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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

SUBCOMMITTEE ON FIRE PROTECTION

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FRIDAY,

APRIL 23, 2004

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B3, 11545 Rockville Pike, at 8:30 a.m., Stephen L. Rosen, Chairman, presiding.

COMMITTEE MEMBERS:

STEPHEN L. ROSEN	Chairman
GRAHAM B. WALLIS	Member
GRAHAM M. LEITCH	Member
DANA A. POWERS	Member
JOHN D. SIEBER	Member

ACRS STAFF PRESENT:

Marvin D. Sykes

NRC STAFF PRESENT:

Suzanne Black
Dan Frumkin
Raymond H. V. Gallucci, Ph.D., P.E.
John Hannon
J. S. Hyslop
David Lew
Eileen M. McKenna
Robert Radlinski
Mark Reinhart
Mark Henry Salley, P.E.
Sunil D. Weerakkody

ALSO PRESENT:

Paul Gunter, Nuclear Information Resource Service
Alex Marion, Nuclear Energy Institute
Bijan Najafi, SAIC (EPRI)
Steve Nowlen, Sandia National Laboratory

I N D E X

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

8:31 a.m.

CHAIRMAN ROSEN: The meeting will now come to order.

This is a meeting of the Fire Protection Subcommittee. I am Steven Rosen, Chairman of the Fire Protection Subcommittee.

ACRS members in attendance are Jack Sieber, Dana Powers, Graham Leitch, and Graham Wallis.

Marvin Sykes of the ACRS staff is the designated federal official for this meeting.

The purpose of this meeting is to discuss the resolution of post-fire safe shutdown circuit analysis issues, revisions to the reactor oversight process, fire SDP, and the ongoing fire risk requantification study.

We will also hear a brief status update on the operator manual action rulemaking and 10 CFR 50.48 rulemaking which would permit licensees to voluntarily adopt NFPA 805.

The subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions as appropriate for deliberation by the full committee.

The rules for participation in today's

meeting have been announced as part of the notice of this meeting previously published in the Federal Register on April 9, 2004.

We have received no written comments or requests for a time to make oral statements from members of the public regarding today's meeting.

A transcript of the meeting is being kept and will be made available as stated in the Federal Register notice. Therefore we request that participants in this meeting use the microphones located throughout the meeting room when addressing the subcommittee. Participants should first identify themselves and speak with sufficient clarity and volume so that they may be readily heard.

We'll now proceed with the meeting. I'll call upon Suzie Black of the Office of Nuclear Reactor Regulation. Good morning, Suzie.

MS. BLACK: Hi, good morning. It's good to see you again. Good to be back here.

Fire protection. We have, as you said, several staff presentations today. Mark Salley is going to address risk informing associated circuits. Mike Reinhart and Dan Frumkin are going to address the revised fire protection SDP.

The research, J. S. Hyslop is going to

talk about the fire risk requantification study. Bob Radlinski is going to talk about 805 and Ray Gallucci is going to talk about the manual actions rulemaking.

But in order to set the stage today, I thought I'd make a couple of opening comments. A couple -- well, I don't know how many of you attended the RIC but both the Chairman and Commissioner Merrifield in their statements said that they were anxious to get fire protection on a path to closure and to have it become more of a normal regulatory process.

So a couple of weeks ago, we gave a presentation to the Chairman and Commissioner Merrifield. I guess it was about two weeks ago. And we presented the path to closure and the schedule for these activities. And I believe we have a copy of that handout to give to you today.

So this is one of the steps in the process of getting to closure and we've appreciated your assistance in the past and your insights and we look forward to hearing them again today.

And with that, I'll turn it over to Sunil.

MR. WEERAKKODY: My name is Sunil Weerakkody. I'm the Chief, Fire Protection and Special Projects section in NRR. And the objective of the meeting today is to provide the ACRS Subcommittee on Fire Protection with a status update of our key activities.

And what I will do is, you know, we have about -- we have five presentations on five key topics. I just wanted to give you an overview and then a context of where we are.

We came and briefed you about six months ago. And I'd like to sort of go quickly, you know, the key major progresses we made in the key areas since we met. I believe it was August of last year.

In the area of risk informing associated circuits, our first presentation will be from Mark Salley on that subject. And the key accomplishment in that area since we briefed you the last time is issuing a final regulatory information summary on that issue.

And Mark will go into the details of how we have worked with our -- worked with industry to find out the potentially more significant associated circuits and how we plan to focus our inspectors on those potentially risk significant associated circuits when we restart the inspections towards the end of this year.

In the area of fire protection

significance determination process, we have Mark Reinhart, the Chief responsible for that area. He will lead the presentation with support from Dan Frumkin, giving you a relatively lengthy update on the revisions to the fire protection SDP.

In the area of NFPA 805 rule, you already know this probably. The final rule is with the Commission for approval and right now given that the staff has completed its activities, the fire protection section has embarked on a number of efforts to implement that rule. And Bob Radlinski will go over the key steps that we are going to follow and some details.

Manual action rulemaking, after we met with you last time, we had a couple of public meetings on what we call the interim Draft Acceptance Criteria for manual actions. We received about 300 to 400 comments. We have received letters from Congress so there's a number of activities ongoing there.

However, for the purpose of this briefing to you, we are going to focus on the area that was of much interest to you the last time when we met which is the Acceptance Criteria. Ray Gallucci of my staff will have a presentation on that subject.

And then obviously we have -- we work with

Research, we meet with them every couple of months to make sure that the research activities are in support of and trying to stay in the schedule that we'd like to have them.

I understand the area that you wanted to be briefed on was the Fire PRA Requantification Study but we have other efforts that are ongoing and if you had any questions on those, we would be ready to answer those.

Having said that, I'd like to introduce Mark Salley. He's a fire protection engineer in my staff and he's the lead on associated circuits and he will present you details on associated circuits.

CHAIRMAN ROSEN: Yes, before we let Mark take the floor, I just want to ask Suzie a question. Your handouts for the April 12th meeting are fairly self-explanatory. But did you want to make any comment about it or you just left them here for our --

MS. BLACK: I guess the only comment is that both the Chairman and Commissioner Merrifield said just get it done. You know, don't dally. And I think -- I don't know that he said it at that point but, you know, the Chairman has said the best is the enemy of the good and that type of thing.

So I think that they're anxious to have us complete these activities as opposed to, you know, continuously polishing them to make them perfect.

CHAIRMAN ROSEN: Okay. Very good. Thank you.

So that's the plan. We'll keep an eye on it as well as you I'm sure.

MS. BLACK: Thanks.

CHAIRMAN ROSEN: Good morning, Mark. Nice to see you again.

MR. SALLEY: Nice to see you. I've got my little box of tricks here.

CHAIRMAN ROSEN: Oh, yes? You always bring something for us to pass around.

MR. SALLEY: Well, yes, I try.

MS. BLACK: And you always want to sit far away from all that.

MR. WEERAKKODY: I hope he's not doing these experiments at home.

CHAIRMAN ROSEN: Right.

MR. SALLEY: Okay, I'm Mark Salley from Fire Protection Engineer from SPLB. Can everybody see okay?

I spoke to you last in September of last year at the last Fire Protection Subcommittee meeting. And I kind of laid out our proposed plan to return the inspection of associated circuits.

A lot of what you're going to see today is very similar to that plan that we laid out for you in September. I've been able to hold the line pretty good and move it forward as we said. So I'll try to point some slight differences along the way. But for the most part, it's going to be very much like September.

So if you're having a flashback, that's why. Deja vu all over again.

Okay. Just to do a little quick review, a recap of what we're looking at and why we're looking at it. 10 CFR Part 50, Appendix R, which you're all familiar with and the standard review plan NUREG-0800 have a requirement in it for us to protect against fire-induced circuit failure to circuits, associated circuits that could adversely effect the ability to achieve and maintain safe shutdown.

We typically talk about that as being maloperation or prevent operation. As a matter fact, I've got just one backup slide I'd like to push around real quick. And you've all seen this before. This is the wording out of Appendix R. It's just worth taking a minute here and reading it real quick.

MEMBER WALLIS: This looks like a Teutonic sentence. It's all one sentence here?

MR. SALLEY: Just like all the regulations.

MEMBER WALLIS: And it isn't even finished.

MR. SALLEY: Well, I needed a second page so in the effort of condensing it, I stopped there. But it will show what I'm looking for.

MEMBER POWERS: You can be secure that the members of the subcommittee have committed this to memory.

MR. SALLEY: I thought that but I knew I was early and the first one today and so I just wanted to make sure that we had it in front of us. But I'm very aware of that.

MEMBER POWERS: Some of the members will ask you how this changes when we go to both plans that are controlled by the branch technical position.

MR. SALLEY: Yes.

MEMBER POWERS: And then those plans that are controlled by licensing conditions.

MR. SALLEY: Okay. Just to recap and take a look at this. This is the wording right verbatim out of Appendix R:

"Except as provided for in paragraph G.3

of this section, where cables or equipment, including associated non-safety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside of primary containment, one of the following means of ensuring that one of the redundant trains is free of fire damage shall be provided."

And, of course, that goes on to the separation and three-hour fire barriers.

But the key here is this is where the associated circuits come in to play in the regulations, which is what we're focusing on. And I just wanted to bring that point in. So we're looking for the things that could cause maloperation or prevent operation of the safety systems.

MEMBER POWERS: Is there any different in the branch technical position plants on this matter?

MR. SALLEY: No, the wording is very similar in NUREG-0800.

MEMBER POWERS: Yes, but similar is the source of many difficulties here.

MR. SALLEY: Yes, but we'll talk about that.

MEMBER POWERS: Of interest lately is -- to this committee in our discussions in the license renewal for Ginna. It's an SEP plant, pre-Appendix R plant with very limited separation and what not. How does this all play out for them?

MR. SALLEY: If this is a pre-Appendix R plant?

MEMBER POWERS: Yes.

MR. SALLEY: Then they have -- they were backfit to Appendix R so III.G, J and O was backfit across the industry universally. So they fall in it.

The post-`79 plants, of course, fall into the standard review plan, like I said, and the wording is very similar.

CHAIRMAN ROSEN: But they had to make substantial modifications to come into compliance, including a back-up train of shutdown safety equipment as I recall.

MR. SALLEY: Most plants did.

CHAIRMAN ROSEN: Yes.

MR. SALLEY: They were very -- there was a lot of modifications.

Continuing on with the recap, Information Notice 99-17, I guess, kind of brought everything together and says there appears to be some confusion in the industry. There are some problems. We need to look at this and we'll look at this -- and we said a couple of things in that Information Notice.

We'll look at it in a generic nature because it's effecting more than a handful of plants. And there are some questions from industry, that we'll work with them and see if we can bring this to resolution. So those were the two key thoughts that come out of Information Notice 99-17.

Along the lines, because of the confusion with the terminology and the language, around November 2000, we suspended the inspection on associated circuits. And we said, okay, we're going to stop for a minute here. We're going to look at this. We're going to study this a bit. We're going to see if there's new information available.

We're going to follow the NRC's charter, if you will, that we're going to start using risk-informed information to see if we can work this a little smarter, a little better. And then we'll pick this back up. That's what my whole project has been about.

A little further on the review, again this is just the status of where we have been. The industry, working through their trade organization, NEI did a pretty good test program early on in the program around 2000 when this stopped.

We had 18 full-scale tests. The thing that was unique about these tests is people have been burning cables ever since Brown's Ferry. But what was unique about this test was this test was designed to go and look for those spurious operations.

If you remember back in time to the late 90s, one of the questions was one the rule that we just read was hey, okay, that may have happened in Brown's Ferry but is this something that is going to happen? Is this a physical phenomena with these associated circuits? Are they going to cause these spurious operations? Are they going to cause these maloperations? And that was the question that was brought forth.

We said, well, we think they will. That's why the regulation says what it does. Then Testing said well, let's look at that a little harder. Is it credible? Okay? So that was the big start of the testing.

The results from that testing went to an expert panel. Industry, again, NEI worked with EPRI and the staff. And EPRI put a report out. I've got it here somewhere. I'm sure you've all seen it.

"Spurious Actuation of Electrical Circuits Due to Cable Fires." It's an issued EPRI document.

Now that we had all this information, both the old information and the new information, we had to sit down and decipher what's it mean? What's it telling us? Where do we need to go?

A very valuable tool, this is the first time I've ever used it and it was very valuable. It was a facilitated workshop. We held a facilitated workshop in February of 2003. I can't say enough about that. Like I said, that was the first time I'd ever used one.

But the exchange of letters that you would write between us and industry -- but to sit down in an open public forum and to be able to discuss the safety significance, the technical attributes, we covered a lot of ground and it was -- Chip Cameron ran it and it was a very, very worthwhile effort I feel. I learned something on this one. That that was a pretty good tool to use.

The key to that meeting was -- and I'll say this a number of times -- not all associated circuits are created equal, okay? And that's something that we thought about. And in the regulations, like you see, it talks about associated circuits. But when you take it into the engineering, the science end of it, it turns out that not all circuits are created equal.

Cables are an industry in and of themself. And if you look at the polymer science that goes into making cables, that not all cables will perform the same. We look at them for a number of different reasons. Fire protection EQ and we see that there's different performance.

The NEI testing as well as some previous work Sandia and Factory Mutual had done had showed us some of those insights. To use those insights in an intelligent manner becomes this risk-informed process. And that's what we'll go into.

Taking the information primarily from that facilitated workshop where we all got to sit down and discuss the technical aspects, we issued a draft RIS in August of 2003.

And in the draft RIS, we tried to accomplish a couple things. The main thing was along the lines that not all circuits are created equal, we said what is the high risk ones? What are the ones that are the mostly likely to fail? What are the ones that are easiest to fail? In what mode do they fail? This type of information we communicated out in the draft RIS.

We received a number of public comments on it, questions, suggestions. We worked through those. That's where I talked to you last year in September if you remember. This was still out for comment. Well, we've taken that and we've issued the final RIS, which you'll see there in March of 2004.

In addition to issuing that final RIS, we also put together a draft NUREG-1778. You all have a copy of it. This is what it looks like.

There is so much information and so much history and so much knowledge that span this 20-plus years of post fire safe shutdown that we needed a place to compile it all in one knowledge base, if you will, where you're not chasing Generic Letter 83-33, or 81-12, 86-10, and where's the clarification letter. And, you know, we've tried to bring it all together in one place to make it, if you will, reduce confusion and make it more user friendly.

And you are here, April 2004, in front of the ACRS Subcommittee. At least I am here.

So that's kind of the background. And hopefully I got you up to date.

Just to continue recapping, when we look at associated circuit, the risk from associated circuits, risk is classically defined as what -- frequency times consequence. And you can take that basic definition and get your risk.

With associated circuits, there's another factor. And that's the middle factor that figures in here and the fact of how your cables are going to fail, which ones are more likely to fail, and in what modes are they going to fail?

You need to factor that in to get the true picture of the risk from associated circuits. And that's along the lines of what we've been doing.

Of course fire frequency is established in other programs like the SDP. This program focused on the cables. The fire threat is another program that we're looking at. NUREG-1805, which we spoke about last time, is our fire dynamics tools which, again, we're finalizing. That should be issued also this summer to quantitate and see the effects of a fire in an enclosure. And, of course, the consequence.

So that's the basic premise we started everything off from.

Next slide please.

Again, the fire testing, the NEI work, and the previous work that was done by the national labs and people like Factory Mutual were the basis for this. So we have some testing, some science, if you will, that this is all founded on.

And from all that information, what it comes down to, simplifying, is that what's the high risk associated circuits, okay? That's what we want to look at. Which ones are -- or we want to focus in one.

The key ones that we saw -- the key difference that we need to define in cables, and I'll pass this around, I'm sure you've seen it before but it's a very good example, cables exposed to the same fire, was that there's a definite difference between the thermoplastics and the thermoset cables, okay?

In the polymer science of it, the thermoplastic cables, they tend to fail at a lower temperature, in the neighborhood of 400 degrees Fahrenheit. They tend to fail where they become drippy, runny, the insulation and jacket literally drip away like a candle would. And it could allow the conductors to come together where the later materials, the thermoset materials, tend to look like a hotdog that's been on the grill a little too long.

What I'm saying there is that it doesn't drip and run away. But it more or less chars up and makes an ash layer, which does give you some insulation, electrical insulation. So the failure modes are a little bit different.

And like I said, this cable is very good. It's worth looking at because it's a piece of history here. The two thermoplastic cables that you'll see coming together here are classic thermoplastic cable failure. These were actual cables from Brown's Ferry. TVA pulled these out of the reserve lot. But this is the old PEPVC. So these are what the cables looked like.

This is a newer 383 cable. And you can see same fire exposed and how the cables look. You'll also notice how the conductors can come together with inside the cable. So I'll pass this around. Suzie has seen it a hundred times.

MEMBER LEITCH: So just to be clear --

MR. SALLEY: Yes, sir?

MEMBER LEITCH: -- these cables have all been exposed to the same fire hazard?

MR. SALLEY: That cable bundle there, NEI was courteous enough to allow me to go in the dumpster after they were done and cut that out after Fred got all the good ones.

MEMBER LEITCH: Okay, thanks.

MR. SALLEY: So that is actually from the

NEI testing. And like I said, it's interesting -- just to make the point again because it's a piece of history you're touching there -- is that the industry had donated the cables to be used in the industry testing.

The thermoset on, the one that looks charred up like a log, if you will, is a newer cable, a 383-qualified thermoset material that you would be buying today. The older cable is a lot of the 70s vintage, the PEPVCs, the thermoplastic varieties. So that's a very good example of how they come together.

And also, look at the conductors inside. You can see where there's even motion. You can physically see the short without having --

MEMBER WALLIS: This hotdog here, actually it's skin is split.

MR. SALLEY: Yes, sir.

MEMBER WALLIS: It's really opened up.

MR. SALLEY: Yes, sir.

MEMBER WALLIS: It's not just --

MR. SALLEY: Yes, sir. But notice how the actual insulation around the conductors --

MEMBER WALLIS: Whoops, I've destroyed part of the evidence.

MR. SALLEY: Oh, you can take that home,

a souvenir.

MEMBER WALLIS: It's a bit crumbly.

MR. SALLEY: So the important thing that I'm drive home is that we need to look at cables on independent bases, what the cable is. And that's very important into the risk.

The second thing we learned about the failures, the failure modes of cables, a lot of people threw this idea around. And it's been written up a number of times. I did some work on it years back. And that's the mechanism -- it's much more likely to have an intra-cable failure than in inter-cable failure.

And what that means quite simply is you have a multi-conductor cable, be it a twisted pair, be it a piece of triplex, be it a seven conductor, a 36 conductor, whatever, it's more likely that those conductors come together rather than having two separate cables and having to have those conductors come together. So the testing bore this out.

MEMBER POWERS: You know that's very plausible if you have a cable tray in a relatively uniform temperature field.

MR. SALLEY: Okay.

MEMBER POWERS: But suppose I have one

with a sharp gradient across the tray. Is it still true that intra is more likely than inter?

MR. SALLEY: For a number of reasons, I believe it will be Dana. And I'll tell you why.

The first thing on the temperature criteria, on the previous slide I showed you that 400 degrees is about then the thermoplastics start energizing and going through their motions of chemically changing, burning if you will, and failing where the 700-degree threshold tends to be where the thermoset are.

So if we had a uniform temperature body, say 500 degrees Fahrenheit, you would know that the thermoplastic are beginning to go through their gyrations and they're beginning to come together and fail where the thermoset cables wouldn't have reached their activation temperature so they would basically be non-actors into it.

Now the question of the temperature spikes, yes, that's true. Fires do do a T-square type arrangement. You get into the spikes.

There is an area that Steve Nowlen's here and he's worked with us and we've studied it quite a bit. And that's the thermal lag, okay, just like with sprinklers. As soon as the temperature reaches 135, the sprinkler heads don't immediately go off. There's a phenomena called thermal lag. Not thermolag, thermal lag.

CHAIRMAN ROSEN: T-H-E-R-M-A-L.

MEMBER POWERS: I thought that was a word that was forbidden from the language.

MR. SALLEY: No, sir. The R/Lead lag circuit.

MEMBER POWERS: Next you'll tell me there is a phenomena called thermal wrap.

(Laughter.)

MR. SALLEY: Well, it's the thermal inertia. And what that quite simply says is that the link in that sprinkler head has to heat up. You have to absorb a certain amount of heat energy, raise the temperature of it for the physical part of the solder and the sprinkler head to literally melt and allow the sprinkler head to open. The same is true with cable.

MEMBER POWERS: Well, what I'm worried about is the premise that I have a substantial thermal gradient across of these things so that the conductors tend to want to come out, and splay out this way. If you have a uniform temperature field, you know, they're going to stay straight.

But there's a substantial gradient,

they're going to tend to want to go out like this. And whether the assertion that -- it's not an assertion, it's the experimental observation, the intra-shorting is more likely than inter-shorting.

MR. SALLEY: Yes, sir.

MEMBER POWERS: And I wonder if it's universally true or it's only true when you have a relatively uniform temperature field.

MR. SALLEY: I want to say it's still going to hold true. From everything that I've seen come out of the testing -- for example, some cables it would be physically impossible. If you had the armored jackets, you know, the conductor is not going to come through the steel-armored jacket. So that's a no-brainer. That goes off to the side.

But from what we see, you can have some of the thermal plastic, as the jacket burns away, if you will, the conductors, obviously, yes, they would do like you say, they would come free of what was in the jacket. With the thermoset, yes, it is a possibility. Where the jacket breaks open, they could also come free.

But the prime mover is the internal -- what we're calling the intra-cable shorts. So those were the -- two of the very big lessons we've learned.

Next slide. Now that we've divided the cable families up a little bit, even if just by thermoplastic and thermoset, the next thing we need to look at in our equation is the severity of the consequence for the spurious operation. Again, not all associated circuits are created equal.

You know what is the consequence of the circuit failing? Let's take something real simple. If I'm -- I'm looking at flow diversion. If I have a six-inch line they can give me flow diversion or I have a half-inch sample line they can give flow diversion. Let's even wire the MOVs up the same way, okay, go through the same size cable.

If the cables fail, the six-inch flow diversion is going to be much, much greater than a half-inch flow diversion. So I need to understand the consequences are not always equal.

Even if electrically they look the same, even if they're in the same type of cable in the same tray next to each other. So one to me is more important from a risk standpoint than others. And those are some of the things that we were looking into.

CHAIRMAN ROSEN: But it's not just a matter of flow. It's what the flow is doing also.

MR. SALLEY: Sure, exactly.

CHAIRMAN ROSEN: The six-inch flow may be irrelevant. And the one and a half-in or the one-inch flow may be important -- you have to consider or vice versa.

MR. SALLEY: Exactly, you need to follow through with the logic.

CHAIRMAN ROSEN: What is the function of the flow, not just the size of it.

MR. SALLEY: Yes. So these are the things we need to figure into the consequences here.

The next bullet on here, I use the word typically but there is no such thing as a typical Appendix R analysis. You all know that. So this is typical according to Mark Salley, if you will.

Why this is important in the inspection arena, when I look back on Watts Bar, which is the last plant I worked on, how long did it take us to finish up and to do a good circuit analysis for Appendix R? I had some pretty good seasoned people doing it then. Electrically and system-wise, they were very good.

And I talked to them even after and said, you know, how long did it really take us to do this? The thought or the memory, if you will, is that if you took your best electrical systems-type engineer and you said hey, I want to take this one-unit plant, I want to do all the Appendix R circuit analysis required and associated, start today, when can you bring me the answer to have the analysis done so that I know everything?

And the answer to that is about five years. That's about five man-years worth of work. And that's a significant effort to trace all the cables through the plant, see what fire areas they're in, fire areas, you know, what protection we need. So it's a pretty big project. And I'll put a ballpark number of it of 10,000 man-hours.

And like I said, that's according to me. You'll hear some licensees it took much less. And some will tell you it took ten times more. So there is no typical. But this is as good as I can give you.

So 10,000 man-hours of effort. Now when we go out and do a triennial inspection, okay, we're basically looking at a three-week effort.

If we take one of the team members and we say okay, go out there, and your job is to look at these associated circuits. That's your mission on this inspection. Have at it. About the most he can spend is 100 man-hours.

So I have a 10,000 year design build effort and 100 man-hours of inspection time.

The key here is I need to look at what is important. I need to focus in on that risk. And that goes with the whole inspection program. We do a sampling inspection. But let's do an intelligent sample. So that's where this risk takes us.

So like I said, those numbers are according to me and me alone.

MEMBER SIEBER: Let me ask you a question.

MR. SALLEY: Yes, Jack?

MEMBER SIEBER: Does every plant have sufficient information to tell where every cable goes, you know, pull tickets and a computer program to analyze what trays they're in?

MR. SALLEY: A loaded question at 9:00, huh, Jack?

MR. SALLEY: The range of information we see across the plants is quite different. Some plants can tell you on a computer-generated database exactly where the cable is and they can pick it between the cable trays and when it leaves the tray it goes into a conduit where it terminates. Some plants can do that. Most of the later plants or plants that went back and redid their analysis.

Other plants really can't. What they can do is tell you a fire area that it passes through. So they know the areas the cable passes through. Can they put their exact hands on the cables? That's difficult.

And I'll tell you another reason that makes it difficult for them, and I've worked some of these, is when we came in post-Brown's Ferry and put in all the Flamastic and Vimisco in the trays, that instead of at least seeing a cable tray that you could physically get your hands on the cables and if you wanted to, walk them on, we lost that because now we sealed the trays into some fire-retardant barriers.

So its across the board, it's --

MEMBER SIEBER: Well, if you're relying on separation distance --

MR. SALLEY: Yes, sir.

MEMBER SIEBER: -- you don't know what tray the cable is in compared to another one --

MR. SALLEY: To use separation distance, you would have to know what tray it's in, so --

MEMBER SIEBER: Otherwise you've got to put a fire barrier in?

MR. SALLEY: Yes, sir. If you were looking at Appendix R, the part we wrote, the first

Option A and it talks about 20-foot -- or C, 20-foot separation with suppression detection, no intervening combustibles, you would physically have to know where that cable is. I mean when we would do this in the plant, you went out there with a tape measures and, you know, 19-foot, 11 -- again, ah, you know put the fire barrier on.

So, yes they would physically know that.

MEMBER SIEBER: So can an inspector, does he just assume that if you don't have the pull ticket analysis programs where you can really tell what tray they're in, the inspector would have to presume then that the licensee doesn't know exactly where the cable is.

MR. SALLEY: If he didn't have that information, yes.

MEMBER SIEBER: Okay.

MR. SALLEY: He would know it's in that fire area. I've been on inspections where we've literally done that, gone out with the inspectors in the field with tape measures and measured. And said yes, it's 20 feet and a half inch, you know, we're there.

MEMBER SIEBER: Okay.

MR. SALLEY: So they do do that. And like

I said, their process is sampling. Our inspectors are good. I've worked with them, helped them a lot. They know their job.

MEMBER SIEBER: Thank you.

MR. SALLEY: So anyhow, that's kind of to give you a flavor of why we want to do an intelligent inspection here.

Next slide please?

MEMBER POWERS: What is -- I mean you've indicated 10,000 man-hours by man-year effort.

MR. SALLEY: That's my best guess, Dana.

MEMBER POWERS: And so I'm asking you for a little more information. What's taking all the time?

MR. SALLEY: I think it would be fair when industry speaks to ask that question to industry more than -- Alex is nodding his head and saying, yes, so I think that would be better asked to industry.

MEMBER POWERS: Is that the answer? Yes?

MR. SALLEY: Yes, Alex will answer that.

PARTICIPANT: He'll answer it later or now?

MR. SALLEY: They're coming up after us.

MEMBER POWERS: Well, I'll cut to the chase. Sooner or later I'm going to get around to just saying why don't we computerize this? Why don't we computerize this?

MR. SALLEY: Some plants have. You know we don't have a requirement, per se, to computerize it. I mean in 1980, they didn't have computers.

MEMBER POWERS: Why doesn't the NRC computerize theirs?

MR. SALLEY: Computerize theirs? As in what?

MEMBER POWERS: So they can do this inspection based on computer analysis rather than going through P&IDs and tape measures and things like that?

MR. SALLEY: I don't know that for us, looking at so many different licensees, that would feasible because the thing is that when the inspectors are out there doing this, we're looking at that unique licensee's unique installation and his unique application so we're --

MEMBER POWERS: So I put in a disk that says Brown's Ferry #2, it pops up, it says, okay, hypothesize the bolts for me and it does it.

MR. SALLEY: I don't think we're there. That's --

MR. WEERAKKODY: Dr. Powers, I think the

first question though is what is the basis for the approximate 100,000 hours? Is that?

MEMBER POWERS: Yes. Well, I really don't care. I mean I agree with him. It's a big number. Whether it's 10,000 --

MR. SALLEY: Yes.

MEMBER POWERS: -- or 5,000 hours, it's a lot of time relative to the amount of time that you'd like to spend, which was 100 hours, okay. And so the question is since we don't have the manpower to do all the work, can we get the computer to do some fraction of the work for us?

MR. SALLEY: From my experience, yes, you can. If you want to -- when I go back in time, in the 80s when I was first learning to do this, you know, the electrical engineers, fire protection engineers, system engineers, we staffed on with P&ID.

Like you said, Step 1, where's my systems? I brought in the fire compartmentation drawings and said, okay, let's overlay the compartmentation drawings with the system drawings.

The electrical engineer came in with his conduit and grounding and his cable tray diagrams and said, let's overlay that a third time and see what is where.

And that's how we started doing it. We made tables of okay, here are the circuits, here are their routings, here are the fire areas that those circuits pass through. And at about the end of the mid-80s, we started having some very thick notebooks where if you did a design mod in the plant and you wanted to see if you created a new interaction, you've got to go through a lot of cables to see what you did.

Plants then took the computer technology and says hey, we can make a database for this. We can make it for this because it's important for Appendix R separation. It's important for seismic for loading of the trays.

So people have -- and, again, from my experience at TVA, yes, we did. There are computer databases that today, yes, you can do what you're asking. But not all plants have done that.

MR. WEERAKKODY: Let me try to add more information now. Before I came to the NRC, I managed four PRAs for four plants that were four different vintages. Millstone 3, which is the most recent, where you could -- or we did have almost a computerized database of where the cables are.

Then you go to a plant like Haddam Neck, which was constructed in -- or started operating in

1967 where when the plant was built, they had only single switch gear room. So when we started doing the IEEE, you know, we had two methods. And we could have done a five PRA or FIVE method.

And one of the ways to answer Dr. Powers' question, why don't we computerize, you know, I remember we wanted to have everything computerized. But one of the key questions is what is the magnitude of the effort and what is the benefit we get from that magnitude?

So depending on the vintage of the plant, we took two efforts. If it is Millstone 3, we would use the information that we could easily get. If it was an older plant, then we would make sure that what we need, the cables we need to do a shutdown, we know where they are.

In other words, rather than plan to track hundreds of miles of cables in the plant, we would put the effort to identify where are the cables that are essential to me, what's going to happen to those cables under certain fire scenarios.

So in some ways, I think for, you know, one of the plants, we used the FIVE method. Again, this is like going back ten, fifteen years. But that's one way of --

MEMBER POWERS: Yes.

MR. WEERAKKODY: -- whether to go back and, you know, from -- you look at the magnitude. You've got hundreds of miles. Then what do you get out of the effort. So that was one of the reasons.

MEMBER POWERS: I think you just made my case. You've got hundreds of miles of cable. You've got a limited amount of manpower. It seems like just a perfect thing for computerization.

MR. SALLEY: It's a good idea, yes.

MEMBER POWERS: If you can do it.

CHAIRMAN ROSEN: I think we need to come back to this when you describe in some detail associated circuits. How you deal with an associated circuit in these sort of issues in a plant where you don't have a location for each and every cable.

MR. WEERAKKODY: Okay. That's a fact for some years.

CHAIRMAN ROSEN: Yes. But are there -- locations in a sense that you don't know which tray and which conduit and exactly where it is in the room. You know where it is in a fire area but you don't know maybe where exactly it is, in which tray.

MEMBER SIEBER: Well the killer is if you have mixtures of cables, different trains in a single tray. And they you got to reroute and repull cables. I believe a lot of licensees had to that.

MR. NOWLEN: Well, could I offer -- my name is Steve Nowlen. I'm from Sandia National Labs.

I think that what Dr. Powers is suggesting is something that actually would have to lay on top of what Mark has already talked about. Because you not only need all the information about the circuit tracing, all the cables locations and routing, you now have to lay on top of that the information on each and every circuit associated with each and every one of those cables and its impact on the plant systems and components.

So, you know, if you take Mark's estimate of 10,000 man-hours, multiply that by say 50, and you might be there. I think that it's a great challenge to try and take all of these plant-specific circuits and put them into a computerized database and then lay that on top of you cables.

So in theory, yes, I think it could be done. But I think you're talking about a massively more complex effort than even what Mark has covered so far. It's a real challenge and I think --

MEMBER POWERS: It's no more difficult than what you're trying to do in your head now, Steve.

MR. NOWLEN: In a sense but again, you introduce the whole issue of, you know, there's many different types of circuits out there. They interact differently. Whether I have a seven-conductor cable with one circuit in it or a twelve-conductor cable with --

MEMBER POWERS: As long as it's countably finite --

MR. NOWLEN: Well, I'm --

MEMBER POWERS: -- it's easier and more accurate for me to do it in a computer than you to do it in your head.

MR. NOWLEN: Having the computer available, yes. But, you know, you have to have the computer tool in hand. And if you had it, then certainly it's easier. But I think creating that computer tool is an extremely non-trivial exercise.

I think in some of the PRA work, we're probably getting closer. But I don't think, you know, you're going to hear about the requantification study later today. And I'm not going to stand up there with J. S. and tell you we're there because we aren't.

So I think to ask Mark at this point for something like that, I think you're asking for more than we can deliver today.

MR. SALLEY: And Steve, just to follow on and answer your question and Jack's, they were the same question, if the cable is in the room and you can't tell me where it's at, I'm going to err on the side of safety and say that's the one that gets it. Sorry. Until you show me otherwise, it's in a fire area. Assume that's the failure if that's my worst case and let's work it.

That's all -- if that's the amount of information that we know from the inspection, then that's how we have to take the inspection. We've got to err on the side of safety.

Now it's up to the licensee, and we've seen this, when we've had findings like this and the inspectors have done the right thing, we've seen licensees say wait a minute, get a team together. Let's go and take this room apart and let's find that very cable.

And they do spend the effort when we start really evaluating the risk. We've seen that numerous times in the SDP.

CHAIRMAN ROSEN: At some point it becomes counterproductive. If they have to tear out insulation and a fire barrier --

MR. SALLEY: It's up to them. We will err on the side of safety. We'll say conservatively that's the one that failed. Prove me otherwise. And it becomes the licensee to do that. And we've seen that.

Just to follow up here and finish this slide -- or excuse me, start this slide. Boy this is going to take me right where Steve and Dana were going. And I guess I've got to get on that train now, too. No pun intended with the trains.

But anyhow, how many cables are we going to look at in an inspection? And what did we learn from the testing?

From the facilitated workshop and the discussions we had, what we said is going into the inspection, we're going to take two cables, any two cables that are in that fire area, that are tied or attached to the associated circuits.

And we're going to take those two cables and whatever combination we need to get the spurious actuation, we're going to assume that's the one we're going to get. We're going to be conservative, assume that's the short we get, and then go on to do the analysis.

So as we do the inspection, we're going to be going and looking at two cables together. So if one cable does it, that's fine. That one cable is that important for the associated circuit. If we need a second cable, we'll take the second cable.

When you do that --again not all cables are created equal, I'll say that a lot -- you're going to look at it if it's thermoplastic and thermoset. You're going to look at it for the intra versus the inter cable failure. So we're going to use that knowledge gained in doing it.

And again, this is a good example. Let me pass out a second backup. And if you didn't understand where Steve and Dana were going with the possible permutation combinations, this backup slide of mine will help you out here. And if we've got some extras, you can throw them out to the audience.

I like a seven-conductor cable because it's pretty common out there. It's a very common control cable that was used. If we look at one of these seven-conduct cables and we say okay, here's one cable. How many hot shorts can I make you in there? How many combinations of two can I make you out of that one cable?

Okay, if you do the math, you'll see that there's 21 possible combinations, okay? If I take two cables and I said -- say they're both thermoplastic and they're both going to come together, how many possible permutation combinations can I get out of those two cables. And you'll see that I now have 49 to analyze.

And again, you can do the exercise on and on. If I bring in a third cable, I now have 147. And, you know, we're into the world of super computers here. I mean it's going to do a lot of calculations.

The key with how the plants were built and what the inspectors have talked to me about and what some of the national labs -- Brookhaven, I worked a lot with this, is they said hey Mark, if you give me one cable and give me a second cable, I'm going to give you the vast majority of risk. The numbers that the experience people have told me is I'll give you 90 percent right off the top.

So that made me feel pretty comfortable. I could take one or two cables and I can show the -- you know, I only need -- I don't need 47 shorts in series, in cycle, you know, to get this thing. I can do it with one or two hot shorts.

Those are the key ones that I need to protect. And that's where we need to focus. And that's where we're taking this risk.

CHAIRMAN ROSEN: Now let's see if I

understand what you're saying.

MR. SALLEY: Sure.

CHAIRMAN ROSEN: Two cable failures evaluated per scenario, right?

MR. SALLEY: Yes, sir.

CHAIRMAN ROSEN: So I'll take this -- a seven-conductor cable, each one of which has 21 combinations.

MR. SALLEY: Yes, sir.

CHAIRMAN ROSEN: I'm going to take two cables like this.

MR. SALLEY: Yes, sir.

CHAIRMAN ROSEN: So I'm going to evaluate 42 combinations in this?

MR. SALLEY: You don't even have to evaluate the 42. You just find the one that gives you the problem and I assume conservatively, up front, that's the failure you get. You need to simply this.

CHAIRMAN ROSEN: I don't understand that. What I hear you saying is there's 42 combinations, just mathematically --

MR. SALLEY: Okay.

CHAIRMAN ROSEN: -- for two cables. So you're going to take any two cables in this room, in this fire area --

MR. SALLEY: We'll look at them all.

CHAIRMAN ROSEN: -- these seven-conductor cables. And you're going to -- you've already proved to me that taking the two, gives us 42 possible combinations.

MR. SALLEY: Yes, sir.

CHAIRMAN ROSEN: Okay, now are you -- you're not going to analyze each of those 42? You're going to say I just want to find one combination that's risk significant in the 42?

MR. SALLEY: Let's talk about what you're saying analyze. Yes, you will analyze it because you will see what will happen. You know, you're looking for an end device. You're looking for an MOV to change positions --

CHAIRMAN ROSEN: Right.

MR. SALLEY: -- you're looking for that end device.

So it's obvious to the inspector. He knows which conductor or which cable he's after. And he knows how the device works. Where's my contacts? What contact do I need to close to change position in that MOV? That's all he needs to find is that cable that has those in there.

CHAIRMAN ROSEN: Yes.

MR. SALLEY: He doesn't have to look at the individual conductor.

CHAIRMAN ROSEN: He's only looking at one? Out of the 42, he's only looking for one case you're saying?

MR. SALLEY: He's looking for whatever cases are possible. When he lays his scenario out, when he looks at that end device, be it an MOV -- let's say flow diversion, that MOV, there's a number --

CHAIRMAN ROSEN: He's know what he doesn't want to see. He doesn't want to see a PORV open --

MR. SALLEY: Exactly.

CHAIRMAN ROSEN: -- or any of that sort of thing.

MR. SALLEY: Exactly.

CHAIRMAN ROSEN: Or a flow diversion. So he takes -- and if it were me and I was a new inspector, what I'd say okay, Mark wants me to look at 42 seven-conductor cables. Each has 21 combinations. So I'd list the 21 combinations for the first cable. I'd list the combinations for the second cable. And I'd start on number one and keep going until I got to 42.

MR. SALLEY: If you need --

CHAIRMAN ROSEN: Why isn't that the process that you --

MR. SALLEY: Yes, you can do that, that's perfect. I think they'll do it faster, though, Steve. I think they'll -- having done that so many times --

CHAIRMAN ROSEN: Yes.

MR. SALLEY: -- they'll know exactly which ones to go to.

MR. NOWLEN: Well, again, let me kick in here. Steve Nowlen again. You can attack this problem from the opposite direction. What you can do is you can look at the component, say it's a PORV, and you say the undesired effect is a spurious operation. So then what you do is you back your way back into the cable and say is there a combination in this cable that can give me the spurious operation?

If the answer is yes, boom, you're off. So you don't necessarily have to go through all 42 combinations. You just look for the one that's going to give you the spurious operation.

CHAIRMAN ROSEN: Okay.

MR. NOWLEN: If it exists, then you attack it. If it doesn't exist, then you say well, gee, this cable can't give me --

CHAIRMAN ROSEN: If you don't see it

apriori by just going backwards as you say --

MR. SALLEY: Right.

CHAIRMAN ROSEN: Then you might have to go through the 42 and see if there's any strange combination or something like that.

MR. SALLEY: Yes, that's correct.

CHAIRMAN ROSEN: You're saying there enough experience in these guys they can look at what's in each of those two cables and say ah-hah, one in four in Cable #1 is going to open a PORV if it hot shorts or --

MR. SALLEY: Correct.

MEMBER WALLIS: But surely there are many other things that can happen. It's not just one of these combinations that are bad, there may be ten other combinations which are bad. And it may be that two of the combinations, if they occur simultaneously, are particularly bad. So it gets extraordinarily complicated.

MR. SALLEY: Yes, yes it can depending upon the plant's configuration but our goal, once again, for inspection purposes, whatever combination you need out of there, that's the combination you take, like Steve said.

CHAIRMAN ROSEN: Now so you find the bad

combination and then what? I'm trying to understand why it is necessary to go through each and every one of them.

MR. SALLEY: Well, let's hope that you don't find the bad combination because the licensee complied with III.G.2 of Appendix R. But let's say you do. Then you assume that device spuriously operates or maloperates or prevents operation, whichever the worst case is.

And that's what you would say okay now we have this. This PORV opened. This valve changed position. How does that effect it? That becomes the finding.

CHAIRMAN ROSEN: How does that effect the --

MR. SALLEY: The safe shutdown.

CHAIRMAN ROSEN: -- safe shutdown. So what's you're saying is that your inspectors will look for combinations which should not be there.

MR. SALLEY: Hopefully. You know -- and I guess the reason I bring this up and I'm going back to where Steve and I were a couple three years ago with industry, working on the testing, one of the things you can tell me from mathematics is that of those 21 combinations, I can now have a probability of which combination I get, okay?

You know, I don't always get the one I need. I can have this one and this one, you know, of these combinations.

CHAIRMAN ROSEN: Oh, because fires don't hit the worst one necessarily you're saying?

MR. SALLEY: Right.

CHAIRMAN ROSEN: I mean if one and two in Cable 1 is the bad one, well maybe three and two will burn. Or three and four burn. But one and two may not be -- we saw that one you passed around. Some of those cables may be -- some of those conductors within the cable may be intact.

MR. SALLEY: Exactly. And that's the point of an inspection. Remember, we've got three weeks to do this. We need to do this smart. We need to do this fairly quick.

I don't want to see the inspectors get hung up with someone in the trailers doing the inspection. And let's take a look at our example here. And say two and five are the combination you need, okay, I mean they've gone to the point where they've opened up the motor heads and they've pulled the wires out and they've pulled the MCC. And they've got it and say let's look at the, you know, which color wire is next to which color.

You know, we really don't want to go to that level of detail. And then we can argue about there's No. 1 in between. This all becomes real counterproductive as far as an inspection. We've wasted a whole day of a three-week inspection fighting over --

MEMBER WALLIS: So you assume that two and five can short?

MR. SALLEY: Yes, sir.

MEMBER WALLIS: You don't worry about the fact that one is in between?

MR. SALLEY: Right. Steve, we had looked --

MEMBER WALLIS: Any combination can short.

MR. SALLEY: Worst case combination, that's the one you take. We looked at that. Steve, what was the term we used in the testing?

MR. NOWLEN: Well, it's the wiring configuration. The conductor -- the orientation of the conductors relative to each other and, you know, clearly the nearest neighbors tend to short to each other.

But the problem is is in the field, you're not going to generally know exactly which of these conductors is the power conductor. And which of the conductors is the target that would cause the spurious operation and lay another one on top.

One of these is probably a ground conductor. And if it shorts to power, it trips the circuit. So you don't get the spurious operation. I mean there are so many wrinkles on what can happen when these things start shorting together.

The guidance here is if it can happen, assume it does. And move on.

MR. SALLEY: That's our conservative nature at the start up of this.

MEMBER LEITCH: But let me ask you about this cable tray where there is ten cables in the tray.

MR. SALLEY: Okay.

MEMBER LEITCH: The orientation of those cables one to another doesn't necessarily follow the same path all the way down the tray, does it?

MR. SALLEY: No, sir, it doesn't. Not in a random-fill tray.

MEMBER LEITCH: Right. So --

CHAIRMAN ROSEN: But that only matters in a thermoplastic --

MEMBER LEITCH: But just a minute. So when you look for two cables, you don't necessarily just look at one and two, you really have to look at one and two, one and three. So what I'm saying is you've got the same possibility of faulting, as you described here, these are wire to wire faults. But you also have a large combination of cable to cable faults.

MR. SALLEY: Yes, sir, you do. And you can take your tray of ten and put ten trays of ten in that same fire area and guess what? Make any combination between any one of those. They don't have to be in the same raceway. They have to be in the same fire area.

MEMBER LEITCH: So what you're saying then is you do a smart inspection, if you will, based on the fact that some of these cables may be less susceptible to fire damage than others. And you tend not to look at those and look at the ones that are more susceptible?

MR. SALLEY: Exactly. Let's do the smartest inspection we can.

MEMBER LEITCH: Okay.

CHAIRMAN ROSEN: But the case that Graham Leitch just ticked off was the case of two conductors -- or two cables resulting in a fault between them. That, I think you said earlier, was just something you worried about in the thermoplastic case.

MR. SALLEY: Yes.

CHAIRMAN ROSEN: Not in the thermoset case.

MR. SALLEY: Yes. From what we've seen in the experiments, the thermoplastic and from what we've seen -- we're very comfortable that yes this can happen with thermoplastic. It doesn't happen every time. But if I had to throw a percent on it, Steve, what would I throw? Fifteen?

MR. NOWLEN: Yes, ten, fifteen percent for thermoplastic.

MR. SALLEY: Ten, fifteen percent of the time?

MR. NOWLEN: It can happen for thermoset. But the probability is much, much lower. Probably .01 or something.

MR. SALLEY: That we are going to do some further research on which we'll get to a little later in my presentation. We're not done yet. We're never stopping asking questions.

CHAIRMAN ROSEN: We'd better move on.

MR. SALLEY: Yes, sir.

MEMBER WALLIS: Well, just to go back though to Dana Powers' point, when you have all these combinations of things, it seems ideal for again a computer to get involved rather than an inspector trying to figure out which combination bad.

Just have a computer run through all the combinations. That would ideally be the way to do it surely.

MR. NOWLEN: Yes. Again, it's quite possible. You can do it. But the amount of work to create this tool that can deal with all the different variations is tremendous. And we are simply not there today.

You know, Mark showed on 7-conductor cable. You know, let's talk about a 12-conductor cable that has two different circuits in it. Or a 36-conductor cable that has 10 different circuits in it.

MEMBER POWERS: But Steve, you're simply saying that the computer can't do what you're already doing --

MR. NOWLEN: No, I'm --

MEMBER POWERS: -- and the fact is, the computer can.

MR. NOWLEN: Well, I am saying the computer can do it. But in order for the computer to do it, you have to teach it how to do it. And we have not yet taught the computer how to it.

CHAIRMAN ROSEN: Well, it's not just a matter of teaching the computer. You have to put the data in.

MR. NOWLEN: Well, yes, exactly.

CHAIRMAN ROSEN: Entering the data is going to be --

MEMBER SIEBER: It's even worse than that. Each plant, in my opinion, is unique. I can think of so-called identical units where the wiring was different from one unit to another.

And so if you wrote software that did more than just analyze pull tickets, you know, and show you what the routing was, if you wrote software that would show you the interactions, you would end up with so many unique things that had to be programmed in besides putting in the database, that you'd spend an awful lot of time doing that. I mean thousands of hours.

CHAIRMAN ROSEN: If was something that you had to do over and over again.

MEMBER POWERS: But Jack, it's the same thing they're doing now by hand.

CHAIRMAN ROSEN: Yes, it's the same.

MEMBER POWERS: There's nothing -- they're looking at the wiring diagrams. They're looking at the cables. They're counting up combinations. They're doing all of this. And they're running out of time.

CHAIRMAN ROSEN: Yes.

MEMBER POWERS: So they can't -- they have to find some sort of a short cut. So they've come up with this two-cable shortcut. What we're saying is that -- I don't know what the structure of the software would look like. But it can't be any different than what they're doing already --

CHAIRMAN ROSEN: Yes.

MEMBER POWERS: Except instead of writing into a computer code, they're writing it down on a tablet --

CHAIRMAN ROSEN: Yes.

MEMBER POWERS: -- which can't be any more --

CHAIRMAN ROSEN: Well, that's totally inefficient if you write on the tablet. And anything you do analyze it, you got to write some more whereas a computer you just write one time.

MR. SALLEY: Sure. Just to close on what you're saying, I remember back in the 80s doing these, we used to have color-coordinated drawings. That's how we would do it. We'd lay out the cable trays and we'd say okay, what's the Train A, what's the Train B, what's the equipment. And we would color code them and we'd look for the colors.

CHAIRMAN ROSEN: Well, I think I'd like to take the chairman's prerogative and just ask us to move along here.

MR. SALLEY: Yes, sir.

CHAIRMAN ROSEN: We recognize that and maybe we'll have to come back to it.

MR. SALLEY: Okay.

MEMBER POWERS: Okay.

MR. SALLEY: Next slide please.

So we've focused in on what we were talking. We'll call these the high-risk cables, the cables we really want to look at, the ones that we saw from testing that are most likely to give us the spurious actuation.

There are other cable combinations and things that we saw in the testing that we don't have the vast amount of knowledge to know okay what's this going to happen? We know it's not high risk from the testing. For example, let's say the thermoplastic to thermoplastic, you know, that cables right in front of you. We've seen that. We know that's going to happen.

But what about the thermoset to interact with the thermoplastic? Is that a possibility? Is that something we'd look at? How about two thermosets coming together coming through the charred layers? These are a couple of questions that are refinement types, if you will.

We know the probabilities is going to be much lower than what we got because we were at the tests. But we need to study that a little further. And right now we're putting a User Need together. It's going over to the Office of Research. And they're going to be answering these, if you will, to reduce the uncertainties is what we're looking for.

MEMBER SIEBER: Well, that's a function of how -- what the temperature is --

MR. SALLEY: Yes.

MEMBER SIEBER: -- as to whether the interaction takes place and what kind takes place at different degrees of destruction of the cable. So the temperature to me is a major factor in determining what the failure mode would be.

MR. SALLEY: Most definitely. Cable configurations also can come into play. You'll see failures more often at a radius or a bend where the cables are tighter than where they're laying spread out in a straight run of tray. So there's the things like that that we need to look further at.

MEMBER SIEBER: And, of course, the tray is also a conductor.

MR. SALLEY: Exactly. Hopefully ground.

MEMBER SIEBER: Well, you never know.

MR. SALLEY: Another question -- Dr. Powers was saying that we're looking at two cables to start out. Yes, and the question -- we feel comfortable that's a good starting point of doing this and getting the inspections moving. But we're also going to ask the question to Research is hey, should we look at more. Is it a percentage function? You know, what -- three, four, five -- is there any benefit to gain in safety space there for that? And that question will be looked at.

CHAIRMAN ROSEN: So that's a validation of your two cable rule, I think. Is that what you're saying?

MR. SALLEY: I don't think it's two-cable rule but I think it's a good starting point. Remember we're getting ready to start these inspections up in a risk-informed manner.

CHAIRMAN ROSEN: Yes, but you're asking Research now to say here's how we do it. We're going to focus on two cables. And pick the conductors within the cables that result in undesirable interactions.

What is the difference if instead of doing that, we just said we're going to look at all the combinations? Would we come up with a different answer? Give me some sort of review, some sort of sense of what the shortcut, if you will, that you're taking implies in terms of risk? Am I close to what you're asking them to do?

Certainly that's the question I'm asking. Is what you're doing likely to miss anything or not?

MR. SALLEY: I personally don't believe we're going to miss anything that's risk significant. I think that we're going to focus in.

Remember, we're tied back to the inspection. It's a three-week inspection. I want to go after what's important.

CHAIRMAN ROSEN: Yes, well I'm going to leave that aside for the minute, the fact that your resource limited and think only about are you doing what sounds to me like an intelligent process to go ahead and find the important ones or find if there is an important one.

MR. SALLEY: Yes.

CHAIRMAN ROSEN: And is there any difference between saying well, I'm not going to even prejudge or attempt to do that. I'm just going to go brute force, as I suggested, through all 42 cables in the example I used before and see if there is an important one.

I'm not going to try to use artificial intelligence or any kind of neural network or any kind of prejudging bias that I might have. I'm just going to plow through this thing.

And that's the question I'd ask Research. Is it different? Do you come up with a different answer? Maybe they need to take a dozen cases and see if they, you know, give a dozen cases to some smart guys and let them pick the conductors that they think are important, write that down. And then say all right, now we're going to go through it, combination by combination, and see if we get the same list.

MR. SALLEY: We can --

MR. NOWLEN: Again, I guess I'll have to kick in -- Steve Nowlen -- we are looking at that sort of question in the Research Program now. You know with the risk requantification study, we are looking at the risk implication of more than two. You know for Mark's risks, the idea was let's get back in the business of associated circuits. Let's get a start on it.

We were all comfortable that if we did two cables at a time, we would capture the vast majority of risks. What we're missing by not considering that third cable remains to be seen.

Again, Mark's right. We're comfortable that we've captured the top ones. Did we capture them all? No. Is what's left not risk significant? We believe so. The jury is still out.

CHAIRMAN ROSEN: So I'm just asking for a validation of that.

MR. NOWLEN: Yes, sir. And you'll see it. It's not there today but again, we are working towards that answer.

MR. SALLEY: We have worked with Research on the very question you cited. When we bend things high and low, that Research has confirmed yes, you look to be on the right track based on everything that's been tested and done. So we've been working together on that.

MEMBER LEITCH: But the question it seems to me is not two or three. The question is two or n where n is all the cables in the tray because you don't know which cable is adjacent to any other cable.

MR. SALLEY: From looking at the systems and what we've seen, I don't think you need the very complex this has to fail from this, to this, to this.

I think that what the inspectors typically find when they do find a problem is something very simple. One or two hot shorts gives them the condition they don't want to see. And that's what they need to go after.

Okay, most of the components in that we're moving are quite simple, I mean it's a MOV, it's a PORV, it's starting a pump, stopping a pump. And so it doesn't really make it that complex that I need this unique 47 string to, you know, click in to make it happen. It's a little more simpler than that. It's just those key -- it's picking those key components.

CHAIRMAN ROSEN: It may turn out that Research, when they look at it, can make -- coach an argument simply, without doing an analysis, that will help us through this. But I think --

MR. SALLEY: That's --

CHAIRMAN ROSEN: -- I still need to see this.

MR. SALLEY: Yes. And we're not done asking questions. And that's our next phase of this.

We've identified that's our Bin 2 items, if you will.

MR. WEERAKKODY: And then, Mark, correct me if I'm wrong, when we restart the inspections and when we evaluate the inspection findings for the risk significance, we are going to get feedback on what kind of risk-significant findings we would get from two cable issues.

MR. SALLEY: Sure.

MR. WEERAKKODY: Now one thing we know for sure is that the three cable combinations are most likely is going to be of less probability than two cables.

So, for example, when you restart the inspections if our findings, the majority of them find out to be -- you know, end up being green or lower, I know you can't be lower than green but -- but that gives us some feedback as to how important or how aggressively we should go after what we call the Bin 2. So --

MR. SALLEY: You know, the thing -- we haven't inspected since 2000. I want to get inspecting. I want to start inspections back up and get back in the business of inspecting. That's paramount here.

CHAIRMAN ROSEN: Well, you're biased

anyway now against false negatives, I think. And, you know, that's the right way to be.

MR. SALLEY: Yes, we're concerned.

CHAIRMAN ROSEN: You want to find things that may prove -- may prove not to be a problem. But at least in the first blush, they look like one. So that's -- you want to bias the way you do business to turn up potential issues.

MR. SALLEY: Yes, I think we've got that.

MEMBER SIEBER: Now you haven't reestablished the inspection program yet, right?

MR. SALLEY: We are in the process of putting that together.

MEMBER SIEBER: Okay. But it hasn't started yet?

MR. SALLEY: No, it hasn't started yet. I'll get to that at the tail end of my slides.

MEMBER SIEBER: Okay, I'll wait.

MR. WEERAKKODY: The inspections have not restarted but, you know, changing --

MEMBER SIEBER: Well, you have to get ready.

MR. WEERAKKODY: Yes, we are working those, yes.

CHAIRMAN ROSEN: All right, Mark, talk

about control power transformers.

MR. SALLEY: Control power transformers -- control power transformers balance the voltage and amps into the units since you need a balance to make the device spuriously operate. At the tail end of the NEI testing, they said hey, this is -- you know, we see a lot of these, especially on MOVs where we're stepping down voltage to make the device -- the mode of the device.

Some of those were put in the test and lo and behold, they do reduce the probability of failure as you would expect because of any leakage through the insulation.

This came at the tail end of their testing and it did show some promise of reducing but not enough. We stayed conservative and this -- again, we'll go to Research and say tell us about CPTs and how they balance out and what effect they play on the circuit failures.

Again, that's a Bin 2 item. That's what this slide is all about. These are the questions we're going to continue to ask after we start up.

MEMBER WALLIS: I don't understand. You keep using the word risk but you've never used the word PRA. I thought risk was something that came out of a PRA, in which case you'd have to have a fire and a shutdown PRA to evaluate all these things.

MR. SALLEY: Well --

MEMBER WALLIS: How do you know what's risk significant when you've never used the word PRA?

MR. SALLEY: Risk is frequency times consequence.

MR. WEERAKKODY: Do you want to take that Steve? Were you going to say something Steve?

MR. NOWLEN: Yes, these are things that are coming out of risk insights from PRA. You know we're looking at plant response models, trying to figure out what kinds of faults and failures are important to the safe shutdown model. You know the safe shutdown model is the key to the PRAs. So it is --

MEMBER WALLIS: Then that should guide your inspections, should they?

MR. NOWLEN: Yes, that's where these insights --

MR. SALLEY: Yes, it does.

MEMBER WALLIS: But I've never seen that connection made so far in this presentation.

MR. SALLEY: Because Steve's going to talk about that later when we talk about the requantification.

MEMBER WALLIS: You're going to talk about that Later? Okay.

MR. SALLEY: Because what you're asking me, Graham, is how do I pick the area to go for these cables. And that's something Steve is going to talk about more so than me.

MR. NOWLEN: Yes.

MEMBER WALLIS: Okay.

MR. NOWLEN: PRA is a part of this. It's underlying what's Mark is talking about. He hasn't put it explicitly up there. But it's definitely where we're getting this.

MEMBER WALLIS: Okay.

MR. SALLEY: And the fourth question, if you will, that we're putting to Research is how long do these hot shorts last? To start this up for analysis purpose, we're using 20 minutes. Twenty minutes was based on what we've seen in the tests and how long they stay in. That was pretty much the long duration.

Can they last shorter? Well, yes. If they -- eventually the cables continue to burn, they're going to find a ground plane sooner or later or CPTs, how do they play in? So that's another question with the duration of the short. Twenty minutes is what we're using to start up.

Next slide please.

MEMBER SIEBER: Do you use coordinated protection like fuses or --

MR. SALLEY: Fuse --

MEMBER SIEBER: -- or circuit breakers --

MR. SALLEY: -- breaker coordination?

MEMBER SIEBER: -- as a way to limit fault duration --

MR. SALLEY: That's what would --

MEMBER SIEBER: -- in a fire?

MR. SALLEY: -- that's what would contribute to a trip NI, yes. How would we limit that? If there wasn't the III.G protection of Appendix R, we wouldn't just naturally jump in and say that fuse will eventually blow. Therefore, don't worry about it. No, we would consider that cable a risk and we would evaluate through.

MEMBER SIEBER: Even if it was just a second where the fault existed? If it was enough to actuate the device, that's it.

MR. SALLEY: It if was enough to send the actuation, the coil pulled in, the holding coils are there, it's spurious.

CHAIRMAN ROSEN: Yes, well I think what Jack is saying is that, you know, some shorts, they don't have to be very long if the circuit seals in.

MR. SALLEY: That's right. The holding coils pulls and that it. It's in.

MEMBER SIEBER: Well, it's sort of like a closing coil on a circuit breaker, you know --

MR. SALLEY: Right.

MEMBER SIEBER: -- one second and it's closed.

CHAIRMAN ROSEN: So it doesn't matter whether the hot short is 20 minutes along or 10 seconds long. If it only takes one second longer for the sealing circuit, it opens the device that you don't want open or it turns off the device that you don't want turned off.

And when the circuit -- when the fault clears, it's not going to turn it back on unless you take a manual action.

MR. SALLEY: That's right.

MR. NOWLEN: Well, you do have a mixed bag there. There are circuits that will reset if the signal is wrong.

MR. SALLEY: True.

MR. NOWLEN: So, you know, you have some

of both. In MOV, it's going to take a certain, you know, say 30 seconds to fully open a small MOV. And then once it's open, you have to do something to close it. So mitigating the hot short doesn't necessarily send the valve back to the closed position.

CHAIRMAN ROSEN: Right.

MR. NOWLEN: But something like a PORV, you have to hold open.

If you lose the signal, it's going to be closed unless it fails open, of course. But -- so, you know, your solenoid-operated values, air-operated valves, you know, it depends on the nature of the component that you're dealing with.

And, again, it's another one of the overlays on these circuit variations that you have to consider.

CHAIRMAN ROSEN: Okay, so as long as you're thinking about that, fine.

MR. SALLEY: Yes. And we saw that in the testing. You know we say circuits change space, close, open, re-close, jump over to another circuit. So we're going to stay conservative with this approach here.

Low risk items. Again, things we've learned from the testing, quite simply, open circuits in the form of lost continuity. We didn't see any cables that the copper physically melted and the conductor busts.

So, you know, chasing open circuits, if you need an open circuit to get you your scenario, we just didn't see that. Brown's Ferry didn't see that. So that's not one worth chasing.

MEMBER SIEBER: Well, that implies sustained, very high temperatures.

MR. SALLEY: Yes.

MEMBER SIEBER: And all kinds of other things will happen before that happens.

MR. SALLEY: Right. We did not see that.

MEMBER WALLIS: So the energy related to the short itself is small. I mean the electrical energy associated with the arcing and all that is small?

MR. SALLEY: It can be.

MEMBER SIEBER: It can be or --

MEMBER WALLIS: But can it actually contribute to the local temperature being increased as the result of the short?

MR. SALLEY: I don't think you would -- the fires that we're talking about, the electrical energy that's released other than if it's the initiator and it's a power circuit, then it wouldn't be a player.

If it's a power circuit and it's the initiator, yes, it can be a very big player to start the event. But the energy that's released, no.

MEMBER WALLIS: It's usually very small?

MR. SALLEY: Very small compared to the fire, the thermal energy.

MR. NOWLEN: But the exception is the higher voltage power cables and you can get high-energy arcing. And that actually is one of the few mechanisms that will get you to one of these open-circuit failures. But what you're seeing is you're seeing repeated shorts to ground for some period of time before the open circuit occurs.

So which one do you worry about? The repeated shorts to ground or the open circuit? The answer is you worry about the open circuit first.

The other phenomenon of the long-time high temperature exposure is the second way you can get an open circuit. But by the time you get to that point, every cable in the tray is already shorted to ground. So, again, the open circuit is just not relevant.

You're worried about what happens well before then.

CHAIRMAN ROSEN: Let's see, Mark, can we get you off in 30 minutes? Think about that?

MR. SALLEY: How much more do I have?

CHAIRMAN ROSEN: Thirty minutes.

MR. SALLEY: Oh, 30 more minutes?

CHAIRMAN ROSEN: 10:15. Oh, we've got -- Alex Marion's got to have -- how much time do you need Alex?

MR. MARION: Ten minutes.

CHAIRMAN ROSEN: Ten minutes?

MR. SALLEY: Yes, I think we can get me well done in advance.

CHAIRMAN ROSEN: All right. Let's see what we can do in the next 20 minutes.

MR. SALLEY: Sure, easy.

Again, going over the low-risk items, the question of a cable being outside of a conduit coming in contact with a cable inside of a conduit, you know, reality tells us that that's not worth chasing. You've got that metallic shield on the outside. It's into the ground plane. Don't be looking at that type of thing.

Multiple high-impedance faults. You know, there's one where you can do the math with the breaker coordination and you can show that well if everything just hangs up just perfect, you know, you have this potential to trip out your mains versus the individuals. And, again, that becomes an exercise in mathematics and not really a good lesson here the safety we're looking for.

MEMBER SIEBER: There is not a lot of margin there. So the probability of you getting that is really slim.

MR. SALLEY: Very slim, you're exactly right.

Three-phase power where you have three-phase power, A, B, C coming into three-phase power A, B, C, where all three just align and phase in, I mean we have trouble phasing a generator in when we want to let alone trying to make it happen like this. So, again, that's not one worth chasing.

There was one exception there and, again, erring on the side of safety, it was the K-heat removal on a BWR. We said, you know, those valves are important. And that one we don't care. We know the probability is very, very low. We understand that.

But the valve is that important. Let's err on the side of safety and protect those. We did do that in the risk. You'll see it.

Same with reversing DC motors. You know, there you need a set of five contacts coming in in just the right sequence to make it happen. It's again an area that we don't want to be going after when there's more risk-significant, safety-significant ideas to go after.

Okay, moving along as Stephen wants me here, I'll get to the remaining activities -- a long way to get here.

Recently the industry, NEI, through NEI has brought in the document, the NEI 04-06. We've just got this. What this is is, I'm sure Alex is going to talk a lot about this, it's the industry's interpretation of, if you will, of the RIS 2004-03 and how they're going to put that information into application in an actual plant.

I believe Davis-Besse is scheduled to be the first pilot of this information for May of `04, which is next month. So I get a lovely trip to Ohio. So that will be coming up.

We have a SECY paper. And one of the things that we're working on now is finishing the SECY paper up. The final question in that is do we need to inform the Commission of this effort and every we've done in it?

There was an earlier question of

rulemaking being necessary. If you remember back to the 1990s, the way this whole thing started was that these things aren't credible. These don't happen.

And we've seen it different. That yes they do. And just as the regulation says. So we have that question of rulemaking to look at. That's the final thing for the SECY paper.

CHAIRMAN ROSEN: This is not the manual action rulemaking. This is something separate?

MR. WEERAKKODY: This is separate.

MR. SALLEY: The reason I bring this up is when this all started back in the 1990s --

CHAIRMAN ROSEN: I understand.

MR. SALLEY: -- the question was the regulation wasn't correct.

CHAIRMAN ROSEN: Well, I don't think there's any contest any more.

MR. SALLEY: I agree with you, Steve. I passed the rule around. It looks fine to me. You know we've even tightened it up. So that's where we wanted to go.

The next step, and this question came up, was the inspectors' workshops. We have inspector workshops scheduled for the June/July time frame. We're trying to get a date to bring all the inspectors into headquarters and run them through.

Peter Koltay and Doug Coe in the Inspection Branch currently have the RIS. They're taking the information from the RIS, they're putting it into an actual inspection procedure. And we're going to be working that in the June/July time frame with the regional inspectors here in headquarters at a workshop.

Another thing that's ongoing is if you remember I said we stopped the inspections around November of 2000. Well, when we stopped, there was a number of URIs that had come in, questions that the inspectors had already found. We have, I believe, about a dozen of those. And we're also looking at those URIs and how they play into the RIS.

CHAIRMAN ROSEN: More than that. If you look at Suzie's --

MR. SALLEY: Is it more than 12?

CHAIRMAN ROSEN: -- presentation to the Commission on April 12^{th}, I would guess more like 50 or 60.

MS. BLACK: Oh, that's total. But there's a breakdown.

CHAIRMAN ROSEN: That's total. You're talking about just on associated circuits?

MS. BLACK: Right.

MR. SALLEY: Yes.

CHAIRMAN ROSEN: Oh, okay.

MR. SALLEY: Yes, the URIs for associated circuits.

CHAIRMAN ROSEN: Anyway, it's in your presentation.

MR. SALLEY: Yes. So we need to look at those is -- the point I'm making here is we need to look at those and then close those up.

After we've done that, the next big step for us will be that we want to have a public workshop. And we want to go through this whole process with all our stakeholders. We're currently looking at around the September/October time frame of this year of holding a public meeting here in Rockville.

Saying okay, this is how we're going to inspect these in a risk-informed manner. This is what we're going to do. This is how we're going to look at it. And just bring everybody up to speed as to how we're going with it.

I have some follow-on issues. You have a copy of NUREG-1778. I would love to have some comments and feedback from the ACRS on that. Again, this was our attempt to take the 20-plus years of knowledge and history and lessons learned and compile it into one user-friendly document was our goal there. So I would like -- love to have some input.

I've got a number -- NEI stayed up late and they reviewed that one quite well. They sent me some pages of input there so I'd like some more to really get that right.

That brings us to the final two points. And that's the inspections. We hope to be ready by the end of this year. By December of this year, we hope to be ready to start inspecting. So that gives us a nice date of January 1, 2005 that the inspections should be all restarted. And this attribute of the fire protection inspections associated circuits should be started back up. And next year we'll be on our way with that.

CHAIRMAN ROSEN: How does that relate to the Davis-Besse pilot of NEI 04-06? Is what they're going to do in the pilot to get ready for that inspection? Is that what I understand?

MR. SALLEY: Yes, and that will be general across the board. One of the things that we talked about here was that okay, the RIS was issued in March and we're looking at picking the inspections up in January first.

So this time frame between March and January is a good opportunity for any licensee that may have not maybe been as rigorous as they should have in their associated circuit inspection, it's a very good time for them to go do a self-assessment and to use that criteria because they know what our inspectors are coming with.

So this time frame, this time we're in right now is that self-assessment period. And that's what the licensees are working on to make sure their house is in order.

And this associated circuits and Suzie's mission of just, you know, just do it and get it done, I don't know that things ever are ever done-done, you know, and forever. I mean it's something we're always going to look at.

We do have some follow-on activities. Those were the ideas that we explained with you, the 3, 4, 5 circuits, thermoset to thermoset. And those are going to be the things, the refinements as how I like to think of them that we want to be working with Research.

Some of those may show that hey, this is pretty important. At that point, we'll take the correct action, go in and supplement the RIS or revise it and move them in. If they find out they're less risk significant, then we want to bring them, you know, over to the Bin 3 items.

That pretty much -- oh, I have another slide, excuse me. That pretty much brings you to the conclusion slide. So the difference between September when we spoke to you last year and where we're at today is that we've stayed on track. We've stayed on course. RIS 04-03 has been issued.

We have a plan to restart the inspections. It slipped a little bit as we picked up some more items along the way to get done. But we're looking at January 1st of this upcoming -- `05, for being up to speed in the inspections.

Our focus, I can't, you know, say this enough that we want to look at the most risk-significant attributes. We've learned a bit about associated circuits, some stuff that we thought is now confirmed, and we want to move forward in an intelligent manner.

And that leads to the next bullet, of course, which is we want to make the most effective inspections. We want the best inspection that we can possibly do. The whole idea that, you know, we've never stopped questioning, and industry's never stopped questioning either. I mean they wanted to run the tests. We went with it. We ran it. We confirmed things.

So that we continued questioning and, of course, that's essential that we don't get lackadaisical in the area.

And, of course, we have the follow-on activities by Research that's going to further reduce our uncertainties.

That about brings me to the end. Steve, do you have any questions?

CHAIRMAN ROSEN: Do any -- thank you, Mark.

MEMBER LEITCH: I have just one question.

MR. SALLEY: Yes, sir.

MEMBER LEITCH: These older plants that were built to grant technical positions and so forth, is there any difference in the way in which you'll inspect those? Or do you expect to inspect to the same criteria?

MR. SALLEY: I expect the criteria to be uniform across the board. You know one way you can look at this, this RIS and that, and I'm sure we'll get maybe some questions and some debating, but the one way you can look at this is we said to the inspectors, okay, here's the -- fine tuned, here's the minimum things I want you to go do. And this is the low bar of the safety, if you will. Go out and do this.

And I would expect that to apply across the board. There may be a plant or two that has a unique licensing condition that may come into question. I think there will be a couple, three of those. But for the vast majority, it's going to be a uniform-type inspection using uniform procedures like they do. Of course, they always take into account the plant's licensing basis. You have to.

MEMBER LEITCH: Yes, okay. Thanks.

CHAIRMAN ROSEN: Anybody else?

MEMBER POWERS: Well, I think -- I forecast a very challenging review on this inspection procedure because what they have done is they've said look, I want to focus on the likely things to happen. And at least a subset of that likelihood that they have forecast comes from a finite number of tests done in one test facility with one configuration.

Okay, so if we -- and based on that, certain things are excluded. Okay, we'll do 14 tests and if I'm excluding things at the probability of 10 to the minus 2, say, I haven't got a big enough sample to base my exclusion on that.

And I think, you know, in some cases it's okay because there's a mental integration of a huge amount of fire damage experience based on that exclusion. But I think we're going to have to go through and look at every single thing that they're excluding from examination and understand where it came from.

Because if it's -- if the only basis is well we didn't see it in the tests EPRI ran, then you're going to have to ask what is the probability threshold that allows you to exclude this. If it's .1, that's one thing. If it's .01, that's quite a different thing.

CHAIRMAN ROSEN: I think we'll have to keep that in mind as we go forward.

I am quite pleased with the progress.

MR. SALLEY: Thank you.

CHAIRMAN ROSEN: You do have some issues. I understand you want our comments on 1778.

MR. SALLEY: I'd love to have comments, yes.

CHAIRMAN ROSEN: I think we're --

MEMBER SIEBER: How can we get comments to you, Mark?

MR. SALLEY: You can feed those back through me, Jack. That would be fine.

MEMBER SIEBER: Okay, you're the man.

CHAIRMAN ROSEN: I think it's been very interesting and I thank you. I think it's good to have a chance to get briefed on the subject again. We actually continue to be very interested in fire risk. It is to us a prominent piece of the overall risk of this endeavor.

So now I think we're ready for Alex to --

MR. SYKES: One last question for you, Mark. When's the deadline? When do you need those comments?

MR. SALLEY: I'm trying to get this document issued this fall. I understand you guys are working on a lot of things. So this summer if I could have your comments, I will be working them. And that would be a good time for me to work them in.

MR. SYKES: Okay.

MR. SALLEY: I'd really appreciate it. Any stakeholder's comments, I welcome them.

CHAIRMAN ROSEN: All right. NEI?

MEMBER SIEBER: Thank you very much.

MR. SALLEY: Thank you.

MR. SALLEY: I got the crowd all warmed up for you, Alex.

MR. MARION: Good morning. My name is Alex Marion. I'm the Senior Director of Engineering at NEI. And Fred Emerson would normally be doing this presentation but he's on vacation and we encourage our folks to take vacation --

MEMBER POWERS: But none, you can't let Fred do this. You've got to keep his nose to the grindstone.

MR. MARION: Well, Fred told me what to say and what not to say.

MEMBER POWERS: Oh, okay.

MR. MARION: And I won't disappoint him.

MEMBER SIEBER: So are you finished now?

MR. MARION: Yes, I'm finished. Any questions?

(Laughter.)

CHAIRMAN ROSEN: Did he take his vacation after the schedule for this meeting was announced?

MR. MARION: No, actually it was planned before the schedule was announced.

Anyway, what I want to do is take a few minutes and provide you some industry perspectives on the circuit failure issue. But let me make one point very clear. We believe that this particular issue as well as a number of other issues that are still outstanding in the area of fire protection are prime targets, if you will, for closure and resolution.

We've spent a lot of energies on the part of the NRC and the industry over the past several years dealing with associated circuits but also with some of the other issues. And it's time to really look at what do we need to do together in a collaborative way to identify a resolution path, pursue that resolution path, and then achieve closure.

And I think it can be done on this particular issue. We've been struggling with this for the past four to five years. And it's something that I think there's a knowledge base available right now and we just need to exercise a little discipline on both sides to deal with what we know and bring this issue to closure.

May I have the next slide please. I intend to cover these general topics. I'm briefly going to go over a little bit of the background and talk about the guidance document that we have put together for evaluating associated circuits. And offer some comments on the Regulatory Issues Summary that you heard about this morning in Mark's presentation.

Next slide please. In terms of background, this issue or this activity -- this project if you will started back in 1996 when there were clear differences between the staff and the -- the NRC staff and the industry in terms of interpretation of the regulatory guidance on how circuit failures will be evaluated.

And as a result of those differences, it became clear to us that we needed to find a way to resolve the differences. And that's when we started the test program that Mark alluded to earlier. And I'm not going to get into any details of that program at this particular time.

However, --

CHAIRMAN ROSEN: We've been briefed -- for the record, we've been briefed on that program at length.

MR. MARION: Yes, okay. Thank you.

And Mark indicated that the results of that test program were communicated and published. And I believe you folks have a copy of the EPRI reports, et cetera.

When we started approaching closure of that testing program, we decided to develop some guidance on how to take the results of that testing program and integrate them into a methodology by which utilities can evaluate associated circuits at their plants and deal with the results of that evaluation. And that document is NEI 00-01. And it was provided to the NRC for review in May of last year.

And while we were developing drafts of that document, we had provided NRC drafts also. And I think that clearly demonstrates the resolve that we have in the industry to work with the NRC on a clear resolution and closure path.

Next slide please. I just want to briefly highlight the content of NEI 00-01. And it basically has two aspects. One is a deterministic approach for evaluating compliance with existing regulations based fundamentally on the plant-specific licensing basis that's been previously reviewed and approved by the NRC.

Now recognize the history of fire protection issues, I've been in Washington, D.C. for 16 years now. And fire protection has always been one of the priority issues. And I sit back and I look it and I say when are we ever going to get through this thing. Because every time we close one issue, another one crops up.

And there was a question raised by one of the members this morning -- and I'm sorry I don't remember who raised it about why is this so complicated. It's complicated for a number of reasons since basically the complexity, if you look at it historically, deals with different plants, different regulatory requirements that were established when Appendix R was developed, when the branch technical positions were developed, et cetera, et cetera.

And then implementation over the course of the last 25, 30 years that had varying interpretations on the part of licensees that were different from interpretations of the NRC officially that were different from interpretations of individual inspectors. And you had that morass of stuff, and I'll call it stuff.

They were trying to cull together and try to rationalize where is ground truth? What makes sense? What's the most safety significant from a risk perspective now that we have risk tools available? And how do we package all that and move forward with resolution and closure?

And the document that we put together for addressing associated circuits, I think, provides a good example of the kind of approach that we need to use. As I mentioned earlier, it contains a deterministic approach and a risk-informed approach.

And we intended to achieve NRC approval or acceptance with some minor exceptions, I guess, and I'm hoping that we can still get to that point. I don't -- I'm trying to recall if the NRC has taken an official position on whether or not they're going to give us approval of that document. But we think it's necessary.

Otherwise, quite frankly, we've wasted four years of work.

CHAIRMAN ROSEN: That's a pretty strong statement. I think -- you indicated that there was quite a bit of cooperation and consultation and coordination during that period.

MR. MARION: Yes.

CHAIRMAN ROSEN: So I would think that a lot of your thinking and the industry's thinking that has been adopted, where the staff has found itself in agreement, and it's included in the current plan. So I would say wasted is not exactly the right word.

It may not come to pass that NEI 00-01 is incorporated by reference to Reg I or something like that. But nevertheless, it's part of the underlying fabric of the knowledge. So I'm just quarreling with the word wasted.

MR. MARION: Well, I'll hold that word. But the reason that I made the statement that I did was because the objective was to clearly obtain some level of NRC acceptance and endorsement.

CHAIRMAN ROSEN: And I think that's not happening right now.

MR. MARION: That's not happening right now.

CHAIRMAN ROSEN: Okay.

MR. MARION: And that's very important to the industry because the utilities are interested in using that guidance document. And they would like to use it with some level of confidence and understanding that the NRC finds portions of it acceptable.

That's, you know, that classic situation. Give me that demonstration that the NRC is agreeing with certain aspects of the document so I can use them as we move forward.

And that's all we're trying to achieve. That was one of the fundamental objectives. That's why I used the -- that's why I made that statement --

MEMBER SIEBER: We've we given --

MR. MARION: -- because we're not accomplishing that objective.

MEMBER SIEBER: Were we given a copy of

the NEI draft document?

MR. MARION: 01?

MEMBER SIEBER: Yes.

MEMBER POWERS: I think I've had several versions of it.

MR. MARION: I believe you have.

MEMBER POWERS: Yes, I mean we've had multiple versions. Most have been retained -- a truthfully obnoxious probability formula. I mean it's a sequence of probabilities, none of which are demonstrably independent and they're multiplied together.

CHAIRMAN ROSEN: Well, I would like to hear what it is about NEI 00-01 that troubles the staff enough for the staff to be unwilling to recognize it in some form at some point. You know I'm not asking for that right this instance.

MR. WEERAKKODY: Sunil Weerakkody, we could address the areas where we have agreed and the areas we have trouble agreeing with on NEI 00-01. You want it now?

CHAIRMAN ROSEN: No, no, we want to let Alex finish. But we'll come back to it, let's come back to it.

MR. WEERAKKODY: Okay.

MR. MARION: Thank you.

May I have the next slide please? Just briefly with regard to the Regulatory Issues Summary 2004-03, it provides a more realistic approach to evaluating circuit failures.

And the only thing, the only major comment that we have about that is as that -- those criteria are being integrated into the inspection process, there needs to be a clear distinction and understanding of differences between -- or findings that fall within the scope of the licensing basis of the plant versus findings that may have some safety significance from a risk perspective. Okay?

And we provided comments, detailed comments to the NRC along those lines. And we think that as long as that distinction will be made, that we can still move forward with resolution and closures on these issues involving associated circuits.

May I have the next slide please. In Marks presentation, he mentioned that we were proceeding with self-assessment of our -- of the associated circuit guidance. And we've published a document that captures the self-assessment process. We have the pilot evaluations being conducted at several plants.

I'm only in a position to mention one at this particular point, which is in early May. And that's Davis-Besse. And we plan to have a mix of plants in Regions I and II. And these assessments will be held in the June, August, and September time frame.

Now I'm pleased to hear that Mark is delighted at his opportunity to go to Davis-Besse. I'm hoping that the NRC can observe the other self-assessments that will be conducted this summer.

And I think by doing so, that will clearly demonstrate the applicability of 00-01 and how the licensees are prepared to use it because one of the differences, one of the problems you have is the licensing basis was established at any point in time over the past 25, 30 years.

Now we're looking back at that licensing basis from a compliance point of view. And our expectations on the part of the industry as well as the NRC are different today than they were at any point in time over the past 25, 30 years ago. And that's a practical reality so we have to find a practical solution. And I think these pilots will help in facilitating that concept.

Next slide please.

MEMBER LEITCH: I guess this is really a comment for the NRC. But the -- you mentioned the pilots were going to be in different regions. I would think it would be important that the pilots look at different vintages of plants. I would think that it would be particularly interesting to look at some of these real old plants and to see how the pilot works in those situations.

MR. MARION: Yes, that's an excellent point.

CHAIRMAN ROSEN: Do we have any NEI 04-06, Marvin?

MR. SYKES: Yes.

CHAIRMAN ROSEN: Are you going to make that available to us?

MR. SYKES: I'll be happy to.

CHAIRMAN ROSEN: Very good.

MR. SYKES: Let me just make a note.

MR. MARION: Okay. As I mentioned, resolution. Again, as I mentioned before, we need to make clear what the regulatory expectations are and the basis for closure of this issue. And NEI 00-01 was basically structure for that purpose. And again, I think as we go through these pilot assessment, I'm hoping that maybe in the fall, Fred and I will be before you to tell you the pilots were successful and we successfully demonstrated the efficacy of that document.

If the pilots identify that additional changes need to be made to the guidance document, then we will move forward and make those changes.

And this is critical from the standpoint of defining closure and resolution because it's been an issue that everyone has been struggling with over the past several years. And I think we have an opportunity to really, really bring everything together and hopefully report in several months that this issue is behind us and it's part of a routine inspection process moving forward into the future. And everyone understands what the expectations will be from the standpoint of the inspectors.

And that completes what I had to say. And I' be --

CHAIRMAN ROSEN: Well, you know, thank --

MR. MARION: -- more than happy to answer any questions.

CHAIRMAN ROSEN: -- you Alex. You know I'm not -- Suzie I'm not willing to either declare it a victory or defeat in this case. With respect to the status of NEI 00-01 is what I mean.

I think what we are really seeing is the staff and the industry on a convergence course where a lot of information needed to be developed from four to five years ago where there was clearly no consensus. Lots of information and dialogue has been -- lot of information has been developed. There's been a lot of dialogue.

We haven't reached consensus. We haven't reached closure. But I'm not certain we're not on a convergence course. There may come a time with some revisions to 00-01 perhaps or some revisions to the way the staff plans to go. And clearly, obviously, they're not set on any one way yet. They're just getting started. That there can be convergence and closure.

I'm not going to predict what year that's going to happen but I'm not yet ready to say we're coming up loggerheads on this. I think there's been a lot of cooperation and coordination. And I hope it will continue.

MS. BLACK: Thank you, Steve. This is Suzie Black. And I agree. I think like a lot of areas in fire protection we get down to the arguing over that licensing basis, which is often unclear, especially in this area.

But I think the success here is that with the RIS, we've identified what issues or what configurations should be fixed, even if they are covered by the licensing basis of the plant. And then it comes down to whether it's a backfit or whether it's an ROP finding.

And I think we have to work our way through that. But the important thing is to fix the risk-significant issues.

CHAIRMAN ROSEN: Exactly, and I think we have processes to deal with the 51.09 process --

MS. BLACK: Yes.

CHAIRMAN ROSEN: -- to deal with if it's accurate, if the staff really thinks it's risk significant and the licensee doesn't agree or doesn't want to fix it, there's a way for the staff to proceed. It's in the regulations so --

MS. BLACK: That's correct.

CHAIRMAN ROSEN: -- I think we can get out of that.

MS. BLACK: And as far as 00-01, we are still discussing that internally about how to handle our review of that. And how to either endorse it or how to incorporate the information into guidance.

CHAIRMAN ROSEN: Or endorse it in part.

MS. BLACK: Or endorse it in part, yes.

CHAIRMAN ROSEN: I think Alex makes a convincing point that the industry wants to move forward with it, is going to try it in the self-assessment process. But there's a substantial degree of unease about committing a lot of resources to complying with a process that's in a document that the staff has clearly stated is not -- that it's not adopting in whole.

MS. BLACK: That's correct. And I think it would help everybody if we clarified which pieces are not adoptable and which pieces are.

CHAIRMAN ROSEN: Right, right. So that's part of the convergence I spoke of. And I'm hopeful that we all will stay bolted in and work on this process.

MR. MARION: I would also like to make another comment based upon one of the questions and topics that was discussed in the briefing that was given by Mark. And this dealt with the capability of utility licensees to identify cable circuits, routings, throughout the plant, et cetera.

A number of plants, a good -- I would say a majority of the plants have the capability to specifically identify routing of cables in conduit and cable tray and also locations as well as terminations. There are a number of -- there are a small percentage of plants that don't have that capability and they use the approach that Mark alluded to earlier. And I just wanted to offer that clarification in terms of the magnitude of that kind of situation in the industry.

CHAIRMAN ROSEN: Yes, I think you're right. My experiences is with the plants that do have the capability and quite in depth. And it may be that some of those plants might be interested in thinking about some sort of work with the staff in some sort of pilot effort to apply some artificial intelligence to an existing database that's already there.

You might want to explore that with some of the more modern plants and plants with better databases because it may be of interest to them to say yes, we'd like to work with you, especially if there was a little exchange of resources to work out what Dana was suggesting.

MR. MARION: Thank you.

CHAIRMAN ROSEN: Thanks, Alex.

All right. It's 10:15 so we must be on schedule. And we're on a break now until 10:30.

MR. GUNTER: Dr. Rosen?

CHAIRMAN ROSEN: Yes.

MR. GUNTER: Could I ask a question?

CHAIRMAN ROSEN: Yes. Please identify yourself.

MR. GUNTER: Yes, thank you. My name is Paul Gunter. I'm with Nuclear Information and Resource Service.

This is admittedly an overly simplified question but if we had compliance with III.G.2, would associated circuits be a problem?

CHAIRMAN ROSEN: I'll let the staff try to answer that question.

MS. BLACK: Can we answer that after the break then when we have a better formulating --

CHAIRMAN ROSEN: Yes, I think if that's all right with our --

MR. WEERAKKODY: The question is --

CHAIRMAN ROSEN: -- questioner, we'll take the break.

MR. WEERAKKODY: -- if we had compliance with III.G.2 -- but can you repeat the question please?

MR. GUNTER: If we had compliance with III.G.2, would the associated circuits problem be resolved?

MS. BLACK: And are you talking about

compliance with the exemptions --

MR. GUNTER: Well, so -- compliance with -- no, I'm talking about operable fire barriers and operable, you know, both in -- you know, the three components of III.G.2, which were not listed and are -- as we have tracked this issue, the root of the problem stems from the fact that we don't have -- that there are a significant number of plants that don't have operable fire barriers or they cannot provide, you know, the 20-foot separation.

So if we were to have compliance with those three aspects of III.G.2, could we resolve the associated circuit problem?

MS. BLACK: Okay. So as I understand your question, it's the three separation criteria that are in the regulation as opposed to anything that we have approved through the exemption process or deviation or licensing basis process?

MR. GUNTER: Well, it's my understanding that we have the problem because of the overuse of exemptions. So then you get into the fact of these questions of when you can't take credit for an operable fire barrier, or the 20-foot separation, then you go to the uncertainties that are associated with exemptions. And that's where we get into this morass of stuff that Mr. Marion has referenced.

So if we were to -- if -- and the public is perplexed by the fact that we don't, you know, that all these problems stem from the -- from what we view as a regulatory contortion.

CHAIRMAN ROSEN: All right. Well, I think the question is understood. We'll take a break and we'll come back and try and -- give the staff a chance to answer, admittedly, a very complex question in a short time.

MS. BLACK: Okay.

(Whereupon, the foregoing matter went off the record at 10:19 a.m. and went back on the record at 10:35 a.m.)

CHAIRMAN ROSEN: We're back on the record now. We'll pick up with a brief chance for the staff to respond to the question from a stakeholder prior to the break. I'm not going to allow a follow-up because we have an agenda that we want to stay on. So do the best you can.

MR. HANNON: My name is John Hannon. I'm the Plant Systems Branch Chief. The simple, quick answer to Paul Gunter's question is yes. If a licensee is fully in compliance with Appendix R, Section III(G)(2), then the associated circuit issue would be resolved. What we've been talking about all morning is the NRC's inspection program to be able to verify that compliance. So that's a quick answer.

CHAIRMAN ROSEN: Okay. Very good. I think what that says to me is if they were licensees in compliance, that's what you're after searching for. And if not, there are processes by which the staff deals with non-compliance.

Okay. Mark? You're up.

MR. REINHART: I'm Mark Reinhart, the Chief of the Operations Support and Licensing Section in NRR. My section had the responsibility to develop the revision to the Fire Protection Significance Determination Process. And our goal today is to present you with where we are in that process revision.

The challenges that really face the staff going into the revision could be broken into two categories. The first, that really is independent of the SDP, is an understanding of the licensing basis. The staff and the industry were challenged in the 2003-2004 time frame of understanding what folks meant with what they wrote in the 1985-1986 time frame. So there's ongoing issues with the licensing basis. The SDP's not going to address that, but that did stimulate a need to revise the SDP. The other issue that stimulated the need to revise the SDP were differences in the staff and in the industry of which reference to use, which assumption to make, which database to use in entering the various pieces of the SDP.

So what we did, we wanted to go back to basics, and we wanted to truly understand the process and come up with first a process that everybody was in agreement with, and then fill in the pieces to that process. So we had ourselves a team. This is basically a two-year effort. A little more than two years now. We put together NRC staff from Research, from NRR, from the regions, along with our contractors from Sandia National Labs, EPRI. Early on we wanted NEI and the licensees involved so we could truly get everybody's views on what was needed and where to go. We formed seven teams, seven sub-groups that took the SDP that we envisioned and started to work on all those pieces. We finally came to a conclusion that we believe we have agreement, and we're using the most up to date information that we can, and have a consensus that we're using the right information.

Overall, contents of the SDP. There's an introduction and approach. The approach, again, explaining what we're doing, why we're doing it, the logic we're taking. Then we have a section that just lays out the assumptions and limitations. So up front, we can see and agree on those really critical aspects.

Then the process is divided into two phases, a Phase I and a Phase II. Phase I is more qualitative. Phase II is more quantitative. The Phase I approach is for the fire protection inspector to screen out the aspects that he or she can. The Phase II approach would go to the senior reactor analyst, or SRA, to make the more quantitative approach. Each step is laid out from Phase I in the Attachments 1 through 9, and then the supporting document provides the rationale for why we went the way we went, and which reference to use. So an individual can clearly reference back and forth to where they're going.

I mentioned this was a two-year plus effort. I'll just cover where we've gone since last fall. In October of 2003, we had a public meeting. We issued a revised draft of the SDP. And then in November through March, we prepared and conducted tabletop exercises to look at findings to make sure that the new approach wasn't significantly different from the previous approach. I think we got no finding that would have been more serious than what we found. Like no whites became yellows, no yellows became reds. Some went down. Some whites could have probably ended up a green, which is where we want to be slightly conservative.

MEMBER LEITCH: This says -- on your previous slide you referred to I guess an outline of a document. Is that an inspection guidance document?

MR. REINHART: This is, if you will, Appendix F to Manual Chapter 0609. It's the Fire Protection Significance Determination Process. That's this Attachment 1 through 9 in the Basic Appendix F. Then the supporting document is a separate piece that goes with that.

MEMBER LEITCH: Okay, so if there are findings associated with what we were hearing about before the break, or anything for that matter related to fire protection, this is the document one would use, then, to classify the significance of those findings as far as the ROP process is concerned.

MR. REINHART: Yes.

MEMBER LEITCH: Okay.

MR. REINHART: Now let me just throw out a caution. Obviously, associated circuits come to mind. The way the current revised process will work, it doesn't look at associated circuits on an integrated plant, but it will look at it on fire area by fire area. So an analyst would have to take the results of each fire area and sum them. That's where we're going forward. But, we do have a proposed tool that came out of the NEI proposed guidance that we're adopting to use that we could again look at certain areas, we'd have to look at all the areas. But say if there's 20, we could screen out 12 through this process. And it looks to be a fairly simple quick screening. Then that would only leave us eight to do a full analysis and summing the results. And so we will have significantly cut down that effort.

Going on in our schedule. In February we issued the Significance Determination Process to the NRR Inspection Program Branch, which then took that, went out to formal comments from our regions, and we're going to take those comments, any other comments we get, feedback, go into a training program for our regional fire protection inspectors and our SRAs, and by May, the end of May, we hope to have all that feedback incorporated and actually implement that fire protection SDP to start looking at actual findings.

Now, what we want to do is actually go

through this for you, section by section, and Dan Frumkin from the Plant Systems Branch is going to do that. Also in the audience we have individuals that were on each of those subgroups, and will try to provide any feedback from that arena that we need to also.

MR. FRUMKIN: Hi, my name's Dan Frumkin. I'm on the fire protection staff at NRR, and in SPLB. And we supported the development of the SDP.

Just based on the amount of time we have for this presentation, rather than stepping through the SDP one step at a time, what I'm going to do instead is focus on the enhancements of the SDP, how this -- what I can call the new SDP compares to the current SDP or the old SDP. But as Mark said, the new SDP is going to be using more state of the practice techniques. Also, the old SDP was generally code-based. There was a lot of look-up tables, whereas the new SDP is going to be using a lot of physical phenomenon information from the fire risk re-quantification study, the fire correlations from NUREG-1805, and so forth.

This is the fundamental method of the SDP using these five factors. This is basically our version of the fire risk formula. Now we've heard the comments from ACRS in the past about having multiple factor formulas, and how multiple factors can cause double counting or over-conservatisms. But the --

MEMBER POWERS: That's not the problem.

MR. FRUMKIN: Well, just the SDP has -- we've spent a lot of energy to try to avoid that kind of thing. For example, if small fires are credible, then we wouldn't have any severity factor. If suppression is not going to occur before the damage occurs, then we're not going to be crediting the probability of non-suppression function. So we're trying to use this formula carefully so that -- and instead of combining the factors, there's going to be factors of one that are used occasionally.

MEMBER WALLIS: How can CCDP be independent of SF?

MR. FRUMKIN: In fact, you're right. These are not independent factors. That's my point. SF is highly dependent. The severity factor is highly dependent on the frequency. It's highly dependent on the probability of non-suppression. Conditional core damage probability as we frame it is assuming that the damage has occurred, what is your possibility of shutting down.

MEMBER WALLIS: So these factors are not

independent, and CCDP is self-dependent on SF and F in some functional way when you make the calculation?

MR. FRUMKIN: Yes. Steve?

MR. NOWLEN: Yes, Steve Nowlen, Sandia Labs again. I think the point is that you have to be very careful about these factors. Depending on how you calculate them, you may not end up independent. The way we've done this, we've tried very, very hard to maintain the independence because this formula is treating them as independent. So for example, the severity factor we do tie directly to the fire characteristics that we assume. And the probability of non-suppression is calculated specific to the fire that we're postulating, and the CCDP is calculated specific to the damage that we're postulating. So again, you have to be careful how you do it, but the way we've done it, we believe we've maintained independent.

MEMBER WALLIS: Okay.

MEMBER POWERS: Beliefs are laudable and appreciated in the Vatican and places like that. But I think a demonstration of independence would be a lot more valuable.

MR. NOWLEN: Well let me rephrase. It is our best professional opinion based on state of the art fire risk practices that we have maintained independence.

MEMBER POWERS: Well how would you go about demonstrating that?

MR. NOWLEN: Again, we're deriving all of this from what we consider to be best practices in PRA today. That's about the best I can say in a short response.

MEMBER POWERS: So you're, but what you're saying is I've got to do some work here.

MR. NOWLEN: We could spend hours on this one subject, and I'm not sure we want to, I guess is my response. We tried -- I mean, we worked really hard at this. I mean, these debates about independence of these different factors are not new. They've been ongoing in IPEEEs, for example. And we definitely thought very hard about this, and we believe that we have done a good job of maintaining the independence of these factors the way they're implemented.

MEMBER WALLIS: So you define enough different things in your "i=1 through n" that each one of these things is clearly defined as being something different. And that's part of what you do?

MR. NOWLEN: Well, the "I=1 through n" reflects that you're summing up multiple scenarios. You have multiple fire ignition sources, each of which can contribute to the risk. So that's what the "1 to n" is, is simply the summation over the important scenarios.

MEMBER WALLIS: I guess I'm most concerned about the last factor.

MR. NOWLEN: CCDP?

MEMBER WALLIS: How you really can predict that from these various fire scenarios. Because it must depend an awful lot on how the fire evolves.

MR. FRUMKIN: Right, and what we're doing with the first up to CCDP is we're coming up with a probability that a particular step -- that the damage will occur.

MEMBER WALLIS: Of reaching a certain state of damage.

MR. FRUMKIN: Right. And when that damage occurs, we say, well, what's -- it may be there's a probability of a hot short, maybe a probability that there is a human action involved that can be evaluated, or a probability of a full train being available.

MEMBER WALLIS: So "i" is really

determined by the various ways in which you could lead to core damage, rather than the various kinds of fires you could have?

MR. FRUMKIN: Well, I see "i" as your target source -- your source, your fire source, to your target pair. So for every source in the room, everything that each source can damage a number of targets, or a single target. And that makes up a scenario based on your number of sources. So for every source damaging a particular target, then there could be an individual and unique core damage mitigation strategy. So if you have a fire in one area of a room, you could shut down using one system. But if the fire's in another area of the room, well then you have to use manual action. We try to break that out individually.

MEMBER WALLIS: So there are lots of "i's" then?

MR. FRUMKIN: There is the potential for many, many "i's". So here I'm going to go through basically the enhancements are what are highlighted here. And then in the brackets I've got the step numbers. And the order is sequential as you go through the SDP, not as order of the priority of the enhancements.

So one of the first major enhancements is a preformatted worksheet for Phase I and Phase II. This worksheet will help to ensure consistency and repeatability, and the worksheets have room for explanations and assumptions to further help with the repeatability. One thing that we found during the tabletops is that we couldn't really tabletop these based on the Phase II's that were performed because we didn't have information such as the equipment that was in the room, or the configuration of the room. Even when we went to the Phase III's, the Phase III methodology used built fire scenarios -- basically built fire scenarios with a limited number of source target pairs. So we didn't have all the information in the room. So now, by using these worksheets we're going to collect that information and it's going to be available for audits or what have you.

The next item is we have a screen to green of low degradation findings as part of the Phase I process. Now the reason that that's considered okay is that for all intents and purposes a finding that is of low degradation is -- the finding of low degradation means that the system remains intact. So if you have a sprinkler system that's of a low degradation, it's very likely going to put out the fire in that room, or control the fire in that room. So if you're only finding in a room is low, we go to green and we step out of the process.

Again, cold shutdown findings have not been found significant to risk. This is like equipment in a warehouse. It didn't have its checkup, or maybe it was in the wrong room, or something of that nature. Or maybe it was broken. By the time you get in the propagation of your scenario to need that equipment, your risk numbers are fairly low.

Multi-room terms scenarios are rare in nuclear power plants. Even some --

CHAIRMAN ROSEN: Well, I want to ask you something about cold shutdown findings screen to green. There are periods during shutdown when the risk is quite high, when you need to continue to have RHR, for example.

MR. FRUMKIN: Right, and this is -- one of the limitations of this is that it's for full power operations. So we haven't addressed cold shutdown mid-loop operation startup in this SDP.

MR. SEIBER: That's troubling to me. If you look at how risk is divided up, about one-third of it might come from shutdown operations. And the other thing that I think that one can say is the frequency of fires is higher during shutdown operations than during operation because of the hot work that's going on, the large numbers of people that are there, fire doors that are open, or fire watches, what have you. And so I think there is a pretty good chance of fire in cold shutdown conditions.

MR. NOWLEN: You're absolutely right. The posture of the plant in many ways is different at shutdown conditions. But as Dan says, the SDP is focused on full power operations. And one of the things that's common in PRA is that the PRA stops at hot shutdown. And that was a conscious decision. The presumption is that the transition from hot shutdown to cold shutdown is low risk. So that's why in this context --

CHAIRMAN ROSEN: Yes, but that presumption's wrong.

MR. NOWLEN: Perhaps.

CHAIRMAN ROSEN: We know it's wrong now because -- that there are periods during shutdown at PWRs and BWRs where the risk during that evolution is actually quite high. And so I think the message you're getting from us is you're not done yet even when you're done with what you're doing.

MR. NOWLEN: Yes, but you're also talking about something that cuts across all of the SDP processes, because they're all built on the same presumption, right?

MR. REINHART: We might add, we have a separate SDP for shutdown operations. So if we have any findings during shutdown, we go into that process as opposed to this process. And a going-in point is a loss of, or a threatened loss of RHR, regardless of the cause, be it a fire, an earthquake, or whatever. That's a different approach.

MR. SEIBER: Are you going to tell us a little bit about that when you're finished with this?

MR. REINHART: I did not come to talk about the shutdown SDP today.

CHAIRMAN ROSEN: Well, that's okay. As you said before, or someone from the staff said before, that the commission has said that the better is the enemy of the good, and we don't want to throw this out, because it's not the whole solution. It's clearly a large part of the solution. So let's just agree, if we can, that there's yet to be something said about fires during shutdown. How does one evaluate it. I'm not sure that I agree that we're -- that you can just go into the shutdown SDP and say that's enough. I mean, maybe that's so, but it's not obvious to me.

MR. REINHART: I appreciate that.

MR. FRUMKIN: One thing about this formula, though, is as we go through it up to the conditional core damage probability, which is what's really going to be significant during your shutdown scenarios, your duration, your fire frequency, we have tools for a lot of transient combustibles. We have tools for failed fire watches.

CHAIRMAN ROSEN: Probability of non-suppression, that's something you can address during shutdown?

MR. FRUMKIN: Right. It could be out of service. So I would think that a lot of the tools are in place to do that, although this was not designed to do that.

CHAIRMAN ROSEN: I think you're right. I think -- go back to the formula for a minute, Dan. I think you're exactly right. This formula doesn't preclude being used during cold shutdown. All you have to modify is the final term on the right, the conditional core damage probability. You have to get to that some other way than you do in full power, but there are ways to do that. People are doing that now.

So it's not an intractable problem. I just think it's a piece of the problem you haven't addressed. Okay, fine, well let's just keep that in mind.

MR. REINHART: Well, we will definitely keep that in mind. And I think in a situation you have to look at more than one piece of the puzzle. Obviously we have a shutdown SDP, we have a fire protection SDP. If we have a finding that there's a synergism, we have to take the best of both. And if we find there's a hole, we will need to make sure that there's a seamless transition from one to the other.

CHAIRMAN ROSEN: The message is that this fire protection subcommittee, at least this member of that subcommittee, is not clear that what you've got in place now covers fires during shutdown completely. And I think the method you're talking about here for at-power risk for fires is more robust, and could easily be applied -- or could -- take out `easily' -- could be applied to shutdown conditions as well.

MR. FRUMKIN: Many features of it could, yes.

Multi-room scenarios, fire scenarios. What we found is that even in some of our more significant fires, we haven't had fires spread from room to room, Browns Ferry excluded. But since we've upgraded penetration seals and so forth, there have been very little spread from room to room. So we've added a number of screening factors, if there's barriers in place where we can avoid -- early in the process avoid the different source-target pairs that can affect one room affecting the other, the exposing room to the exposed room, which simplifies the process. If you don't, if you're unable to screen those out, you continue your multi-room term scenarios through the process.

MEMBER POWERS: So what you're saying is that fire barriers are of guaranteed reliability?

MR. SEIBER: That's what we're afraid of.

MR. FRUMKIN: What we're saying is that if there's a fire barrier, there's enough assurance that it's not going to be significant compared to within the room.

MEMBER POWERS: One hundred percent effective?

MR. NOWLEN: It's not quite that simple. What we look for are multiple layers of defense-in-depth that would mitigate the likelihood that a multi-room scenario would actually occur. So we're not looking at just, say, the penetration seal. That may in fact be our finding, that we have a penetration seal. But what we look at is suppression availability in the two adjoining rooms, additional passive fire protection, the fire hazards that are present, do we have fire hazards that can lead to a significant challenge to the barrier in the first place. So it's really a weighing of multiple layers of defense-in-depth. And if we have enough we say these are going to be low risk scenarios and we don't carry them forward through the rest of the process.

MR. SEIBER: Do they still allow the stuffing of penetrations with mineral wool as re-establishing the fire barrier?

MR. FRUMKIN: Well, permanently, I don't know that there's any tested configurations of just stuffing mineral wool into a fire barrier. As a compensatory measure for short duration, some plants may have evaluated that. But I don't believe that just -- usually there's some sort of capping material, some sort of cap, if it's a configuration that uses mineral wool to hold it in.

MR. SEIBER: I would say that if you had any kind of energetic fire, or fire with some kind of clean leak small LOCAs, what have you, you could kiss the mineral wool goodbye. Or even turning the ventilating system on can do it. So there is some probability that fire will communicate across a fire barrier. That's the point.

MR. FRUMKIN: Right. Generally the mineral wool is not going to be the longstanding -- that would be a compensatory action. So we wouldn't see mineral wool typically as a permanent fire barrier.

MR. SEIBER: Yes, but if you go in there and an inspector sees mineral wool, he may ask the question how long has this been here, and so you've got to find some old guy who can remember when he was young when it was put in there.

MR. FRUMKIN: And another enhancement. We've used generic area fire frequencies. Here's the fire frequency table from the fire protection re-quantification. In the old SDP the sources were the five methodology, or other generic sources, or plant-specific sources for fire frequencies. Now we have one source and one location. This improves repeatability, and it's also -- at this early stage where there's a qualitative process, we have used fairly -- we have used the mean of all the fire frequencies. So these are fairly high numbers for generic fire frequencies.

MEMBER WALLIS: These are per plant per year?

MR. FRUMKIN: Yes.

MEMBER WALLIS: So if I add them up, I'm going to get -- every couple of years I'm going to have a fire.

MR. SEIBER: Yes.

MR. FRUMKIN: Right.

MR. NOWLEN: They're all a tad on the conservative side. And for the Phase I, you know, this is only a Phase I piece of information. We've erred towards somewhat conservative. It would be inappropriate to add these up directly and say that's the plant fire frequency.

CHAIRMAN ROSEN: Well, let's take a look at this. First, how are you going to use it. You say you take the mean of these?

MR. FRUMKIN: No, no, I'm sorry. This was made up of the means, right?

CHAIRMAN ROSEN: Oh, so at each area you've taken the mean.

MR. FRUMKIN: Mean of fire --

CHAIRMAN ROSEN: Of experience. Now let's zero in, then. Now let's take reactor building BWR, which is the highest one on this list. Ninety of the minus two. Well that's practically 10^{-1}. One every 10 years.

MR. FRUMKIN: Yes.

CHAIRMAN ROSEN: What is it about the reactor building that has such high frequency?

MR. FRUMKIN: Probably that it's a very large building, and a lot of activities go on in that building.

MR. SEIBER: A lot of equipment too.

CHAIRMAN ROSEN: But there's nothing -- I mean, I can see for instance, the last row on this chart, turbine building main deck is almost as high as reactor building BWR. But there's a lot of oil up on the turbine building main deck, and rotating equipment, and all kinds of other activities that go on on the main deck. But I don't think that's necessarily -- I mean, I don't see those two areas, the BWR reactor building and the general turbine deck as being the same. My intuition would be that the BWR reactor building a lot lower. Instead it's higher. Can you help me?

MR. NOWLEN: Yes, it's modestly higher. Take those two numbers. Those are virtually identical, right?

CHAIRMAN ROSEN: Yes. Okay. I wouldn't

have expected that up front.

MR. NOWLEN: The other part of what your intuition is probably telling you is that in the turbine building we generally are going to expect that those fires that occur are more challenging. And they're more, from a classical fire protection point of view, they're going to be --

CHAIRMAN ROSEN: Big fires.

MR. NOWLEN: -- big oil fires, and things like that. Reactor building we have a lot of small electrical equipment fires, hot work fires, some transient combustibles. So they're different kinds of fires in that sense. But if you look at the data, roughly the frequency is similar. Just of --

CHAIRMAN ROSEN: Different kinds of fires, but if you're just counting ones and ones.

MR. NOWLEN: Yes. Right. And for Phase I that's all we're doing right now, is just counting each of the fires.

CHAIRMAN ROSEN: All right.

MR. REINHART: Maybe it would be good to address -- It seems an issue with the SDP that might solve some of these questions. Remember, it's a Phase I, Phase II, Phase III approach. Phase I is a very gross screening. If it screens to green, we're done. Issues that do not screen to green go to Phase II, which is primarily what we're talking about when we say SDP. Fire protection, shutdown, whatever it is, we have a simplified approach in Phase II. If that screens to green, we're done with the finding. If it's not, if it's white or more, very often, and there's some synergism between the staff and the licensee on who will accept what result, we go to Phase III. And in the Phase III, many, many of these issues that aren't seamless in the SDP as it is today get resolved. But in the final slide, we'll show a lot of those go to our contractor, particularly in fire protection, which are expensive. So the Phase II piece is always a subject where we have to run out of its capability and go back to Phase III. So we'll get more and more conservative as we back up. Phase I will be the most conservative, Phase II is slightly conservative, and Phase III we're really striving for best estimate.

MR. FRUMKIN: Another enhancement is we've added a quantitative screening tool to various steps of the SDP. This is the Phase I quantitative screening tool. And it helps us to screen some moderate findings. It can't be used to screen a post fire safe shutdown finding, or a high degradation safe shutdown finding, because those are 10^{-6} if anything falls, the smaller one, even 10-6 it would be green through any of the processes. But what this does is where we know we have some defense in depth, for example cable separation or barriers, a fire prevention finding can rely on that additional defense in depth, or a moderate fire prevention finding can rely on that, and we lower the threshold for screening, or raise the threshold for screening.

If it's fixed fire protection systems, we're still fairly sure that we have some separation. And also with localized cable protection, we're still sure we have -- not only do we have some significant remaining cable protection, because this isn't the complete lack of a cable wrap. We have a cable wrap that's moderately degraded. So we have a cable wrap, and then we also have some …

CHAIRMAN ROSEN: So how do you use this? This says, for example, fire prevention and administrative control is the first row.

MR. FRUMKIN: Right.

CHAIRMAN ROSEN: If your calculation says that the finding you're looking at is $1E^{-3}$ then it wouldn't screen. Is that right?

MR. FRUMKIN: Right, but --

CHAIRMAN ROSEN: It's higher than …

MR. FRUMKIN: Exactly. But let me give you a quick example. If we go to an area like a cable -- well, let's just take the second one, a battery room. And somebody left combustibles in the battery room for two days. And that was a moderate finding. They didn't leave, you know, highly combustible material, but they left some combustible in there for two days. They got it out. That's $4E^{-3}$.

CHAIRMAN ROSEN: But wait, the duration, did you take the duration into account?

MR. FRUMKIN: Right, right.

CHAIRMAN ROSEN: In calculating that?

MR. FRUMKIN: The duration comes into play here. I don't know if I can get the mouse up there. At this point in the Phase I quantification, we have the duration factor and the frequency. Only those two factors.

CHAIRMAN ROSEN: So in your example, I'm just looking at your example. Someone left a small amount of combustibles in a battery room. You calculated a number based on the two days.

MR. FRUMKIN: Right.

CHAIRMAN ROSEN: Okay. And for over a year's time frame?

MR. FRUMKIN: Over a year there would be a factor of 1.

CHAIRMAN ROSEN: Two over 365.

MR. FRUMKIN: Right. The breakdown is three days is 0.01, 30 days 0.1, and greater than 30 days is a factor of 1 for a duration factor.

CHAIRMAN ROSEN: And so that one brings you to what?

MR. FRUMKIN: So that would take you down here to, you know, you have, what was it, 40^{-5} because you've got two orders of magnitude because it was less than three days. And you call that green and you move on.

MR. SEIBER: Is the table on Slide 8 complete, or is there a big table someplace?

MR. FRUMKIN: Well, this is complete for generic fire frequencies.

MR. SEIBER: Okay. You're missing important areas like turbine room basement where you keep all your oil, in the reservoir and water pumps down there, and motors.

MR. NOWLEN: Yes this -- you have to apply a little judgment in cases like that. It's difficult to get a frequency for a turbine building basement because --

MR. SEIBER: It's big.

MR. NOWLEN: Yes, well, and a lot of people -- what you tend to find is that all the turbine building fires are just called "turbine building fires." They don't tend to tell you exactly where it is.

MR. SEIBER: They start up on the turbine, and then run down.

MR. NOWLEN: Right, and run down. So, you know, in a case like that I would say, well, take the main deck, and it's going to be pretty close. I mean, the frequency of fires down in the basement is probably not much different from the frequency of fires on the main deck. The characteristics of those fires might be quite different. But you know if we're getting more than one every ten years down there per plant, I'd be very surprised. So again, there is a bit of judgment. You can't cover every single named area in every single plant in a single table. So you have -- and there's also a Phase II process that if you don't just fit anywhere in this table there's a more sophisticated process that Dan will cover in a minute that will cover you. You can always apply that in lieu of this table.

CHAIRMAN ROSEN: Now, just quickly on this duration thing. You don't divide two by 365 and calculate it. There's a table in here, I think I saw it, where you just do that, you get three choices, and use that number.

MR. REINHART: That's consistent in all the SDPs. That's not just fire protection.

CHAIRMAN ROSEN: Okay, what page is that?

MR. FRUMKIN: Well, it's Page 8.

CHAIRMAN ROSEN: Page 8. Maybe that's electronic Page 8.

MR. FRUMKIN: Is this electronic Page 8. F-8.

CHAIRMAN ROSEN: F-8?

MR. FRUMKIN: Yes.

CHAIRMAN ROSEN: All right.

MR. FRUMKIN: That's what that table looks like.

CHAIRMAN ROSEN: Yes, okay, thank you.

MR. FRUMKIN: And we can -- there's some parts of the SDP that go page and page and page. So if we want to see those, I can just jump to the SDP and we can pull that up.

So that calculation of duration factor times the generic fire area frequency is the end of Phase I. And if you can screen at that point, or on low degradation, or on cold shutdown, then you have a green finding, and you leave the process.

That takes us to Phase II. And what I've done here is I've got the step numbers up at the top, and again the task numbers for each of the individual enhancements. I'll just start with the picture since it's the most obvious thing on the page. This is how we talk about what I call source-target pairs in the SDP. We have a fire source, which is our FDS0, which is assumed to be damaged based on whatever frequency we have. We have our FDS1, Fire Damage State 1, which means that the fire caused basically a direct -- damage to something within its -- call it a zone of influence. Then we have an FDS2, which is outside of the zone of influence. This is either a fire going into a cable tray and propagating down the cable tray till it damages a crossing cable tray, or fire damaging through a hot gas layer or something of that nature. And then there's an FDS3, which is propagation through some sort of rated fire barrier.

And this is the nomenclature that was developed for the SDP. And what it does is it gives us a way to communicate about your source, and then what kind of target is it, an FDS1, FDS2, FDS3. And it also allows us to bin certain findings for particular fire sizes. If there's one cable that's in a remote area of the room, then we're only worried about FDS2 scenarios. So throughout the process, and as you hear people talking about the new SDP, they'll be talking about these FDS scenarios.

The first bullet, which I passed over, which is the screen the findings with an independent shutdown path. For many of our findings, administrative controls, or fire suppression or detection systems, there could be a completely redundant path that's separated by a substantial fire barrier from the room that has the degraded system. And where there is that completely redundant path, we take credit for it early. But our threshold, the way to screen that path is very challenging. And you can't -- if it's a finding against safe shutdown, you really can't take credit for this independent shutdown path. But this is useful for these findings that involve these administrative controls, or some detection or suppression where two redundant, or even three redundant trains completely isolated, you have a degraded system in one room, you have two complete trains, there's no reason not to credit them.

CHAIRMAN ROSEN: So a fire barrier degradation that doesn't affect the independent shutdown path, for example, would be used in that case too?

MR. FRUMKIN: For example, if you had a Train A switch gear room and cable spreading room, and then a Train B switch gear room and cable spreading room, and the barrier that was degraded was between the Train A and Train A, you could still credit Train B. If there was a barrier degradation between Train A and Train B, all bets are off and you wouldn't be crediting.

CHAIRMAN ROSEN: Right. That wasn't what I was -- I was just saying that an internal fire barrier within A, some kind of degradation of a stop, a cable stop, or who knows what, limited to one of the two trains, you wouldn't spend a lot of time fooling around with it. You'd use your first bullet and just say, well, there's a whole another path.

MR. FRUMKIN: Right. And this third bullet is similar to our -- what we talked about before about screening unlikely fire confinement findings. So if you have a fire confinement barrier that's slightly degraded, more than low, but still substantial, in the moderate category we have certain specific rules, checkboxes as it were, if it meets certain criteria, you can screen it. And like an example of that is between the Train A switch gear room and the Train A cable spreading room, if that barrier is degraded, you still are going to have your opposing trains. So you may be able to screen that.

So as we move through the process, these are Steps 2, and Step 3, and Step 4 of the Phase II. One of my favorite enhancements is the component-based fire frequency table. Basically, what's come out of the re-quantification that Research has done is somehow they've mashed the numbers together to determine what the frequency of a particular component is in an area. What's the frequency of a piece of switch gear? What's the frequency that a motor or a pump is going to catch on fire? So this would answer your question about your reactor building. What the inspector would do is they would go in the reactor building and they would count, based on specific counting rules that we've developed, how much equipment is in that room. And they will develop a fire frequency based on that. Then there would also be severity factors, because the likelihood of a large fire versus a small fire will be applied. So even though they're counting -- we're going to say that there are small fires and large fires out of that, and the large fires happen at a lesser frequency.

Also we have treatment of non-simple fires. Again, like cable spread on cable trays, it's not a simple fire. It moves over time. Or cable propagating up a stack of cable trays, we have rules. Or an oil fire. What the SDP has done is come up with bins of fires. We've got our small fires, our medium fires, our large fires, our very large fires in the SDP. But an oil fire can be very large or very small. It depends on a lot of factors, the area and so forth. So we treat those using individual rules that we have in an attachment.

A zone of influence chart in fire growth and damage correlations. We use a zone of influence chart for a specific piece of equipment to, basically it gives you the ability to screen out its FDS1 scenario. And what it is is it's a column and a sphere around your component of interest, your fire source of interest, say a piece of switch gear. And if there's no target within that zone of influence, then you would screen out the FDS1 scenario. Now there might also be an FDS2 scenario where that could create a hot gas layer. That would still propagate through. But using the zone of influence charts, we're able --

MEMBER WALLIS: So these aren't always simplistically spheres. I mean, you do account for hot gases?

MR. FRUMKIN: Right. The zone of influence is a sphere or a column, but we also account for hot gas layer using these fire growth and damage correlations that are also in the SDP.

MR. NOWLEN: To be a little more specific, the sphere accounts for the radiated heating from the fire on a target. And you predict the size of the sphere depending on how much radiant energy you've got coming from the fire, and the damage threshold of your component. The column reflects the plume behavior, the heating of the direct buoyancy-driven air rising above the fire. So the ball and the column represent a zone of influence for localized damage. And then as Dan mentioned, you have to also look at the hot gas layer to see whether the fire source is sufficient in and of itself to cause more widespread damage in the room.

MEMBER WALLIS: This is all temperature-based. There's no smoke consideration?

MR. NOWLEN: Correct.

MR. FRUMKIN: Correct. And using these correlations, we are able to screen fire sources. So if you have a fire source that can't cause damage through direct flame impingement because the target is too high, too far away, and it can't cause damage through either cable propagation or through hot gas layer, then that fire source is not a fire source of interest, and it will be screened out, and thus reducing the number of factors, sources we carry forward.

The last two bullets on the slide are related in that they relate to whether fire frequencies increase because of poor combustible control, or poor hot work programs, or there's compensatory measures that could reduce the likelihood of fire, or reduce the fire frequency. So this could in a way answer some of your questions like, well, you know, there's just a lot of people out there welding, and you know there wasn't enough people doing hot work where they didn't stage the area properly. At this point we can raise up the fire frequency.

Step 2.5. Now we're getting into the meat of the growth and damage scenarios of the SDP. This is another thing that's very interesting, a very large innovation in this SDP process. The SDP requires growth and damage scenarios to be identified, or source-target pairs. For sources that are unable to cause damage, in those sources the damage is not considered. So again, that's using your column, and ball and column scenarios. Also, conservative assumptions regarding the damage is made at this step, the second bullet. For example, as Mark said earlier in the day, if a cable that involves a train, it is assumed that, well, two things. One is if we don't know where the cables are, we assume that the cable's damaged. But also, we assume that if there's a control cable in the room, at this point we don't pull out the wiring diagrams and say, well, what combinations in this control cable could cause the pump to stop working, or something like that. We just say, you know, this runs through the area, we're going to consider it damaged.

And what we do is we come up with a result in minutes that the damage will occur, which will be used in later processes. But we say, you know, fire on this frequency will cause damage in this many minutes. And we're going to use the fire dynamics tools as needed to determine how the damage -- how fast the damage occurs.

I guess I skipped this. It says by using this time, in minutes it will help us avoid the screening of fast fires. Fires that cause damage very quickly will have a less likelihood of probability of non-suppression. You know, the suppression systems, there may be a minute for the detector to pick it up, a minute for delay, for people to leave the area, maybe manually actuated. So if the damage can happen very quickly, we might not give any credit for non-suppression from a number of sources.

And then we do an analysis of the non-suppression probability. This is the likelihood that they're going to be able to put it out before the damage occurs. We're giving credit for fire watch or detection by general plant personnel. We have tools in NUREG-1805 to determine the time that these detectors are going to go off, the time the sprinkler system's going to go off, if there's a fixed suppression system.

Effectiveness and timing are considered in the fixed suppression system. So if the system -- whether the system is going to be effective, we have a factor that says, well, this percentage of the time the system's not effective. And then we also have timing, which says, well, the system goes off in five minutes, but the damage happened in two minutes. Okay, well we're not going to credit that suppression. Now if the system goes off in five minutes and the damage happens in 20 minutes, there's going to be a factor which is going to be, you know, greater than zero that it's going to be successful. There's going to be -- you know, there's still going to be a probability that it's not going to be successful, but it's going to be much smaller.

CHAIRMAN ROSEN: Now, fixed suppression

systems are usually fairly effective if they go off. Is that what you're factors show?

MR. FRUMKIN: That's right. That's right. I think we have a factor of, you know, 0.05 for some of the gashes, or the pre-action type sprinkler systems, and a factor of 0.02 for the wet pipe sprinkler systems.

CHAIRMAN ROSEN: There are two of --

MR. FRUMKIN: Of non-suppression, exactly.

MR. NOWLEN: Well, those are failure on demand numbers. So if you get a demand for a sprinkler system, based on what we know today, about two percent of the time the system will just not work. That's probably pretty conservative, by the way.

There's another piece that --

CHAIRMAN ROSEN: So 98 percent of the time it will.

MR. NOWLEN: Ninety-eight percent of the time it will. And probably better.

MR. SEIBER: Is that whether it will actuate or not.

MR. NOWLEN: Yes.

MR. SEIBER: Or whether it will put out

fire?

MR. NOWLEN: No, it's actuation.

MR. SEIBER: Okay.

MR. NOWLEN: Yes. Now there's another piece that Dan's referring to, and that is take a case where you predict your suppression system goes off in five minutes, and you predict your damage goes off in six minutes. How confident are you that the suppression system's really going to put that fire out before the damage occurs. Both of those numbers, the five-minute suppression time, the six-minute damage time, have uncertainty. So we fold that in and say, well, based on that we have some confidence that the suppression system's going to work, but it's certainly not, you know, 100 percent. So there's a table in the guide that allows you to look at the ratio of those two numbers and assign a probability of suppression on that basis.

MEMBER POWERS: Steve, let me ask you this question. On your gaseous suppression system, it fires, it suppresses, it's emptied, air comes back in the system, the fire resumes. How do you treat that?

MR. FRUMKIN: We don't in the SDP. If this system is undegraded, if the fire suppression system is undegraded, then we assume that it's successful.

MR. NOWLEN: If we have a specific degradation of the system.

MEMBER POWERS: No, no. This is just a well-known phenomenon that gaseous systems don't really put out fires.

CHAIRMAN ROSEN: They don't cool them off much.

MEMBER POWERS: Yes.

CHAIRMAN ROSEN: Eventually you get some air and off they go.

MR. SEIBER: It re-ignites.

MR. NOWLEN: Well, the best evidence we have today is that if you can maintain the concentration for 15 minutes, then the fire will not re-flash. So that's the design basis for most of these systems is to maintain concentration for 15 minutes. And in that event, we basically assume that that's good. Now, in reality, you always have the manual brigade as a backup. And at the very least you've had a substantial disruption of the process of this fire. It's not going to pick up where it left off, it's going to have to almost start from scratch.

CHAIRMAN ROSEN: The manual brigade has fire pre-plans, and they understand that when they open the door, this is a bad thing, that this is going to let out air into the area which may be hot. They know about it. These are firefighters. They're trained. They know about that. They know that they need to cool the room off and be careful about letting air in and so forth.

MR. NOWLEN: Right. But frankly, for a Phase II analysis, which is what Dan's now into, that's a subtlety that we don't attempt to treat.

CHAIRMAN ROSEN: No, I think that's appropriate. I think you're relying on the fire protection professionals in the brigade to deal with those secondary effects.

MR. NOWLEN: Basically that's correct.

MR. FRUMKIN: And then the next step, and I'll talk about this on the next slide, but there's a probability of non-suppression, of how successful the fire brigade will be, and that's a function of time. And then what we do is if there's a fixed suppression system, typically an automatic fixed suppression system, and manual fire brigade suppression, these are combined. And if the fixed suppression is going to be very successful, then this is going to be a very promising suppression scenario. But the fixed suppression is the majority. If it's successful, you're going to be in good shape. If the fixed suppression is not -- is going to take too long, then you're going to combine them together. That didn't make any sense, but they're combined.

And this is a table of non-suppression. And what you can see -- we'll just go down this. All events -- just how to read this table is we have the time to damage, which could be, you know, 10 minutes for the damage to occur, and then the time for detection. It's hard to read I guess. And that's the time that the detection occurs. That's when you find out that the fire's going to -- when the fire brigade or first person is on the site and sees the fire. And so for example, in 10 minutes, if you have a generically all fires, they've got about a 50 percent chance of putting out a fire in 10 minutes. Just because they're there. Now one thing that doesn't show up here is there's a delay in detection, then -- if detection is delayed for 10 minutes, then you're going to be in a much -- damage occurs in 10 minutes, then you're at the zero, and you're at, you know, damage of 1.0.

MR. NOWLEN: Right. The idea is that it's the detection signal that triggers the response by the manual brigade. So until they know they have a fire, they can't respond to it. So the difference between the damage time and the time that it takes you to figure out you actually have a fire is the time available for the manual brigade to respond. And so then we --

CHAIRMAN ROSEN: The classic example of that, I think, is the MGM Grand fire in Las Vegas where they had a fire that was going on in the cafeteria for a long time. It was at night and there was nobody in there. It was going on for a long time and burned a lot of things before it broke out.

MR. NOWLEN: Precisely, yes. So until you know you have a fire, manual brigade is not going to -- they're going to be doing their regular job. So the idea is that you look at a reliability, essentially, of the fire brigade putting out the fire within some time period based on how long they've got to do that. So we take away the detection time, and we weigh only the time from detection to when they can put it out.

So if your damage time is 20 minutes,

your detection time is 10 minutes, you've got 10 minutes to put that fire out. So you'd be back to the 10 minutes, not just the straight 20-minute damage time, if that makes sense.

MEMBER WALLIS: These look like exponential something.

MR. NOWLEN: Yes. Yes. These are basically exponential distributions based on the statistical data from the events.

MR. FRUMKIN: Next slide. The plant safe shutdown response analysis and the final quantification. So to develop the conditional core damage probability, we see the equipment available that's useful for shutdown, and we evaluate it using the plant-specific Phase II notebooks. So this will allow credit for systems that may be available and not affected by the fire. For example, if there's no loss of off-site power, you may have a number of systems available that you wouldn't consider available, you know, just using your fire analysis.

We have also developed a manual actions worksheet, which I've got a little bit on the next slide, to --

MEMBER WALLIS: So, these plant-specific inspection notebooks, these are developed by the staff, or by the --

MR. FRUMKIN: Yes. Brookhaven developed --

MEMBER WALLIS: Is there some coordination with the plant itself, and presumably the --

MR. FRUMKIN: Oh, yes.

MEMBER WALLIS: These are all very plant-specific.

MR. FRUMKIN: Yes. Yes, this involves, and Mark will tell you more specifically, but it involves Brookhaven doing some work, site visits, validation, I guess, work with the plant staff just to make sure everything's on the same page, and all the systems that are useful are incorporated.

MR. REINHART: Each plant has a plant-specific notebook Phase II SDP. The original notebooks that were developed by Brookhaven were then taken. We had a plant visit for each unit, and some visits included more than one unit and more than one plant. But every SDP was benchmarked against that plant's PRA to make sure that we weren't over-conservative grossly and we weren't under-conservative. And we took lessons learned from their PRA to improve our notebooks to the best that we could. It's interesting to note at the same time we had a SPAR representative and contractor on that also did a benchmarking there. Further improvements to those notebooks will involve further plant visits.

CHAIRMAN ROSEN: These are separate notebooks than the SPAR notebooks?

MR. REINHART: Yes.

CHAIRMAN ROSEN: These are fire notebooks?

MR. REINHART: No, no. I'm sorry. What Dan is saying is at a certain point in the fire protection SDP there's a reference to the plant-specific notebooks.

CHAIRMAN ROSEN: I'm trying to be sure and understand what these notebooks are. These are the SPAR notebooks?

MR. REINHART: No.

CHAIRMAN ROSEN: Or they are separate fire protection notebooks?

MR. REINHART: Let me go back. I mentioned coincidentally, oh by the way, to save resources, at the same time we looked at the notebooks we looked at the SPARs.

CHAIRMAN ROSEN: Right.

MR. REINHART: End of discussion on SPARs. SPARs are not part of the Phase II notebooks. The Phase II notebooks, which are part of the operating full power significance determination process, were all given a plant-specific visit and benchmark.

In this SDP, the fire protection SDP, there's a reference to operating notebook.

CHAIRMAN ROSEN: Which is for all SDPs, or just fire?

MR. SEIBER: All. The notebooks cover all the SDPs?

MR. REINHART: Yes. The notebooks cover other situations. They do not cover fire. So the reason there's a fire SDP was to cover fire. But there's some synergism. So where we can use what we've already accomplished, we referenced that notebook.

MR. NOWLEN: Yes. To clarify a little, the plant-specific notebooks are basically internal events based notebooks. So they're driven more by the internal events view of safe shutdown. For fire actually, this Step 2.8 is fairly challenging because you have to make some adjustments to those notebooks to deal with the fire-specific issues.

For example, spurious operations. Those will not be in the notebooks. So you have to adjust the notebook to reflect a spurious operation. You know, spurious operations are something you don't get from internal events. It's a fire-unique failure mode.

But the notebooks are internal events. We use them to support the fire, but they do require some adjustment.

CHAIRMAN ROSEN: The notebooks are internal events, use them to support the fire, but there's some adjustment. But they are not the SPAR notebooks.

MR. NOWLEN: Correct.

MR. REINHART: There are no SPAR notebooks. There are SPAR models. And I try to -- maybe I confused the inference of the SPAR model with benchmark at the same time the notebook was benchmarked. We had a synergism learning from the licensee's PRA, the SPAR model, and the notebook, to have an improved notebook.

MR. SEIBER: But that was just coincidental.

MR. REINHART: And resource efficient.

MR. SEIBER: Right.

MEMBER WALLIS: All these steps are in

some sort of computer program where people put in various inputs at various times? Or is it some sort of a spreadsheet, or what is it?

MR. REINHART: The notebooks are manual.

MR. SEIBER: It's a manual spreadsheet.

MR. REINHART: Manual tables.

MEMBER WALLIS: They're all manual tables?

CHAIRMAN ROSEN: The worksheet.

MR. SEIBER: Fill in the blanks.

MEMBER WALLIS: But you can also combine that with a computer thing where as you fill in the blank, the computer notes what you've filled in in some way and it does some computations for you.

MR. REINHART: Right. In addition the hard copy notebooks, which is the program, there are ways and individuals have developed spreadsheets that automate the use of the notebooks.

CHAIRMAN ROSEN: You're back to saying notebooks. I thought you already said worksheets?

MR. REINHART: The worksheets are in the notebooks.

CHAIRMAN ROSEN: Oh. You're filling out a worksheet. If you're an inspector, you're filling out a worksheet.

MEMBER WALLIS: Filling out all sorts of paperwork, it sounds like.

MR. REINHART: There's a lot of paperwork, yes.

CHAIRMAN ROSEN: Are you filling out a worksheet? I mean, you've got an instance of an inspection finding. You're trying to evaluate it. That's what we're talking about.

MR. REINHART: Yes.

CHAIRMAN ROSEN: And what you do is sit down with a worksheet and try to fill it out.

MR. REINHART: Fundamentally.

CHAIRMAN ROSEN: Not a notebook.

MR. REINHART: The colloquialism is that compilation of worksheets, some event trees, some amplifying information, is called a notebook.

CHAIRMAN ROSEN: Okay.

MEMBER WALLIS: Individuals have computerized theirs, rather than it being done in some general way?

MR. REINHART: The individuals that have developed the spreadsheets have passed them around to senior reactor analysts so that they're using -- the ones that use the spreadsheet use the same approach. The official copy comes in a hard copy though.

MEMBER WALLIS: Is it passed around in a totally informal way? There's no attempt to encourage more efficient use of these processes?

MR. REINHART: Regardless of the tool they use, when we come to the final conclusion, we have a hard copy notebook filled out, worksheet filled out.

MR. SEIBER: This is not a difficult process. It's one sheet of paper.

MR. REINHART: Or several.

MR. SEIBER: Yes.

MEMBER WALLIS: It sounded to me with all these steps is that it could be quite a complicated process.

MR. FRUMKIN: Well, which process are we talking about. The fire process or the inspection notebook process?

MR. SEIBER: The fire SDP.

MR. FRUMKIN: Okay, we're talking about the --

MR. SEIBER: The worksheet.

MR. FRUMKIN: Yes, the worksheet is a number of pages. And we've just gotten it to the point of getting some final numbers into it. So we haven't really had a chance to put it together in a -- well, hopefully it's a usable form now, but in an automated form. And I'm sure we're going to be considering doing that. Many of the processes are or can be automated very easily, like the fire frequency calculation, the fire model, or fire correlations are already automated. And it's just where you plug in the numbers and how you get the results.

So we talked about these last two bullets together. And that's very appropriate because the SDP has a formula for combining the manual actions, credits that you can use, and the spurious actuations, probabilities, to come up with a CCDP which is also based on the notebooks. So this is a very fairly advanced step, this Step 2.8, and it's going to involve a good knowledge of spurious actuations, manual actions, and also -- or human HEP, and also the plant-specific inspection notebooks.

CHAIRMAN ROSEN: Aren't you tied up here with the rule-making? How does the rule-making affect this step?

MR. FRUMKIN: Well, this is independent of the rule-making. This uses -- this is the next slide. This uses manual actions categories which are similar to the rule-making. I'm sure that people who develop these slides were also involved in the feasibility and timing categories for the rule-making. But these were developed and put in the SDP. And the difference -- I guess the main difference is that -- it didn't fit on this slide, but this isn't a go/no go. As you can read down the slide, let's say Tools Properly Staged. There would be no degradation. And Tools Must be Brought In. That may not be failure. That could be, okay, that's a degradation. They're not going to get full credit for this because they have to bring in the tools, but we're still going to give them some credit. I think more or less as the rule-making goes that you either, you meet the acceptability criteria of the rule, or you don't meet it.

And here we have degradations. You can -- from this worksheet you can have a credit of two orders of magnitude if everything is fairly straightforward, or you could have a credit for human actions of one order of magnitude if there's some complicated actions but they're doable, and you could have no credit for things like if they do operations in the room in the first hour while the fire's occurring in that room you would get no credit. And so that's --

CHAIRMAN ROSEN: How do you arrive at no credit for SCBAs? I mean, fire companies all around the world use SCBAs to combat fires, save lives, and do all kinds of things. There must be some value to it?

MR. FRUMKIN: Well, I'm not sure what the credit here is, but this is the credit -- this is an operator going into a room wearing an SCBA where there is dense smoke, high temperatures, and it's filled with CO2. So he's either reading an instrument, or operating a piece of equipment in the fire-affected room. And that, you can put on an SCBA, but you're not going to be very effective at doing, you know, operating equipment in that situation.

MR. NOWLEN: Yes, and another consideration is to keep in mind this is still Phase II. So how much credit do you want to give that without doing some detailed analysis of that particular process.

CHAIRMAN ROSEN: I think that's a fair response. When you get to Phase III you might credit it some.

MR. NOWLEN: Absolutely, yes.

MR. FRUMKIN: Right.

MR. NOWLEN: If all bets are off for Phase III, you can do what you think best estimate is. For Phase II --

CHAIRMAN ROSEN: Because you agree, I think, that fires are often fought with SCBAs?

MR. NOWLEN: Oh, absolutely, yes.

CHAIRMAN ROSEN: I mean they're trained to operate in an SCBA.

MR. NOWLEN: Right. But to ask someone to do this in a Phase II analysis it was just decided that's asking a little too much. Let's save that for Phase III, a little more detailed consideration. Again, high temperatures, dense smoke, possibility of CO2. Gosh, it's a dicey action, it's going to take --

CHAIRMAN ROSEN: Piece of cake for a firefighter, for a trained firefighter. That's what he does for a living.

MR. NOWLEN: Yes, but the trained firefighter may not be the trained operator that you need to go in and take the action. So again, you get into those questions. Is the person who's being asked to do this action trained in SCBA? Do they go through smokehouse training? Have they experienced these kinds of conditions? Those would all be valid questions, but I think it's too much for them to ask in Phase II. So in a lot of these cases, they've tended to err towards limited credit for human actions. And you'll see, there are other places where you could raise the same kind of question. Well, they could do that, but again, the question is in Phase II should we be trying to credit that.

MR. SEIBER: Actually you're just analyzing postulated events anyway from conditions that an inspector observes. So the question becomes do you give credit or don't you give credit for various features and manual actions. And I think that's a reasonable approach. You know, it's conservative. On the other hand, you can't guarantee that it would always happen the other way, that you'd be successful. So when the question is do you give credit or not, you'd say can't guarantee it's going to be successful, so I don't give the credit. Or give them partial credit.

MR. FRUMKIN: The one thing that's useful about this, again, and all of this whole worksheet that we have is that as the inspector or SRA is going through the process, they're recording their results so that if the Phase III is required, you can see what assumptions were made. If new information is brought in, the pages can be updated and the results can be updated.

CHAIRMAN ROSEN: Well, let me take another example just so I'm sure I understand, Dan.

MR. FRUMKIN: Sure.

CHAIRMAN ROSEN: Let's take the Lighting Failed row. Simple one.

MR. FRUMKIN: Okay.

CHAIRMAN ROSEN: In this case, you said -- now, it's the grading I'm questioning. In this case, if flashlights are available, they have lighting, you give them full credit. For neither lighting or flashlights available, you give them no credit.

MR. FRUMKIN: Okay, let me just bring up the slide that'll tell you how much credit you get. Because I'm not really playing -- I'm not giving you necessarily all the information. Okay, I think this is the slide. So what this says is for emergency lights -- okay, right. If there's no lighting at all and they don't have flashlights, yes, they would get no credit.

CHAIRMAN ROSEN: What is that, an alpha?

MR. FRUMKIN: That's an alpha. Yes, the alpha factor is no credit.

CHAIRMAN ROSEN: Where are those listed? Are they on the --

MR. FRUMKIN: Yes, they're at the end in the table here. If a row is an alpha, then use zero.

CHAIRMAN ROSEN: Okay, I see.

MR. FRUMKIN: But what you'll see, though, is if for example, if tools must be brought in, that's not a failure. That's a degradation. I think the only two -- there's only a few actual failures, and one is that you're doing operations in a smoke-filled area, you have no lighting at all, and I think they're almost always going to have some sort of flashlights. Or inadequate time. If there's, you know, if the core damage happens in five minutes and it takes 10 minutes to get there, it's inadequate time. Other than that everything can be credited. There's few things in this table that say -- those are the only three where absolutely --

CHAIRMAN ROSEN: Most operators carry flashlights on their belt.

MR. FRUMKIN: Right. So that would not

be an absolute no credit.

CHAIRMAN ROSEN: Okay.

MR. FRUMKIN: Okay, and the last slide is for Mark here.

MR. REINHART: Just in conclusion, I'd like to just summarize what we believe we've accomplished. Again, this is the fire protection SDP significance determination process which is one of a number of significance determination processes. And there's some synergism between them.

MEMBER WALLIS: Let me understand what's going on here. This is evaluation post fire?

MR. REINHART: No.

MEMBER WALLIS: This is an inspection evaluation of how prepared they are for a fire?

MR. REINHART: No.

MEMBER WALLIS: What's it for?

MR. REINHART: If there's an inspection, and the inspection results in a finding of performance deficiency, it goes into an appropriate SDP.

MEMBER WALLIS: So it's the significance determination of the results of an inspection rather than of an event.

MR. REINHART: Exactly.

MEMBER WALLIS: That's what you're talking about here.

MR. REINHART: Yes.

MR. SEIBER: Right.

MEMBER WALLIS: Okay.

MR. REINHART: And there's three phases to that. Phase I, II, and III.

MEMBER WALLIS: So these are all hypothetical things. If there were a fire, they wouldn't be prepared because they didn't have flashlights or whatever.

MR. REINHART: Yes, right. To try to determine the significance of the defect that is under discussion.

CHAIRMAN ROSEN: Of an observed defect.

MR. REINHART: Right. In three phases. Phase I, gross screening. Conservative, very conservative. Phase II is again a screening, slightly conservative. Phase III would the more detailed --

MEMBER WALLIS: And the output for Phase II is a CDF?

MR. REINHART: It's a color.

MEMBER WALLIS: It's a color, yes, but this whole thing started with a fundamental method which said it was CDF?

MR. REINHART: And the CDF ends in an order of magnitude that in the SDP gives you a color. Greater than 10^{-6} is white, less than 10^{-6} is green.

MEMBER WALLIS: Based on risk.

MR. REINHART: Yes. And then an order of magnitude up. The delta CDF is the result of just the finding on its own. And you go up a color order of magnitude.

So we took the initial challenges we started out with. We believe we've addressed most of those. We've achieved significant consensus with the industry. I think Alex will come and say it's not perfect, but we believe that we're much more in consensus than when we started.

MEMBER WALLIS: So it's understood well enough that industry itself could go around and make its own inspection, emulate your SDP, and come up with the same answer, roughly speaking?

MR. REINHART: A knowledgeable person, industry, public, and NRC, should be able to come up with the result.

MEMBER WALLIS: The same answer.

MR. REINHART: Yes.

MR. SEIBER: And in fact that's what licensees do.

MR. REINHART: Yes.

MR. SEIBER: In the event that there is a finding with color. They evaluate it on their own so they can decide whether they're going to contest the finding or not.

MR. REINHART: When we get into a situation that's not covered by the SDP, any SDP, by definition we go to Phase III. And in fire protection, once we go to Phase III, we're back to Mr. Nowlen, or it could be another contractor but today it's Sandia National Laboratory.

That's where we are.

MEMBER WALLIS: So since we have a table that showed that fires were fairly likely, this can be tested, because you have all these greens and whites and whatever. And you can then find out that it turns out that the plants to which you gave greens were the ones who were most likely to have damaging fires in practice. By -- I mean, there's experience as well as just inspection in this process, because fires are a fairly common occurrence. So there's a feedback to tell whether your process is producing reasonable results or not.

MR. REINHART: I would say that's true, and our tabletop exercises was the first step in doing that. And obviously as we go forward after May and we implement this, we're going to have lessons learned and see what we'll have to do.

MEMBER WALLIS: But fires are unlike sort of reactor core accidents and things. They're fairly common things so that you do have a very good chance to learn lessons from fires.

MR. SEIBER: Well, that's where all these factors came from was actual fires. So it seems to me that you take all the history, develop the factors, put them into formula, and then today things are occurring out in the future and you can evaluate to see whether those factors are still appropriate. Which is what you're doing.

MEMBER WALLIS: This is very important because the whole thing could be just a huge fantasy where all these things, these are all calculated, and they really have no connection with reality.

CHAIRMAN ROSEN: But there's a huge advantage to having done this exercise, which takes us beyond intuition, which is where we were before.

MEMBER WALLIS: It's better than what you had before.

MR. SEIBER: Yes, in a number of ways. It's more accurate, and it's based on something, but it's also risk-informed which I think is another attribute that is important to administering the oversight process.

CHAIRMAN ROSEN: Right. Well, our philosophy is getting in the way of lunch, but I do want to let Alex Marion have a few minutes also at the floor. But he's in the way of lunch also. Thank you guys. Good presentation.

MEMBER POWERS: Alex only helps.

MEMBER WALLIS: Well, Alex, you're going to tell us that industry agrees, aren't you?

MR. MARION: Alex Marion, Senior Director of Engineering at NEI. I would like to make a comment to clarify a point that came up in the previous presentation dealing with self-contained breathing apparatus in training of plant personnel. Just about all personnel are involved in some firefighting training at utilities today. They have been for years. However, there are certain personnel that are dedicated to be the fire brigade responders. Their training is typical of training by typical fire department employees. And that training does include self-contained breathing apparatus.

Okay, may I have the first slide? These are two topics. I just want to offer some views and identify a couple of remaining issues that need to be addressed as far as this SDP is concerned. Next slide, please.

As Mark indicated, this is another area where there's been tremendous interaction and collaboration between the industry and the NRC in developing an SDP that we feel is practical. But more importantly we feel that it can be implemented from the standpoint of addressing the significance of findings that are developed from the inspection process. Communications have been very effective. There have been a number of public meetings, and specific task force-type interactions between representatives of the industry as well as representatives of the NRC.

The only issues that remain deal with the Phase II portion, if you will, of the significance determination process. And I'd like to just elaborate on those issues briefly. Next slide, please.

The first deal with the application by inspectors. The question that we have is whether or not -- I think you're on the next slide.

MR. SEIBER: Yes, next slide.

MR. MARION: Slide 4. I apologize. That's correct. Whether or not the inspectors by themselves can adequately complete or implement the SDP without some significance reliance on the SRAs, the senior risk analysts. And that's a question that the NRC needs to resolve.

CHAIRMAN ROSEN: Do you think that's a startup question, or is that a long-term question? Is that something that'll get, yes, they'll have trouble at first, but over time they'll get better?

MR. MARION: I don't know. We have a general concern that it's going to be a startup issue, but we think that the NRC needs to look at that. And I don't know if they've had an opportunity to. That's one of the main comments that we submitted.

CHAIRMAN ROSEN: What did you just say? You have a general concern that it will be a startup issue?

MR. MARION: Yes.

CHAIRMAN ROSEN: You mean you agree that it may be just the startup issue, or you don't agree?

MR. MARION: It may be a startup issue.

CHAIRMAN ROSEN: Okay. That would be my gut judgment is that they're almost certainly going to have trouble in the beginning, but over time as the inspectors take real inspection findings and work through the process, they'll gain some confidence. And it'll take a few years, but you know, and inspectors move around from plant to plant. But ultimately you'll have a cadre of inspectors who generally do a pretty good job with this. They'll need some help from the SRAs, but we're going to come up a curve.

MR. MARION: Yes, we fully support the concept, we just want to make sure they can be meaningfully implemented in a reasonable manner to achieve the expectations that the NRC and the industry have.

CHAIRMAN ROSEN: Do you agree with my characterization of how that will go with the inspectors?

MR. MARION: Yes.

CHAIRMAN ROSEN: Okay.

MR. MARION: Generally agree. But the question is that, you know, the findings identify, you don't want to wait six months until everybody agrees before that finding's been dispositioned somehow. So as quickly as you can get to a point where you're responsive in terms of the process, to deal with the findings expeditiously I think is the overall objective. And we've had some discussions with the staff along those lines so I'm not really indicating anything new.

One other area, and this was touched on in the earlier presentation, is the treatment of associated circuits as well as the treatment of manual actions. And more importantly in the manual actions arena is the extent to which the SDP complements this rule-making. And that's something that we think that the staff needs to focus attention on before they finalize this and put it forward.

And that basically concludes the comments I want to make. But I do have one question of the staff, if I can. In the table that you had that identified non-suppression values for manual firefighting capability, did that reflect actual fire events? I was trying to understand from my own perspective.

MR. NOWLEN: Yes. The short answer is yes, absolutely. In fact, it's based entirely on the suppression timing evidence provided by the fire event database that EPRI maintains.

MR. MARION: Okay.

MR. NOWLEN: So what we did is we basically partitioned those events up into different categories, and did an analysis of the suppression time based on that history.

MR. MARION: Okay, thank you. Well that completes the comments that I want to make.

CHAIRMAN ROSEN: Well, thank you very much, Alex, and thanks to the staff. I think we've got a major effort behind us. It isn't done, obviously, but I'm gratified that you've made as much progress as you have. And I think we're all much better off for it. I think we've got a much better SDP potentially now than we had before. Any other comments by members?

MEMBER POWERS: Well, I think that the mystery numbers have been removed from the SDP process, but at the cost of being a fairly complicated thing to do here. And of course that means that there's enough complexity and enough subjectivity to add -- we have real potential of having divergences of opinion between the inspector doing the analysis and his plant colleague doing the analysis.

And so, I mean, there's no answer to this except to go try it and see if we're going to get the same kind of problem that we've had that Mr. Marion mentioned, that it just takes an inordinate amount of time to disposition these because you've got to resolve the subjectivities in here. And you know, time will tell. I mean, that's clearly the -- the mystery numbers bothered the theoreticians. The disposition time bothered the practical individuals.

CHAIRMAN ROSEN: Well, I think you're right. But I think at least now the arguments will be focused on some tangible subject that one can argue, rather than arguments about intuition or mystery numbers, as you call them. So I think we're all better off. We're a step down the road. We're still going to be arguing, but we're arguing about different things, things that are more tangible.

Any other comments by members? We'll recess until five minutes after 1:00.

(Whereupon, the foregoing matter went off the record at 12:06 p.m. and went back on the record at 1:04 p.m.)

CHAIRMAN ROSEN: All right. We're back in session. And we'll turn the meeting over to J.S.

Hyslop of Research. J.S.

MEMBER POWERS: No, you're not going to turn the meeting over to him. If you do that, he'll adjourn it.

MR. HYSLOP: I'll select questions.

CHAIRMAN ROSEN: He can't. I've got the hammer.

MR. HYSLOP: Thank you, Steve. I'm here today to talk about an improved technical approach that we're developing in a joint program with EPRI. The program is called the U.S. NRC/EPRI Fire Risk Requantification Study. First, I want to give you some background on the program.

We have a general memorandum of understanding between the Office of Nuclear Regulatory Research and EPRI, and this is on cooperative nuclear safety research. Research and Epri recognized mutual benefits of working together on fire research, and developed a fire risk addendum. The Fire Risk Requantification Studies is one of several elements of the fire risk addendum. For example, we also have tests on circuit analysis identified on their addendum.

I wish to remind the Committee that the activities in the Fire Risk Addendum are part of a broader program, a broader fire risk research program. I've spoken to the subcommittee earlier. On September 11th, 2002 we gave you a fairly detailed presentation, programmatic and some discussion on technical.

The purpose of today's presentation is to update the subcommittee on this work. The objectives of this joint program are as follows - to develop and demonstrate state-of-the-art fire risk analysis methods. And it's our intent to accomplish this by consolidating existing research of both the RES and EPRI research programs, to form a limited extension of the state-of-the-art, and then to field test these methods.

WE also intend to identify --

MEMBER WALLIS: What do you mean by field tested?

MR. HYSLOP: Well, I have a slide later, but I was really thinking about the demonstration part. We are demonstrating that these methods are viable to applying those in pilot plant fire risk analysis. I intend to identify those pilot plants later, and talk a little bit more about the demonstration if that's okay.

MEMBER WALLIS: So you're going to show

that the methods can be used.

MR. HYSLOP: Yes.

MEMBER WALLIS: You're not going to validate that what's in them is correct in some way.

MR. HYSLOP: Well, we feel that through this joint program that we've developed methods which are correct.

MEMBER WALLIS: Okay. So the test is to see if you can apply them in a plant.

MR. HYSLOP: To see if they're viable. You know, when you actually get in there and apply a method, have we forgotten something? Is it useable? And we also get feedback from these applications that feeds into the further refinement.

MEMBER POWERS: J.S., I think those are all important things to do, but there's another element that's appeared largely since IPEEE Insights Report came out, and that's the question of are we getting enough, or is there more that we could be getting out of fire risk assessment. And I don't think that's come out of your field test per se, but it may come out of when you look at the results of the field test and you can ask the question are we getting enough, or is there more that would help us. In the sense of what we would like to do in any of these risk assessments is to focus our activities on the areas where we get the biggest bang for the buck.

MR. HYSLOP: Right.

MEMBER POWERS: I mean, does that -- this is really -- I mean you've been very careful saying a limited extension of the state-of-the-art development as we can here, and I know you're doing some significant actual development, but that's not your primary -- but the real question comes down to do we need to take a big step in this field or not, and is that something that I wait for the next program plan, or is that a follow-on for this, or is it part of this?

MR. HYSLOP: Well, one of the icons of this program is to identify areas where we need to do more. That's certainly one activity, so in terms of measuring the value, we're certainly going to try and get -- we're going to be developing risk insights, so we'll try and gain some insights about dominant contributors or significant changes. But as you said, the focus of this program is to extend the state-of-the-art to the extent we can under the guidelines. And this program has really been a result-oriented program to consolidate work and apply --

MEMBER POWERS: I mean, it springs directly from some of the comparisons that were done in the IPEEE Insight, in comparing the various methods that were used. And you can leave here with elementary correlations and say hey, gee, to a significant extent the risk is correlated heavily with the method that the plant developed, and so now can we do a really good job and find out what the reality is. And I'm sure that when you come out of this you'll find gee, this area is not too good, in this area we could do better, and there's some real opportunities over here to do better. I'm really asking is there a point probably following this activity, but at some time when we take back and say do we need to take a quantum -- a major step in this field, or do we just need to hone the things we have?

And one of the things that moves me to ask this question is simply the issue of COMBURN. I use it as an example, not as an issue in itself. COMBURN is our fire progression model that was written when George Apostolakis had a full head of hair and things like that. I mean, a long time ago. And, in fact, it's difficult to run on existing computers because of the computer style it has. It has not tried to keep up with some of the developments that have occurred, NIST and things like that. And, in fact, our relative inability to predict the effects fire have on equipment is limiting to some of our risk assessment technologies here.

I mean, is there a point where we say let's quit fixing COMBURN and write a modern COMBURN, things like that. I mean, is that the sort of thing that comes out of this or follows this?

MR. HYSLOP: Well, we have -- this program has done some work with respect to fire models, initial conditions, heat release rates and things of that nature, and there has been some demonstration or some work.

We have another activity associated with verification and validation that Moni Dey is leading, in the audience. Certainly, the verification and validation effort will identify acceptabilities and limitations of models, and we would expect to develop Lessons Learned from that activity, and then decide where to move forward. I'm not aware that management or anyone has made the decision to make the leap forward at this point, but certainly we would be thinking about --

MEMBER POWERS: Well, they're never going to. I mean, you're going to have to come up and recommend it to him. It's not going to spring whole into their head. I mean, I wouldn't -- that's not really their job, to dream these things up. I think what you're telling me is hang tight.

MR. HYSLOP: Yes.

MEMBER POWERS: You've got these activities going on, and it's the sum of those things that will feed into that decision on your part, not any one thing.

MR. HYSLOP: Correct.

MEMBER POWERS: Okay.

MR. HYSLOP: So the last objective is to transfer the technology. Certainly, EPRI has interest in transferring to the licensees, as does NRC, as does Research. Research also has interest in transferring this technology to NRR, other areas of the agency.

Now I'm going to talk about the participants. EPRI and Research are the primary developers of these methods. So far we've had some informal feedback from NRR up until this point on the methods. EPRI and Research have a whole host of contractors. Sandia is the primary contractor for NRC. Steve Nowlen's leading that activity. Bijan Najafi on the other side of the table here is leading the EPRI activities.

We have two volunteer pilot plants, PWRs - D.C. Cook and Millstone Unit 3, and we have been using their fire risk analyses to demonstrate methods. We have six non-pilot plant participants, and individuals from those pilot plants are providing a review of the methods, or providing review and feedback on the methods.

CHAIRMAN ROSEN: Are they secret?

MR. HYSLOP: What?

CHAIRMAN ROSEN: Are those plants secret?

MR. HYSLOP: No, I just didn't write them down. Bijan, do you want to identify those for us, the non-pilot?

MR. NAJAFI: My name is Bijan Najafi. Exelon is one of them, NMC is the other one. If I can remember all of the --

CHAIRMAN ROSEN: Those aren't plants. Those are --

MR. NAJAFI: No. Basically, these are

the utilities that subscribed to this program, and their objective was that basically they would provide feedback reviewing these procedures or method as we develop them, so in each one of these organizations we identified one or two individuals in different disciplines, in the fire, in the safe-shutdown area, in the human factors areas, and we send these procedures to these individuals for review.

CHAIRMAN ROSEN: Okay. Well, Exelon, NMC. Who's the others?

MR. HYSLOP: Florida Power and Light.

MR. NAJAFI: Florida Power and Light, CANDU Owner's Group, and there's a total of six of them. I don't remember all -- Southern California Edison.

MR. HYSLOP: I can get back to you with that, Steve.

MR. NAJAFI: I can't remember all of them right now.

CHAIRMAN ROSEN: All right.

MR. HYSLOP: Okay. We have further cooperation. There's an independent pilot plant, Diablo Canyon, that has elected to apply these methods and we'll be getting some feedback and insights from them. And we've recently added a BWR to this activity, Nine Mile Point. We expect to get a fuller demonstration of methods and captures on BWR insights.

CHAIRMAN ROSEN: Now if the ACRS were to visit D.C. Cook for instance, say this June, would anybody at the plant know anything about this, or is there -- who is it at D.C. Cook who would know something about it?

MR. NAJAFI: This is Bijan Najafi again. Let me add something about these two first pilots. These two pilots were initially subscribed to this program maybe about a year to two years ago, with the intent to be a full demonstration. And that objective from their side changed since then, and each one of them is involved in this project in more of a limited sense testing individual procedures or tasks, as opposed to a full-blown risk assessment. So I would say that if we have done much more testing and demonstrations at Millstone, they're fully aware of it. I mean, if you go there and ask the right people, they would know. And we have done that significantly less at D.C. Cook. And if you ask some people, or a lot of people may not know at D.C. Cook.

CHAIRMAN ROSEN: Well, give me a name of somebody at D.C. Cook who would know it off-line. We are going to D.C. Cook in June, and I would like to talk to them about what their view of this is.

MR. NAJAFI: I would say that if you were interested in that, the better would be Millstone, because they carry through that a lot more.

CHAIRMAN ROSEN: So if you have D.C. Cook on the slide, you must have somebody there who knows something about it.

MR. NOWLEN: Well, one of the issues with Cook is that the individual who is the manager in charge of the program is no longer with the utility, so there were some management changes there that I'm not sure what the name would be today.

MEMBER SIEBER: So are they still a pilot plant?

MR. NOWLEN: Their participation is essentially done. We got in and did some pilot studies almost a year ago, and that basically ended their participation in the program. They agreed to support us through a certain stage. We made it through that, and they're now no longer involved actively. Officially, they're still a pilot, but actively they're not involved.

MR. NAJAFI: That's correct.

MR. NOWLEN: Yes. Now Millstone has been more recent. We were up there in December, this last December, and did some substantial work, so they're still supporting us a bit more actively on follow-up for demonstration studies.

CHAIRMAN ROSEN: Okay. I was just asking because we were going to be at a plant, and that just seemed like a real opportunity, but since it doesn't seem to resonate, let's go on.

MR. HYSLOP: Okay. I intend to address that a little bit later.

MEMBER SIEBER: In this whole pilot project, how would you character the industry participation, as strong, or adequate, or are you struggling?

MR. NOWLEN: Well, the two pilot plants, and the fact that they had changes in priorities, has presented us with challenges. As Bijan said, our intent originally was to do full PRAs for these two plants. We were going to develop the methods and train the utilities, and they were going to follow through by completing the PRAs for their plants, and we would then learn from what they learned. That we have lost.

Basically, neither of the two original pilots will be following through on their full PRA, so we were basically limited to what we were able to learn from our demonstration studies, which was substantial, but we didn't get quite as far as we hoped. Now we've added Nine Mile Point. That's a very good thing from our view. We believe we're going to get a full pilot. We have Diablo, who are independently -- we gave them early access to the procedures in exchange for feeding us back insights. And we also have the non-pilot participants who have acted as a peer review team, basically.

So overall, we've gotten a lot of really good feedback from industry. I think the peer review in particular has been especially effective. We've gotten some really good comments, people challenging our methods, challenging us to provide a basis that makes sense to them. I think that has all strengthened our procedures tremendously. And even the limited pilots we were able to do, both cases we learned quite a bit, so I think it's been tremendous.

MEMBER SIEBER: Yet you weren't able to complete any of them. Right?

MR. NOWLEN: So far, yes.

MEMBER SIEBER: Is that a --

MR. HYSLOP: Well, we did demonstrate all the methods, so we met that objective. Now if you're talking about --

MEMBER SIEBER: But that's just one objective. Right?

MR. HYSLOP: Yes. Now if you're talking overall risk insights, any risk insights that relied on a full PRA might have been affected. But if you had risk insights on a limited basis, associated with scenarios, then we could still get those.

MEMBER SIEBER: Okay.

MR. HYSLOP: But hopefully, you know, by the more complete demonstration of the upcoming plant and the Diablo, there we would hope to get those other type of risk insights. So I'll move on to the expected use of the products.

EPRI is anticipated or will be developing guidance for risk-informed analyses from this program. This program will provide a basis for review guidance that RES will develop for the NFPA 805-related changes, that is, support the implementation of the risk-informed performance-based rule making. And this program will also support the development of the ANS fire risk standard. And was said in the previous presentation, these methods and insights have been applied to revising the fire protection SDP also, so we're basically addressing all areas of fire risk analysis.

The elements of a fire risk analysis parallel fire protection, defense-in-depth, and Research and EPRI, as Bijan was saying, have provided specialists in all these areas. There's fire data and ignition frequency. There Marty Kazarian is supporting Research, and Francisco Jovoir is supporting EPRI. Fire modeling for the initial conditions, heat resites and things, we have Bijan Najafi and Steve Nowlen. Monty Hess performed a review on some of these activities.

For fire protection systems and features, we have the two previous mentioned. We're also looking at plant response, systems analysis. Alan Kolaczkowski and Rick Enoba are supporting that. For circuit analysis, Frank Wyant is support Research and Dan Funk is supporting EPRI. And for the human reliability analysis, we've had John Forester and Alan K involved.

CHAIRMAN ROSEN: Those all are

interesting to me, all these names, but what are you doing?

MR. HYSLOP: Why am I doing this?

CHAIRMAN ROSEN: No, no. I said what are you doing. You're telling me all the people who are working on it, but what's going on?

MR. HYSLOP: Well, I was telling you these people because I thought you'd be familiar with them, and that might assist you in understanding things, but that was the purpose. I'll move on.

CHAIRMAN ROSEN: No. I'm interested in who's working on it, but I really want to know what it is that they're doing. What is part of their thought process? Is that what you're going to tell me now?

MR. HYSLOP: The next slides will tell you about the advances, and there I'll talk about the individual areas.

CHAIRMAN ROSEN: Okay.

MR. HYSLOP: The purpose of this slide was to say that all fire risk analyses areas are being address in some form or fashion. The demonstration studies, we've talked about that a little bit. These are analyses being performed jointly by NRC and EPRI using case examples from pilot plant fire risk analyses. The purpose is to demonstrate the methods can be implemented successfully in fire risk analysis, and another purpose is the technology transfer that comes about. As I said, we've demonstrated all 18 procedures. And for the initial pilots, we've been doing demonstration studies in place of the full update of the plant PRA.

Now for the advances. Fire frequency is one of the first areas that we're making an advance, and fire condition and fire frequencies, all fires were considered. And now we're limiting the fires considered to those that are potentially challenging. Those are the only ones that were retained for fire frequency. We developed criteria for fire frequency, that is, substantial smoke, flame rising ignition source, multiple extinguishers, keeping all of those.

Judgment is still important in determining whether a fire is challenging or not, because we may keep a hot work fire extinguished by a single fire extinguisher if our judgment tells us that's important.

There are other improvements in fire

frequency. There is an increased implementation of component-based fire frequencies; that is, we're developing frequencies for components instead of parsing them out by fire area that's been done in previous approaches.

We're also applying a two-stage Bayesian analysis. The purpose of the Bayesian is to -- or the first stage is to address plant differences in reporting of fires.

CHAIRMAN ROSEN: Are you going to tell me why that's important, or do I have to assume I know. Why would you do that?

MR. NOWLEN: Well, I think J.S. is trying to point to some of the improvements that we've made in the methods. The past practice has been to use simple frequentist-type statistics, number events, total number of plant years. The Bayesian update allows us to take explicit information, such as plant-to-plant variability in the number of fires that have occurred and fold that into the fire frequency estimates generically. We're using a method developed by Ali Mosleh, University of Maryland, to do that, so I think the idea is that again it's -- Bayesian is the accepted practice in PRA today, and we now have the fire frequencies on a Bayesian footing, if you will.

CHAIRMAN ROSEN: Now I would answer my own question differently. Tell me if you think my answer is correct. Why are you doing this? Well, because we're limiting it to potentially challenging fires, and when we put the number into the significance determination process, it's a number that has more relevance to the importance of the inspection finding.

MR. NOWLEN: True. Yes.

CHAIRMAN ROSEN: Rather than just some frequency, which is based on area in the plant, but it may not have been a challenging fire. It may not have been particularly important.

MR. NOWLEN: Yes. And again, in this area, to go a little deeper, one of the things we're trying to do is address some of the issues that came out of IPEEEs, and this was an area where there were a number of issues.

In general, the generic numbers that have been cited for fire frequency, where as J.S. says, based on all events, just total number of events divided by total number of years. But a number of plants did sort of an ad hoc screening of events. Said, well, we don't think any of these are relevant, so we came up with our own frequency.

You also get in -- you know, we were talking about dependencies this morning. When you start screening out fire events, you have the potential of introducing dependencies that you may or may not pick up later. For example, if you -- one of the cases that we saw in the IPEEEs was elimination of any fire that lasted less than five minutes. Okay. If it was less than five minutes, clearly I don't care. That was the theory, at least.

Well, that says you're automatically including some credit for putting our fires within five minutes, so when you do your suppression analysis you better be self-consistent. So by setting up a very rigorous set of screening rules, criteria that we applied, going through basically a team effort with peer review, reviewing the individual events and saying is this one in or out, or is it somewhere in-between? We don't know, so we leave it as an unknown. And then treating those appropriately with statistical methods, I think overall we have a much more robust feel for what fire frequencies are, and what our uncertainties in fire frequency are.

Plus, by this rigorous treatment we have preserved the independence of our subsequent analysis of fire growth and damage, and suppression. So all --

CHAIRMAN ROSEN: It does better is what you're saying.

MR. NOWLEN: It's much better.

CHAIRMAN ROSEN: Is NRR going to use it, put it in the SDP?

MR. NOWLEN: They are in the --

CHAIRMAN ROSEN: Change the table?

MR. NOWLEN: No, the table that was generated for SDP used the same information source that went into the requantification study. We did a somewhat independent analysis of the data for SDP. We basically recalculated some of the things. Again, SDP is simplification, simplification, simplification, so one of the things that we did was for fire frequency, we regrouped things, and we've broken out for the requantification study, so some of the small bins got combined into one larger bin. So basically, we did a re-analysis of the exact same data set using the same criteria with somewhat simplified grouping approaches.

CHAIRMAN ROSEN: So who's going to use

this?

MR. NOWLEN: Who's going to use which, SDP or --

CHAIRMAN ROSEN: No, the better fire frequency.

MR. NOWLEN: I hope that anyone who is doing a fire PRA from now forward will use these improved methods. That, I think, is clear.

CHAIRMAN ROSEN: Improved frequencies.

MR. NOWLEN: Yes.

CHAIRMAN ROSEN: Because you've sorted the database out better.

MR. NOWLEN: Yes. Yes, we've sorted it out.

CHAIRMAN ROSEN: But not the SDP, because they wouldn't want to be tainted by better data.

MR. NOWLEN: No. The SDP is also using the same approach. Again, they're not identical because of the way we've -- we've simply parsed the data somewhat less detailed for SDP in order to keep things a little bit more simple. But the two approaches are fully consistent. You can trace the SDP groups to specific groups in the requantification study. Actually, if you look in the supporting documentation, there's a map that tells you exactly where each of the requantification bins went.

CHAIRMAN ROSEN: You can send a blizzard of words across a table, but what you're saying is you're not going to use it in SDP for reasons I don't understand.

MR. NOWLEN: No.

CHAIRMAN ROSEN: You went through the effort to do this, why wouldn't you use it?

MR. NOWLEN: We are using it.

CHAIRMAN ROSEN: In SDP, not just in PRAs. Okay. I grant you ought to use it in PRAs, but --

MR. NOWLEN: Well, we are using it in SDP, as well. I mean, again the exact same analysis went into the SDP numbers. It's the same stuff. It's just that they're grouped a little bit differently.

MEMBER SIEBER: It's a different sort.

MR. NOWLEN: Yes. It's a slightly different sort. It's the exact same information. We use the exact same approach to identify potentially challenging fires. It's the same set of events, the exact same set of events has gone into SDP as went into requantification. The analysis procedure is exactly the same.

The only thing we did is we grouped them in little bit larger groups to keep SDP just a little bit simpler, but it is the same stuff.

CHAIRMAN ROSEN: Okay. Now we're going to talk about heat release rate.

MR. HYSLOP: Okay. We've developed distributions for heat release rate. And prior to this, each source had a single heat release rate and a single heat severity factor. So these distributions are based upon available data and experience. There's data on fires and experience from looking at reports in the nuclear industry, as well as outside the nuclear industry, so the result is we have distributions for each major fire ignition source type, whether it be panels, pumps, et cetera. And now we're including the low frequency/high confidence value, so we're capturing those fires which have the potential to produce the most damage in this particular method. And severity factor is tied explicitly to intensity now, so we have a one-to-one -- it's no longer a one-size fits all.

Now as Steve talked about, we're addressing this double kind issue in this particular approach, because now the severity factor doesn't include components of suppression, as it had in the past, and the issue of counting suppression in two separate factors doesn't exist. We've remedied that.

For detection and manual suppression, a common previous approach was to consider the fire brigade response time in your manual suppression credit. There's a new event approach, which characterizes potential paths to detection and suppression, so detection and suppression is quantified on the conditions of the scenario. Now you detect the fire before you suppress it. There's a certain sequence of activities that goes in.

We're doing this analysis using data, and the new approach actually explicitly treats long-duration fire, so in a sense we're also incorporating the effectiveness of past fire brigades. We're not just thinking about time to respond. The events have been screened for inclusion; that is, those events where the plan allowed the fire to burn out, to occupy a long duration intentionally, we don't characterize that as a long duration fire in our database. It just wasn't meant to be that way.

So the duration curves or bend in this case by component or location; that is, a high voltage cabinet is going to have a different duration from a low voltage cabinet, for instance. And also, there are different characteristics of suppression. The main control room has a different characteristic where it's occupied, so we're capturing those in our improved approach detection and manual suppression.

Now for advances in the plant safe-shutdown response model. We find in the IPEEEs that SISBO often wasn't traded as SISBO. And then also there was a --

CHAIRMAN ROSEN: SISBO?

MR. NOWLEN: Self-induced station blackout.

CHAIRMAN ROSEN: Oh, I should have known.

MR. HYSLOP: Okay. And also, there was a simplistic treatment of post fire safe shutdown procedures, so one of the advantages of this particular program is to look at those differences between EOPs and plant safe shutdown procedures and implement those. And there are differences, as you know. There are differences in terms of sometimes plant's safe-shutdown procedures require you to take equipment out of service that EOP might not.

We developed a process for crediting equipment beyond Appendix R. The internal events equipment doesn't always -- the people haven't thought about circuit analysis, and as a result, we have a process for raising the pedigree of internal events equipment so they can be used in fire analyses.

Naturally, as a part of the plant safe-shutdown response model, it incorporates various operations and fire-specific actions, and that's something that's happening here in this program.

We're looking at improvements in human reliability analysis. It's been my experience that fire wasn't necessarily treated directly in human reliability analyses, and we've incorporated a specific treatment in this program, so that's how we've improved it.

I guess the biggest improvements have been in quantitative screening in HRA. And we got three levels of degradation, from no degradation, to some degradation, to a high degradation. And we have credits that are assigned for the different HEPs associated with those categories.

Fire is specifically included in those categories, high temperature, smoke, et cetera, so we've addressed that. Now with respect to detailed human reliability analysis, what we've done is consolidated the guidance inside there.

MEMBER POWERS: Yesterday we had quite a lot of discussion of the ATHEANA approach and their expert elicitations, really some quite interesting work was being done in using expert elicitation to develop distributions on failure likelihoods. But more so, to go beyond that and explain why the distributions varied as they did, and identify key factors. Are you doing that sort of thing on this human reliability work?

MR. NOWLEN: Yes, we're doing some of that. We are supporting the folks working on ATHEANA. For example, as part of one of the recent ones, we sent one of our folks to participate in their expert elicitation, so that extent we have -- there's also been some limited expert elicitation specifically for the fire risk requantification project.

This particular area, though, the

detailed quantification of human reliability, is an area where there's no clear consensus between NRC and industry as to how things should be done. So within the scope of the requantification study, we're not trying to bridge that particular gap.

MEMBER POWERS: You're not leaning forward in the trenches on this one.

MR. NOWLEN: Not for this study. Again, one of the ground rules, if you will, for the EPRI-NRC MOU is that if we don't agree, we maintain our own positions.

MEMBER POWERS: Sure.

MR. NOWLEN: Right. Well, this is an area where very early on, we realized we weren't going to be able to reach agreement independent of all the other things going on. So yes, we chose not to tilt at this particular windmill under this program. So again, as J.S. said, we really focused a lot of our efforts on trying to improve screening methods; how do you incorporate the HRA into your screening results and have reasonable confidence in what you've done, rather than attacking --

MEMBER POWERS: I found what they were able to do from their expert elicitations really remarkable in the sense that in the past in human reliability assessment, somebody would give you a number, and that's what it would be. And you didn't quite know where it came from, but since the numbers were always the same, it didn't sound outlandish. They were giving a distribution, and the mean is still one of those numbers that are always the same, but the fact is that the more extreme percentiles you get a lot of information, and their expert elicitation tells you why. And the examples they show just told you -- clearly they said, here's the things you need to do to go fix that. And these were coming from the guys that had to do the job, so you kind of believed that at least they weren't wrong about needing to fix these kinds of things. They may not be 100 -- anything you need to do. That seems like it would be just extraordinarily good information for the -- especially responding to a fire. If a guy at the plant told you yeah, I can respond to a fire except on a rainy night, in which case I can't get over there because this pathway is flooded or something like that. It's something that would never show up in a mean value, but in the distribution it would show up. And you'd say well, that's probably something we ought to fix. I mean, that sounded like just extraordinarily good information to me on this, but I can understand that that might have to be a completely separate undertaking, because I don't think it's a trivial undertaking.

MR. NAJAFI: I'd like to add a couple of things. This is Bijan Najafi again. When we started on this project, we made some principal ground rules, and one of those ground rules were that our intent is to document the state-of-the-art. And we basically said if we need, let's say in the order of days to advance the state-of-the-art, we would do it. If it's going to take us months to a year to advance the state-of-the-art, we won't do it. That's far beyond.

MEMBER POWERS: Yes, I'm not being critical. I've got my research review hat on here saying what kinds of things do we need to start flagging -- you know, not this year, maybe not even next year, but say five or six years down the line here.

MR. NAJAFI: Okay. But the thought here is that at that time we said that fire HRA, it may be one of those candidates that at least at this point we have to leave alone for a number of reasons. First, there's plenty of argument even within the HRA community. There's no consensus there, so why just bring it into fire.

Number two, is because we felt that at the time it requires a big add-on that we have to put in. The other reason was that we thought that we only need to build a fire HRA approach or added tool, that it's consistent what the PRA community does with their internal event. You don't want to create a whole new rule.

For example, if a plant is using ATHEANA, versus THERP, versus SHARP, versus any other method, you have to give them instructions not for something completely new or new methodology that could potentially be inconsistent with what they do for HRA for an internal event, so we said just leave that alone. But it is -- to add this file that it is my personal opinion that after going through this, I don't believe we are that far as I thought when we started from having the right principle to have a fire HRA.

Now we're not as far as I thought a year or two ago, so we may be able to achieve it with a lot less. We're not going to solve the basic HRA disagreements. We're not going to touch it. That's going to be there. We're going to deal with only the fire layer, and I think we're not that far from it.

MR. HYSLOP: Next slide. I'm not sure how far we are. Circuit analysis. Fire condition and circuit analysis was the limited examination of spurious operations. In the IPEEEs, a single value for spurious operation was used, for example. And through the testing that's been done and the improvements that you've seen that's reflected in the risks, we now look at things in terms of cable features and circuit faults, so the approach in this program is to identify fire-unique failure modes and incorporate them in the plant model to apply that information. So we have done tests. We are -- this is one area where the testing that's occurred over the past several years has really improved what we're going to be able to accomplish.

We've identified or developed cable and circuit selection criteria for the early parts of the fire risk analysis. We're developing quantitative screening based upon cable and circuit conditions, so we are distinguishing between thermoplastic and thermoset cable. We're distinguishing among cable that's armored and not armored. We're looking at those distinctions.

We also have a further refinement that's been proposed in these studies, and that's to look at the number of conductors in a cable, the role of those conductors, and how they play a role in the probability, because the tests that we have so far are for the configurations tests. I think there are a lot of -- seven conductor cables with conductors lying around them.

We're trying to take the state of knowledge further than that to make judgments about other types of cables, other types with different numbers of conductors.

CHAIRMAN ROSEN: Before you get off that one, there was one piece of operating experience that we've had that has been troubling me for some time, and I wondered if you could comment on it; that is, there was a fire at San Onofre, in which fairly significant damage occurred to some switch gear. It was during start-up so it didn't have core damage importance, but what was important to me about it was that it revealed some new fire-unique failure modes. That's the word from your slide; and that was, the propagation of toxic gas was smoke from the burning of certain switch gear components propagated through sneak pathways, you could call it, between cabinets. And ultimately affected some adjacent cabinets, or cabinets remote from the cabinets in which there was the fire. And as I recall, I think were some actuations, as a matter of fact, of some of these remote components.

Is that -- I mean, let me generally -- that was already a specific event, but let me generalize from that to the effects of smoke and toxic gases on equipment. Is that something that anybody is thinking about? We're dealing well, I think, with spurious actuations from associated circuits. I think we're doing about as good a job as one could do in that area. But there are other ways that one could spuriously actuate the components.

MR. NOWLEN: Yes. Let me respond to that one. Specifically to the San Onofre event, that's what we're referring to in our's as the energetic arching fault scenario. And yes, we do have guidance for how to deal with that scenario. And we've actually developed frequency estimates specifically for the energetic arching fault.

CHAIRMAN ROSEN: Is that a high-impedance fault? Is that what --

MR. NOWLEN: No, it's not the same as

what they talk about with a multiple high-impedance fault. This is a -- it usually happens due to an error made during maintenance, actually. What you get is you get an arching fault phase-to-phase or phase-to-ground usually on the back plane of something like a switch gear or large breaker. And that arching fault actually vaporizes conductor. You end up with a copper vapor, so what happened in the San Onofre event, for example, was that there was an initial fault on one of the two main input breakers on a switch gear bank.

The fault on the initial switch gear created this copper plasma, basically, that drifted through the panel and into an adjacent panel where the second main input breaker was, and caused that one to phase-to-phase fault as well. So you ended up with one breaker faulting, causing the second breaker to fault.

It wasn't explicitly a spurious operation because it was a phase-to-phase short that ended up tripping out the source of power to the entire switch gear basically. But yes, we are dealing with that one explicitly. And in fact, we're using San Onofre as the prototypical case for that particular scenario.

The second question was on smoke and other things, the combustion products affecting components. We have provided some guidance on that. Right now the best evidence that we have is that it takes quite a bit of smoke to cause component failures. It's something that happens near the fire source. We have, for example, cases where a fire in one breaker cubicle causes adjacent breaker cubicles to trip out, as well. Or we have another case where there was a switch gear fire. This actually a conventional power plant, not a nuclear plant. But there was a switch gear fire and the products propagated through a connecting bus duct to an adjacent cubicle and tripped that out.

CHAIRMAN ROSEN: So this happens.

MR. NOWLEN: It does happen. Again, we tend to see it very close to the fire. Maanshan is another example where they believe that happened. There was a very large switch gear fire at Maanshan, and there's evidence that some of the subsequent switch gear trips were due to propagation of smoke from the initial fire.

CHAIRMAN ROSEN: Smoke or the copper plasma?

MR. NOWLEN: It's a combination,

actually. You know, you have a combination -- smoke itself is somewhat conductive. It's not a real good conductor, but it is electrically conductive, especially when it gets wet. You can have a lot of acidic products, for example, that once you get them wet, now you can have a pretty good conductor.

Spurious operations, I'm not aware of any cases where we've seen spurious operations as a result of smoke exposure. Definitely, the tripping out of -- especially electrical switching equipment seems to be the biggest problem.

CHAIRMAN ROSEN: Well, it would seem to me then that the modeling -- I'm not talking about advanced modeling. I'm not talking about what we're doing today. We're always trying to do better. Advanced modeling of these highly energetic faults ought to at least have a branch that says what's adjacent to this, and could it -- I mean, if you've got enough separation, if this isn't likely to cause redundant trains to go --

MR. NOWLEN: That's exactly the way our guidance reads, in fact. It's more of a deterministic assessment, if you will, that if you get one of these faults, assume that the neighboring switch gear are going to fail, or the neighboring breakers are going to fail. Don't try and take credit for one breaker cubicle above another surviving. No. So our guidance is it's relatively deterministic in the sense that we say just make the assumption. We don't have models today that will do this kind of thing.

CHAIRMAN ROSEN: We always used to say the plant is trying to tell you something if you'll listen.

MR. NOWLEN: Yes.

CHAIRMAN ROSEN: So this operating experience is useful and should be incorporated in what we're doing.

MR. NOWLEN: Exactly. That's our approach.

MR. HYSLOP: And the SDP -- I'm sorry.

MR. NAJAFI: In fact, our model - its basis - I call it a model. Its basis is exactly that, because there is a dozen of events of that nature in the industry since `79 that they will give you enough information to tell you what that zone of influence as a result of that are.

CHAIRMAN ROSEN: Are those the events of the highly energetic fault?

MR. NAJAFI: Varying range, very small

because they can categorize those as as small as -- that didn't even affect the integrity of the cabinet, so they're basically -- all we call high energy arching fault is a discharge. There are discharges that you don't even break the integrity of the cabinet, so they're as small as that, and there's the San Onofre event that you mentioned. So it goes from there, and then everything between, so there's some that doesn't even open the cabinet. There's some that they open the cabinet, don't cause anything outside. And there's some that they open the cabinet and cause damage within a certain radius. But the model uses exactly what you're talking about, historical evidence.

CHAIRMAN ROSEN: I'm happy to hear that.

MR. HYSLOP: And the SDP captures energetic faults, also. So this is another application of work done in the requantification that's finding its way to other areas.

MR. NOWLEN: Dan mentioned non-simple fire sources and the energetic arching fault is one of those.

MR. HYSLOP: We have some lessons and insights from our fire risk requantification study. We feel that we've resolved many past methods issues through the technical discussions, through the deliberations and debates between the teams. In fact, a consensus has been reached by these technical leads on these issues in all these areas that I'm going to talk about, and I have spoken about.

We have demonstration studies which have led to significant improvements, so that feedback has been valuable to us. We find that documenting these procedures; that is, the developing the methods guidance took more resources than originally estimated. It was a tougher project than we thought. The procedures are highly complex and comprehensive. We have 18 procedures, as I said, and those 18 procedures are reaching 500 pages, so these aren't small procedures.

The main goal, as I said in the beginning, was to consolidate the state-of-the-art, but we pushed the state-of-the-art in several areas. We pushed it in developing these heat release rate distributions. We pushed it in energetic faults. We pushed it in lots of areas.

The procedures do allow flexibility for the user to determine the extent of the state-of-the-art as necessary, so for circuit analysis, for example, there could be various levels of applications. Speaking of circuit analysis, this is an area that could take extensive resources to apply. There's the issue of how many spurious do you assume, and how you factor that in, so this is an important issue.

The technical insights are still under development in this program. You know, we were up at Millstone. We were working with that information, and the insights are still to come.

Status. We've developed technical test procedures for all of these. The peer review is ongoing. This is a peer review by the non-pilot participating plants. And as I said, we've had informal comments from NRR. We've done pilot application and testing of the methodology, limited testing of all procedures at a PWR. This is in Millstone. We've had ongoing use of methodology at Diablo Canyon, and we plan a full testing at the BWR Nine Mile Point that we've recently recruited, and that will occur in this year and next year.

The milestones for the projects are as follows; in June we intend to have a draft report out. This draft report is going to be circulated to the licensees, as I recall. Is that right, Bijan?

MR. NAJAFI: Within the project team.

MR. HYSLOP: Oh, within the project team. Okay. And we're going to have a publication, December `04. Of course, it will be done before then, but we'll put it in publication and get it out. We're planning for -- and right now we're talking about a joint publication. We're working that issue, so that's still being worked.

We have a fire PRA workshop that we're planning, and we're planning this together also, for some time first quarter calendar year `05. And really intend to -- as I told you, the BWR work is going to be ongoing through `04 and `05, and we intend to take a look, see if our methods have changed, see if we need to make a revision to the publication in December `04.

MEMBER POWERS: May I ask you, is your workshop that you're planning for the first quarter of `05, is that something the subcommittee should try to attend?

MR. HYSLOP: I think so, yes. I would suggest. This is going to be a public workshop, and I think it would be a good idea to attend.

MEMBER POWERS: The subcommittee has traditionally found those things to be very useful.

MR. HYSLOP: Now for final remarks, I think that we've developed more comprehensive and accurate methods. Our circuit analysis is certainly more comprehensive than existed before, more accurate methods in heat release rates, detention/suppression across the board. The path forward to providing better information for risk-informed decisions are technology transfer; that is, to get this information out there, get people using it.

It's also going to be the basis for the ANS fire risk standard, as I said before, so certainly we intend to get this information out there, and even getting broader feedback, and working it into the system.

We have a feasibility study for low power and shutdown fire risk analysis which is nearing completion also, so we're working that area, as well.

CHAIRMAN ROSEN: Gosh, you must have heard what we said earlier given your last bullet and rushed out and changed your slide.

MR. HYSLOP: You couldn't be more right.

CHAIRMAN ROSEN: Fire risk and low power shutdown is important, so I'm glad to hear you're doing it.

MR. NOWLEN: But keep in mind that these low power feasibility studies started last November, so we're --

CHAIRMAN ROSEN: So you're claiming to have preceded our -- let me try some bottom-line kind of questions. All of this, presumably, is going to improve the state of practice in fire risk analysis, but it won't do that unless people use it. What do you know about that, whether people will actually take a bite and step back and say okay, we're going to do our fire risk analysis over? Is that going to happen? Maybe this is a question more for --

MR. NOWLEN: It's probably a question more for --

CHAIRMAN ROSEN: Senior Management.

MR. WEERAKKODY: I can try.

CHAIRMAN ROSEN: You want to try that one?

MR. WEERAKKODY: Of course.

CHAIRMAN ROSEN: We're all friends here.

MR. WEERAKKODY: We have first REG Guide 1.174(b) is the risk-informed fire application license amendment under evaluation. And I am beginning to see other effications where even though we have not adopted the 805 or the 805 methods formally, we are inquiring of the licensee what if you came to the risk-informed? Because I see sometimes applications where had the licensees come through the risk-informed, they would have much less questions except -- still, because it has not done anything in a successful way before, there's still a lot of anxiety and apprehension.

And then the other thing is I would say as a section we are preparing to use all of these state-of-the-art. For example --

CHAIRMAN ROSEN: Within the staff.

MR. WEERAKKODY: Within the staff, because we can't wait until it happens. We have section meetings. I would share with the staff that if 20 plants adopted 805, the kind of questions that we would get from the licensee or the inspectors two years from now would be different from the kind of questions that you get now. And, in fact, if you look at the staff wrote -- my next presenter, for example, is a fire PRA expert, and he's such and so.

We are seeing and we are encouraging a trend of risk-informing and risk-informed applications as we go on in every area.

CHAIRMAN ROSEN: Well, that's a good answer for what the staff will do. The staff will use and try to advance the state-of-the-art some more because you guys will be practitioners, as well as regulators. But my concern is that there is -- I'm not sure I see where the exact benefits are to licensees. Maybe you could help me with that.

MR. WEERAKKODY: Yes. I think the staff has to take the lead in a way, in a sense that the licensees, when they have a license amendment, they are apprehensive to try a new thing where they don't know if it could be success or failure, so we have that burden. And, in fact, I would also point out like when we had the first 805 plant, that would be a test for the staff and the licensee.

CHAIRMAN ROSEN: Okay. So you're going to use it with -- you're going to ask the first 805 plant to come in with a new -- using the new methods?

MR. WEERAKKODY: On the 805, the licensees -- any renewal adopts 805 would have to use, in certain circumstance, fire PRA methods that are acceptable. I can't remember the exact word - acceptable to the --

MR. NOWLEN: Authority having

jurisdiction.

MR. WEERAKKODY: So whether it's when our inspectors go out and do our inspections and need some help from the head office, we expect PRA-related questions because the licensee who adopts 805 will have to use some PRA working their implementation.

MR. NOWLEN: Now 805 uses PRA in a somewhat unique way though. You can start into 805 without having a full PRA for your plant, for example. It's not necessary.

CHAIRMAN ROSEN: All right. You can use it in a very limited way.

MR. NOWLEN: Yes.

CHAIRMAN ROSEN: Which is okay. I mean, it's a start.

MR. NOWLEN: And presumably, the same methods and approaches that we've outlined would fit perfectly. They should apply. You're just not doing your full scope PRA. You're doing a more limited look at a particular change analysis, for example.

CHAIRMAN ROSEN: Well, I think there's a possibility that there's some people may try it, but I think -- my advice to the staff would be that they ought to think about ways to move it off the shelf, and what kind of things can you do to encourage people to -- or require people under certain circumstances to use the more advanced fire methods.

MR. HYSLOP: Well, certainly the workshop that we hold is going to get the word out.

CHAIRMAN ROSEN: Well, the word, yeah.

MR. HYSLOP: And the idea is, the word would hopefully encourage people. They would see the benefits.

MR. LEW: This is Dave Lew with Office of Research. We are -- part of this work would be going toward developing standards ultimately, and we have gotten a Commission SRM out there in terms of the phase quality to PRA approach.

CHAIRMAN ROSEN: Right.

MR. LEW: One of the parts of 1.200 will, as the standards get developed, is going to include external, will include low power shutdown, perhaps, and fire. And I think that may be, depending on how we approach that. That's in progress.

CHAIRMAN ROSEN: I think the way that's written is that if you want a risk-informed change, you're a licensee and want a risk-informed change, you've got to comply with the standards that are available. And if this effort, your work is somehow embodied in the new standards, that's kind of a first principle's way to get adopted work utilized, so I think that's a good answer, Dave. All right. Your final remarks are complete?

MR. HYSLOP: Yes.

MR. NOWLEN: Bijan Najafi wanted to make a couple of points from EPRI's view.

CHAIRMAN ROSEN: Please proceed.

MR. NAJAFI: Well, just there is a couple of points that I wanted to add, I mean, a little bit on the background and why EPRI got involved in it, and what we hope to get out of it. And basically, what we see the path forward, because we've asked the same question that you're asking - are we developing something that somebody is going to use? If yes or if no, then what can we do to make -- bring some more confidence to make people use it, because I don't know if you notice the previous presentation, we talked about the complexity of what is being produced. And this is not going to be a small effort. It's going to be a rather big effort and undertaking, as it can be told by the couple of pilots that we had, because it took like a year and a half, two years, and some of them their priorities changed. Still risk is not on the top of the list of a plan. I mean, there is day-to-day plant operation, a million other things that this falls maybe point two or three, do I need a PRA?

Basically, I mean 90s EPRI started developing these fire risk methods. It was documented in the fire PRA guide, and it was used by the industry. Around `97, EPRI developed a program plan for risk-informed fire protection, which had many, many different elements. One of them was the recognition that the methods that were developed at the time would require some kind of upgrade in order to move into basically these risk-informed applications, so we need to do something to -- we need to put a little bit more muscle into it. So we had that in mind, and this opportunity came in, and that's when we felt that th is would be a good opportunity to use as a case to put the muscle behind this technology. And so we entered this effort with that intention, and it's the intention that once this is done, those methodologies are going to be revised; meaning that these are going to be an upgrade or a revision to 5 or the fire PRA guide that EPRI had in early 90s. So this is going to be a revision to that.

The second remark I wanted to make is that we believe that this process worked. I mean, this process of collaboration has been successful in that we have made significant improvements to the method as it existed before we started. And that can be attributed to a very large number of things.

I mean, to me, the most important part of it that could give ourselves the benefit, the opportunity to benefit from the fire research program, both at EPRI and NRC. And also, benefit from the knowledge-base as it exists within the principal investigators and the key individuals, because the past modus operandi was we did something, send it to the researcher at NRR, they reviewed it, they didn't like it or they commented. I mean, everything got RAI'd to death. And I guess the example that I used to use, that we might as well deal with those RAIs before rather than after. Let's deal with it first, and that means that we'll have less maybe at the end. So it helped quite a bit to take whatever research has done, learn what they have done, see whether it has any place in the EPRI method, and offer whatever EPRI has done in terms of testing and whatever, and discuss the merit of each research program. So we have come to understand each other's research programs throughout that process considerably more than we did two years ago. And I think that's one of the biggest lessons learned. And it's spilling into the other things, as much as in the SDP, into the validation of the fire model, so it's just there is some good thing. I mean, it doesn't mean that we agree on everything. We've established a process through which we can document our disagreement and stick with it.

And as an example, you guys say HRA. We probably came closest to triggering that mechanism with HRA, so it was a tough one. But all of that has been a very good learning process. We've had some challenges. Some of those challenges has been as much programmatic. I mean, we've asked over the time what's the precedent? I've asked this question a year, year and a half ago. I mean, the precedent as other fields and areas, I still have a hard time to find that there are other areas in this, outside of fire, that that kind of precedent has been set.

I've always wanted to see who has done something so we can learn. Can we publish a joint report? How far can we go with sharing information?

How far cannot go? What we can do together, what we cannot do, so we're breaking a little bit of ground there. But it's been I think for the better use of all collective knowledge, so that is good.

For us, the path forward is basically -- has a couple of elements to it, that at least we're looking into right now, or we have somewhat started. The first element is that we feel that it's time to start developing and think through applications of these tools and the testing of those applications. That's one way to increase people's confidence, because as I said, these things are not going to be cheap. They're expensive.

In order for people to use it, you have to demonstrate very specific focused applications that why -- does it pay off? What's the cost benefit? Do the math. We've got to do the math. And one example, we know the presentation in about a joint sort of cooperative work that we're discussing with Westinghouse Owner's Group and EPRI - I guess we made a presentation here in November of last year as well, is trying to see how we can risk-inform the fire protection and paralleling comp measures. So, I mean, I think that is critical. That's critical to build not only the confidence in these tools, also to learn where the weaknesses and the strengths are. Because it's easy to ask in a vacuum, in generalities, are we good enough? It depends. So until you look at what the question is, it's hard to say are we good enough, so let's just take one question, one application and assess that are we good enough. So that's one way we're trying to -- the other goes back to the question of confidence that the industry -- many people ask, if I use this method, would NRC buy it?

Well, so we are planning to put this EPRI product and at least report through some formal review process, and we may start on it as early as towards the end of this year, once this is published, or early part of next year. It's in the current plan to submit it for - I mean unless changes - but I think that is critical again, as I said, to improve the industry's confidence before they start using it.

CHAIRMAN ROSEN: It seems like it would be a great topic for your joint workshop in the first quarter of `05, discuss a step forward and how you're going to try and move it.

MR. NAJAFI: Well, the thing is that for us -- to me, one of the ways -- there's a number of things, it's not only one. There's a number of things that you have to do to gain the confidence of the end-user either way, whether it's the regulator or the industry. One of those things is to inform so that from a technical nature, a confidence is built - meaning that even internal event, it took a while until the people used it and they felt comfortable with it, that the technology is defensible, has some merit, and some basis.

One of the principal objectives of that workshop is that, to layout the technical bases and say what we've done, how we've done it, how good it is. So to me, that's more for that purpose, from a technical standpoint, we can gain the end-users confidence that we have done an adequate job. We've done a good job, as much as the state of knowledge can support. And that's the primary objective - how to use it, is it useful for you, is it going to get you bang for the buck. That's a bigger question than for a two or three days workshop. At least, we haven't even drawn up an agenda for it yet, so we don't know.

MR. NOWLEN: Well, there is also a related point there, that there's a certain point at which EPRI and NRC Research have to part ways, and develop their own approaches and decisions. And we have been very careful to observe that line. And in particular, Bijan mentioned applications - what's good enough? We have been very careful as a team to not even attempt to come to joint decisions as to what might be good enough to answer, for example, and NRR circuit question. That's a place where the MOU is clear. You must separate ways. You must each develop your own view of what that is, and debate that through the public forum. So in some senses, we're really looking even beyond the point where this project is finished and we go our separate ways, and NRC is going to have their responsibilities, and EPRI and the utilities are going to go their way. To some extent, we're really outside the scope of this particular effort, so we have to be very careful.

CHAIRMAN ROSEN: I think you're right. It's not a question that I can ask you how the industry is going to use it, but I could -- Sunil answered it anyway of how the staff is going to use it.

MR. NOWLEN: Yes.

CHAIRMAN ROSEN: And I think there's clearly, in the industry, there's clearly a bias against spending money to do things and then not use them.

MR. NOWLEN: Yes. But it's also --

CHAIRMAN ROSEN: Natural pressure exists to put th is into practice.

MR. NOWLEN: Right. And even beyond the question of will they use it, how will they use it - it's questions of is it good enough? Are we doing well enough to resolve manual actions issues.

CHAIRMAN ROSEN: Is it better than what we have, I think is the first question.

MR. NOWLEN: That I think as a team we can say yeah, verily, it's better than what we had.

CHAIRMAN ROSEN: And we're moving ahead with what we have, and using what we have.

MR. NOWLEN: Yes. But when you starting asking is it --

CHAIRMAN ROSEN: I think that's a slam dunk, that it's better than what we're using.

MR. NOWLEN: Right. But when you start asking is it good enough, I think we really, as a team, we have to split ways, because NRC will have their view of whether it's good enough, and industry will have their view. And there's a separate forum for that debate to work itself out - not our project.

MR. WEERAKKODY: Steve, I and J.S. have been talking about this, and what I have indicated to J.S. is that we, NRR, when the public comment period opens up or even before, everything will be informal comments. We want to do a formal review of this document, and then take transparent positions, because what you say is right on the money. The industry should be able to use it without having to guess as to what is acceptable and what is not.

CHAIRMAN ROSEN: Okay. Any other comments by the members? If not, we'll take a break until 2:35. We're actually 10 minutes ahead.

(Whereupon, the proceedings in the above-entitled matter went off the record at 2:20:09 p.m. and went back on the record at 2:37:50 p.m.)

CHAIRMAN ROSEN: Okay. We're back. Acceptance Criteria for Operator Manual Actions Rulemaking. Sunil.

MR. WEERAKKODY: Yes. I wanted to say a couple of words before Dr. Gallucci started the presentation. Manual actions rule making, as you know, the last time -- after we had a meeting with the Subcommittee the last time, in September of last year was when the Commissioners approved or gave us the go-ahead for the rule making. Since then, we have taken a number of steps, had a couple of public meetings. We have put out interim acceptance criteria on this rule making. And unlike the other two topics, the SDP or the associated circuits, rather than at the completion stage, we are briefing you at a stage where a number issues, questions asked have been discussed, so we will answer whatever questions you have, but we may not be able to answer all questions today, especially if they pertain to some critical issues that are still undergoing discussion.

I remember the last time when we came to the Committee, one of your areas of interest was the acceptance criteria, and so we spent some time on those. Having said that, Ray, go ahead and start the presentation. Should I go to the next slide?

DR. GALLUCCI: You can just leave it there for a minute. It's nice to, after all these controversial fire protection topics, to have something that's fairly innocuous. Okay. That's me. I work Sunil. I'm in NRR. I am a PSA person who dabbles in fire.

Brief history, 10 CFR Part 50, Appendix R, Paragraph R, Paragraph III.G.2 provides three acceptable methods to protect at least one shutdown train during a fire, when all the redundant trains are located in the same area. There's (a) the three-hour passive fire barrier, and (b) and (c) which require that you have fire detection and automatic suppression in the area where the fire occurs. (B) Twenty-foot separation with no intervening combustibles, and (C) A one-hour passive fire barrier, so this is the current 10 CFR Appendix R, Paragraph III.G.2.

Starting in 2000, the Reactor Oversight Process, the SDP process, showed some licensees were crediting unapproved manual operator manual actions for III.G.2 compliance. Things happened between 2000 and 2003, but as far as the acceptance criteria go, the next major milestone was March, 2003 when NRC issued the inspection criteria for fire protection manual actions as part of the inspection guidance.

Last June, the NRC issued SECY 03-0100. That was the rule making plan on post fire operator manual actions. The Commission issued an SRM in September of last year, which approved the staff's recommendation to proceed with rule making to revise the fire protection program requirements contained in Appendix R of 10 CFR Part 50, and the associated guidance.

Following several public meetings last fall and the presentation to the subcommittee here, NRC issued what was titled "Post-Fire Safe Shutdown: Criteria for Determining Feasibility of Manual Actions." That was put in the "Federal Register" in November, extended public comment period ran to the end of January.

In this, the proposed acceptance criteria for what were termed "feasible" and included implicitly the concept of reliable operator manual actions during an interim enforcement discretion period, so the sole purpose of this "Federal Register" notice was to put forth the criteria for the interim enforcement period, with the understanding that these criteria would hopefully roll over into the final rule making without too much change.

MEMBER SIEBER: Question. The staff had issued exemptions to certain licensees for manual action under III.G.2 in the past. Right?

MR. WEERAKKODY: That's correct, yes.

MEMBER SIEBER: Okay. So you had the combination of either full compliance, some exemptions, or people claiming credit for manual action without the benefit of an exemption or staff review.

MR. WEERAKKODY: That's correct.

MEMBER SIEBER: Those are the three areas. How will a rule making affect each of these areas?

MR. WEERAKKODY: You mentioned three areas. You mentioned the area where we already have approved, or the licensee has come to us with exemption requests, which we have approved.

CHAIRMAN ROSEN: Right.

MR. WEERAKKODY: And then the second part is where licensees assume that they were in compliance, but later, a few years ago found out that according to the agency position, they are not.

CHAIRMAN ROSEN: Okay.

MR. WEERAKKODY: And then the third category is what?

CHAIRMAN ROSEN: The ones that are in full compliance without taking credit for operator action, which are probably no plants. Right?

MR. WEERAKKODY: I don't know in that category.

CHAIRMAN ROSEN: Okay.

MR. WEERAKKODY: Our current thinking is -- what we are focusing on is for the plants that are out there that have not received exemptions for us, because even if you go back to the earliest base, I don't know the exact time frame. The manual actions that we had approved, there's a nexus of one or two, or three, four, five criteria of the acceptability. Even though they were not broken down like the 12 criteria in our inspection guidance, the objective was that you should have criteria -- you should have manual actions that allows you to safely shutdown the plant. So as time in turn, it was broken down to five, and then I think in the inspection report like 12. And right now we have about 10 criteria.

MEMBER SIEBER: Okay. Now the existence when you do the rule making of criteria, will that invalidate previous exemptions that you've --

MR. WEERAKKODY: No, they will not. What will happen is -- in fact, this goes on now because the -- even the rule making happens, the inspections still continue. And as a result, if an inspector goes out today, and once in a while they do find manual actions which the licensee thought was feasible or acceptable, but the inspector goes in and then they find out that because of the time, or the training, or the procedure, or some inadequacy that in the inspector's opinion that they are not acceptable --

MEMBER SIEBER: Right.

MR. WEERAKKODY: -- then that becomes a finding, and then it's going to be dealt with that way. So that would be the way, rather than going in and saying to licensees even though we approved your actions, now you have to meet this new criteria. That's correct.

MEMBER SIEBER: So that will not happen.

MR. WEERAKKODY: That will not happen. No, sir.

MEMBER SIEBER: Thank you.

DR. GALLUCCI: Okay. Let's move on to the criteria. Okay. Regarding the acceptance criteria, I mentioned there is a 60-day period for public comments. Since then, the proposed acceptance criteria have been revised. I'll get into the criteria in a minute.

The results of the comments - the public, that is the non-industry comments were exclusively negative toward the rule making. No one liked it. The industry comments felt the rule making was too restrictive. We weren't going far enough.

As far as the criteria themselves, there was a limited amount of substantive comments on the criteria. Most of the comments are on the rule making.

CHAIRMAN ROSEN: I don't understand the difference.

DR. GALLUCCI: The criteria are the means by which you determine if the operator manual actions are feasible and acceptable.

MEMBER SIEBER: Is acceptable, right.

DR. GALLUCCI: The rule making is whether or not operator manual actions should even be allowed under III.G.2 without exemption.

CHAIRMAN ROSEN: Well, no one or few people commented on the criteria themselves.

DR. GALLUCCI: There was limited -- NEI did send it some word-for-word changes on the criteria, but there wasn't --

CHAIRMAN ROSEN: So by and large, if we're going to have criteria, those are the ones that you're going to talk about are probably close to being what you will brief.

DR. GALLUCCI: Yes.

CHAIRMAN ROSEN: I'm trying to make sure I understood what you said, was that the questions were about whether we should allow manual actions at all.

DR. GALLUCCI: Yes.

CHAIRMAN ROSEN: In other words, on the rule making.

DR. GALLUCCI: Those what were the comments, most of the comments that came in were on the rule making itself. The "Federal Register" notice was intended to elicit comments on the criteria. They elicited a few but not a lot. Most of the comments were on the rule making itself.

CHAIRMAN ROSEN: On the process of the rule making, or the --

DR. GALLUCCI: Whether or not there should even be one.

CHAIRMAN ROSEN: The fact of the rule making. I mean, the processes in 10 CFR, how to make rules.

DR. GALLUCCI: Right. The question is whether there should even be -- public comments for whether there should even be a rule making.

CHAIRMAN ROSEN: And the Commission is empowered to make rules.

MEMBER SIEBER: Yes, but isn't that sort of a moot point, because if you continue to issue exemptions, that's the same as having a rule with a set of criteria, provided the exemptions also meet the same criteria. It's just a matter of how you do the paperwork. Right?

MR. WEERAKKODY: Exactly, yes.

MEMBER SIEBER: Okay.

CHAIRMAN ROSEN: Now there was no, I don't think, any challenge to the Commission's right to make rules, was there?

MR. WEERAKKODY: No, there was no such challenge. It was --

CHAIRMAN ROSEN: That's the whole foundation of a regulatory agency.

MR. WEERAKKODY: No, there was no challenge to the Commission's right to make the rules. But like Ray says, it was more whether there should be a rule making that allows manual actions in lieu of the other options.

CHAIRMAN ROSEN: All right.

DR. GALLUCCI: Okay. Next slide. Definition of operator manual actions. They are the manipulation of components and equipment typically at their location outside the main control room to achieve and maintain post-fire safe shutdown.

CHAIRMAN ROSEN: As opposed to operator actions.

DR. GALLUCCI: As opposed to what we call -- if you look at NUREG 17.78, you will see "Operator Actions". The main difference is outside the control room.

CHAIRMAN ROSEN: All right. Operator actions are things done inside the main control room.

DR. GALLUCCI: Correct.

MEMBER SIEBER: Right.

CHAIRMAN ROSEN: Operator manual actions are things done by operators outside the --

DR. GALLUCCI: At the locations of the equipment or at the emergency control stations, whatever. It's outside the control room.

CHAIRMAN ROSEN: Or at the auxiliary shutdown panel?

DR. GALLUCCI: Correct.

MEMBER SIEBER: Or resetting a breaker, or something like that.

DR. GALLUCCI: Yes. As soon as you leave the control room, you're in the realm of operator manual actions.

MEMBER SIEBER: Yes. Or manually operating a motor-operated valve.

DR. GALLUCCI: Correct.

CHAIRMAN ROSEN: How about taking an action to energize a component by pressing a button or a switch outside the control room, is that a manual action?

DR. GALLUCCI: Yes.

MEMBER SIEBER: Manual, right.

CHAIRMAN ROSEN: Okay.

DR. GALLUCCI: It's a very simple one.

CHAIRMAN ROSEN: Yes.

DR. GALLUCCI: So I mean, these can be anywhere from very simple things, or take a step outside the -- take a few steps outside the control room to --

CHAIRMAN ROSEN: To a panel that you know is there.

DR. GALLUCCI: Right.

CHAIRMAN ROSEN: And press a button.

DR. GALLUCCI: Those are typically the type that you would see under III.G.1, where it says the actions are taken in the control room or at an emergency control station. That's the type of manual action you would typically expect under

III.G.1.

CHAIRMAN ROSEN: Or going down to an auxiliary shutdown panel in the auxiliary control room --

DR. GALLUCCI: Correct.

CHAIRMAN ROSEN: -- to a control board where there are buttons and switches that the operator is trained on, and executes a procedure for that area. That's still an operator manual action. Right?

DR. GALLUCCI: Correct.

CHAIRMAN ROSEN: Although its character is very much like the control room. He's in a confined space where the environment is controlled, and he's got -- he's not doing anything other than manipulating switches or dials and he's in the control room. And he's following a procedure that's just like -- I mean, it's a different procedure, but it's just like the procedures he uses in the control room. Right?

DR. GALLUCCI: Presuming that there is no problem from any fire effects that might have impeded his access to this --

CHAIRMAN ROSEN: Yeah, that he can get to.

DR. GALLUCCI: In comparing those two situations, it's basically how do I -- getting there and taking action in that location, and being able to report back to the control room that the -- or somehow verifying that the action has been taken.

CHAIRMAN ROSEN: Okay.

DR. GALLUCCI: Since the rule making is focused on III.G.2, as for two of the current III.G.2 options, if you'll recall a couple of slides ago, there were three compliance options for III.G.2; the three-hour fire barrier, and then the two that required that you have fire detection/automatic suppression. Operator manual actions will require that fire detection and automatic fire suppression be installed in the area where the fire occurs, not in the area where you take the manual actions, but in the area where the fire occurs. This way, operator manual actions under III.G.2 are essentially parallel with the one-hour fire barrier or the 20-foot separation with no combustibles-types of compliance options.

CHAIRMAN ROSEN: I see that there's a parallelism that you've constructed there, but it's not obvious to me why. Well, surely fire detection and automatic suppression might put the fire out before the operator ever takes the action. We heard earlier today, for instance, that automatic fire suppression, especially with water is 98 percent effective.

DR. GALLUCCI: Then the operator manual action would probably prove to be moot in that case.

CHAIRMAN ROSEN: That's right.

DR. GALLUCCI: But like I said, it's --

CHAIRMAN ROSEN: More than 2 percent of the time it will be moot.

MEMBER SIEBER: And that's similar to the fact that if detection and suppression is effective, you really didn't need the 20 feet of separation and the one-hour barrier, so it's --

DR. GALLUCCI: Right.

MEMBER SIEBER: The analogy is correct, I think.

MR. WEERAKKODY: And then one other thing.

DR. GALLUCCI: It's a level of defense-in-depth that is maintained to be consistent with the other parts of III.G.2.

MEMBER SIEBER: That's right.

MR. WEERAKKODY: Now this is a sequence in the comment we had some discussions on. One of the things that we need to consider here is since the criteria, after everything is agreed upon and the rule making goes forward and gets finalized, the licensees will be looking at the criteria and making a determination as to whether the manual actions are acceptable are not, rather than staff.

MEMBER SIEBER: Well, the staff will do it after the fact.

MR. WEERAKKODY: Yes. After the fact, there will be inspections.

MEMBER SIEBER: When the inspector shifts the burden.

CHAIRMAN ROSEN: When the inspector shifts the burden, I think is your point.

MR. WEERAKKODY: Yes. He shifts the burden, but the point I was getting to is that there may be a situation where you have a manual action, that does not necessarily meet this bullet. In that case, we are not saying it cannot be done, but then it would have to come from --

MEMBER SIEBER: Then you have the exemption.

MR. WEERAKKODY: Exactly, because if it's -- to not have that criteria as something out there for the licensees to use, we wanted to be a bit conservative there.

CHAIRMAN ROSEN: So now, presumably, there are a class of manual actions for which some of these licensees have taken credit, where they simply looked at the traditional feasibility questions; access, training, procedures, that sort of things, lighting and avoidance of toxicity, or radiation, all the things that we typically -- I'm sure are in your criteria, but they didn't think about fire detection and automatic fire suppression. So there's a bunch of manual actions that given this second bullet will not pass your criteria. Is that your view?

MR. WEERAKKODY: Not necessarily, because if you think of even the very simple criteria in the ROP and read them - I don't have them in front of me - you're supposed to -- your action, the reliance is supposed to be -- you could have the training and the procedures, that needs to make sure that the manual action that you learned can work. So if in an inspector goes in and they see a manual action, of course, it's all within their right to ask how are you -- if you get this fire, how is this going to happen? So they can have a series of questions to make sure that the critical manual action is --

CHAIRMAN ROSEN: I don't think we're disagreeing, Sunil. I'm saying under those circumstances, the licensees who have taken credit for manual actions may have pretty good answers for yes, it's proceduralized, and yes, they're trained in it, and yes, we believe that can get access to this because maybe it's not too far from the control room, and not combustibles in the pathway or something like that. And there's unlikely to be a high-radiation environment. I mean, they can give you a good series of answers and justify it, but you can postulate a fire in an area that doesn't have fire detection and automatic suppression, to which that manual action would have applied. And so, the manual action under the new criteria would not pass your screening.

DR. GALLUCCI: It would require -- if it was one that is in the unapproved bin currently, it would have been any manual action taken under III.G.2 without an exemption was cited as at least green, if it was deemed to be feasible, greater-than-green in the ROP if it was deemed not to be feasible. In either case, it went into the corrective action program. The greater-than-greens go into something called the "Action Matrix", and get higher attention.

CHAIRMAN ROSEN: Well, let's not get confused by talking about not feasible. Let's just stick with the feasible ones, but not in response to areas, fires in areas where there's automatic detection and automatic suppression.

DR. GALLUCCI: Okay. So some have been greened, and I assume some have been greened in areas where there was not fire detection or suppression.

CHAIRMAN ROSEN: And those would change color by this criteria.

DR. GALLUCCI: I don't know if they change color, but what they would do is they would not be approvable under these criteria. They would have to be -- they would require exemptions.

CHAIRMAN ROSEN: Or fixing, so in a modification or --

MEMBER SIEBER: Detection and suppression --

DR. GALLUCCI: Well, you could always do one or the other options that are currently in III.G.2, or you could credit in a different manual action, or put in detection and suppression, so there will be options. But no, those would not pass muster.

CHAIRMAN ROSEN: Okay. That's what I was trying to --

DR. GALLUCCI: And these are different from the grandfathered ones that received exemptions in the past.

CHAIRMAN ROSEN: Yes. No, I'm not talking about the ones that are exempt.

DR. GALLUCCI: Right.

CHAIRMAN ROSEN: For whatever reasons we exempt it, going back and un-exempting them --

DR. GALLUCCI: Right.

MEMBER SIEBER: Well, you can't do that. You told us that you weren't going to do that.

DR. GALLUCCI: Not the ones that are exempted, but ones that were -- since 2000, there's a batch that -- any operator manual action that has been credited under III.G.2 since 2000 without an exemption, is a violation.

MEMBER SIEBER: Well, this rule making -
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DR. GALLUCCI: This rule making will enable the --

MEMBER SIEBER: It's an amnesty program.

DR. GALLUCCI: Correct.

MEMBER SIEBER: But it only forgives the ones that otherwise would have been green.

DR. GALLUCCI: Pretty much.

MEMBER SIEBER: Okay.

DR. GALLUCCI: But the thing is, those other ones were green under a less stringent set of criteria. It's not finalized yet, but as part of interim enforcement discretion, the licensees will be expected to review all the violative operator manual actions, and determine whether they meet these new criteria. And then they will have -- if they deem that they don't prior to the actual rule making, they will have to decide whether they want to file exemptions, if they want to change, if they want to install detection. I mean, it could be because of procedural reasons that they don't meet -- whatever. What is the reason they don't meet these criteria, again that's not final, but that's sort of the understanding for interim enforcement.

CHAIRMAN ROSEN: And the reason you're doing this again is just by analogy?

DR. GALLUCCI: No, it's to maintain defense-in-depth. Even if you look under III.G.3, where operator manual actions have always been allowed, you require fire detection and fixed suppression, which for all practical purposes is very similar to automatic suppression.

MEMBER SIEBER: Right.

DR. GALLUCCI: So it's analogy, but it's also consistency, and it also is maintaining a level of defense-in-depth that we feel that although operator manual actions are adequate for maintaining public health and safety, they are more analogous to the one-hour fire barrier and the 20-foot separation, than the three-hour fire barrier. The three-hour fire barrier does not require detection or suppression, but the one and the 20-foot separation do, so we're putting operator manual actions in that class. And that class has that extra level of defense-in-depth.

CHAIRMAN ROSEN: Okay.

MEMBER SIEBER: Okay.

DR. GALLUCCI: Okay. We'll get into the actual criteria. Okay. Major comments from the subcommittee last September was about feasibility and reliability.

The new criteria address both feasibility, can it be done, can the operator manual action be done, and the reliability, which is how well can it be done? Can it be done repeatedly with high confidence that it will be successful?

CHAIRMAN ROSEN: By different operators.

DR. GALLUCCI: Correct. We're establishing feasibility mainly by the criterion called "Demonstration." It used to be termed "Validation and Verification" or something. It's now been reworded, "Demonstration."

MEMBER SIEBER: Good.

DR. GALLUCCI: "The required operator manual actions shall be demonstrated through time-authenticated walk-downs utilizing a randomly selected crew and equipment required to perform the actions during a fire. Documentation of the demonstration, as well as periodic operator training, shall be provided."

CHAIRMAN ROSEN: Well, that's pretty good except for the fact that you're not going to have smoke environments and radiation.

DR. GALLUCCI: That's correct.

CHAIRMAN ROSEN: You're not going to impose that.

DR. GALLUCCI: That's why this is only feasibility, and the next criterion will address that.

CHAIRMAN ROSEN: Oh, okay.

DR. GALLUCCI: Go on to the next one. This used to be called "Complexity in Number." This was present in the "Federal Register" notice. It was the criterion that ensured reliability, but the word "reliability" never popped up in the "Federal Register" notice, but the concept was there. We now call it "Time Margin."

"The analysis must contain a postulated fire time line assuming sufficient time to travel to action locations and perform actions required to achieve and maintain the plant in a hot-shutdown condition. The fire time line shall extend from the time of initial fire detection, called the "Time Zero", until the time when the ability to achieve and maintain hot-shutdown is reached, and include a time margin that accounts for all variables, including (a) differences between the demonstrated and actual conditions; and (b), human performance uncertainties that may be encountered."

So if the demonstration cannot simulate all the fire conditions, and in an attempt to simulate that and to factor that into whether these criteria, whether the operator manual action will be reliable, the time margin concept will impose sort of the idea of the safety margin. So if the crew was able to demonstrate this in 10 minutes without the fire conditions being there, just how much more time would we expect them to need if there were fire conditions, another five minutes, another ten, another twenty? And that would be the type of concept that goes into the time margin.

We also recognize that the demonstration will be done with only one randomly selected crew, and any of five or six crews could be the one performing the actual action during a fire, so we also want to account -- so the demonstrator crew again did it in 10 minutes. Does that mean Crew B would also do it in 10? No, they could be faster, but we have to account for the worst possible crew performance. And that's the second part here, the "Human Performance Uncertainties."

And naturally, the trick - and we'll talk about this a little bit more - is how do you set the time margin. But as far as the --

CHAIRMAN ROSEN: And the uncertainties.

DR. GALLUCCI: Well, the time margin is -- yes, the time margin is to account for the uncertainties.

CHAIRMAN ROSEN: That takes care of both

A and B.

DR. GALLUCCI: Yes. But for now, the important thing is the criterion is the one that establishes that a reliability concept has to be met. So the demonstration establishes feasibility. Time margin establishes reliability. And the next slide.

Many criteria support both the feasibility and the reliability of the manual actions. These are the familiar criterion from the March inspection, and earlier exemptions that deal with available indications, the environmental considerations, smoke, toxic gas, heat, et cetera. Included in there is accessibility, can you get there, can you get back from there, can you perform the action in the location where required, the staffing and the training, communications capability while you're taking the action, the status of equipment dealing with both the portable equipment. Typically, they're called tools. They might be the ladders, the infamous SCBA, keys, whatever. And the plant, what we call plant equipment, the installed or fixed equipment, such as valves. And that concern arises out of Information Notice 92-18, where it was possible for a spurious actuation of an

MOV to over-torque the valve stem, and then when it was necessary for the operator to go and turn that stem, it was physically damaged, and he could not do that. So we have included that criterion under equipment, so that's the type of concept where we talk about valves. But it would include things, if you had to go pull a breaker and for some reason you got there, the breaker wouldn't come out. So if you want to credit those manual actions, we would expect that you would have some sort of inspection or surveillance program where this equipment that's important for manual actions, you have some sort of confidence that it will be operable if needed at a specific time. And it can be worked into your normal maintenance surveillance program.

The last item is procedures. Any operator manual actions will have to be included in written procedures.

MEMBER SIEBER: And the tools are pre-staged tools dedicated to this task.

DR. GALLUCCI: They will either be pre-staged at the location themselves, or they'll be something that might be carried.

MEMBER SIEBER: From the control room.

CHAIRMAN ROSEN: Like a flashlight.

DR. GALLUCCI: Flashlight you might carry, a key you might carry. If you needed a ladder for some reason to climb to the top of a panel, maybe the ladder would be in that room.

CHAIRMAN ROSEN: But now if you say credit of a flashlight that's being carried, and you find operators in general are not carrying flashlights, that's --

DR. GALLUCCI: They would fail the feasibility criteria on --

CHAIRMAN ROSEN: That would be a finding of an inspection.

DR. GALLUCCI: Yes.

CHAIRMAN ROSEN: And inspector could --

DR. GALLUCCI: If they credit an operator manual action, and the inspectors found that the flashlights didn't work, or they were lost, or they --

CHAIRMAN ROSEN: They weren't being carried.

DR. GALLUCCI: Yes, operators fail to carry them, then you would say you have a finding, and you go into the ROP.

MEMBER SIEBER: On things like valve wrenches, you could not count on a generic valve wrench being found some place. You would have to have the right valve wrench at the site where you're going to operate the valve.

CHAIRMAN ROSEN: Hanging on a rack right there.

DR. GALLUCCI: If it's conceivable that you're not going to be able to just turn it with your hand, or that you might have Arnold Schwarzenegger as one operator and Caspar Milquetoast as the other, you've got to make sure that Caspar is going to be able to turn this. And if needs that valve wrench, then that valve wrench either has to be carried there, or be accessible at that valve.

MEMBER SIEBER: Yes.

DR. GALLUCCI: Because again, we have to cover all possibilities in the crews. The next slide, which is the last - the path forward. The time margin concept and quantification, et cetera, is being refined to a research facilitated pair of expert elicitations, which includes NRC and NRC contractor human factors analysts, NRC inspectors and human reliability analysts.

We had one elicitation earlier this month. Part II will be early in May. The results will be included in a draft regulatory guide expected towards the end of June. As far as the proposed rule itself, we expect it to be published in the "Federal Register" early next year, and accompanied by a final draft of the regulatory guide, which will not only include the results from the workshops and guidance on time margin, but guidance on all the criteria themselves.

MEMBER SIEBER: So you're expecting the rule making actually to become final in 2006?

DR. GALLUCCI: I'm not --

MEMBER SIEBER: If everything goes well.

DR. GALLUCCI: I will turn to Eileen for this.

MS. McKENNA: This is Eileen McKenna in NRR, in the Policy and Rulemaking Program. Normally, that is kind of the schedule, that between a proposed and a final is something around a year, a little less, we hope. It kind of depends on what kind of comments you get.

MEMBER SIEBER: Right.

MS. McKENNA: But yes, that would be kind of the timetable.

MEMBER SIEBER: Okay. Thank you.

CHAIRMAN ROSEN: That's a mouthful.

MEMBER SIEBER: Thanks very much.

MR. MARION: Alex Marion, NEI. I'm just going to make a couple of comments to try to put an appropriate perspective in terms of background and this rule making process, and the impact.

Fundamentally, when we looked into this back in 2001-2002, the issue very simply came down to NRC's position relative to their expectations of what licensee's should do to seek NRC approval of manual actions, versus NRC practice. The Blackout Rule - I'm sorry - the Backfitting Rule addresses both the development of new NRC regulatory requirements, as well as NRC practice. So we did a little homework and captured the documentation that utilities had to represent NRC approval of manual actions, and that approval was not obtained via an exemption request. Okay?

So it came down to two basic fundamental elements in terms of resolution. One was, how do we deal with the process issue moving forward? And secondly, what do we need to do in moving forward in terms of providing some assurance that manual actions are appropriate, make sense, and indeed focus on safety? And we concluded - when I say "we" - there was an agreement and understanding between the NRC and the industry, but we included feasibility criteria for manual actions may not be a bad thing to do, so at least everyone knew what the acceptance criteria would be moving forward. And we also felt given the sordid history of the treatment of manual actions over the last 25 years, that it made sense to put in place this new concept in a permanent manner. And that suggested the idea of incorporating the acceptance criteria, or providing some language that allows the use of manual actions for all three sections of Appendix R, and put it in rule making. And the idea was that that would be a rather straightforward approach, and we would permanently have the linkage to the acceptability of manual actions. There would be some decision to be made whether the acceptance criteria would be incorporated in the rule, or incorporated in a regulatory guide, so I wanted to set the stage in that regard.

We also agreed at that particular time on what the particular language would be in the rule making. Since that time, there have been additional things brought into the solution, and one of the points was made with regard to the requirement, and this is a new regulatory requirement, and it is a new regulatory position. A requirement for detection and suppression if you're going to take credit for manual action in a particular area. That is clearly a backfitting.

CHAIRMAN ROSEN: Well, it did seem new to me when I saw it the first time. And as you heard me question that, I was surprised by that.

MR. MARION: And the troubling aspect, and I do find it troubling, is the fact that if that provision goes forward in this final rule making, you're going to have exemptions again. So from a regulatory process point of view, we're not fixing anything. Okay. Do you follow? One of the problems we have is --

CHAIRMAN ROSEN: I follow, but I don't think I agree.

MR. MARION: You've got exemptions --

CHAIRMAN ROSEN: You have some requests for exemptions, but you also have some licensees who will fix it by changing the procedure or doing something different.

MEMBER SIEBER: In the third place is you'll have some licensees who comply with the criteria, taking credit for manual action, but never did have an exemption or seek one. And so now their legal problem is solved, so that's a third category, and that's probably the only one that's truly effected.

CHAIRMAN ROSEN: I'm not sure I understand, Jack, what you mean.

MEMBER SIEBER: Well, there are people who have taken credit for manual action where they had detection and suppression, but failed to apply for an exemption under the current rules, and so they're in violation right now of the rules the way they exist.

CHAIRMAN ROSEN: But they wouldn't be in the future.

MEMBER SIEBER: Rule making, that goes away.

CHAIRMAN ROSEN: Yes.

MEMBER SIEBER: Okay. So that's the class of licensees who are helped by this process.

MR. MARION: I would submit, to go back to your example, that it would be difficult to provide the case and document the case where the licensee is in violation of the current regulation, because there's nothing in the current regulation that addresses this. The expectation on the part of the NRC was if you were going to use a manual action, submit an exemption.

MEMBER SIEBER: That's right.

MR. MARION: There's nothing specifically in the regulations. But that expectation was never implemented, if you will, consistently across the industry by NRC or the licensees.

MEMBER SIEBER: If you're doing something different than the rule requires, then you need an exemption.

MR. MARION: So our hope with this rule making process was to put in place something that captured both the expectation of the NRC, as well as the practice. And with the identification of acceptance criteria, we would have a predictable stable process moving forward. And quite frankly, gentlemen, at this particular point, based upon what I heard in the presentation, I doubt very much if that will be achieved. And that's all I have to say. Thank you.

CHAIRMAN ROSEN: Thank you.

MEMBER SIEBER: Before you leave, I need to ask you a question on another matter.

MR. WEERAKKODY: Steve, I'm assuming you're not -- I mean, do you want us to -- I mean, Alex brought up a good point in terms of what he perceived as a new requirement. Is that something that we need to discuss here?

CHAIRMAN ROSEN: If you want. I'm not going --

MR. WEERAKKODY: The one thing I would add is that one of the things that changed from our current practices when you go to the rule making is we are pretty much handing the criteria to the licensees, and we tell them you figure out the feasibility and the acceptability. And with that, shifts the burden in terms of having to be more objective, because like I said, there may be situations where that particular requirement that a particular licensee under a particular situation may not have to meet, but given that we would have the licensees making the determinations rather than what used to be the agency, there was a higher requirement for objectivity. But we recognize industry's significant --

MEMBER SIEBER: I don't fully understand though why there would be a major concern. For example, let's say you don't go ahead with the rule making, licensees are then faced with getting exemptions for manual actions, whether they had detection and suppression or not. If they have it, then they don't have to bother with the exemption, nor does the staff.

On the other hand, if the rule isn't there, the things are the same as they are now. I mean, there's no change, so it just seems to me that rather than considering this a new burden, one would better consider it as a relief for those non-risk trivial incidents where the form of the procedure was not complied with as a way to clean up those cases. So I don't see it as a backfit or a new requirement, because the exemption is still available, the same as it was before.

MR. WEERAKKODY: Yes.

CHAIRMAN ROSEN: I'm not sure though that -- you know, the lawyers at the side, and backfit the questions aside. I'm not sure --

MEMBER SIEBER: You've got to have people that can spell.

CHAIRMAN ROSEN: I'm not sure of its value because we heard -- as I said before, and maybe I don't need to say it again, but if you have fire detection and suppression, you're going to get 98 percent of the cases are not going to require manual action when you're going to put the fire out.

MEMBER SIEBER: That's defense-in-depth, you know. You got 2 percent of the cases where it doesn't work, and the manual action is necessary for a success path.

MR. RADLINSKI: Can I just qualify the statement you just made. I believe --

CHAIRMAN ROSEN: You need to identify yourself.

MR. RADLINSKI: I'm Bob Radlinski. I'm sorry. I'm a Fire Protection Engineer working for Steve.

CHAIRMAN ROSEN: All right.

MR. RADLINSKI: I believe the 98 percent was the probability of actuation.

MEMBER SIEBER: As opposed to putting the fire out.

MR. RADLINSKI: Not necessarily suppression of a fire.

MEMBER SIEBER: That's true.

CHAIRMAN ROSEN: So once you're pouring water on it, the question is will the fire go out.

MEMBER SIEBER: Right.

CHAIRMAN ROSEN: It tends to go out, but it depends how big the fire is, I guess.

MEMBER SIEBER: Defense-in-depth is

defense-in-depth.

CHAIRMAN ROSEN: I mean, I'm an old plant guy, and they used to teach us to put the wet stuff on the red stuff. It puts fires out.

MEMBER SIEBER: Well, it's very effective. I was in a fire drill and they said put the fire out, and I did, and they couldn't get it started for the next class.

MR. WEERAKKODY: And one other thing we struggled with is when you go to III.G.2 and look at the column "Criteria" there, where you have a three hour passive barrier, that doesn't require suppression and detection. But in the other two, you do require a one-hour and then a 20-foot separation, so from a staff point of view, we look at some --

CHAIRMAN ROSEN: So if you take a purely deterministic view of the situation requiring fire detection and suppression might be necessary, because there's 2 percent of the cases or maybe a few more, you put the wet stuff on the red stuff, but the fire still doesn't go out, so you can't say deterministically that it's a solution because there's always a few percent that it may work. But if you take a risk-informed point of view on this thing, most of the fires will go out if you do that.

MR. WEERAKKODY: That's why I say --

CHAIRMAN ROSEN: You wouldn't need to do anything manually.

MR. WEERAKKODY: Yes. There may be circumstances where the necessity to have that requirement may be a moot point. The counterpoint there is that it's no longer the amendment process or the exemption process. It's a matter of a licensee going through the criteria and making a determination whether the manual action is acceptable. And this is why I said it at the beginning, there's a couple of very challenging issues in front of where we are -- for example, Alex also mentioned the potential expansion to the other than just III.G.2, III.G.1, and also III.G.3. So we have received very significant comments, and we are looking at all of that.

DR. GALLUCCI: This is Ray Gallucci again, and I just ask a question. If one were to advocate not having detection suppression for operator manual actions under III.G.2, then what justification is there for having them under the other two options? If you have it one of the other two options, wouldn't you have to remove them from all three?

CHAIRMAN ROSEN: There's an inconsistency there.

MEMBER SIEBER: Well, let me ask this question. You may not be able to answer it, and if you don't feel comfortable answering it, just tell me. Let's say the rule making goes through. Okay? And so now you have the requirement in the rule making that you don't need an exemption if you have automatic detection and suppression.

Now here's Licensee A, and he says, or she says I really don't want to install detection and suppression because I don't think it would be effective in this particular area, and I don't have a source of fire water and all kinds of excuses. And so that licensee decides they need an exemption. They come to the staff and say I need an exemption for this manual action, but I don't meet these criteria. Would the staff reviewer say well, these are the criteria under which I'll give you the exemption, and then cite the requirements of the rule, or is it going to be something different than that? In effect, what I'm asking is will the exemption process rules conform itself to the official rule making, such that exemptions will no longer be granted?

MR. WEERAKKODY: Well, you said I don't have an answer but let me try anyway.

MEMBER SIEBER: You don't have to answer it, but I would -- if you have an answer, I'd like to hear it.

MR. WEERAKKODY: I think in a way it's a hypothetical question, but also when you walk down different plants, you may have one plant where a particular fire area could be a whole aux building. And you may have a different plant, your fire area could be in auxiliary feedwater pump room.

MEMBER SIEBER: Yes, sections of it.

MR. WEERAKKODY: Exactly. So when you look at a requirement like detection and suppression, depending on where you apply it to, when you get down to some of the other details like the fire growth and propagation, there may be a big difference. But there could be situations where we would say you don't meet this, and therefore no --

MEMBER SIEBER: Yeah. Where you have some difficulties, for example, in an aux building where you have all your high-end safety injection pumps in that building, and they may be separated by cubicles. On the other hand, they have to run all the time, and they particularly run during any kind of an accident, but the ventilation systems are all tied together one way or another. And you can put dampers in that have a fire rating, but if you close the damper, you ruin the pump. So you're sort of in a hard place when you get to situations like that.

CHAIRMAN ROSEN: Okay.

MEMBER SIEBER: And a lot of plants are built like that, or some 50 of them or so.

CHAIRMAN ROSEN: Right.

MR. GUNTER: I'd like to have the opportunity to ask a clarifying question at the appropriate time.

MEMBER SIEBER: That's up to the chairman.

CHAIRMAN ROSEN: We have another subject, and I'm a little bit worried about getting done before 4:00. How much time do you need, Mr. Radlinski?

MR. RADLINSKI: Not a lot. It should be very short.

CHAIRMAN ROSEN: Let me ask you to hold that and let's get done with 805, and then we'll --

MR. GUNTER: Fine.

MR. RADLINSKI: Okay. As I said, my

name is Bob Radlinski. I'm a Fire Protection Engineer working for Sunil. I'm a new face here. I've been with Sunil for about four months. And as a matter of fact, I am sitting in for Paul Lain today to give this report. Paul had other pressing matters, and also Joe Birmingham, who was not able to attend, as well.

This is a status update. There was a detailed presentation given back in early December on all the ramifications and details of the 805 rule making process, so I'm just going to report on the current status. Just a brief summary of the components of the 805 rule making.

Of course, the first is the change to the rule, and as Suzie mentioned earlier, that rule has gone to the Commission, so that's a major milestone for that. Another component is the NEI Implementation Guide, which is currently at Revision E, and is currently in-house here with the NRC and with various other stakeholders for review and comment. A third component is a planned new regulatory guide, and the plan for that is that it will essentially endorse the NEI Implementation Guide.

In addition, there will be inspection

guidance prepared for the inspectors in the regions to inspect once the plant has adopted 805 and made the transition to a new licensing basis based on 805, and inspector training that will be conducted by the headquarters staff. And other miscellaneous tools and methods associated with this program include license amendment review guidance, that would be for headquarters to review a license amendment request, fire risk requantification study which was already reported on, and validation and verification of fire models that would be considered acceptable to the NRC. Next slide.

With respect to the NEI Implementation Guide, if you're not familiar with it the title is "Guidance for Implementing a Risk-Informed Performance-Based Fire Protection Program under 10 CFR 50.48(c)." As I mentioned before, we are currently looking at Revision E. NEI is waiting for our comments before they proceed with revising and updating that. Hopefully, we are getting very close to reaching a final version of that, that's acceptable to all parties involved.

There will be a public meeting here at headquarters on April 30th to go over those comments, discuss them with NEI. We also are planning a non-public meeting the day before with NEI to go over some of our major comments.

Best case scenario as far as the schedule is that the final issue of the document can be done -- can be produced by the end of this May, and that assumes that, of course, we have no major sticking points and that the approval process goes through without a hitch.

During the presentation or following the presentation in December, the ACRS made a specific comment that they would hope that the guidance document would not create any unnecessary barriers to the use of NFPA 805, and we fully intend to comply with that as we proceed forward. Next slide.

Regulatory guide, as I mentioned before, the plan is that the guide will simply endorse the NEI implementation guide. This is similar to Reg Guide 1.160, which endorses the NEI guidance for implementation of the maintenance rule, so we'll follow a similar process there.

This is, of course, dependent on the acceptability of the NEI guide. And if agreement on the guide can be achieved in the near term, then the first draft of the Reg Guide should be out in June of this year, so we're moving right along with that effort.

Inspection guidance, we will revise -- make any necessary revisions to inspections, procedures to address the inspections of the plants that have adopted 805, and we plan to conduct workshops for the inspectors to provide training and inspection guidance documents in addition to the revisions to the procedures will also be prepared for the inspectors. I don't know if you want to talk about the details of that, but we have some tentative thoughts about what to base that guidance on. There's an SFPE text called "The Introduction to Performance-Based Fire Safety", and there's also an SFPE training course that was done for FEMA. We plan to use the course materials from that as a basis for providing guidance.

CHAIRMAN ROSEN: This is a risk-informed guidance for FEMA, fire protection for FEMA? Is that what you're saying?

MR. RADLINSKI: It was entitled, "In Valuating Performance-Based Building Design". Where did Richard go? He's familiar with it.

MR. DIPERT: I'm Richard Dipert. I'm also a Fire Protection Engineer working for Sunil. That is primarily the current state of the practice for evaluating performance-based design. It did not bring risk-informing into the practice, but it does give a methodology for performing performance-based evaluations of the fire-protection program. Risk-informing will be an additional part to it.

MR. RADLINSKI: Okay. Next slide. Adoption of 805 by a licensee is not expected to have a significant impact on inspection resources. I believe that was another comment made by the ACRS.

CHAIRMAN ROSEN: Well, hold that thought for a minute.

MR. RADLINSKI: Sure.

CHAIRMAN ROSEN: That's unexpected. To me, is that because no one is going to do it? I would understand it then.

MR. RADLINSKI: No, not at all.

CHAIRMAN ROSEN: No one is going to take up 805?

MR. RADLINSKI: Pardon me?

CHAIRMAN ROSEN: No licensee will adopt 805, and then it won't have --

MEMBER SIEBER: No resource --

MR. RADLINSKI: No, that's not the basis for this.

CHAIRMAN ROSEN: Well, what is --

MR. RADLINSKI: This assumes that they will adopt it.

CHAIRMAN ROSEN: So why do you think it wouldn't have a significant impact? I would have thought just the reverse.

MR. RADLINSKI: Well, we aren't going to change our approach to inspections. The basic format of inspections where you go out and take a sampling and analyze that is not going to change. I mean, we are going to -- there is going to be some requirements, as I mentioned before, for training the inspectors and there will be a learning curve in that respect. But once they've come up to speed, then we don't anticipate that there would have to be additional inspectors on staff to inspect the plant that has adopted 805 versus one that has not.

MEMBER SIEBER: The training is going to be labor intensive.

MR. RADLINSKI: Right. And that's a start-up.

MEMBER SIEBER: Yes.

MR. WEERAKKODY: Bob, correct me if I'm wrong. Are you -- you know, a couple of these bullets, like given the previous page, aren't you stating some of the expectations or some of the comments you got from ACRS the last time? Like, for example, if I go to the previous page --

MR. RADLINSKI: Well, the comment from the ACRS was that the staff monitor inspection resources to make sure that we don't create an impact.

MR. WEERAKKODY: Okay. That's what --

MR. RADLINSKI: That we don't extend existing resources to establish --

CHAIRMAN ROSEN: You think the existing resources you've got will just shift over and do an 805 inspection, and it won't be substantially different than the fire inspection in a non-risk-informed --

MR. RADLINSKI: That's our expectation, yes.

CHAIRMAN ROSEN: Well, I think there's going to be a big impact in the change-over, because there's so much analysis and documentation and whatnot that the licensees have to do that will have to be reviewed.

MR. RADLINSKI: Right. I mean, this is essentially a self-assessment. The analyses will be done by the licensee, and that will be audited and monitored, whatever you want to call it, by the inspectors.

CHAIRMAN ROSEN: Right. And the headquarters staff. It wasn't just --

MR. RADLINSKI: Right. It will be involved, especially for the first few.

CHAIRMAN ROSEN: Well, I hope you're right, but I'm not sure you are, but we'll see.

MR. RADLINSKI: I can't guarantee it.

CHAIRMAN ROSEN: All right.

MR. RADLINSKI: But like I say, that's our anticipation right now. The licensees will be required to perform a plant-wide evaluation before changing over to the program, and this should help avoid any surprises.

CHAIRMAN ROSEN: Somebody is going to have to look at that. Right?

MR. RADLINSKI: Right. But it should also help avoid surprises when the inspectors go out and start doing their on-site inspections. The initial submittals, as I mentioned, for license amendment requests under 805 will get a very comprehensive review by the staff here in headquarters, so again that will help avoid any surprises. And there will be enforcement discretion during the transition, that the details of that were actually issued in the SECY with the final rule that went to the Commission.

And future changes will be monitored. I believe this is consistent with the comment that the ACRS made that we here at headquarters would monitor any future impact on inspection resources and take necessary action if it warrants it.

The other methods and tools, risk requantification study which has already been talked about, acceptable fire models we touched on, will be identified following verification and validation. And license amendment review guidance will be prepared for staff's guidance.

Let's do this slide first. These are activities that have been completed already. ACRS Full Committee briefing, as I mentioned before, occurred in December of 2003. ACRS endorsed the final rule, same month, same year. Staff provided comments on the NEI Implementation Guide back in January of this year, and we submitted a SECY for the final rule to the Commission in March of 2004. And submitted enforcement policy to the Commission in March 2004 with the SECY on the final rule.

Activities to go, turn to the last slide, if you'd like. There's a bar chart, and it pretty much follows the bullets on this particular activities to go slide. We're going to complete the NRC review and approval of the NEI Implementation Guide. As I mentioned earlier, we hope that we can get that into final form by the end of May, issue the final rule. Again, that's up to the Commission. We anticipate that happening in the June time frame. Issue final staff license amendment review guidance - that will take place later in the year. And issue a final regulatory guide, which we mentioned before will essentially endorse the NEI Implementation Guide, so that's dependent upon resolution of that.

Verification and validation of the fire models is ongoing and is expected to be completed near the end of the year, 2004. And after that, we'll conduct the workshops for the inspectors some time in March of 2005. The requantification of the fire PRAs is going to go on into November, 2005. Right, J.S.?

MR. HYSLOP: I've just come in recently, but the requantification, the first report is going to be done by the end of `04. And we have additional activities which are going to continue in `05, and as a result, there's the potential for an additional report to follow near the end of `05.

But we will have a report on the street at the end of `04

MR. RADLINSKI: Okay. And that would coincide well and support the conduction of the workshops in March of 2005. And then anything that comes out of the final requantification will be incorporated in the issue of the final inspection guidance, which is the last line of our chart. That's where that stands today.

CHAIRMAN ROSEN: Okay. Jack, do you have any comments?

MEMBER SIEBER: Well, a couple. I think that I would thank the staff for providing us with an update. I know it's an effort to put these talks together, and to take the time out of busy schedules to talk to us, but I think they're very important for me to have a sense of ease that things are happening, because for a while I had a sense that things weren't happening as fast as I would have liked. On the other hand, I thank and appreciate the staff for the work that they put forth to come here and keep us informed.

The other thing I would like to point out is that on this NUREG-1778, which we all got a copy in the mail, the staff has asked us for comments. I think we ought to assemble comments and send them to Marvin, so he can pass them on to the staff. I think this is an important work, and since they asked us to give it critical review, I think we ought to do that.

CHAIRMAN ROSEN: Yes. Marvin, would you make a note to send the fire protection subcommittee an email to remind them of that request?

MR. SYKES: Yes, sir.

CHAIRMAN ROSEN: And ask them to send comments to you with a copy to me.

MEMBER SIEBER: Yes. Now we're going to have to figure out how to send them to the staff, because you don't want to send them as an ACRS letter which takes on the tablet form.

CHAIRMAN ROSEN: Well, Marvin will assemble them, and then we'll figure out --

MEMBER SIEBER: We'll figure it out.

CHAIRMAN ROSEN: Before you forward them, we'll have to get together with --

MEMBER SIEBER: Figure out how to do that.

CHAIRMAN ROSEN: -- staff or management and find out how one does that sort of thing. But I have no objection to doing so. And, in fact, I have enjoyed so far my reading of this document.

MEMBER SIEBER: Yes. Okay. I think it's an important document, and some knowledge-based documents struggle a little bit, but this one doesn't seem to, as far as I've read it so far. But I think they deserve our comments, since they asked for them. Other than that, I guess I'm pretty satisfied with what I've heard, and I'm glad associated circuits is back on track or getting there anyway, and I think that's an important milestone.

CHAIRMAN ROSEN: I think some of these issues have been around for a while, and I think they're coming to closure, or coming to some point that everybody may not agree with everything that's being done, but at least there's some motion, and we seem to be expending enough resources to think about them carefully.

MEMBER SIEBER: We're generally headed in the right direction, so I'm relatively at ease that the staff is doing the right thing.

CHAIRMAN ROSEN: Okay. Good. Okay. With that, I will turn back to our commentor. Please introduce yourself again. We also have one other comment after you.

MR. GUNTER: Okay. My name is Paul Gunter. I'm with Nuclear Information and Resource Service, and I'd like to go back to the operator manual action section. I think that both public and industry were quite surprised by the addition of the detection and suppression feature to operator manual actions, and probably for completely different reasons. But obviously -- the public's concern and what you've heard through comments is the fact that there's a lot of concern about abandoning the automated shutdown from the control room. And so you're abandoning these circuits, and substituting operator manual actions. So in light of the fact that it's a given that you've abandoned the cable trays and conduits, what's the point in suppression and detection? I mean, are you seeking some -- how does that provide reliability to the operator manual actions?

MR. WEERAKKODY: I've been talking to Paul, answering the questions. Paul, I initially challenge the premise leading to the question. I think it's not correct to say we are abandoning the circuits, so I want to state that up front. Because if you go back, I think one of the really misconceptions, Paul, that is definitely out there is that the rule making is providing an option that was never there before.

Really, what is happening is, and you probably know this already, but in the past before we went to the rule making stage, we have reviewed and approved manual actions. So in 2001 or 2002, recently when we recognized that there are, for our agency position, unapproved manual actions, we were at a fork in the road.

In other words, 2001 or 2002 is not when we decided that we are going to create another option. The option was already there, but we expected the licensee to come in for our review and approval. But when we reached the fork in the road, we could have gone two ways.

One way would have been bringing all the amendments and give them a review, and approve each one of them, and then make a determination. That was one. The other was, let's consider rule making and share our acceptance criteria with the licensee. And let's be very clear with those criteria so that the licensee can make accurate determination, so I think the better way to characterize is we took that second part -- I think your premise would have been defendable if we have never approved a manual action before, and recently. I just want to share that in a very candid way.

MR. GUNTER: Can I rephrase my question?

MR. WEERAKKODY: Yes.

MR. GUNTER: Okay. Given that -- I'm not going to retract our concern about abandonment, but to rephrase my question - how are you offering credit to safe shutdown, or how are you crediting reduction of risk through these operator manual actions for safe shutdown capability by adding the suppression and detection feature? Is that clear?

Obviously, if there are not provided -- if they haven't gone through the exemption process, they can't take credit for the operator manual action. That's my understanding. And so it seems like you're offering a reliability factor by bringing in the suppression and detection feature to operator manual actions. Is that correct?

DR. GALLUCCI: My remark, as before, that why do we have detection and suppression for 20-foot separation? Why do we have it for the one-hour fire barrier? If the one-hour fire barrier was sufficient, then we wouldn't have required detection and suppression, as is the case with the three-hour fire barrier. It's defense-in-depth for the options that are considered different from the three-hour fire barrier. That is the only current way under III.G.2 that you can protection one redundant train when two are in the same fire area without detection and suppression.

Operator manual actions are not viewed as similar to a three-hour fire barrier. If you were to remove detection and suppression for operator manual actions under III.G.2, you would have to do likewise for the other options, and that would be -- that's totally counter to what goes on III.G.3, where fixed suppression, which is essentially very similar to automatic for most situations, it would be counter to that, so it's just a case of absolute consistency with the current regulation.

CHAIRMAN ROSEN: Okay. I think we could probably continue this debate for a long time.

MR. GUNTER: Would the Chair indulge me one more question in follow-up.

CHAIRMAN ROSEN: But I don't think that's the purpose of an ACRS Subcommittee meeting, but one last one.

MR. GUNTER: Okay. So are you saying that this feature only affects three-hour fire barriers?

MS. BLACK: This is Suzie Black. I think I'll jump in here now because we're really discussing a lot of pre-decisional thoughts that are being passed around. The proposed rule hasn't even been written yet, and so we don't know what the final words are going to say as far as detection and suppression, so I think it's premature. We'll have other opportunities to discuss that, probably right here at an ACRS meeting when we come up with the proposed rule language.

CHAIRMAN ROSEN: The ACRS will have to write a letter at some point to the Commission saying whether we think the proposed rule language is --

MS. BLACK: Right, so I think we should vet it out internally through the staff before we bring it out, a discussion out in the public.

CHAIRMAN ROSEN: All right. I think NEI has one more comment.

MR. MARION: All right. I'll try to be brief.

CHAIRMAN ROSEN: And you're not going to indulge us with a follow-up question.

MR. MARION: No. Alex Marion, NEI. I

agree with Mr. Gunter's question. And from the process point of view, what you have is you're trying to make a transition to a risk-informed performance-based environment and capture acceptance criteria that focus on safety. That's fundamentally the basic principle.

To invoke a purely deterministic provision as part of that process is no different than what's been done over the last 25, 30 years that we're trying to fix today. And that's all I have to say on that one.

Back to the rule making, I'm sure some of you are interested and curious as to how many plants are interested and willing to make the transition.

CHAIRMAN ROSEN: To NFPA 805?

MR. MARION: To NFPA 805.

CHAIRMAN ROSEN: I certainly am.

MR. MARION: There's only one plant that we're aware of that's willing to do that, and there are about approximately 20 or so plants who are going to watch the process very carefully, because this is not only a transition for the utility from the existing regulatory framework to a new regulatory framework, but it's a transition for the

NRC to demonstrate that they're willing to make the change from business as usual with regard to fire protection, to a process where it's focused on safety using risk-informed performance-based approaches. And if that transition on the part of the NRC with this one plant is not demonstrated to the rest of the industry, I suspect that you will only have one plant that will make that transition. And so these process issues are becoming critical, and I would just ask you to keep that in mind as we go through future discussions on this. And the real distinction, the real challenge is one of understanding and appreciated what's the documented licensing basis, and how that carries forward into this new regulatory environment, and how that's being implemented through inspections under this new regulatory framework as you're trying to integrate risk-informed performance-based approaches. It sounds easy, but I suspect it's not, so the process issue is extremely important. And that's all I have to say, and thank you for the time.

CHAIRMAN ROSEN: Thank you, Alex. And thank you, Mr. Gunter. We are in the midst of obviously a change in the area of fire protection, as we are in the whole agency. So far, the agency seems to have weathered the risk-informed applications fairly well in most of the other areas. It may be harder in fire, I don't know, maybe not, but we'll have to all stay involved and keep trying, because I think there's a real benefit to safety of moving towards a risk-informed environment.

I want to thank the NRC staff, echoing Jack Sieber's comments about the performance and the information that was transferred. I certainly have learned a lot in this period of time with studying the reports and listening to you all, and I want to thank you for the effort that you put out. I ask if there's any concluding remarks from the staff.

MS. BLACK: Yes. This is Suzie Black again. I just wanted to clarify, I heard Mr. Radlinski say something about a non-public meeting with NEI, and we don't have non-public meetings with NEI, so that was a misunderstanding on his part.

CHAIRMAN ROSEN: Okay.

MS. BLACK: And I'd like to thank the subcommittee for entertaining us today, and we're hoping to make some progress.

CHAIRMAN ROSEN: Okay. Well, thank you very much, Ms. Black. We are five minutes before the normal time, so we'll quit while we're ahead.

(Whereupon, the proceedings in the above-entitled matter went off the record at 3:53 p.m.)