit here with procurement costs for some of the SSCs.

MEMBER ROSEN: Sure.

MR. PIETRANGELO: Again, I'm not exactly sure how the process works, but if you wait to do it after the design certification, I think all the equipment might already be procured.

MEMBER ROSEN: Yes. Well, that was my point. Tony, do you remember when I mentioned during this meeting that the vendor, NSSS vendor could be doing this analysis in parallel.

MR. PIETRANGELO: That's correct.

MEMBER ROSEN: And this PC submits and this PC he almost submits, but doesn't. He holds it back. He gets his design certified. He gets a site pick with his client, and at that point, because the client knows what this content of the 50.69 analysis is, which is a dramatic reduction in treatment let's

say for a lot of stuff. He's done his costing based on that, perhaps, all those things that are important for the decision to buy the plant in the first place. And as soon as the site is picked and you get an early site permit and all the other things, he submits the analysis.

Now the likelihood that the staff will suddenly say, well, you can't do 50.69. The point is it's in the rule and he's allowed to, so I'm not exactly sure -- I understand your concern but I'm not exactly sure it would play out to be a problem.

MR. PIETRANGELO: I don't know either. It's just coming up real late in the game, and we haven't had any discussion on it, so I'm just trying to raise it --

CHAIRMAN BONACA: It's something that you want to procurement. I mean, you want to make sure the procurement --

MR. PIETRANGELO: If that part is taken care of, then I wouldn't have any --

MEMBER ROSEN: Well, the procurement is typically -- the kind of procurement you're making is for early components with the major NSSS components, maybe the turbine generator. Those things you're going to know where they're going to end up. It's all

the other stuff that --

MR. PIETRANGELO: I just don't know. That's all, I don't know. And again --

CHAIRMAN BONACA: You may be right. The NSSS --

MR. PIETRANGELO: Yes.

CHAIRMAN BONACA: That's one way, but I can understand.

MR. PIETRANGELO: Yes. The other point I wanted to make here is that I don't we want this issue to hold up this rule making either. All right.

MEMBER ROSEN: Will it?

MR. PIETRANGELO: Well, I'd rather see if there's a change necessary do it in Part 52 space. Don't do it in 50.69 space. That's my parochial perspective.

MEMBER ROSEN: In other words, what you are suggesting, somebody would come in grab Part 52 that says --

MR. PIETRANGELO: Well, again I'm not --

MEMBER ROSEN: You can do 50.69.

MR. PIETRANGELO: I'm not an expert on all the change control mechanisms in Part 52, but it seems to me for something that's not related to design, it shouldn't be that hard to do.

MEMBER KRESS: Well, it is related to the design, because it's part of the design basis. This is safety-related --

MR. PIETRANGELO: That doesn't change, Dr. Kress. It doesn't change. It's only treatment.

MEMBER KRESS: It could be you're right.

MR. PIETRANGELO: Okay. We haven't seen the rule language. And even the presentation in February wasn't very explicit on changes from the proposed rule and the final rule based on comments received from stakeholders. To try to comment on that now, not knowing what's in there, is dangerous for me to do. Nevertheless, I'm going to presume that I know what's in there to some extent.

Let me go back a step first. We had a lot of discussion this morning on this thing already, and what 50.69 does. Let me try to simplify it. If we go through a very rigorous process to demonstrate that SSCs are properly categorized. It doesn't change the safety-related, non-related classification. It just gives them a high or low safety significance. And we spent the better part of the last five years making sure that that process is very rigorous every step of the way. The risk sensitivity study at the end is really an adjunct to the categorization process. It's

designed to demonstrate the rigor of that process.

We also use it later on in terms of our monitoring of the SSCs that are categorized as low, and I'll come back to that point in a second.

The rule exempts you from certain special treatment requirements, the ten listed in whatever section it is in 50.69. I don't remember the particular section. It should be very clear. If the SSC is categorized as low after you get through that process, and it's like running the gauntlet. It's not easy to get through that process and still be low at the end of the day. Okay. But if you get there, those special treatment requirements you're now exempted from.

In lieu of those, there are four high level treatment requirements in the rule, basically aimed at maintaining the design-basis functionality of those SSCs.

What muddies the water on this, and which remains I think a significant issue towards long-term success of 50.69 is when you start trying to back away from what's in those 10 special treatment requirements and tie them up with other things. And that's what this known degradation mechanism business is about. It's okay to exempt them from the special treatment

requirements, except if that treatment was dealing with some known degradation mechanism. Now you've got a caveat on those 10.

To the extent that one of the special treatment, or one of the high level treatment requirements in the rule even includes language from one of the special treatment requirements that you were exempted from. And I'm speaking to EQ 50.49, and the design control high level treatment requirement. Again, I'm presuming what's in there, but the same language that's in 50.49 is in the high level treatment requirement.

Most of you have been in our business for a long time. When you see language that's been there for years, and years, and years you know what it means, hopefully, through implementation. If you use the same language from the requirement that you're exempted from, what does that tell the implement. You want him to do something different? You're supposed to do something different to these SSCs if they're low. If you use the same language from the rule that you were exempted from, what are you telling the implementer? What are you conveying to that implementer?

We've commented on this probably four

different times to the staff, and this is a shell game. You have the rule exempted, and then you see the same language back in the treatment requirement, so I'd urge you to look at that very closely. I'm assuming you have the 400 pages that have the final ruling, so I'm, again, at a disadvantage here. I'd ask you to look at the closely, and whether that's really the right thing to do in terms of this.

It's very difficult to try to do treatment at the same time you're doing categorization. There's a lot of things we don't know how to model in the PRA. Okay. Specifically, a lot of these quality things. We don't know what factor to assume if we change the treatment. There is no research on that. Okay. So we keep doing these bounding things all along the way.

All right. The issue the staff has is not with the factor and how it's established. It's how you monitor against that factor. That's the remaining technical issue. They've sent us their latest letter. It has what they want us to do to address this. All right. We still need to have more discussion on this. But based on a single failure, on a low safety-significant SSC, the rule is going to require a corrective action, as well as there's language in there that we commented on to pick up the significant

condition adverse to quality, which really means do an extent of condition evaluation on the failure. We're required to do that anyway. Everybody knows what that means, but what they sent us back and prescribed what you should do if you find one of those things, immediately change treatment, immediately go test everything else on a low safety-significant SSC on one failure. We're not going to do that.

I think that's an overreaction to the failure of a low SSC. We still have to meet the requirements in the rule, do the corrective action, and look at extent of condition. That's what we're required to do. That's the same language, basically, that's used in Appendix B.

MEMBER APOSTOLAKIS: Doesn't the maintenance rule still apply?

MR. PIETRANGELO: No. That's one of the treatment requirements that's exempted from these RISC-3 SSCs. What we've proposed, and again, we want to have more dialogue with the staff to make sure we do this right, is to look at the number of failures that occur on RISC-3 SSCs to see whether it's in line with these presumptions we made in the risk sensitivity study about the increase in failure rate. It doesn't obviate us from doing the corrective action

and the extent of condition on any single failure of a RISC-3 SSC.

MEMBER APOSTOLAKIS: Do we have a copy of that letter, Mike?

MR. PIETRANGELO: The staff letter?

MEMBER APOSTOLAKIS: Is that the private thing?

MR. PIETRANGELO: No, it can't be.

MS. McKENNA: This is Eileen McKenna from the staff. The letter that was sent to them in essence captures the issues in the Reg Guide, so it's the same information that you saw in the Reg Guide.

MEMBER APOSTOLAKIS: I'd like to see it anyway.

MS. McKENNA: We can do that.

MR. PIETRANGELO: I'm not trying to say that known degradation mechanisms are not important. They are, but that's something for the treatment people to look at. We're experienced with that equipment. They know what those mechanisms are, and they know what treatment applies to them, and they'll make the appropriate decision.

This is a performance-based monitoring approach for these RISC-3 SSCs. We'll look at the performance as we go forward, but to prescribe how to

do that that in a way undercuts the exemption from the special treatment requirements muddies the water on this, and presents regulatory risk for licensees in implementing this. That's the concern, and I think hopefully when the rule is finally issued we have clarity on this, because that's something that could really undermine the long-term success and hopefully broad implementation of the rule by the industry.

Okay. Trial use on the Reg Guide. I've been calling people here for the past week trying to get them to change this trial use. Obviously, I wasn't successful. Let me try to make the case here. We don't think this Reg Guide should be issued for trial use.

We've been working on this thing again for five years. We had four pilot applications of the categorization guidance, as well as an exemption request from a licensee that's now implementing this, so we've had five trial uses already over the past several years.

And let me distinguish this from what we're doing on Reg Guide 1.200, the PRA technical adequacy Reg Guide. The reason that was done as trial use was because we had a process in place, Reg Guide 1.174. This was the first standard endorsed, and this

committee is well-familiar with all the discussion that went into PRA technical adequacy. In fact, you had some more of it this morning. We didn't want the amendment request, the application and review process to apply to every automatically when that Reg Guide came out. We wanted to put it in a limited scope pilot program for trial use, because the standard had never been applied in any kind of trial form. Okay. So the trial use was to limit it to the pilot program. That's why it was trial use.

In this case the opposite is true. We don't want to limit the application of a final rule that's taken six years to develop. We want broad application of it in the industry. When you say it's for trial use that means well, we expect it's probably going to change. We've got to incorporate all these Lessons Learned-type things. In fact, in the staff slides they said they don't expect to make any changes in it.

MEMBER ROSEN: I think they said they expected the differences to narrow.

MR. PIETRANGELO: Well, even the two plants, Surry and Wolf Creek, are not piloting the categorization process. Surry is piloting this for the PRA technical adequacy for Reg Guide 1.200. And

Wolf Creek is really more aimed at developing a submittal template to help the review process along, not change anything in the categorization process.

Now we're committed, if there's something that comes up in implementation that requires a change to the guidance, then it's our guidance that's being endorsed. We'll have to step on that. I mean, if it's causing an issue, it's in our interest to change it to make it better, to make it work. We don't even necessarily need to revise any NEI 00-04 to develop a submittal template. We can do that on the side. But saying this Reg Guide is for trial use sends the wrong message out.

We don't want this to be of limited application. In fact, the success of 50.69 hinges on broad implementation by the industry, so anything that conveys or connotes regulatory risk or change, or instability, I think undermines the potential broad application of this. So I'd ask you to look at that very closely when you're writing your letter here.

Again, we think of the 12-page comment letter we got from the staff on the Reg Guide, all but two issues I think we can take care of right away. In fact, we'll probably send back this Friday a final draft Rev. 1. And most of those comments will be

addressed. There's the two, this monitoring and implementation. And there's another issue related to commitment management. All right. Those are the remaining two issues on the Reg Guide. And hopefully, once we see the final rule language if the Commission releases the SECY, we'll meet with the Staff in July. There's still time to get, I think -- our objective is to get a clean regulatory endorsement of NEI 00-04.

I think that's all I have to say on this.

MEMBER APOSTOLAKIS: Okay.

MR. PIETRANGELO: But again, we're looking for clarity and regulatory stability going forward with implementation of this rule. And some of these issues are longstanding, that deal with treatment of RISC-3 SSCs. If the thing is low, we should be able to use a performance-based monitoring approach, and we have to meet the high level requirements. Any more specificity beyond that cut into, I think, the scope of 50.69 in terms of the rules that we're exempted from.

CHAIRMAN BONACA: Well, let me just say that at least personally, one of the reasons why we wrote the recommendation in 2002 that additional criteria, or what we called risk metrics to include, for example, inadvertent releases should be used is,

in fact, the act that to eliminate RISC-3. In fact, we said that, because until you have certain components in RISC-3, if you're saying are not very significant for PRA, but they're still controlling certain paths to releases or late containment failure.

MR. PIETRANGELO: Right.

CHAIRMAN BONACA: Somebody is going to feel that they're sacred enough to put some additional requirements on RISC-3 components in general to capture those. And that's why we said maybe you should consider using some additional criteria to screen out those components there, and say those go to RISC-1, and all the rest goes to RISC-4, and there is no more RISC-3. That's the reason why we put it in. I mean, we discussed this and that was the intent of that, because we felt that by the time you get to this point, you're going to have no requirements, but you're going to have some requirements, and then this issue becomes how many requirements and what kind of requirements, and so on. Here we are doing this now. Right now we are too far along, and I'm not proposing that we go back on that. In fact, I don't think it's an issue of safety significance enough for me to pursue it any further.

However, I think there is lack of clarity

there, between the criteria that were used to design the plant, and the criteria that we're using to exclude or reduce the treatment creates sufficient confusion there that you're going to have this problem. And you're going to have still requirements being imposed on RISC-3, and for some components would be irrelevant. For some component, I understand why they would be imposed but just as a general application to all components in RISC-3.

MR. PIETRANGELO: Yes. I think some of the items you mentioned hopefully are picked up in the IDP consideration.

CHAIRMAN BONACA: I would expect that they would be.

MR. PIETRANGELO: That's where those should be dealt with, those kind of things.

CHAIRMAN BONACA: Yes, but I think until you have that kind of -- you know, that's what we've said all the time. We discussed that, until you have this big lump of RISC-3 and you have a lot of animals inside there. Some of them, they're in tech specs. Some of them we have viewed as operators as sacred for tens of years.

MR. PIETRANGELO: Right.

CHAIRMAN BONACA: Not any more, because of

allegedly core damage. And so the result of that is that you are going to struggle with additional requirements.

MR. PIETRANGELO: Well, at least in terms of 50.69, it shouldn't be those 10 special treatment requirements. Now you've got these four high-level treatment requirements.

CHAIRMAN BONACA: I understand.

MR. PIETRANGELO: There's some overlay. I think you've captured it perfectly. There's this lack of clarity. You know, I understand the concern about known degradation mechanisms, but I don't think the way to address that is to go into using the same language from the special treatment requirement in the high-level treatment. That's the wrong way to do it, and I think that, again, this is a performance monitoring approach to the treatment of these SSCs.

I think licensees are smart enough to know how to deal with this when they do revise the treatment. South Texas has been doing it for a couple of years now. The staff had them in this spring to talk about how they're doing it. I think they've had their resident out there and the region has gone out to visit them. I understand the new EDO is going to go out to South Texas very soon to look at how they're

implementing 50.69. I think that's a wonderful idea, but there's still inspection. But trying to bring all that stuff back into treatment and back into the rule just -- that's where that confusion and lack of clarity comes in.

CHAIRMAN BONACA: That's exactly -- we called it 1 and 2. And 2 was if you do this maybe you'll be able to eliminate the requirements all together, eliminate RISC-3 because you have a population moving into RISC-4. And maybe a number of them would go to RISC-4. And then you have some clarity, but now you're going to have to deal with that. Now you have this hodge-podge of components.

MEMBER APOSTOLAKIS: Any other comments from the members?

MEMBER ROSEN: Well, only that it's kind of summary in looking at your major points, Tony. I think they're very well thought out. Appreciate them, and they're important, but I just don't think they're the major stumbling blocks. I mean, I think we can work through this. I mean, I hope that --

MR. PIETRANGELO: It's hard not seeing the final ruling. I have kind of one hand tied behind my back here.

MEMBER ROSEN: Some of them are

legalistic, the linkage between --

MEMBER APOSTOLAKIS: Oh, you haven't seen it.

MEMBER ROSEN: No. No one has seen it but you and the -- the Commission hasn't even seen it.

MEMBER ROSEN: Let me just make a couple of more points here. The linkage between Part 52 and 50.69 is a legalistic issue. I mean, it's not at the heart of the substance of what we're doing. I mean, it's important but it's not a PRA.

MR. PIETRANGELO: I think some dialogue would be nice with people in the know on that. That's all.

MEMBER ROSEN: I'm just trying to characterize it. The trial use issue is another one like that. The way we do this is -- it would be better, I guess I agree with you, that sends a wrong message, but --

MR. PIETRANGELO: Is there any final -- is there a precedent -- I'll ask the staff, is there a precedent for a final rule that has a Reg Guide out for trial use?

MS. McKENNA: I don't know. We'd have to --

MR. PIETRANGELO: I'm not aware of one.

MEMBER ROSEN: So at least those two issues. I think you raised four major issues, four issues, and I think those two can be dealt within the process the way this agency does business.

MR. PIETRANGELO: Yes.

MEMBER ROSEN: The other two we'll have to be a little more careful.

MR. PIETRANGELO: And we're still going to have more dialogue with the staff on them.

MEMBER ROSEN: And I think those can be resolved by the time --

MEMBER APOSTOLAKIS: Anything else? The staff, public. Back to you, Mr. Chairman.

CHAIRMAN BONACA: Thank you. Appreciate that presentation. We'll take a break now until 10:45.

MEMBER APOSTOLAKIS: Very good.

(Whereupon, the proceedings in the above-entitled matter went off the record at 10:22:50 a.m. and went back on the record at 10:43:57 a.m.)

CHAIRMAN BONACA: All right. I think we're set here. Okay. Let's get back into session, and the next item on the agenda is the revised license renewal review process. I understand that there will be two issues addressed; one is the process by which

the staff is going to review the license renewal applications, and also however you address the changes to the guidance documents. So with that, I will turn to PT Kuo.

DR. KUO: Thank you, Dr. Bonaca, and good morning. For the record, my name is PT Kuo, Program Director for the License Renewal and Environmental Impacts Program. To my right is Mr. Frank Gillespie, the Deputy Director of the Division of Regulatory Improvement Programs. And to my far right is Mr. Steve West, the second Chief in the License Renewal Program. He is responsible for the audit process review and updating the guidance documents.

If you will recall, about several months ago we informed the Committee that we were implementing a new audit review process, and we -- that the purpose of it is to replace the traditional in-house technical staff review with this audit review process. And this process will look at those portions of the applications that are consistent with GALL, and previously staff positions.

Since then, we have implemented this process and tested this process at the three plants; that is Farley, ANO Unit 2, and D.C. Cook. We have gotten good feedback from the applicants, so we are

implementing this new process on all applications submitted after D.C. Cook. And today, Kurt Cozens, our Senior Materials Engineer, will brief the Committee on the review process, and how we go about doing things. And Jerry Dozier, our Senior Mechanical Engineer is going to give the Committee a brief status report on updating the GALL guidance document, and other guidance documents.

So with that, I would ask Mr. Gillespie to see if he has any opening remarks.

MR. GILLESPIE: Yes, let me -- because they guys are going to give you the solution. I'm going to give you the problem, which is, I find, always kind of helpful.

Back in 1989 when we were first looking at even having a License Renewal Rule, there was a concept we put in place, and that was give us an application quite honestly that is fairly thin, and keep the supporting documentation on site. And that actually was the basic premise behind GALL, which also suggests that you should keep, if you're complying, if you would, or consistent with GALL, the backup detail should be in the file cabinets on-site.

You actually implemented that through the 90s, so I might suggest that what we're really doing

is not a new process, but going back to basically the underpinnings of how that rule was written to start with. Some of the problems we saw where you're getting to 250 to 300 RAIs coming in, if that's two-page answers per RAI, that's 600 pages of additional information which probably starts approaching the thickness of the application itself, and so the system needed to be looked at.

These guys have done a heck of a job, and what's happened is we moved the furniture and there was more dust bunnies under the furniture than we thought, and that led to a connection made between GALL and the audit process that we were looking at.

Just some statistics. GALL used to cover, and I think the licensees are here - there's a fair representation so they can jump in on this - GALL used to cover about 40 percent of the AMRs and AMPs as we kind of were using it up to about a year ago. Then we said you know what, if we're going to update GALL, we should being some of the past practices, things we've already approved into it and give credit to those things also.

With the first pilot that percentage with past practice included, kind of went up to about 60 percent. With the second pilot, it went up to about

70 percent. With the third pilot, the applicant was able to demonstrate the past decisions that had already been applied to their situations at close to 80 percent. And with the latest Millstone application, while we haven't done the audit there yet, they're claiming 98 percent of their AMRs and AMPs have actually already been decided. And so what we got out of the pilot was some immediate insight in working with the industry, and that's put Jerry on a crash course to try to now bring this insight and this body of information in previous decisions into GALL, which will actually be a significant streamlining of the whole process.

The other thing I hope Jerry touches upon is maybe the use of technology. Is GALL a document or a database, is a question we have on the table. And so that's some things we're working with the industry on, and they've done a lot of work to help support that kind of -- answer that kind of question.

So one of the things that are happening, the other thing we're not talking about today we have just finished is an audit of the scoping process, looking at duplication between three different units. We're looking at scoping process, the results of the process which was DSSA in the systems people in the

regions, and PT's got some corrective things going in place to try to eliminate some of that duplication he's going to be testing out in the next six months also. So a lot of things came out. When you move the furniture around and try something new, a lot of different things come out. You say why didn't I see that before, but we were too close to it, so in that case it's working very well, so there are a lot of other things going on. You'll see two aspects of that today.

MEMBER ROSEN: How many RAIs are we going to have when you're done?

MR. GILLESPIE: I think Kurt might be able to give you some examples, and touch upon the portion that the audit team is doing, because we can't -- we're only going to cut down the RAIs that are on the portion that they've kind of taken under their wing. And I think I'm going to leave it to Kurt's presentation to demonstrate that. I promised Steve I wouldn't steal his thunder.

CHAIRMAN BONACA: Yes. One observation that was made, I noted reviewing some of the LRAs recently, that a lot of proliferation of RAIs was tied to some of the narrow prescriptiveness of the GALL.

MR. GILLESPIE: Yes.

CHAIRMAN BONACA: For example, fire protection is amazing to me how the GALL prescribed this. You will inspect something every other two months. And then the applicant says well, we do it every three months and it's good enough. And the reviewer says yeah, right. So I mean, that's certainly one way that we never put it on paper, but we recommend that you consider removing that kind of narrow prescriptiveness that forces an interaction where you don't need it.

MR. GILLESPIE: Yes. And that's actually a major piece of PT's concept on this, and the way he explains it is even if it's in words, GALL probably covers the right subject matter, but it doesn't have a range. And what we did was manage to write it the first time around, which is okay. You don't know this until you try to use it. Too narrowly we tie things to systems and components and individual requirements, rather than saying stainless steel, certain kinds of stainless steel in a primary chemistry environment, and with hyper temperature and pressure.

The system it's in is probably a bit independent of the treatment, or the treatment is independent of the system, as long as it's a safety function. Also, the range of -- an easy one is a 24-

month fuel cycle and you're inspecting it every 18 months. Well, the intention was every shutdown, so I think GALL, you're going to see it coming out with more of the concept of a range, where the back end of the range, or the backstop is based on the best science and engineering we could come up with, versus that descriptiveness because well, you know, everyone kind of does this every three months, so let's say three months.

Well, let's say three to eight months, and eight months may be the backstop based on the known mechanism, so that's going into it. With that, let me turn it over to Kurt, because he's got some --

MR. COZENS: Good morning. I decided to do this old-fashioned way with hard copy slides. Again, I'm Kurt Cozens. I'm a Senior Materials Engineer in the License Renewal Program, and I am also one of the team leaders, leading the Point Beach license renewal application review for our group, and have been an active participant in the development of this improved process. So I'd like to kind of go over the process itself, not necessarily speaking about individual reviews that we're doing at this point.

The objective of this presentation is to talk about why we changed, what's changed and what has

not, and really we're still doing the same reviews that always have been done. It's a matter of a process to obtain those reviews, and the more specific kind of audit process that we're using in RLEP-B. RLEP-B, if I use that term, is the section which I am in.

Basically, what's changed? And I think the best way to demonstrate that is this graphic here. This is a listing of plants that either have come in recently, or we have here, and plants that are coming in in the near future. You see the durations that we're planning to complete these reviews in, our target for a plant that does not have a bearing is a 22-month period. You begin to see a great deal of overlap.

About here starts hitting about 12 applications in-house being reviewed actively at any given time. That's more than we've ever done before. It takes a lot of resources, and as Frank had indicated, we needed to figure out how to take advantage of all the planning that we had done, how to take advantage of the positions that have been established by the staff and the Commission that we do find technically acceptable. So, therefore, this is what has motivated us to move on to this improved

process. And having dedicated resources with NRC staff, some additional contracting staff and other reviewers to maximize the effort that we can do here, and make it as efficient as we know how. So currently, we're leveraging our resources and taking advantage of the efficiencies that we could get out of reviewing against the criteria that are established in the GALL report.

I presume everybody is familiar with the GALL report from previous presentations, so I wasn't planning to talk a great deal about that. So that's why we have a new process in-hand.

First of all, I'd like to capture the thought of what has changed and what hasn't. So we can just focus on the changes that have been implemented, and not those where nothing has changed.

So one of the things that we're doing, we're standardizing the approach. We are dedicating resources and review teams, and this is a very key thing. We have very much kept low to the schedule; whereas, a traditional review may have taken a year plus to do the technical evaluations, and let's get to the 95, 98 percent closure rate. We are pressing this into now about a 6 to 7 month period, shaving off quite a few months of effort by having these dedicated

resources. And as a result, there's a different division of work that had not existed previously.

This is a graphic that shows basically what has changed. These are all the different steps that have to be done in the reviews, the application acceptance, the scoping and screening activities, the scoping and screening results, aging management reviews. Aging management, I'm going to use the acronym, AMPs. That's what these are. These are the programs. Excuse me, these are the line items and these are the programs, aging management programs. Finally, the aging analysis and environmental assessment.

If you look at this column here, you will see that the original groups that would have performed the reviews, we only have DE that would have performed the entire review for these activities, and the only change that happens here is the division of labor that changes with the review of the AMPs and the AMRs.

VICE CHAIRMAN WALLIS: This is because these are the biggest parts of the review or what?

MR. COZENS: This is where we're able to review against the GALL report, and to use NRC prior approved position.

VICE CHAIRMAN WALLIS: So these are the

ones which you can accelerate. Is that --

MR. COZENS: Yes. Thinking again of decisions that have been made, and confirming and auditing against those.

The AMP assignments and AMR assignments are based upon those that are consistent with the GALL report, we have been able to identify that the AMP itself is consistent, or the AMR line item is, and where we have NRC approved precedence.

Basically, Jerry is going to be talking about the updated GALL, and the next presentation, Joe Dozier over here. And these are the things that we've agreed are acceptable. We'd like to move them into our envelope and within the GALL report. We believe that the biggest bang for the buck would be to get this updated so that the applicants can, indeed, use that and make their reviews and application development much more efficient.

Those things are -- and there are some exceptions. I'll talk about these later, but the other things, those things that do not fit in this category with some exceptions are retained by DE for their review, the category. And as I said, remaining AMPs - in reality I should have put here remaining AMPs and AMRs, line items, that they'll be continuing

to perform evaluation on.

MEMBER FORD: Excuse me. Just for those of us who aren't intimately aware of the organization, what's the difference in the personnel between RLEP-B and DE, and their expertise?

MR. COZENS: That is a better question. Because in reality, many of -- we have people who hired contractors to help do some reviews, and I'll be getting into that in more detail. In many cases, those reviewers are one and the same people, so we are always using what we would consider highly experienced engineers to do the reviews. They are familiar with the process, familiar with the plants. That is the criteria to be a reviewer on this.

MEMBER FORD: Because the way I read this slide, the RLEP-B people just essentially doing a check down a list; they did this, they did this, they did this. Whereas, the DE people are taking judgment, engineering judgments and analysis.

MR. COZENS: Both will require some level of judgment. Obviously, there is more precedence with GALL and the NRC approved positions that you can confirm it, but one has to look carefully, is that truly a match. And to do that, you have to have technical understanding and experience base to ask

intelligent questions. So before this might have been performed by DE. This has been removed from their assignment list, so that they could be freed up to do some of the other assignments that really do require some of their other technical expertise.

MEMBER FORD: So I should read into RLEP-B is subcontractors. Is that right?

MR. COZENS: Not totally, and I have a split on the group. I could show you that later.

MEMBER FORD: Okay.

MR. COZENS: This is another paragraph that kind of shows what has happened. As I think Frank mentioned, these are some examples of the splits of where the work is now being assigned; whereas, in the traditional approach, 100 percent of this work would have been performed by DE. Now about on the order of 20 percent is retained by DE, and about 80 percent has shifted over to being worked by the RLEP-B group. Same in AMPs and AMRs, fairly proportional. And this seems to be holding, regardless of the percentage the people have coming in. And I'll explain the reason for that shortly.

I thought I'd provide an overview for you, kind of demonstrate the process in more detail. As I had indicated, you had asked about who's on these

teams. We have an NRC team leader, which is just somebody that is knowledgeable about the process, the decisions that have been made in the past, how to work it. We'll always have a backup team leader on this. That will be an NRC staff member. That's because these are very important reviews, people move around on the staff, and somebody needs to be prepared to carry the ball, should changes occur.

We always have five engineering disciplines, in addition to these two positions, that will be manned on each of these teams. Sometimes it's more, but it will be these minimum areas. These are the areas that basically match up with the split in GALL, and how the different --

VICE CHAIRMAN WALLIS: Is this because the leaders have no disciplines?

MR. COZENS: No. I am the Senior Materials Engineer and have experience, but I have to be broad-based also.

VICE CHAIRMAN WALLIS: It seems to me the backup leader could be one of these engineers.

MR. COZENS: Sometimes it is, but there's a lot of administrative activities that go along with this, so this backup team leader may be on multiple projects also. It's not necessarily 100 percent

dedicated to this. Matter of fact, some of our team leaders are dedicated to multiple projects too, a lot of things going on.

But in these interviewers, we also have staff members that man these positions, as well as contractors. We have staff in RLEP-B. In some of the pilot plants, we did have some members of DE accompany us to help do some information transfer as we're implementing this program. But these individuals will always be senior individuals, many years of experience, lots of plant experience, and we try to make certain they also have explicit experience in the license renewal arena.

I just want to point out the activities that happen as you establish a team. First of all, you have to know the team, which means not only do you have to have names of individuals proposed to support this, you really have to review who they are and approve them. We have not always approved every name that has come to us from either internal staff or a contractor.

As I said, one of the goals that we're doing now is to standardize the process where we can really demonstrate what it is we're doing in hard form that could be retrieved in the future. And so we

prepare a very detailed audit and review plan that quite frankly turns out to be about two inches in thickness. About less than a third of it is actual of the how-tos, and the other thickness happens to be the set of all the tables, and the work splits on line items. As within any given table, there would be line items that are retained by DE, and line items that are assigned to the RLEP-B team, and this is a little bit of a bookkeeping on who's responsible for what.

We will also then review prior SERs that have been put out, understand what type of documentation we will want on any given issue, have discussions and determine the things we want to look at closely. We will perform the reviews, and I'm going to talk more about this in the process of how do we do this, and what are some of the differences of how we're performing our reviews. And then we're trying to standardize on the documentation of our work, both the new product which will be an audit report, and then the SER input that we will be providing to the overall PM that has responsibility for pulling together the complete SER on the reviews.

And, of course, we'd like to have feedback loops, what's working well, what isn't, and how do we improve the process.

MEMBER POWERS: When you talk about improving the process aren't you talking about the efficiency with which you go through the thing?

MR. COZENS: That's correct. Our reviews are all centered on 10 CFR 54.21(a)(3), which basically says we have to be able to manage these components for the stated period, and make certain the CLB is maintained.

MEMBER POWERS: What you're proposing is to change this process, to make it a little more efficient, a little easier.

MR. COZENS: Absolutely.

MEMBER POWERS: And, of course, the question is, is it an effective review still, or not. And do you have a mechanism to go back and say okay, these teams who are composed of members stretched seven letters from Sunday, doing multiple projects simultaneously, did this review. How well did they do it?

MR. COZENS: We have a couple of new documentation formats that we've implemented on our standardized approach that are helping us do this. We look at GALL and figure out what it is that is indeed auditable. GALL was established as something that if you are consistent with it, then you need no more

further technical review. And that's the process of GALL that was put in place by the Commission, I believe it was probably reviewed by you, the ACRS, as it was going through the process. And now it's time to be implemented in that format, so we do a very careful review of what it is that we need to be auditing.

We've asked our reviewers to document on their worksheets actually what they looked at and where did they find these things, so we would have some level of traceability if we had to dig back to the internal records to find out where did they confirm that this thing exists.

We also have experienced people, as I mentioned, and there's always an overriding criteria that you need to satisfy 54.21(a)(3), and is it anything you're seeing that is not consistent with good technical logic of why this is an appropriate program to manage the aging effects. So we do, indeed, look at --

MR. WEST: Well, I think what I'm asking, let me add to that if I could, maybe I'll get your question, Dr. Powers. A couple of points I'd like to make. First, I hope we didn't give you the impression that the team members are stretched thin.

MEMBER POWERS: They're stretched. Come on.

MR. WEST: No, seriously.

MEMBER POWERS: Everybody in the organization is stretched.

MR. WEST: They've very busy because they're working on the reviews, but the idea is to have these dedicated teams that Kurt mentioned. And the primary work responsibility for a team member is that review for the plant he's assigned to. He may be doing other things, but really prior one is the review. And that was one of the main principles that goes behind this process, to have the dedicated teams and the people available and the right focus on the review. So I think we have achieved that.

As Kurt mentioned, we have had DE participation actually in all three of the pilot reviews that we're doing. And we're still in -- we have a lot of communication with DE still to look at the review questions that come up, look at effectiveness. We have DE involved in doing peer review of the team's work, so we have that process in place, and we're learning from that.

The other thing is that the teams are highly experienced, as Kurt mentioned, and qualified

engineers that have been involved in license renewal and are doing the work in that regard.

MEMBER POWERS: But you have never said okay, let me put together a team. These guys did this review, your guy, is it was fine. Everybody signed off on it and things like that. Put together an independent team, a bunch of guys that didn't do that work, and go check it. See how good it is. Find out, you know, highly experienced people, they overlook things, every once in a while I'm told.

MR. WEST: We thought you did that, reviewed our work. There's a couple of other things we've done too. We have regular meetings with industry where we review the process and review lessons learned, look at the effectiveness of the process. And we do have in place a plan to do an assessment of the process when we get finished with the three pilots, when we get through those three reviews. And your question could give us -- stimulate some thought when we get into that assessment of the process.

CHAIRMAN BONACA: Until now the inspector is going on site and spending weeks there. Are you going to still have that taking place?

MR. WEST: Well, that brings up a good

point. One other thing I think Kurt is going to talk about in his next slide, is that one thing the team does is that most of the team's work is done on site, getting back to Dr. Powers' question. So there's a whole different interaction that takes place between the reviewers and the applicant that results in a very effective review.

CHAIRMAN BONACA: My question was going to the point that if you had also an inspection team going in to verify, then you would have already the verification of whether or not implementation and the problem.

MR. WEST: Right. I just wanted to -- you made a good point. I wanted to make sure I capture that in the context of Dr. Powers' question. We have looked at, as Frank mentioned in his introductory remarks, we have been looking at what the regions and the NRC headquarters reviewers are doing, in trying to identify overlap. And we do have plans to do a more formal review of the inspection program against the review program, look for overlaps or duplication work, and make adjustments to whichever program is appropriate to eliminate that.

There still will be a need to send inspectors in to look at things that the reviewers

aren't looking at. Where they may look at actual implementation of a program, where we're looking at the program from a reviewer's perspective.

DR. KUO: And just to add to what Steve just said, we have a team assessing the effectiveness and the efficiency of the review of the screening and scoping part, because we sensed that there might be some duplicate effort between the region and the divisions in the headquarters. And that assessment has been done, completed, and it is -- we are going to start to implement it as soon as we have the guideline established.

MR. COZENS: If I might continue, it was mentioned by Steve is the fact that we have -- these are questions now. It sounds like a simple statement but it's very significant. Our traditional process has been to use RAIs, that the contractor was doing the review for the staff as frequently is the case, that it be approved by their management, then if you transferred it to staff, it be approved by staff, submitted to the applicant, reviewed by the applicant, answers be generated, reviewed and signed, concurrent signature. That, quite frankly, could take anywhere from four to six months to get a response back.

By the time the individual got the

response back, they're asking themselves why did I ask this question even because they've been on to three different projects since then. So it was this difficulty with the streamlining the communication. The project teams now go to the site. They do our audits and reviews, and the AMPs and the AMRs as appropriately on site. And they have an opportunity to interface in a face-to-face manner with the licensees.

This is an opportunity to take care of some of those RAIs that would truly qualify. Show me where this is in your application. These are huge documents, difficult to know exactly where everything is, or explain the logic. I'm not certain I understood it, but yet you may be right. Just tell me a little bit about what you put into place.

MEMBER POWERS: When you get those in, just send them to me. We need this mechanism. How do we get this?

MR. COZENS: The point being that the efficiencies of dealing face-to-face with counterparts of the plant are very valuable, very efficient, and resolve a great percentage of the type of questions that pop up as you're just looking at a piece of paper.

CHAIRMAN BONACA: That should also reduce the size of the SER, I mean because the SER, many pages are there to describe, in fact, the interaction on RAIs, as a means of documenting that flow path. And at the end of it when you read it, you say okay. All right. And I would expect that this interaction of verification would even be documented at some point.

MR. COZENS: As appropriate, those documentations work. When you have information that's necessary to make a finding, if it's not in the application, it needs to be put on the docket so that it can be referred as a basis. If it's just a general exchange of understanding on how the plant is set up, it may not be necessary always to document that level of detail. But we have these questions, we do get documentation on them for our own use. And as appropriate, we would either see if the applicant is willing to voluntarily submit these and put them on the docket. And frequently, they've identified that before we even did. They realized the significance of what's being asked, maybe it's an error or omission, or just something that really builds their case to really support it. That's usually done. But for whatever reason the applicant does not choose to put

it on the docket, we always have the use of RAIs that we may apply to this and we do, indeed, do this.

On the first pilot program, I think it was Farley, I think we had -- I believe it was four RAIs total in our reviews for AMPs. And, Ken, was that also AMRs? That also included AMRs? Yes. And those were what resulted after some draft RAIs were issued and we were able to have some discussion on those.

MEMBER ROSEN: Did you say you had four RAIs on Farley? Only four?

MR. COZENS: Four, the pilot which in that case I believe it was about 63 percent of the overall safety evaluation.

MEMBER ROSEN: Going from hundreds to four are you saying?

DR. KUO: I just want to clarify. These four RAIs is only from the audit teams.

MR. COZENS: That's correct.

MEMBER ROSEN: Okay.

MR. COZENS: Not the DE or DSS.

MEMBER ROSEN: Okay. Let me ask another question about when you have a question. Do you actually write it down? Is it documented, or is it just a verbal thing?

MR. COZENS: It could be both. You will

frequently start with a written question, and through sitting across the table, you'll have follow-on exchanges that will happen. And those will frequently -- it depends on what it is, to be honest. It's a level of discretion --

MEMBER ROSEN: See what I'm getting at, where I'm headed with this in my thinking is the implications of all this to our review, because you may not know it, but we do spend a considerable amount of time looking at your work.

DR. KUO: I'm sorry. At the end of this audit, they prepare an audit report, very detailed audit report, document the discussions and the findings. And that is on the docket.

MR. COZENS: Yes.

MEMBER ROSEN: So we would get that in addition to what we now get?

DR. KUO: Yes, sir.

MR. COZENS: That's a new type of product that did not previously exist.

VICE CHAIRMAN WALLIS: We have been getting site visit report, which I found very, very useful.

MR. COZENS: I believe those would have been probably the same --

MEMBER ROSEN: Those are inspection reports. Right? What you're referring to, Graham, is the inspection reports?

VICE CHAIRMAN WALLIS: Is that what --

MEMBER ROSEN: Like Caudle Julian does?

MR. GILLESPIE: Let me just get it right. We did site audits before we actually went into this program because the comment from OGC, and this is something interesting, audits are not optional. OGC's comment was that if you make a finding that GALL applies, then it's okay. You need to be able to go and do enough work to say that GALL actually does apply as claimed by the site. And so I think you saw some report on Summer, Robinson, and there might have been one other, in Ginna, which were shorter reports. I think you're going to see that the audit reports from these guys are almost as thick as the SC that you used to see. It's a very, very detailed audit report. They're covering a lot more scope, and a lot more detail. Those went to more of a confirmatory site visit to make sure that GALL was, in fact, applicable to the plant as was claimed. A lot more detail in these.

MEMBER ROSEN: Does that mean we get to read even more paper?

MR. GILLESPIE: Yes. And that's what I wanted to put in - yes, you will now have probably 50 percent more paper to read.

MR. COZENS: The goods news is, and I'll talk to this a little bit more later, is a great deal of the audit report gets transferred into the SER, because you're not reinventing the information. You're selectively adding what needs to go formally into the SER.

MEMBER POWERS: Can we make it a staff RAI process?

CHAIRMAN BONACA: We'll have to streamline that process.

MEMBER ROSEN: I'm still trying to figure what's in it for us. So far I haven't heard much positive.

MEMBER FORD: Could I backtrack to an earlier question Dr. Powers brought up? I understand the idea of going to increasing efficiency, but it has to be done without impact on effectiveness. And the way we seem to be going is in one of your earlier tables, relying more and more on external contractors to do the technical reviews. And that, therefore, depends on their technical proficiency. How are you going to assure that these external examiners or

contractors are working to the required technical competency?

MR. COZENS: I believe all contractors that we've hired to date were originally working for DE and performing the same type of reviews. We're using some commercial contractors, but we're also using national laboratories contracted previously by DE to do similar work.

MEMBER FORD: But you're not going to be asking them to do more work. Is there some sort of internal review process that you do check that things aren't slipping under the rug?

MR. COZENS: We examine their worksheets when we're at the site to see what type of work they're doing, a sanity check. We frequently participate in the interviews with them as a form of control, and look at their questions that are posed in advance, and have some idea of what's covered, and also look at the consistency and how we treat things.

MEMBER FORD: Okay.

MR. CHANG: The process we are implementing requires two checks.

DR. KUO: Identify yourself, please.

MR. CHANG: Oh, my name is Ken Chang. I'm in RLEP-B, and I'm the audit team leader currently for

Three Plains and for all this review process, I participate in every audit on site, including Farley -- no, including Ginna, Robinson, Dresden, Quad City, and V.C. Summer. Every one.

Before the audit team is formed I, as the tech manager, I review every team member's qualifications, their background, and if we have to, we check their qualifications and references. And when the auditing team is going on, we review the qualification and the work they do and the attitude they take in reviewing this process, and if we find someone who is not capable or not qualified, or not doing a good job, we get rid of them right on the spot, or we come back and we don't accept them for the next audit. So we do a screening process to verify, to make sure the people we got is really qualified people. Otherwise, how do you think the audit team leader will function. If that staff is bad, the product is bad, the team is bad. We cannot tolerate that, and we are not tolerating this.

MR. COZENS: Thanks, Ken.

MEMBER SHACK: Again, direct question. What fraction of the team is NRC staff, and what fraction is contractors?

MR. COZENS: We've had as much as 40 or 50

percent of the team being NRC. We've had as little as 25 percent of the team the NRC.

MR. WEST: Kurt, I'd like to just make sure one thing is clear. All the contractors that we're using have not been involved in the reviews for DE before. Some have and some have not, but we do, as Ken said, for any contractor that we use, we do review their qualifications and assure ourselves that they are qualified and capable of doing the work we're asking them to do.

I think another kind of main point is that virtually all of the work that's being done is being done by a team working together so there's always the NRC team leader, and usually a backup, and usually one or two other staff participating in the team, so there's a lot of opportunities to observe and participate in what's happening.

DR. KUO: And I also want to say these team leaders are very senior people, many years of experience, and they themselves are technical experts in one or two areas.

MR. COZENS: As I had mentioned before we're trying to standardize. One of the things that we've implemented in this process, which I do not believe has been formally done, and definitely not to

the level and detail that we're doing it now, is the development and issuance of the audit and review plan. This is a large document, very explicit on the details that are being done. It includes a process, drawing diagrams and how to do different types of reviews, worksheets and checklists, and guidance for reporting results and review.

This is to assure that we have a minimum level of review and control over the process as different individuals become involved, that if there is a question we can go back in the guidance that we provided our reviewers to take. So this is now available. I think the first one will be going in the PDR this week, although all plants have indeed had them developed and been through the polishing phase on this. Now we have templates that we are following.

I will be glad to go on in time, but I'm a little bit concerned about time for Jerry, so as appropriate, I can either go quickly, or you could tell me if you wish to hear about this. I wanted to talk about some of the detailed forms we review, and how they're actually performed, so with your permission, I'll continue.

On the AMP reviews, if it's consistent with GALL, the criteria is to match GALL program

elements that have explicit criteria that a program to be considered consistent with GALL would need to meet. I would note that the audit, the RFB reviews seven of the ten program elements. There are three program elements that we do not review. They'll be like the corrective action program, quality program, the confirmation process. Those three are cross-cutting and they are reviewed, I believe, by DIPM. So those are reviewed elsewhere, as they have always been reviewed.

We look very carefully at the exception enhancements identified by the applicant. We look for the technical bases for those. We look also for a process to find out if those were acceptable previously, or if the basis is sound and robust, and the discussions that are necessary. And the corresponding documentation will be found on those.

If the audit team, and the project team finds differences that were not identified by the applicant, they're treated as if it was an exception, and reviewed on the same bases, and documented on the same bases.

As to specific AMPs, or those AMPs that are not consistent with GALL, the only reason those would be assigned to the project team is if they're

based upon a past precedence. Those would be reviewed in a similar manner. The intent would be that ultimately these AMPs would essentially be captured by GALL. There could be some exceptions to that, but that would the long-term intention.

AMR reviews, I'll note that typical applications contain something between, I believe, 2,200 and 2,500 AMR line items. Quite frankly, this is just a roll-up-your-sleeve-and-work type of activity. Each line item representatives components, materials, the aging effects, the program that's being used to manage it, and they need to be confirmed if they're adequate. This is the part of the regulatory review, this is where you're really confirming that you're satisfying the 54.21(a)(3) criteria, so we take these very seriously and we go through all line items that are assigned to us.

For the project team at an 80 percent level, it's basically about 1,800 line items. We will check that they are consistent with GALL. And in GALL you may remember, some of the line items have a further evaluation. Those are reviewed against the criteria established in the standard review plan, and they are documented if they are, indeed, consistent with that. And if it's based on NRC approved

precedent, we will look at that from a technical perspective to assure ourselves that these are still defined as being sufficient for managing the aging effect.

The AMR line items, they are a form that if we are doing precedent reviews, that we can start in the office. This is another efficiency that we take when those are placed in the public document room in ADAMS, because we are able to do reviews and only identify questions associated with those reviews. Then when we go on site, we directly interact with the applicant to deal only with questions, not where we have agreement already. And the site visit is critical to this activity, very important, these face-to-face interactions.

It permits the large number of questions that come out of these reviews, and there are numerous, to be addressed, discussed, and resolved in a large haul. Occasionally, we find errors and omissions that need to be addressed, and the applicant usually is very forthright in seeing what solutions would be acceptable, and putting those on the docket.

My last slide, the most important one to you guys, is documentation, small packages. We have the new product of the audit and review report. That

documents all their efforts and all the reviews that were assigned to the RLEP-B project teams, they document the reviews in as streamlined a fashion as we could get, but yet making certain that we have sufficient justification to explain why are we accepting these things? Or if there's open items, what are the open items, and they will always be linked to a RAI at that point.

You either in this report will be closing out an item, or having an open RAI. And those RAIs will have to be resolved. This information is largely carried into the SER input. There are some exceptions on what documentation we carry, that is in general. This is a good preview of what you will see here. When we write our SER inputs, we will be writing up Sections 3.0 through 3.6 as they apply to the line items that were assigned to us, and we will always address each and every RAI, or actually I should even include docketed material that are necessary to support this. That concludes my prepared remarks. Any further questions?

MEMBER ROSEN: I guess I was being serious about this. If the staff intends to make their work more effective and efficient, how is it helping us? How could we benefit from it to make our work more

effective and efficient?

MR. COZENS: PT, did you wish to say something?

DR. KUO: Yes. Dr. Rosen, the way I think about this is that we will generate, as the result of an audit, we will generate an audit report which basically documents the interaction between the audit team members and the applicant. And I hope this audit report, you use it as a reference document. You don't really need to review it, audit report. This is really a detailed interaction between the team members and the applicant's staff.

Another thing I want to clarify is you asked a question about you got only four RAIs as a result of an audit? Yes. The four RAIs are the formal request for information. The reason that we issue that is for the certain documentation to be placed on the docket. In-between there are a lot of commitments made by the applicants also. During the audit they say okay, this may be wrong, we're going to change certain things. So all these commitments are also documented in the audit report, and that would be later on transferred into the SER.

So I think for the purpose of the Committee, all you have to review is really the SER.

The SER itself will capture the essence of the audit report findings.

CHAIRMAN BONACA: Okay. We're ready to move on to the next presentation. I understand there may be also comments from the industry. Okay. This is now dealing with updating license renewal guidance documents. I understand they would be probably ready later in the year, these documents.

MEMBER ROSEN: The schedule.

CHAIRMAN BONACA: Oh, okay. Just I was thinking about when we would be reviewing them. Okay.

MR. DOZIER: Good morning. My name is Jerry Dozier. I am the Project Manager for getting this out for this year, as you just mentioned. And I'd like to go over a few minutes of what's going on with it.

Of course, all of us know about GALL and SRP, and we'll change the GALL report, change associated information with the standard review plan. While we're doing this, basically we've reviewed a lot of applications, learned a lot of things. We've got out past precedents that we've approved before. We've approved them several times. Why not go ahead and capture these ideas, and incorporate them into the GALL report, and use those lessons learned.

We talked about, in Kurt's presentation, how this could improve our efficiency, the NRC efficiency, and the review. Also, industry has asked and they're very much wanting to see a draft of this on our web by the end of September. They have also made a submittal to us on some of their ideas on how this may be performed, so we have both the NRC and industry wanting to increase our efficiency and effectiveness in this review process.

For the scope of this change, it will primarily involve the low-hanging fruit. It will be the decisions that have already been made by the staff. It will be obvious corrections that we need to do, a little bit of reformatting to make it a little easier, and also to consolidate some of the components. Sometimes the components were very specific and now in this review process, it will be well, it's just like GALL, but it has the same material, environment and aging effect, and it's in the same system, but the component wasn't incorporated.

With a little bit of generalization, we feel like we can solve those problems. And that is low-hanging fruit, but it takes away from these diversions in the applications to just speak of

nuances or differences in GALL. And I think that these generalizations are probably more of the essence of what we really meant in the first place when we wrote the document. And again, we'll change the SRP.

CHAIRMAN BONACA: Although I saw something important in the slide. I mean, you pointed out that you're going to include the interim staff guidance documents. Those are important guidances, and you can just see the many applications that repeat issues with items which are in that guidance, so that would be implemented in GALL.

MR. DOZIER: Right. The ones that have been approved actually at this point is five, hopefully then we'll have some more, but yes. In other words, these are not positions that we have to argue about. They are our approved positions at this time. Yes, sir.

What we're focusing on doing, and I am a dedicated resource to it. I'm part of RLEP-B, but they have dedicated me to this effort, as well as the funding and other folks to do it, but our intention is to have something on our web for the end of September. And then for the final documentation, we expect it to be issued early 2006.

CHAIRMAN BONACA: When would they be

usable? I mean, we have to wait until 2006?

MR. DOZIER: We'll have our stated positions. Basically, what you'll see in the September time frame is the NRC review, and this is how we propose it to be. Can they use it?

CHAIRMAN BONACA: I don't understand what takes place between September 30th --

MR. GILLESPIE: Yes, let me -- we haven't figured that out yet.

CHAIRMAN BONACA: Okay.

MR. GILLESPIE: But clearly, with the emphasis on the first one as a low-hanging fruit and already approved positions, I think what you're going to see is GALL turning more into a continuous document, rather than some major event every five years, that after every review we take the lessons learned from that review and fold it in. We haven't figured out quite how to do it, but given in its previously approved positions, we're trying to press to get on the web by September. GALL traditionally has been put out for public comment, but even the industry isn't going to be able to have too many bad comments on something we've already approved. And so I have a feeling we're going to have some shortcut method for at least some phase of it, that would allow

it - I'm going to call it Revision 1 - to go into some rapid kind of use.

CHAIRMAN BONACA: Is the ACRS going to be involved in this review? I mean, people will want to review it.

MR. GILLESPIE: Yes.

CHAIRMAN BONACA: That will be in the fall.

MR. GILLESPIE: Yes, it will be in the fall. Well, we want to give the industry a chance to look at something on the web. And we're actually toying with the difference between a paper document and a database now, which would make the material much more accessible. In working with the industry, they've got some ideas, and some actually demonstration projects that they've done themselves at different utilities. But we would hope we wouldn't necessarily have to do a whole lot if we stay pure to the previous approved positions to argue over those, so yes. Get those out as rapidly as possible, go through all the comment processes. We're not going to shortcut anything, but we're looking to get something out earlier for use.

CHAIRMAN BONACA: Good.

MR. DOZIER: So not only will they have

the regular 60-day period for comment, but really they'll have a much longer period. So all stakeholders involved will have a good opportunity to have input into these documents.

CHAIRMAN BONACA: And at that time, the October time frame, you'd come to us with a presentation so we understand the changes.

MR. GILLESPIE: Yes. As Steve said, don't burden me with too many presentations.

CHAIRMAN BONACA: All right.

MR. GILLESPIE: Sometime in there, yes, we're going to be back. I think the other thing Jerry has got up there, which is an important set of words, is bases document. Relative to human capital, things you see about documenting why what it is, the way it is. Even looking at GALL today and some of our SCs that we've written, we haven't necessarily had to went back to what the science and engineering basis of the acceptable program is. And that's going to take a bit longer. That likely will take fully to 2006 to pull that additional documentation together. That's probably a more significant document and work, than GALL itself, as kind of a decision and criteria document. So with that, let me ask Steve to undo what I just said.

MR. WEST: This is Steve West. I just didn't want you committing to a date. Actually, there's a number of steps that need to be taken between September and early 2006, that are just driven by our process for issuing this type of document. But we definitely do -- one of the steps in the process is definitely to bring to the ACRS the proposal that we're making for the update, and to have your review and comment. And I don't have the detail -- we have a detailed schedule of milestones, which I don't have with me, but we're definitely planning to come back here sometime after September, but before the end of the year with that document to make a presentation. And we'll probably come back and provide some more information before September, and let you know a little bit more about what we're planning to do. We're kind of in the preliminary stages now of reviewing NEI's proposal and staff proposals, and developing the framework for what we're going to put together. And I think we'd like to come back and explain a little bit more to you technically later this summer.

CHAIRMAN BONACA: Okay. Thank you.

MR. DOZIER: Any other questions?

DR. KUO: That concludes the staff's

presentation.

CHAIRMAN BONACA: Any other questions from members of the public?

MR. EMERSON: Fred Emerson from NEI. I have the privilege of working license renewal, as well as fire protection. The industry has been very supportive of the staff's efforts to create a more efficient review process, and we've had numerous meetings with them to try to achieve that goal.

As with any new process, there have been a number of lessons to learn, and we've had regular meetings with the staff, as Steve indicated, for us to provide feedback on things that we thought could be improved with the process. And the latest in a series of a such meetings is tomorrow.

In general, we applaud the staff's efforts to improve the review process. Ultimately, it's a success for industry and NRC both if we make it work because of the level of resources that are being applied on both sides of the regulatory fence.

On the industry side, ultimately you would like to see reduced costs in terms of what the licensee direct costs and the NRC review cost, and we're hopeful that the process will result in that when all is said and done, so we are supportive and

working with the staff.

There is one point I'd like to make about consistency with GALL. It is a significant effort for a licensee to, in his application, demonstrate that he is consistent with GALL. And an improved GALL will certainly enhance the licensee's ability to do that. But I just wanted to make it clear that this is not an effortless process to do this, so we want to be sure that the GALL process is as efficient as possible, so that it reduces the amount of work for both the licensee to demonstrate its consistency, and for the staff to confirm that.

MEMBER POWERS: But, Fred, you still haven't told us what's in this for us.

MR. EMERSON: Well, if I could quote one of my colleagues, ultimately our goal is either reduced cost or reduced schedule, or both.

CHAIRMAN BONACA: All right.

MEMBER POWERS: I think we ought to get cranky until they come up with a process that makes it easier for us.

MEMBER ROSEN: In your case, that wouldn't be hard.

CHAIRMAN BONACA: All right. If there are no further comments --

MR. COZENS: Dr. Powers -- if I may.

CHAIRMAN BONACA: Yes.

MR. COZENS: Dr. Powers, with the generalization, we expect the GALL report to be a smaller document rather than a bigger document. So at least for the ACRS when they do their reviews, it should be less pages to go through.

MEMBER POWERS: Well, I don't know that --

MEMBER SIEBER:: We do have a minimum font size.

MEMBER POWERS: Making the SER and the applicant's document more readily comprehensible and encompassable.

CHAIRMAN BONACA: Yes. I think --

MEMBER POWERS: That's the biggest challenge.

CHAIRMAN BONACA: We may spring up some comments ourselves.

MEMBER POWERS: Yes.

CHAIRMAN BONACA: And I think we should do that. I think the proof is going to be when we review the various documents, I think we'd probably come up with some comments, some thoughts.

MEMBER POWERS: We could go on strike until they fix it.

CHAIRMAN BONACA: All right. If there are no further comments, thank you very much for your presentation, and we will work with you. And we're going to break until a quarter of one, so 12:45.

(Whereupon, the proceedings in the above-entitled matter went off the record at 11:46 a.m. and went back on the record at 3:58 p.m.)

CHAIRMAN BONACA: We're back in session, and we're going to hear about digital instrumentation and control system research activities. Jack Sieber is going to lead us in this presentation.

MEMBER SEIBER: Okay. Unaccustomed as I am to public speaking --

(Laughter.)

CHAIRMAN BONACA: You got good practice.

MEMBER SEIBER: I'd like to give you a little background as to how we got to this point this afternoon. Dana isn't here so I can talk freely about him. But in the process of writing the research report, I have looked at the Year 2000 INC Research Plan with a list of research projects. I kept reading it, trying to figure out, I wonder what it is they are really doing here so that we could comment on it in the research report.

So we asked for a meeting with the

research folks and had that meeting on March 26 where they went through and explained what some of these projects really consisted of. But I still had the question in my mind as to, "Why are we doing this?" So now, the latest document that we will need to consider is a draft regulatory guide. It's Draft Guide-1130.

It's entitled "Criteria for the Use of Computers in Safety Systems of Nuclear Power Plants." This draft guide references an IEEE standard 7-4.3.2 dated 2003. Lo and behold in that standard - and this is the industry document - they reference a number of the projects. For example, the software quality metric section is new to this standard. That's one of the things we're going to talk about this afternoon.

We've already in the past talked about verification and validation. The fault injection process is mentioned in the standard. We're going to talk about that and a number of other things. So now, we've come full circle. We think we know what it is research is doing. We also now think we know why they're doing it which is very comforting to me.

MEMBER APOSTOLAKIS: Well, does everyone have a copy of that?

MEMBER SEIBER: No.

MEMBER APOSTOLAKIS: I don't.

MEMBER SEIBER: No, and we will talk about it later in this meeting as to whether we want to review it before or after public comments. It's a pretty standard regulatory guide. It invokes an industry standard. It does have some words in there about the various steps in the life cycle process of digital I&C.

In any event, this document is out there. This is the reason why the research is being done. So with that kind of an introduction, we decided at our March 26 meeting that we would give an abbreviated presentation to the full committee where we could review some of this. I would like Steve Arndt now to begin the presentation.

MR. ARNDT: Thank you, sir. As John mentioned, we are here to provide an overview of a particular part of our research program. We briefed the Subcommittee on Plant Operations on the digital system reliability research program which is one of several sub-programs that we have. As was mentioned, this is an overview of that presentation.

At the actual subcommittee meeting, we went into a fair amount, probably not as much as some member wanted, but a fair amount of the technical

details of that program. One of the comments that we got back was, it was a little hard to follow how it all got put together.

So in this presentation, I'm providing a little bit more of the organization issues and how they fit together and what the objectives are for the full committee. If there are any specific technical questions that you have, please feel free to ask those. We'll try to provide you those answers if not today then in the near future when you are putting together your deliberations.

As per standard format, I'll give you conclusions. I'll give you a very, very brief overview of the rest of the research program plan so you can understand how this part fits into the rest of the program. I'll talk to you a little bit about the drivers and boundary conditions, basically an explanation of why we're doing what we're doing and what the issues are.

One of which, of course, is the ongoing movement in this area from the industry as highlighted by the IEEE standard that was mentioned. Then I'll go into the program, a little bit on the specific research projects that make up the program, our interfaces with other programs, and a short summary.

With me here is my illustrious colleague, Hossein Hamzehee who is part of the PRA Branch in Research. They are working with us on certain aspects of this program. Of course, that impacts their program and the overall PRA program.

Conclusions we would like you to take away from this presentation. First of all, the industry is moving very proactively in this way both in the design of advanced plants but also in the retrofitting of digital systems and control room monitoring and protection systems in current generation plants. We have several applicants that have already told us they are going to do complete control room retrofits with digital systems including the safety systems, ESFAS and RPS. This is an ongoing issue that will be with us for the near future.

One of the parts of our Research Instrumentation and Control Program is devoted specifically to support regulatory review and reliability in a risk-informed environment. That's the part we're looking at specifically today. We have several universities and national labs supplementing in-house efforts to develop the tools, methods, and regulatory guidance necessary to support these kinds of regulatory reviews.

Short refresher. SECY-01-0155 was the Digital Instrumentation and Control Research Plan. That establishes the objectives and program areas that we are working in. Since that time, about three years ago now, there's been a lot of movement within the organization.

We have added some additional areas including future reactors, advanced reactor work. We've added work in the cyber area. We've added areas that have basically come up. Because of the changed both in the external environment and the internal environment, we're in the process of revising the overall research program plan in I&C. That should be available in the fourth quarter of this year. We will come and talk with you in detail about that.

The research program goal in this area is basically to get smart, understand how these things work and how they fail and what the context of the failures are, develop analytical tools to be able to analyze those things both from a deterministic, how do they fail, what do they fail, are the current rules applicable, quantitative methodology applicable, do this in a qualitative way, and also develop regulatory guidance on how to best review the systems.

Our current regulatory guidance is very

qualitative. It was written back in the mid to late nineties. A lot of things have changed since then. Industry as a whole has been able to develop a lot more quantitative methodologies that we're going to try and work into our regulatory structure including risk-informed.

MEMBER ROSEN: Steve, I have a problem with this goal because it doesn't say why you are doing this. It doesn't say in order to make ourselves feel better because we love knowledge or whatever your reasons for doing this. It may be just typographical or editorial. But at least you ought to say the goal. I know you know why you are doing it. I think it's because you are trying to support NRR.

MR. ARNDT: Right. We're trying to support the regulatory mission of the agency which is to ensure --

MEMBER SEIBER: Could you move a little closer to the mic?

MR. ARNDT: I'm sorry.

MEMBER APOSTOLAKIS: In that context, I think it would be helpful if you developed your own integrated, decision-making process just like 1.174 does because NRR will have to make decisions in a risk-informed way. So what kinds of decisions are

going to be faced by the regulators?

Is the process proposed in Regulatory Guide 1.174 appropriate? Does it have to be modified? I think if you started that way, then it would be easier to justify why you are doing certain things. And you are not doing them just for knowledge sake.

MR. ARNDT: And we will get to that specific issue, what kind of guidance we're developing and how that relates to current guidance later in the presentation. But you are correct. We are doing it specifically to support decision-making for this particular technology in the current regulatory environment.

MEMBER APOSTOLAKIS: But that I think will give you an opportunity to investigate several aspects of it at the high level that perhaps you haven't paid much attention to. For example, there will be significant testing of all of these things, debugging. The process will be controlled. And then you want the risk information.

The question is, how does one put everything together? If there are holes in the risk information, how do the other things take care of that and visa versa? I think that would be a very useful exercise for you that will be the overarching model.

That will guide you also as to what research you need to do. It may turn out the research you are doing already fits very nicely. Or you may have to modify it. Whatever. I think that would be a nice high level framework.

MR. ARNDT: And in point of fact, maybe not quite exactly in those words, but that's a process that we're undertaking right now.

MEMBER APOSTOLAKIS: Okay.

MR. ARNDT: We're trying to put together an integrated program plan on how all these things fit together and what the outputs need to be to support the regulatory structure. I have a little cartoon here later in the presentation that kind of gets to those kinds of issues. But if that doesn't answer the itch you have, please bring it up again at the end because we want to --

MEMBER POWERS: Maybe the subcommittee members are more familiar with the issues here than I am. But I guess I am perplexed.

MR. ARNDT: Okay.

MEMBER POWERS: My understanding is that most of NRR's work, when it looks at digital I&C systems, is controlled by an IEEE standard.

MEMBER SEIBER: Several.

MEMBER POWERS: Several of them.

MR. ARNDT: There is a whole structure of IEEE standards and reg guides that support those.

MEMBER POWERS: And I will admit that in my one attempt to try to understand those standards, I discovered that that is a trail that I became exhausted pursuing after a while because each standard refers to another standard refers to another standard.

MR. ARNDT: Yes.

MEMBER POWERS: So what I'm struggling with is, if you have this consensus standard available to NRR and presumably some prescription on how to follow that standard, what is it exactly that you are providing them?

MR. ARNDT: What we're providing them or attempting to provide them in some cases is an understanding of the technical issues associated with the particular technology that the standard or the reg guide or the regulation is providing them a methodology to assess. So for example --

MEMBER POWERS: So you are providing them background information.

MR. ARNDT: We're providing them background information, knowledge if you will. We're providing them information and technical tools, if

they choose to use them, to independently assess the technology via the review guidance, a check tool, whatever.

MEMBER POWERS: And there you are saying that they sometimes do things differently than what I said.

MR. ARNDT: Well, there's a whole structure associated in the standard review plan about what is expected of a review. Of course, the individual reviewer uses that as the guidance on how to do that review. That, in large part, refers back to --

MEMBER APOSTOLAKIS: But the IEEE standards do not get into quantitative reliability calculations.

MR. ARNDT: No, they do not. And point of fact, our current regulatory position is that - and of course this was developed in the mid nineties - the knowledge was not and is not sufficiently mature to use that as a primary review standard. This work is to advance that state.

MEMBER APOSTOLAKIS: But is the position of the staff that if something is in the standard it's correct?

MR. ARNDT: No, the position of the staff

is that we will use consensus standards as the starting place to develop regulatory positions if appropriate. And then in some cases we choose to endorse them.

MEMBER POWERS: Now, Professor Apostolakis says you need this quantitative reliability information. I'm wondering, do you?

MR. ARNDT: "Need" is a relative term. The PRA policy statement says basically that you should use risk-informed insights wherever supported by technology, data, et cetera.

MEMBER POWERS: And here you could assert, "Well, it's not supported so I'm not going to use it."

MR. ARNDT: Well, but the implicit corollary there is, as the technology becomes available, you should use it. That is in large part where the research community and in some cases the regulatory industry is going. The prime example that I'll get to in a few minutes is the EPRI work that is ongoing to risk-inform a particular piece of the I&C review, that is, the defense-in-depth review.

MEMBER ROSEN: This Slide 4, could you just go back to it for a minute now that your flow is interrupted anyway? This first bullet is something the nuclear industry has desperately wanted to do for

a long time.

MR. ARNDT: That's correct.

MEMBER ROSEN: But it has been hampered because the staff didn't have the tools and the industry didn't have the tools to show itself or the staff that these things were adequately reliable.

MR. ARNDT: That's correct.

MEMBER ROSEN: So it's a little bit of a chicken-and-egg situation. We sat next to a chemical plant down the road. Their control rooms were miles ahead of ours, their instrumentation and control, and it was cheaper and better in every way. And yet, we couldn't use anything like they were using.

So we would have these longing gazes over there and forget about it for a few months and then go back and say, "Oh my God, it's even gotten better. They are on version 2 of the thing. We just long for version 1." So this is a chicken-and-egg situation. I don't think your bullet is really correct. I mean, "is moving forward." It would like to move forward.

It's moving forward on the fits and starts. I know some things that have been done in the balance of plant that are good. A couple of things have been done on diesels that are excellent. So that's the first safety-related thing. Can you give

me a feel for where and more broadly it's being used to retrofit digital systems and control monitoring and protection systems? Boy, that's a pretty good statement. That's a wish, not an is.

MR. ARNDT: That's a currently ongoing process. There are at least four plants that I know of - and my NRR colleagues could probably give me a better set of numbers and plants that have basically come and told us they are going to do full plant control room retrofits including the protection system, RPS.

MEMBER ROSEN: They are going to do it if you'll approve it. Or are they going to do it on the 5059?

MR. ARNDT: No, protection systems we have to review.

MEMBER ROSEN: That doesn't mean they are going to do it. They are going to propose it.

MEMBER APOSTOLAKIS: The staff has already approved I understand some digital.

MR. ARNDT: We have approved some digital things. We also approved three generic platforms.

MEMBER APOSTOLAKIS: Platforms, yes.

MR. ARNDT: But that still requires specific plant-specific reviews of how they are going

to implement those platforms or protection systems.

MEMBER APOSTOLAKIS: But let me go back to what Dana said earlier. I think the implication in the exchange was that there may be risk information out there. The commission encourages us to use it. Dana asked, "Do you really have to use it?" I don't think it's a matter of choice here because if you install these digital control systems in your safety systems, the existing PRAs are not valid anymore.

MR. ARNDT: That's correct.

MEMBER APOSTOLAKIS: You don't know whether the unavailability of a particular system is the same as before. People talk about different failure modes of digital software. All of the systems are very nice. There are physical systems, continued behavior. So it's adding another hole to the holes that Commissioner McGaffigan mentioned earlier.

MEMBER ROSEN: And it's poking us --

MEMBER APOSTOLAKIS: So you really want to understand that.

MEMBER ROSEN: It's poking us in the weakness of our current technology and that is in common cost failure.

MEMBER POWERS: It seems to me there's an obvious solution to this. Go ahead and let them put

in the digital control systems. Just have the analogs as a back-up.

MEMBER APOSTOLAKIS: If we can find them. Apparently you can't find them anymore.

MEMBER SEIBER: There's no room.

MEMBER APOSTOLAKIS: We don't manufacture them anymore.

MEMBER ROSEN: Dana is suggesting, leave the existing one and have this great big transfer switch.

MEMBER SEIBER: No, the big motivation for going digital --

MEMBER POWERS: What transfer switch? Explain it to me. I want to know what you are talking about. I didn't say anything about transfer switch. I didn't mention transfer switch at all. What are you talking about, sir?

MEMBER ROSEN: Well, you said leave the analog as a back-up. What do you mean?

MEMBER POWERS: You have redundant control systems.

MEMBER APOSTOLAKIS: Diverse, too.

MEMBER POWERS: And you would be diverse.

MEMBER APOSTOLAKIS: No, I think the problem is you can't find them. From what I am told,

the chemical industry, for example, is not using them anymore. They are not going to manufacture systems just for the nuclear business.

MEMBER POWERS: Right.

MEMBER APOSTOLAKIS: That's a major problem. Some of the things are market forces. Other things are, the introduction of new system shakes our confidence in the existing risk assessments. We certainly have to understand what is going on.

MR. ARNDT: That's correct. There's a number of different forces and reasons, if you will, for undertaking this --

MEMBER APOSTOLAKIS: But I wouldn't call these conclusions. This is probably summary.

MR. ARNDT: All right.

MEMBER APOSTOLAKIS: You don't conclude that there is research at several universities. You create it. You looked outside and said, "Gee, there is work at Maryland," right?

MR. ARNDT: Yes.

MEMBER APOSTOLAKIS: So these are summaries.

MEMBER SEIBER: Before you try to move forward, I'm curious. As I understand what it is you are trying to accomplish in these research programs,

it seems to me that for the industry to develop digital instrumentation they should have been doing this work themselves. For example, in order to buy the software, you ought to know something about the software metrics, the engineering metrics upon which you gage how good the software really is.

For example, in order to determine the fault tolerance of a digital system, you ought to have a fault injection technique. These have been around for a long time. And so my question is, is the agency duplicating something that's already out there or are we doing this to find the regulatory nuances that might be involved or has the work never been done?

MR. ARNDT: It's unfortunately a very complicated matrix or patchwork of all of the different issues you raised. Some of the work has been done for very specific areas both in non-nuclear and nuclear areas in various parts of the world, the different regulatory structures.

The industry has, in various areas, both in off-the-shelf technology as well as plant-specific and industry-specific technology, done some of it. But putting it into a specific regulatory context with specific analysis tools as opposed to design tools is something that has not been done.

MEMBER SEIBER: Right. Okay.

MEMBER APOSTOLAKIS: But again, it's not clear to me what role the fault injection method will play in the decision-making process.

MR. ARNDT: Let me try --

MEMBER APOSTOLAKIS: No, I'm not asking you to answer now. This is constructive advice.

MR. ARNDT: And later in the presentation, we have an attempt to provide you with more information on that.

MEMBER APOSTOLAKIS: But now let me come back to another thing. I notice that your conclusions today are not the same as the conclusions you presented to us at the subcommittee meeting. At the subcommittee meeting, you had a bullet that bothered me then.

MR. HAMZEHEE: I took it out.

(Laughter.)

MEMBER POWERS: He's not stupid.

MEMBER APOSTOLAKIS: "Current analysis methods are sufficiently mature such that guidance documents can be developed." That was your first conclusion on page 6 of the guide. Do you still believe that?

MR. ARNDT: Yes, but it is a nuance of

something we were discussing specifically at the subcommittee meeting which we're probably not going to discuss in detail at this meeting which is why we took it out.

MEMBER APOSTOLAKIS: Okay.

MR. ARNDT: For those people who are now here and have now heard this, the issue was whether or not we know enough to even write guidance.

MEMBER APOSTOLAKIS: But then you are writing something that we haven't seen, Steve. Is this guide out?

MR. ARNDT: No.

MEMBER APOSTOLAKIS: Where is it? How come Mr. Seiber has a copy?

MEMBER SEIBER: Because I'm to make the decision as to whether we're going to review it before it goes out for public comment.

MEMBER POWERS: And he's particularly astute and good looking. That's the reason he gets it.

MEMBER SEIBER: Yes, I get stuff before you do.

(Laughter.)

MEMBER POWERS: Routinely.

MEMBER RANSOM: Does your program address

optical transmission as well as wireless-type for the transmission of signals as well as just the digital?

MR. ARNDT: The actual transmission media as to fiber as opposed to copper.

MEMBER RANSOM: Right. Or wireless.

MR. ARNDT: Or wireless. Yes, we have a program that's looking at that particular thing. It's not something I'm going to discuss today. We do have programs in that area. Let me scroll through the next couple of slides, if I can.

MEMBER POWERS: Just to make sure you don't go too rapidly.

MEMBER APOSTOLAKIS: Show every other slide.

(Laughter.)

MEMBER POWERS: One of the problems with Slide 6 is the term "continually improving" lacks a quantitative character to it that smacks of a sandbox. I don't know that you can say "improved by 50 percent" or something like that. But you need to cast your goals of your program into something that says, "Yes, indeed, they will have accomplished something if they did this."

MEMBER APOSTOLAKIS: I think, yes, the Chairman and Commissioner Merrifield will not get too

excited when they --

MEMBER POWERS: They might get very excited is the problem.

MEMBER APOSTOLAKIS: But the wrong way.

MR. ARNDT: Here are some of the external drivers that have basically been driving what we're doing, why we're doing it, and how we're doing it. Some of these things obviously you have seen before; the National Academy study that ACRS actually commissioned in this area and provided a whole list of specific recommendations, many of which were specifically in the digital system. As we get smarter about this, put in the regulations, encourage the licensees to do better.

As we mentioned earlier, the technology is becoming available. The licensees are moving to do this. It has the different failure modes. It's more difficult to analyze. There have been several workshops and industry-sponsored and DOE-sponsored recommendations to move forward in this area. The last one, of course, is the EPRI work to risk-informed regulation in that particular area of defense-in-depth and diversity.

VICE CHAIRMAN WALLIS: Can I ask my first question now?

MR. ARNDT: Yes, sir.

VICE CHAIRMAN WALLIS: Would you clarify something for me? I notice there's an NRR User Need in 2000. There was the SECY in 2001. You are going to talk about the digital I&C research program. I would like - it doesn't seem to be part of your presentation at all - some evidence that you have achieved something in four years with this program.

All that you are talking about is a very fluffy goal and a new plan. So what's been going on for four years? Have you actually solved some problems? Have you met these needs? And what are these measures of success that you have achieved in four years?

MR. ARNDT: Okay. We were planning on including that in the presentation later this summer.

VICE CHAIRMAN WALLIS: Later this summer. But it does exist.

MR. ARNDT: Yes.

VICE CHAIRMAN WALLIS: You have achieved things in four years.

MR. ARNDT: Yes, we have indeed.

VICE CHAIRMAN WALLIS: And there are definite measures of that achievement.

MR. ARNDT: Yes.

VICE CHAIRMAN WALLIS: They are not being applied in the new plan though. There isn't a statement, "We have achieved A, B, C, D, but we still need to do E, F, G, H."

MR. ARNDT: Yes, there will actually be a chapter in the new plan that basically says what we have finished and what we haven't finished since the last time.

VICE CHAIRMAN WALLIS: But you are not going to tell us that today.

MR. ARNDT: I can give you a couple of examples if you like.

VICE CHAIRMAN WALLIS: If you can fit it in somewhere, yes.

MR. ARNDT: Okay. I will.

VICE CHAIRMAN WALLIS: Thank you.

MR. ARNDT: The overall research program area has five general areas, systems aspects of digital technology. These are basically things like environmental effects, like EMI/RFI, large scale things that effect the system as a whole such as lightening and things like that.

As an example, we have published guidance on environmental effects, EMI/RFI in the last couple of years. Another area is software quality assurance

and software validation and verification. You will remember just recently we came to you with a reg guide in that area endorsing an IEEE guidance with some exceptions based on our review of those issues.

VICE CHAIRMAN WALLIS: Does this lead to some sort of regulatory enforcement in the way of testing? They have to be reliable in the presence of lightening. Is there some test that confirms that they are indeed reliable in the presence of lightening?

MR. ARNDT: Yes, when we put forth a regulatory guide, we usually basically, either through endorsement of a standard or through our actually writing a particularly specific requirement.

VICE CHAIRMAN WALLIS: Very specific about how you check that they meet the requirements.

MR. ARNDT: We have a set of requirements that basically say, "If you do this, then it's acceptable."

VICE CHAIRMAN WALLIS: Thank you.

MR. ARNDT: The digital system reliability program, which we're going to talk about more later, the emerging technology and applications program, which is a program which is a set of projects to look at new things that are coming so we're ahead of the

curve or at least not too far behind it on new emerging issues, new technologies that are going to work their way into the plants - the wireless communication is one of these projects - the future reactors program where we're actually looking at specific applications that are likely to be used in advance reactors, and what the technical issues are going to be as well as potential policy issues like the reliability.

MEMBER POWERS: This is a qualitative question. Especially on these future reactors when these guys come up the things, they surely know that you are going to want to understand things about reliability, quality assurance and stuff like that. They must surely present stuff or have stuff for you. Is that not at all useful to your line organizations? I mean, how they did it, the line organization, just take their techniques and use it.

MR. ARNDT: That's a more complicated question than it might appear on first glance. Because a lot of the future reactors were designed someplace else, were designed for different applications, CANDU and the ACR-700 being the primary example, the CANDU 6s were licensed under a different regulatory scheme and have different requirements.

One of the projects under the future reactor program was basically to look at advanced reactors or evolutionary reactors that have been licensed elsewhere and try and learn what they did both from a regulatory standpoint as well as from a technical standpoint.

MEMBER POWERS: Are you looking at the EPR?

MR. ARNDT: We're not looking at the EPR right this minute. We're looking at the ACR-700 right this minute. But if that gets, more likely down the road --

MEMBER POWERS: More likely? It's sold. They are going to build one.

MR. ARNDT: Yes.

MEMBER POWERS: You can't get more likely than that.

MR. ARNDT: We're not.

MEMBER POWERS: But they clearly have an all-digital control room.

MR. ARNDT: Yes, and we looked at the Nforce (PH) reactors. We looked at ABWR. We looked at the CANDU. We looked at a number of different ones.

MEMBER POWERS: Well, I want to keep

hammering on the EPR. The Finns put together the most comprehensive spec sheet I have ever seen in my life. So they clearly speced the digital control system.

MR. ARNDT: Yes, they did.

MEMBER POWERS: Can we just borrow these Finn guys? We're using them in Halden to run the reactor. Can we just use them to review the digital system?

MR. ARNDT: We can certainly learn from what they are doing.

MEMBER APOSTOLAKIS: I thought they were using the Siemens system.

MEMBER POWERS: George, to be honest with you, I don't know what they are doing. But it certainly wouldn't surprise you if they used the Siemens system.

MEMBER APOSTOLAKIS: Which was reviewed I think in Germany by various groups.

MR. ARNDT: TUV reviewed --

MEMBER APOSTOLAKIS: TUV reviews everything there.

MR. ARNDT: As well as GRS/ISTec which is their equivalent of research in this area. Actually I work with the lead reviewer in that particular organization very closely. It's a gentleman by the

name of Arndt Lindner.

MEMBER APOSTOLAKIS: Which organization is this?

MR. ARNDT: GRS/ISTec. It's the subdivision of GRS.

MEMBER APOSTOLAKIS: In Munich?

MR. ARNDT: Yes, in Munich, that does this particular area. They have done a lot of reviews as well as actually developing review tools for that particular product line which is basically a similar product line that's going to go into some of our retrofits. We have actually looked at some of their review tools. We haven't specifically looked at the EPR design, but we have looked at a lot of the stuff that's going to go into it for other reasons.

MEMBER POWERS: I'm just wondering, theft is far cheaper than invention.

MR. ARNDT: Yes, sir.

MEMBER POWERS: Can we steal instead of invent?

MR. ARNDT: Yes, and part of the idea is to use things as they become available which is why we're involved.

MEMBER POWERS: And the reason to get excited about the EPR is, unlike the ACR-700, unlike

the AP1000, unlike any of the Gen IV reactors, they actually sold one. People might actually build one of these.

MEMBER SEIBER: Moving on.

MR. ARNDT: Just a quick reminder of some of the things that the NAS report recommended. We should include influence of software failures in PRA, the issue that George brought up earlier that as these things become put into the plant, we need to update our PRA to do it.

We need to develop advanced techniques to analyze the digital systems, to increase our confidence, and to produce uncertainty in our quantitative assessments. Basically the committee then as well as now is highlighting the fact that there are things associated with technology that we need to understand to do our job.

These next two slides are basically a short summary of some of the issues we're trying to deal with. We're trying to develop --

MEMBER APOSTOLAKIS: I think, Steve, here a high level, risk-informed, decision-making process will be helpful because then you will show why you need to understand the failure mechanisms, why this, why that.

MR. ARNDT: Right. And these are basically just some of the issues that we have.

MEMBER APOSTOLAKIS: Now, you never really presented to us the state of the data, did you? Have you done this?

MEMBER POWERS: Can you even explain what "state of the data" means?

(Laughter.)

MEMBER POWERS: Is this Indiana so that we keep this data in?

MEMBER APOSTOLAKIS: State of the art, state of the practice, state of the data.

MEMBER SEIBER: It's the state of the union.

MR. ARNDT: As part of one of our review projects, we looked at the state of the data. We're not finished doing that.

MEMBER APOSTOLAKIS: Yes.

VICE CHAIRMAN WALLIS: What does it mean?

MEMBER POWERS: Yes, what does it mean?

MR. HAMZEHEE: I can expand on that a little. We have done some review in search of the existing data for the I&C electronic components. There are some --

VICE CHAIRMAN WALLIS: Data describing

reliability?

MEMBER APOSTOLAKIS: Failure data.

MR. HAMZEHEE: Failure data, reliability data, that's what it's talking about. These are the information we need ultimately to be able to quantify the reliability models.

VICE CHAIRMAN WALLIS: Put some number in the PRA.

MEMBER APOSTOLAKIS: You never put a number in.

VICE CHAIRMAN WALLIS: Well, you put something quantitative in there, George, I hope.

MEMBER POWERS: They never put distributions in, George.

MEMBER APOSTOLAKIS: They ought to.

MEMBER POWERS: They put numbers in.

MEMBER APOSTOLAKIS: And then they do sensitivities.

MEMBER POWERS: Your point about doing uncertainty analysis is falling on deaf ears. They are never going to listen to you.

MR. HAMZEHEE: We're talking about a two-stage process. One is, understand what constitutes a model and then the data we need to support it so that we can quantify the reliability or availability of a

digital system. Then the second stage is, now, how do we use this information to come up with overall risk impact in the overall PRA models? This is really what we're talking about.

MR. ARNDT: And the data is a fairly complicated thing. It's both things like component data, and how often does this particular processor fail? It also has to do with what kind of failures you are interested in. How does it fail in actual use? What does the use profile look like?

VICE CHAIRMAN WALLIS: Component data doesn't tell you too much because these things are all hitched together in some way.

MR. ARNDT: That's correct.

MR. HAMZEHEE: And we have the preliminary results of some of the work we have done with PNNL. As a matter of fact, we have come up with some of the insights of the review and literature search that we have done. One of the major problems we have come up with is the fact that it's hard to look at the CCF, common cause failures, of software and hardware. Then sometimes the existing data doesn't have enough description to tell you really what part or component is failing. And in some areas, there are some recoveries that are embedded in data that you can't

figure out exactly.

MEMBER APOSTOLAKIS: Are these data nuclear or broader?

MR. HAMZEHEE: No, they are broader. I think they are from other industries because in the nuclear, you don't really have much data. That's a problem we're facing right now.

MEMBER APOSTOLAKIS: But you have included the - what is it - in Canada, the Bruce rector.

MR. ARNDT: Yes, Bruce. And there's been a very small number of nuclear-specific work. Another part of our data program is looking at international nuclear-specific failures. The problem with that is it's almost certainly going to be a very sparse database no matter how hard we work.

MEMBER APOSTOLAKIS: Sure.

MR. ARNDT: So it's probably going to help us identify areas and trends and things like that and bounding.

MEMBER APOSTOLAKIS: Now, "sparse" you mean the nuclear.

MEMBER ROSEN: I'm not sure that matters. The program doesn't know that it's working on a nuclear application.

MR. HAMZEHEE: That's correct.

MEMBER ROSEN: It's just software.

MR. HAMZEHEE: That's why we're looking at some of the AT&T data that they have on some of the electronics systems because they may be applicable. You are right.

MR. ARNDT: The challenge from a nuclear-specific domain is that the operational profile might be different and how it's connected with other things may be different.

MEMBER SEIBER: But it's the same basic building blocks regardless of whether it's chemical, retro-chemical, nuclear.

MR. ARNDT: That's correct.

MEMBER ROSEN: It's an actuated device and a signal that comes.

MEMBER APOSTOLAKIS: The nuclear systems may in fact be simpler. I mean, the control system of the one of the Airbus. We don't intend to store anything as complicated as that.

MEMBER SEIBER: It's the sheer numbers of things that make nuclear different. In Airbus, you only have so many actuating devices to move. But in a nuclear plant, you might have 100 or 200 times that many.

MEMBER APOSTOLAKIS: But -- Go ahead. I'm

sorry.

MR. ARNDT: But the system requirements are frequently different like the single failure criteria, the levels of redundancy, the levels of diversity, the kind of error checking and things like that, depending upon what level of failure data you are talking about, whether you are talking about component data or system data.

MEMBER APOSTOLAKIS: But there is a fundamental question there. For example, in Future Reactors, are they proposing to use digital systems for control of the core or just monitoring and actuation?

MR. ARNDT: It's a gambit depending upon which system you are talking about.

MEMBER APOSTOLAKIS: Because that's a big difference. The Airbus, it's actually a control system.

MR. ARNDT: That's right.

MEMBER APOSTOLAKIS: Well, if we never install any control systems that feedback control.

MEMBER SEIBER: But if you go digital I&C, you are going to have digital control systems which are primary sensors, controllers, and actuators and you are going to have protection systems which shut

down. There should be independence between those two systems. But you are going to be controlling with digital I&C whether you want to or not.

MEMBER APOSTOLAKIS: But you are controlling in the sense that you are shutting down.

MEMBER SEIBER: You're controlling feedwater level. You're controlling heat level. You're controlling pressurizer level.

MEMBER APOSTOLAKIS: These are minor things.

MEMBER SEIBER: You are controlling temperatures by modulating various things in the plant. It's not on and off.

MEMBER APOSTOLAKIS: But is that what Future Reactors propose? That was my question.

MR. ARNDT: Yes.

MEMBER APOSTOLAKIS: I'm not so sure.

MEMBER SEIBER: I don't know how else to operate them other than with modulating controls on many things.

MR. ARNDT: And depending upon the plant, the pebble-bed reactor, for example, the current proposed control system is very sophisticated including --

MEMBER SEIBER: The pebble pushers on.

MR. ARNDT: The pebble pushers, the control system, the protection system, the monitoring system, the various interfaces with the grid. The very extensive controls of the high temperature high temperature helium turbine is all done by a fairly sophisticated digital control system.

MEMBER APOSTOLAKIS: But now, another question that comes from Slide 10 is - and I noticed that also at the subcommittee meeting - your presentation was very good. You used the right words and the right goals, noble goals. And there was a gap. Why are you doing the work at Maryland, for example? It doesn't fit anywhere here. Do you see that? Why are you doing the work at Virginia? That was my problem. It was not clear to me.

MEMBER SEIBER: It does.

MR. ARNDT: At the risk of putting you off, there's a slide in two or three slides that tries to explain that.

MEMBER APOSTOLAKIS: Well, let's move on then.

CHAIRMAN BONACA: Finally, one good suggestion.

MR. ARNDT: This is basically a different way of cutting the previous slide. I won't spend any

time on it. It's basically how we model and what we model and the kinds of issues.

MEMBER APOSTOLAKIS: Yes, and I think you are missing a word there.

MR. ARNDT: I probably am.

MEMBER APOSTOLAKIS: But digital systems and the reliability modeling period "Motherhood Statements."

MR. ARNDT: Okay.

MEMBER APOSTOLAKIS: Come on, Steve.

MR. ARNDT: Fair enough.

MEMBER APOSTOLAKIS: Why didn't you put another bullet, "We should do a good job"?

MEMBER SEIBER: There you go. That would be our comment.

CHAIRMAN BONACA: That's important.

MEMBER SEIBER: Moving on.

MR. ARNDT: Moving on.

MEMBER APOSTOLAKIS: Moving on.

MR. ARNDT: These next couple of slides are basically to try and answer the question that you have been asking for the last couple of minutes.

MEMBER APOSTOLAKIS: I think you did a disservice to yourself last time.

MR. ARNDT: Why is that?

MEMBER APOSTOLAKIS: You should have presented the integrated program.

MR. HAMZEHEE: We're working on it.

MR. ARNDT: We're trying to define it better.

MEMBER APOSTOLAKIS: Yes, but we're here to help not to criticize.

MR. ARNDT: Absolutely.

MR. HAMZEHEE: We have made progress.

MEMBER APOSTOLAKIS: Good.

MR. ARNDT: The program basically consists of three elements. If you think of it in these areas, it's easier to see how it fits and what we're trying to accomplish in the individual programs. The first area is basically to develop quantitative, digital system models of the systems, understand how they work, and how you can model them in different ways. That's basically the Virginia work, the Maryland work, some of the work at Halden and things like that. We're trying to understand how the systems work primarily.

MEMBER APOSTOLAKIS: I would approach this in a different way. I would first complete the data analysis investigation that you are doing and draw some conclusions from what you all see there as you

have already started doing. Then in parallel, I would focus on the assumptions behind all of these models that you are mentioning here.

Then when you have the insights from the data, I would try to match the models and the insights and then conclude that maybe under these conditions, this model seems to be pretty good and under other conditions, some other model is pretty good. I think sometimes people take models just because they are out there, especially some sort of an international document.

This International Electrotechnical Commission, for example, that has Markov models in there, does that commission ever have a peer review by somebody who can be adversarial? I don't know that. But the damage they do is, Markov, Markov, Markov, we'll all do Markov. It's a mystery to me that Markov models apply to all of this.

MR. ARNDT: And one of the big challenges - and I actually sit on an IEC standards review.

MEMBER APOSTOLAKIS: I'm sorry.

MR. ARNDT: That's okay. Like most standards review bodies, IEEE, IEC, ASME, they generate their documents by basically an internal review, if you will, not an external review. But the

real issue is, we're trying to accomplish several things in this program. One of which is exactly what you said, understand what is necessary, what the issues are, what does the data tell us, what do models tell us, in parallel with trying to understand what the guidance are, what the limitations are and things like that.

MEMBER APOSTOLAKIS: Last time, for example, we had the presentation from Virginia. And then somewhere there it says, "If we have a Markov model, we have lambda and this and that and here is the result." I think a committee like this would like to see before the equations, what does lambda represent? What kind of events are you talking about? This lambda, what is it? Rather than starting with it and then developing equations. This is the fundamental question here.

I'm not saying I have the answer myself, but if you read the literature, as you know, there are two conflicting approaches. One is that these are design specification requirement errors. You can't really model them just as you can't model hardware designers. The other point of view is, "Yes, but things happen in time and this and that." These are fundamental issues that I think we should resolve

first.

MR. ARNDT: Yes, and the real issue is, you have to look at this in two parallel paths. There's the issue of understanding how the system works and how it fails and what the failure modes are and things like that which is really what the first part of the program is which is what Barry is doing with his fault injection methodologies, Professor Johnson at UVA, what Carol is doing in software metrics work, and what we're doing with the requirements analysis work at Halden. The point of that work is to understand how you can model these systems because if you don't understand how they fail, what the failure modes are, in essence, what lambda presentation is.

MEMBER APOSTOLAKIS: But is that what Virginia is producing? I would have no problem with that. They go way beyond that. They give me a study state probability that comes from a Markov model and I cringe.

MR. ARNDT: Yes, the fundamental issues --

(Laughter.)

CHAIRMAN BONACA: Could don't we proceed with the presentation? I am losing sight because there's a side discussion going on.

MR. ARNDT: Yes, I apologize, sir.

CHAIRMAN BONACA: No, it's not your fault.

MEMBER APOSTOLAKIS: It's not mine either. If two guys are talking and --

CHAIRMAN BONACA: I'm trying to think about his presentation and I'm stuck here.

VICE CHAIRMAN WALLIS: Yes, I'm trying to think about it too. The problem I have with it all, to go back to my previous question, is all of these slides talk about developing something as if nothing exists. Is there any state of the art at all? And what are the faults of the state of the art? You haven't given us any kind of a base to say what you are building on. The impression I get is that it's all new.

MEMBER APOSTOLAKIS: You're asking my question in different words.

VICE CHAIRMAN WALLIS: Okay.

MEMBER APOSTOLAKIS: What I asked him to do is look at the existing models and question their assumptions.

VICE CHAIRMAN WALLIS: Okay. Well, tell us. Is it all new?

MR. ARNDT: There have been a number of different areas that people have investigated. It

primarily depends on what industry and what particular interest area you are coming from. For example, the fault tolerant people, these are the people who design systems not to fail, design systems in such a way that they have what is referred to as fault tolerance.

MEMBER SEIBER: Self-recovery.

MR. ARNDT: They continue to work either because of redundancy or because of fixing and things like that. They have developed certain methodologies to do that. One of the projects we have is to build on that particular methodology to try and develop tools for our particular applications. There is a whole set of people who look at software independently of hardware.

There's a large argument associated with whether or not that's appropriate or not. One of the projects that we have is to look at a particular part of that area to see whether or not you can use those kinds of methodologies, be it software fault tree analysis or software metrics predictions or things like that. They have been looking at a particular area of it to see whether or not we can use that.

VICE CHAIRMAN WALLIS: So computers have been around for a long time and digital systems for a long time. There's no state of the art. I can't go

to some university 50 miles from the coast where all the good ones are, of course, and take a course where they say, "This is the way you do it. This is the failure."

MEMBER APOSTOLAKIS: They don't even teach courses on failures of systems. If you go to a computer science department and talk about failure, they look at you like you are from Mars.

VICE CHAIRMAN WALLIS: It's incredible, isn't it?

MEMBER APOSTOLAKIS: They don't teach that because they think in terms of mass production.

MR. ARNDT: Quite frankly, the people who really think about this at a serious level you could probably fit in this room worldwide. It's very small.

MEMBER APOSTOLAKIS: Very small.

MEMBER SEIBER: It's a matter of consequences. You talk about digital control of an airplane. If the airplane never levels out as it's landing, you feel sorry for 200 to 300 people. On the other hand, the consequences of a nuclear accident, while highly improbable and probably doesn't hurt anybody, everybody is scared of it.

So that demands this greater level of attention to all these aspects of digital I&C. And

this is a relatively new art. I would like to encourage us to move on because we actually have to stop at 5:30 p.m. for this session. To argue a single point and miss the rest of the talk is probably not good.

MR. ARNDT: The second part of the program is basically the issues specifically associated with risk-informed regulation. How do you take the knowledge and the models that you develop and put that into a system analyzing risk-informed? Integration with current generation PRA, how do you do it? The last part is the establishment of regulatory guidance and understanding what is and is not acceptable and how do you fit that into our current procedure.

The next three slides just amplify on that. I'll go through them very quickly. The real issue is to attack some of the fundamental issues in the first part, the issue of hardware versus software, the limitations to the models, what kind of modeling is meaningful, what level of assurance you can have, how does the testing affect things, the basic software/hardware digital system aspects of these kinds of issues.

The second part deals with what's an appropriate way to model these in a risk-informed

application? Can you use traditional PRA models and just put data in at the lowest level of reliability? You would need actual dynamic system modeling at the lowest level.

VICE CHAIRMAN WALLIS: Most areas of engineering developing models from scratch, verifying them, testing them, showing that they work, trying them in the field, takes a very long time.

MR. ARNDT: It is.

VICE CHAIRMAN WALLIS: Is that the same thing with this system?

MR. ARNDT: Yes.

VICE CHAIRMAN WALLIS: Is it going to take you ten years or something like that?

MR. ARNDT: We're stealing from everything we possibly can. We're looking at things from the aviation community. We're looking at things from the transportation community. We're looking at things that have been done in other parts of the world and trying to fit them into our methodology and see if they work which is one of the reasons we're trying to -- When I say "new models and methods," new for us and pilot them and see whether or not they work.

MEMBER SEIBER: You are piloting them on relatively simple systems like the cardreader and the

three-element feedwater control.

MR. ARNDT: Depending on the particular project, we're trying to start a relatively simple system to see whether or not it's feasible.

MEMBER SEIBER: Right.

MR. ARNDT: And then we're going to use a prototypical nuclear system.

MEMBER SEIBER: Right.

MR. ARNDT: And then the last one is basically looking at the regulatory things.

MEMBER APOSTOLAKIS: You know, just one quick comment here. You may be going down the path of the human reliability analysts in the sense that these people who develop all these models typically don't read each other's work. Maybe you can think of a way to force them to do that, at least the guys you control.

MR. ARNDT: Yes, and that is a significant issue that we have experienced and have been fighting and working with because of exactly that. The electrical engineers who do this work publish in the IEEE journals. The reliability engineers publish in journals like yours. The human factors people publish in the human factors. The people who are nuclear engineers publish in *Nuclear Technology*. It's a real

challenge to cross-fertilize this work because not only do they frequently publish in different journals but they also speak slightly differently.

MEMBER APOSTOLAKIS: Absolutely.

MR. ARNDT: That's one of the reasons that we're trying to integrate this as much as we can and get the right people with the right resources looking at the program.

MEMBER SEIBER: Okay. Moving on.

MR. ARNDT: Implementation, we basically have the programs proceeding in parallel as much as possible. Obviously some things need input from others. As I mentioned earlier, the first part is being carried out by Virginia, Maryland, and Halden with some work from in-house staff. The second part is being carried out by BNL, Ohio State, and in-house efforts.

MEMBER APOSTOLAKIS: Who in Ohio State?

MR. ARNDT: Tunc Aldemir and Don Miller.

MEMBER APOSTOLAKIS: And Don Miller.

MR. ARNDT: Yes, the third part is being carried our primarily through in-house efforts with some support from BNL?

VICE CHAIRMAN WALLIS: How will you evaluate the results of this work?

MR. ARNDT: Primarily through pilot studies, look at a real system and see whether or not we can coddle it in such a way that the information --

VICE CHAIRMAN WALLIS: How do you know that it's not a fantasy, this model, when you do this? What's the check that it's good?

MR. ARNDT: There are several ways of assessing whether or not the reliability number or the model we're getting is what we expect to get. You can have independent reviewers. You can have peer review which we have done in several cases. You can have basically an Oracle, if you will.

VICE CHAIRMAN WALLIS: That's going to work well enough?

MR. ARNDT: It depends on what kind of numbers we're expecting.

VICE CHAIRMAN WALLIS: The reliability bridge-building took centuries to establish. There were models and they developed. But they had to be tested and checked and so on.

MEMBER POWERS: And they failed frequently.

VICE CHAIRMAN WALLIS: They failed frequently. And computer systems fail from time to time in a catastrophic way. No one seems to know why.

I see there might be a problem here.

MR. ARNDT: I think we're getting better at knowing why. But you are correct. In a lot of ways, you can go back to Professor Levenson who --

VICE CHAIRMAN WALLIS: How do you avoid being fooled by these academics developing all these models and saying they are great?

MR. HAMZEHEE: I think just one thing at least we will try to do is that the fact that we don't do what the rest of the industry does and that is to look at the system failure. We're trying to go down at the lower level to really try to understand at least what could go wrong at the lower level. Hopefully that will help us in understanding how things can fail and how they constitute a system failure and with some uncertainty.

MR. ARNDT: And one of the things that I have in an earlier slide that I went through more quickly is, one of the issues is, if they models don't at least prescribe to the limited data that we have, you know you have a problem. In some cases, the data is going to directly inform the models and provide us reliability numbers.

But in most cases, it's going to be there just to be sure our modeling is not completely out to

lunch. That it's failing in the same way the data gives us general ideas associated with it. It's not failing any more than what the data would give us and things like that.

MEMBER POWERS: Steve, you know the models of physics frequently are highly, highly approximate.

MR. ARNDT: Yes.

MEMBER POWERS: And don't match the data.

MR. ARNDT: Right.

MEMBER POWERS: Is there a chance sometime in the near future you could take a model, something, and run it through an analysis and say, "Okay. Here's what you get at this highly simplified model. But here's what we actually want"?

MR. ARNDT: Well, I go back to the old physicist statement, "All models are wrong. Some are just useful." One of the things we're trying to do in our pilot studies is kind of that kind of thing. It's run it through the analysis, see what the numbers are getting, and understand whether or not that's sufficiently accurate in an abstract way and has enough detail to be useful from a regulatory standpoint.

MEMBER POWERS: It could easily be if your failure rates are so low that I don't care if your

model is off by a factor of 10 or 100.

MR. ARNDT: That is one of the issues. That's actually a two-edged sword in several different ways. One of the issues that we look at is, what we're trying to demonstrate is that it's at least so-and-so accurate. If it's more accurate than that, we don't care.

If the model tells us it's ten to the minus eight and we have relative confidence that it's not to bad a model, then it's more than good enough at ten to the minus six. That is certainly one part of the guidance-type issue that we're looking at, the quality of the model, the confidence we have in the model, and things like that.

The problem with that is that many of the things that drive the uncertainty and the number are things that make that kind of analysis very difficult. Simplified analysis in this area gives us real problems because you have system interactions which is a very significant problem. You have common mode failure not only of the software but of the hardware and the software/hardware interfaces and the communications and other things. You have issues associated with model incompleteness which is a real problem in this area. So it's very difficult, but

yes, that is something we're looking at.

MEMBER POWERS: I think I could have taken human factors and substituted in your speech there and everything would have been coherent. I don't think there was anything that you said that could not be said about human factors. Yet, we get an awful lot of mileage over what Dowell (PH) and Swain put together, which everybody will admit doesn't match the data. It simply happens to be useful.

MR. ARNDT: Yes, and our state right now is trying to get to that point.

MEMBER POWERS: Okay.

MR. ARNDT: To get a model or set of models that are useful that may not be 100 percent accurate, that may not be completely reflective of the data, et cetera, but are useful for our particular application.

MEMBER POWERS: The reason Alan was successful is, having been told what he was doing was impossible - and he did it for the nuclear weapons program is what he was doing it for - is he started discarding requirements. People say this interacts with this and you have to worry about this. He truncated down to something that was doable first and then quit.

(Laughter.)

MEMBER POWERS: And people have been fighting all over the rest of the stuff ever since. Is there a point where you can make that bold initiative? Or you are not there yet.

MR. ARNDT: Well, that really goes back to the discussion we had at the very beginning about, are we sufficiently mature that we can make a model that's useful? Whether or not it's accurate or not is a different issue. I think we are to the point where we can do that.

MEMBER POWERS: Okay.

MR. ARNDT: The few pilot studies we have had have been relatively successful. They have had issues and limitations and things like that. The current research that we have ongoing are for larger systems that are more prototypical of bigger (PH) applications both in the complexity and the size and things like that. So I think we are at that point. As was mentioned earlier, there is some work we can build on, not a lot. But we're trying to get to that point where we have that.

MEMBER POWERS: In thinking about presenting your material here and to others less sympathetic, you might want to communicate that more

optimistic state of affairs and whatnot because you have succeeded in convincing me this is a very, very difficult area to work in and I'm glad I don't. But you might want to also communicate that those of you who are condemned to work in this field are actually verging on the cliff of a success here.

MEMBER ROSEN: Success in the sense that maybe you'll have something useful. You won't be able to prove it's giving you the right answers. But you'll at least have something that one can use to give you an answer.

MR. ARNDT: Yes.

VICE CHAIRMAN WALLIS: It would help me greatly if you could show an example of a success and a measure of it and a test which showed why it was a success.

MEMBER APOSTOLAKIS: One measure of success is to have a model that guides you to investigate a piece of software and you find an error that others have not found.

MR. ARNDT: Right.

MEMBER POWERS: That's a very, very demanding level of measuring.

MEMBER APOSTOLAKIS: But that's what people are looking for.

MEMBER POWERS: That strikes me as very useful in academic surroundings. But I think that's a very demanding level of metric for this.

MEMBER APOSTOLAKIS: No, because the tests, Dana, are blackbox tests essentially. Here you are trying to have some intelligent approach that will allow you to combine blackbox tests with some intelligent analysis of the system. You would never rely on one method. You asked for a measure of success. Here is a measure of success. It may be difficult to achieve. But it's a measure of success.

MEMBER SEIBER: Well, the problem is you never know when you achieve it because in a complex system, you are going to have more than one fault.

MEMBER APOSTOLAKIS: The difficulty is separate from the measure. He asked for a measure of success. I gave him one.

MEMBER POWERS: And we don't deny it. But that's far too demanding for what they are trying to do.

MEMBER APOSTOLAKIS: Yes, and I'm not saying that we'll use that measure to evaluate their approach. I'll tell you. Professor Levenson that Steve mentioned, that's how she made her reputation. She did the fault tree analysis with one of her

Master's students in 1985 on a small control system of a satellite that Berkeley is supposed to launch. Lo and behold, the fault tree led her to find an error. And everybody paid attention immediately.

MR. ARNDT: And although it is a very difficult metric to achieve simply because there are two different ways of looking at it, if you find something, great, you prevented a fault.

MEMBER APOSTOLAKIS: If you don't find it, you don't know.

MR. ARNDT: If you don't do it --

MEMBER APOSTOLAKIS: It was really good.

MR. ARNDT: Did you really demonstrate that there weren't any faults? That's right.

MEMBER ROSEN: Absence of evidence is not --

MEMBER SEIBER: Why don't I suggest that we speed up since we only have 20 minutes left and a lot of slides?

MR. ARNDT: Okay. One quick point before we leave this point. One of our researchers who has done extensive work in this area in the transportation business has actually made his name by using the methodology we're currently using to find faults in some metrices (PH) systems. So the techniques are

capable of doing that. We simply haven't exercised them for a nuclear-specific application yet. That's currently part of our research program.

MEMBER SEIBER: Okay.

MR. ARNDT: This is basically just a cartoon of how the various pieces fit together. I'll spend two seconds on this. This area up here --

MEMBER APOSTOLAKIS: Do you have a microphone on you?

MR. ARNDT: No, I'm sorry. The circle in the upper left hand side is basically the quantitative description. What we're trying to accomplish is understand how the systems fail, what the failure modes are, how likely they are to fail, those kinds of systems analysis kinds of things both for software and an integrated hardware/software system.

That in and of itself is a useful output. As you can see in the arrow going up, that is informing our other parts of our research program that's trying to improve the review of these systems in a deterministic way. But it also provides us understanding what the limits and strengths of the system modeling is and also hopefully some model failure rates and things like that that can be put into the PRAs. That's the Virginia work. That's the

Maryland work, looking at specific ways things fail.

The box on the right there is digital systems, PRAs, failure rates, how you integrate with current generation PRAs, whether or not dynamic fault trees or Markov or some other methodology is the most appropriate way of doing it. That also provides us input on the guidance that establishes the capability of the models, the importance of the assumptions, the kinds of uncertainties you have to deal with.

Then of course, the bottom bullet is the establishment of the guidance. What are we going to do? It's the stuff that George was talking about in the beginning of the presentation. Do we need a 174-series document in this area? How does this affect the PRA quality documents? How do we update the standard review plan to be more risk-informed in this area so that that is the output of that particular part of the work?

MEMBER APOSTOLAKIS: Now again, Steve, this is not just the area where that is important.

MR. ARNDT: Correct.

MEMBER APOSTOLAKIS: When we do 1174 applications in other areas and somebody tells me that they have installed digital systems, I'm going to have a problem. You all remember what McGaffigan said

today about the holes and where is the absolute CDF. Now, you are creating a hole because I don't know, as you have on your next slide, what the failure modes are. You are telling me that they are different. And I believe you because you are right. So it's not just here. What you are doing here will affect many other things.

MR. ARNDT: Right.

MEMBER ROSEN: As an overall systems diagram, I think this would be stronger if you showed some of these arrows as two way streets.

VICE CHAIRMAN WALLIS: I think it would be very good if you could show us that these systems really are more reliable than all these analog systems we've been relying on. I would believe it.

MR. ARNDT: That's true.

MEMBER APOSTOLAKIS: I don't think they are more reliable.

MEMBER SEIBER: You can't do that.

MEMBER APOSTOLAKIS: They are not more reliable.

MEMBER SEIBER: The major failures are in the actuators and the sensors.

VICE CHAIRMAN WALLIS: Not persuasive.

MEMBER SEIBER: And not in the control

room which is his digital part.

MR. ARNDT: The next slide is basically a chart form of what you saw before. It's basically talking about what the specific issues are, what the approach is, and what the resources are associated with that. Very briefly, some of the successes we have had so far are that we have done some very simplified modeling in some of these areas.

For example, the Maryland project, we did a simplified software system. It was a data entry access system and had some successes in that area. We did a fairly simplified feedwater control system for the University of Virginia and had some successes in that area. Both those programs are going on to a phase two pilot program, real actual digital systems that are going to be used for protection systems.

We have made some progresses, as was mentioned earlier, in understanding what the state of the data is. We're trying to do some more work in that area. The next three or four slides just update the specific research projects. I'll go through those fairly quickly.

MEMBER APOSTOLAKIS: Now, this is where I have an objection or at least I don't have enough information. Why did you pick those? Have you done

a literature review where you evaluated assumptions? For example, you are about to start the dynamic reliability modeling at Ohio State. I'm not saying it's not a worthwhile model, but I don't know how it fits in the bigger picture.

In the ensemble of models, what can it do? Why is it better than something else? That's what's missing. The conclusions may still be the same. You may still decide to do this. But at least I need to be convinced. The rest of the committee may not. Do you see what I mean?

MR. ARNDT: Yes.

MEMBER APOSTOLAKIS: In other words, the data evaluation that you are already doing and the evaluation of the models and the comparison of the two in my view are the number one tasks that will define everything else. Maybe Tunc can do it. I don't know. Not this model, I mean the evaluation.

MR. ARNDT: Right.

MEMBER APOSTOLAKIS: The problem is that all these guys are my friends.

MEMBER SEIBER: That's probably right.

MEMBER POWERS: Not for very long.

(Laughter.)

MEMBER POWERS: This may be a self-

correcting problem here.

MEMBER RANSOM: We visited Japan 15 years ago. They were working on the all-digital control room and system at that time. I'm wondering, where are they at this point 15 years later?

MR. ARNDT: Actually, the Japanese as well as the Koreans with the ABWR work are working in this area. Actually the head of the Korean program, J. Juha, was a classmate of mine. They are doing much more qualitative analysis of this work. Basically their work is primarily in the area of bounding analysis.

How good does the system have to be, not necessarily how good can we demonstrate it to be which is a different way of attacking this. We looked at that and we decided that we didn't want to it that way. I think primarily because of the way our regulatory structure is set up, not so much that it's not a good way of doing it.

MEMBER APOSTOLAKIS: Does 80+ have a digital control system yet?

MR. ARNDT: 80+?

MEMBER APOSTOLAKIS: Yes, the Combustion Engineering. I think they do.

MR. ARNDT: They do but it's not nearly as

sophisticated as some of the others.

MEMBER APOSTOLAKIS: I see. But they did have somebody review it, didn't they?

MR. ARNDT: Yes. ABWR, for example, is a much more sophisticated system.

MEMBER SEIBER: Well, we have 15 minutes left and seven slides.

MR. ARNDT: Okay.

VICE CHAIRMAN WALLIS: I guess I have to say, I like academics and I like academic thought. But it's very different to do projects in academia which result in publications in journals and prestige and designing a workable, adequate system to be used by NRC or industry. It's a very different task. I wonder if you have the right people doing it.

MR. ARNDT: It is a challenge. Getting the right set of people doing the right set of things is a very difficult thing. The concern is developing a prototypical application is a challenge at the universities. But primarily those are the people who are doing the research.

VICE CHAIRMAN WALLIS: Good luck.

MR. ARNDT: Okay.

MEMBER APOSTOLAKIS: So now that you retire, universities are not good.

VICE CHAIRMAN WALLIS: No, they are wonderful for what they do well.

MEMBER APOSTOLAKIS: Which is a tautology. They are wonderful for what they do.

(Laughter.)

MR. ARNDT: I'm going to step through these very quickly. The University of Virginia work, as I think we have talked about, is dedicated to using the methodologies that have worked in certain other areas to develop a methodology in our area fundamentally based on the fault injection technique.

VICE CHAIRMAN WALLIS: But you see what I mean. A modeling project is very different from developing a usable system to do something.

MR. ARNDT: Yes, that's right.

MEMBER SEIBER: Moving on.

MR. ARNDT: The University of Virginia work is focused on basically the software aspect in isolation which is one of the methodologies that is done. This particular project is looking at software metrics which is one of the particular issues. But they are also providing input on software reliability and software in general. The Brookhaven program is looking at the classical PRA issues, the regulatory guidance, the failure databases, the traditional PRA

modeling, failure modes and effects analysis, failure modes, effects, and criticality analysis.

MEMBER APOSTOLAKIS: When do you think you will be ready to have Brookhaven here in the subcommittee meeting? Remember, we're here to help.

MR. ARNDT: We could probably have them here relatively soon.

MEMBER APOSTOLAKIS: In the fall sometime?

MR. ARNDT: Yes, probably.

MEMBER APOSTOLAKIS: Because I'm really interested in this.

MR. ARNDT: Okay. I'd like to work with the subcommittee to figure out what the best set of presentations are.

MEMBER APOSTOLAKIS: That will be great.

MR. ARNDT: Like I mentioned, Ohio State is looking at the dynamic reliability model and the issues associated with that. Some smaller projects. The Halden is there. We pay into it. They are doing various work. The big thing that they do that other people don't do is the digital system requirement-type work.

The COMPSIS is the international failure database in the nuclear community. We're a participant in that. Then we have our own in-house

staff efforts. As I mentioned earlier and has been pointed out, a lot of other people are doing it, both external organizations and there's a lot of interfaces associated with internal regulatory policy. We're working with the NRR electrical and I&C people as well as the PRA community over there, our colleagues in the Research PRA community.

There's other nuclear research organizations that are working in this area. EPRI and their work is the primary one right now. They are developing their methodology that they would like us to endorse at some point. There are, of course, other regulatory bodies in other technical communities. We're working with NASA, FRA, and various other organizations that have been much more proactive in this area in various ways.

As we develop the regulatory stuff, we're going to have public meetings and workshops that get into it. Basically this is just a rehash of what we talked about. We have the three different areas that are proceeding in parallel. I haven't left much time for additional questions and discussion. But I would be happy to provide any additional comments --

MEMBER APOSTOLAKIS: You didn't get enough.

MR. ARNDT: Or specific technical issues that we didn't have a lot of time to talk about as well as where we are going and things like that.

MEMBER SEIBER: If there are no questions, Mr. Chairman, we'll go back to you.

CHAIRMAN BONACA: No additional questions?

MEMBER APOSTOLAKIS: No, you cut us off.

MEMBER RANSOM: I'm wondering, does your work include --

VICE CHAIRMAN WALLIS: Did you say there was an example of success sometime?

MR. ARNDT: I mentioned a couple of things.

VICE CHAIRMAN WALLIS: Not necessarily in this meeting, but can we see that?

MR. ARNDT: Yes, what I think would be the best way of doing it is to work with --

VICE CHAIRMAN WALLIS: The subcommittee.

MR. ARNDT: Mr. Sieber and Dr. Apostolakis to talk about specific programs and their accomplishments as it becomes appropriate.

MEMBER APOSTOLAKIS: Absolutely.

MR. ARNDT: We can have a half day subcommittee meeting on the particulars.

MEMBER RANSOM: I'm wondering if your work

or program includes the basic transducers for measuring pressure, temperature, and things like that. Some of them require analog/digital conversion at the transducer. Some of them may have - I don't know - today technology where you get a digital to start out with.

MEMBER SEIBER: It always starts as analog.

MR. ARNDT: Yes, the program as a whole looks at not only digital systems but also transducers and meters and things like that and particular issues associated with them. One of the programs looks at the trend now to put digital information processing at the transducer level, what is colloquially referred to as smart sensors. So we're looking at that. As that becomes an important part of the reliability calculation, then that would be included. Right now, it's mostly the failure of the analog sensor of some sort would be a number based on some reliability data that we have for various sensors.

MEMBER SEIBER: A component switch is a digital thing.

CHAIRMAN BONACA: If there are no further questions, I guess we'll plan a subcommittee meeting in the early fall and have an update on this.

MEMBER APOSTOLAKIS: I think we should. This is a very important issue. We should keep abreast of what you guys are doing have a dialogue.

MR. ARNDT: Sure.

MEMBER APOSTOLAKIS: We don't need to review final points.

CHAIRMAN BONACA: All right.

MEMBER SEIBER: Well, before we end, I would like to thank Steve and the staff for their presentation. It's always extra work to have to put one of these together and a trying experience to deliver it.

MEMBER APOSTOLAKIS: It's a pleasure too though.

MR. ARNDT: Absolutely.

MEMBER SEIBER: It certainly is.

MEMBER POWERS: I think I would agree with Professor Apostolakis's important area because it's new and novel and somewhat exciting and things like that. The challenge I think that you face is you need to educate us a little more on the specifics. It wouldn't hurt for you to put us on the distribution of reports that your work generates and things like that so that we can get a little better understanding of the specifics on this and even some of the more

salient review papers in the field.

I think the older hands here are familiar with the National Academy of Sciences report, which I'll be quite blunt with you, I gleaned next to nothing from. I believe that was the general feeling of the ACRS on the report. It was not very helpful to us.

MR. ARNDT: At the risk of being a shameless promoter, for those of you who are interested, the American Nuclear Society sponsors a meeting on I&C and human factors and man-machine interface once every three years. That happens to be coming up in September of this year.

MEMBER APOSTOLAKIS: You are one of the organizers.

MR. ARNDT: I'm actually the general chair. But probably at least a quarter of the papers are out on this particular subject of digital reliability.

MEMBER POWERS: Where is it, Steve?

MR. ARNDT: It's in Columbus, Ohio.

MEMBER POWERS: Good God. That's not going to attract very many people.

(Laughter.)

MR. ARNDT: It's a technical meeting.

VICE CHAIRMAN WALLIS: Are these academic papers or are they industrial papers? For people who know how to design a system, do we have a prescribed reliability?

MR. ARNDT: We have papers from all over the world. Probably about 40 percent are academic. A good 30 percent are industrial, some regulatory bodies. It's a very broad cross section.

MEMBER APOSTOLAKIS: It's a hell of a lot of papers there, but a hell of a lot of them are really bad.

VICE CHAIRMAN WALLIS: There are all in digital form.

CHAIRMAN BONACA: When is the meeting going to take place?

MEMBER POWERS: It's in Columbus, Ohio. When are the dates?

MR. ARNDT: It's September 19 through 22.

MEMBER POWERS: Mr. Chairman, can I go to this meeting?

CHAIRMAN BONACA: You are absolutely welcome to.

MR. ARNDT: It's a shameless promotion.

MEMBER APOSTOLAKIS: If he said "Columbus, China," you would go.

MEMBER POWERS: I have to get these guys to approve it. It's not in some salubrious locale like Kyoto, Japan so they might actually.

CHAIRMAN BONACA: All right. I think we need to wrap it up. Thank you for your presentation. We are going to be going off the record now.

(Whereupon, the above-entitled matter concluded at 5:27 p.m.)