ORIGINAL ACRST-3134

OFFICIAL TRANSCRIPT OF PROCEEDINGS

NUCLEAR REGULATORY COMMISSION

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

Title: **ACRS - ADVISORY COMMITTEE ON REACTOR SAFEGUARDS**

477th ACRS MEETING

PROCESS USING ADAMS
TEMPLATE: ACRS/ACNW-005

Work Order No.: NRC-1554

LOCATION: Rockville, MD

DATE: Friday, November 3, 2000 **PAGES:** 285 - 507

ANN RILEY & ASSOCIATES, LTD.
1025 Connecticut Ave.,NW, Suite 1014
Washington, D.C. 20036
(202) 842-0034

TR04

UNITED STATES

NUCLEAR REGULATORY COMMISSION

***

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

***

477TH ACRS MEETING

Conference Room 2B3

Two White Flint North

11545 Rockville Pike

Rockville, Maryland

Friday, November 3, 2000

The committee met, pursuant to notice at 8:30 a.m.

MEMBERS PRESENT:

DANA A. POWERS, Chairman

GEORGE APOSTOLAKIS, Vice Chairman

WILLIAM J. SHACK, ACRS Member

GRAHAM M. LEITCH, ACRS Member

MARIO V. BONACA, ACRS Member

THOMAS S. KRESS, ACRS Member

JOHN D. SIEBER, ACRS Member

GRAHAM B. WALLIS, ACRS Member

ROBERT L. SEALE, ACRS Member

PARTICIPANTS:

JOHN T. LARKINS, Executive Director, ACRS

AMARJIT SINGH, ACRS Staff

CAROL HARRIS, ACRS/ACNW Staff

JAMES E. LYONS, Associate Director for Technical Support, ACRS

HOWARD J. LARSON, ACRS Staff

THOMAS A. GORMAN, BWR Owners Group, Appendix R Committee

JIM KENNY, BWR Owners Group, Appendix R Committee

CHRIS PRAGMAN, BWR Owners Group, Appendix R Committee

ERIC WEISS, Office of Nuclear Reactor Regulation

LEON WHITNEY, Office of Nuclear Reactor Regulation

STEVE DINSMORE, Office of Nuclear Reactor Regulation

TONY ULSES, Office of Nuclear Reactor Regulation

FRED EMERSON, Nuclear Energy Institute

DENIS SHUMAKER, PSEG Nuclear

BIJAN NIJAFI, EPRI/SAIC

MARK HENRY SALLEY, Office of Nuclear Reactor Regulation

PAL A. BOEHNERT, ACRS Staff

NOEL F. DUDLEY, ACRS Staff

SAM LEE, Office of Nuclear Reactor Regulation

JERRY DOZIER, Office of Nuclear Reactor Regulation
STEVE, KOENICK, Office of Nuclear Reactor Regulation
STEVE HOFFMAN, Office of Nuclear Reactor Regulation
TAMARA BLOOMER, Office of Nuclear Reactor Regulation
JIM DAVIS, NRR
JIT VORA, NRR
BARRY ELLIOT, NRR
DOUG WALTERS, Nuclear Energy Institute
CHRIS GRIMES, NRR
YUNG LIU, Agronne National Laboratory
ROBERT LOFARO, Brookhaven National Laboratory
ALAN HISER, NRR
JUAN PERALTA, NRR
CHRIS GRATTON, NRR
MARY WEGNER, NRR

P R O C E E D I N G S

[8:30 a.m.]

DR. POWERS: The meeting will now come to order. This is the second day of the 477th meeting of the Advisory Committee on Reactor Safeguards.

During today's meeting, the committee will consider the following; performance-based risk-informed fire protection standard for LWRs, BWR Owners Group proposed use of SRV/LPS for post-fire safe shutdown and related issues, the ABB/CE and Siemens digital I&C applications, and the license renewal guidance document.

The committee will also consider its research report to the Commission, future ACRS activities, a report of its Planning and Procedures Subcommittee, reconciliation of ACRS comments and recommendations. We will also work on proposed ACRS reports.

The meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Mr. Howard Larson is the Designated Federal Official for the initial portion of the meeting.

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

A transcript of portions of the meeting is being kept and it is requested that the speakers use one of the

microphones, identify themselves, and speak with sufficient clarity and volume so that they can be readily heard.

Before we launch into the scheduled proceedings, do any of the members have opening comments they would like to make?

[No response.]

DR. POWERS: In that regard, I will say that we have a very intense session this morning, with a lot of topics being covered. Then the discussion of the digital I&C programs will be compressed in its time because of the absence of the subcommittee chairman, because of a death in his family, and Jit will try to give us a summary, but otherwise we're going to defer work on digital I&C until the December meeting.

With that, let's move to the area of fire protection and, Mr. Sieber, I believe you're going to guide us through several interesting and important topics.

MR. SIEBER: Yes, sir. Thank you, Mr. Chairman. Two weeks ago or a little more than two weeks ago, the Fire Protection Subcommittee had a subcommittee meeting which lasted two days, actually, and covered an awful lot of material. And if we ignore the subcommittee discussion at Davis Besse, it's been almost two years since we've had a full Fire Protection Subcommittee meeting.

That's not to say that a lot has not happened and

it also is not to say that fire protection is not important. If you look at the IPEEE reports that utilities have submitted, you can come to a conclusion that fires as an initiator for core damage are sort of on a par with just operating the plant and, of course, that means that we ought to be paying a lot of attention to risk-informing fire protection and making fire protection a top-notch thing.

Even though TMI did occur, Brown's Ferry also occurred and Brown's Ferry was almost as exciting as TMI. With that, we are going to cover basically just a couple of things today that were among the things we talked about in the Fire Protection Subcommittee.

The first of those is a BWR Owners Group initiative, where they would like to use safety relief valves and their low pressure injection system as part of their fire protection shutdown, alternative shutdown.

Now, there is an interesting thing. I re-read a couple of times Appendix R and Branch Technical Position 9.5-1 and the associated generic letter, and the inspection guidance, and it seemed to me that it hasn't changed since the early '80s, when I first read it, and one of the things that's in there, in Section 3L2, is that if you are to claim credit for an alternative shutdown mechanism, one of the things that you aren't supposed to do, which is one of the performance goals, is uncover the core in the BWR.

There is some indication that in some plants, that uncovery of the core briefly occurs during the use of low pressure systems to achieve cold shutdown and, therefore, would be the subject of an exemption.

And I think that we should pay particular attention to that as we go through this first session.

However, with that, what I would like to do is introduce Mr. Tom Gorman, from the BWR Owners Group. By the way, as Mr. Gorman is getting ready, the information in your books is in Tab 9.

DR. POWERS: I will remind the committee that Mr. Gorman was among our hosts when we were up at Susquehanna.

MR. SIEBER: At Susquehanna, right.

MR. GORMAN: Good morning. I'm accompanied this morning by Jim Kenny, who is the Chairman of the Boiling Water Owners Group, and Chris Pragman, who is a member of the BWR Owners Group, Appendix R Steering Committee.

This is just a check to make sure that we're all at the right place and we're going to be here and we're going to talk about the use of SRVs in low pressure systems, as both redundant and alternative shutdown paths.

And the topics that I'm planning on covering this morning are just a brief introduction to bring everybody onto the same page relative to this issue, talk about fire protection defense-in-depth briefly, and then talk about

what the BWR Owners Group has done and what the BWR Owners Group position is relative to the use of the SRV and low pressure systems, and then briefly conclude.

The BWR Owners Group believes that the use of SRVs in lower pressure systems has always been a part of the way we have shut our plants down in the event of fires, and we came into a disagreement relative to this issue in the recent past relative to some inspections that were being done at the plants.

We took the action to form an Appendix R Committee to address these types of issues in the BWR Owners Group and through our interactions with the NRC, I think we're very close to the resolution of this issue with respect to SRVs and low pressure systems.

Fire protection defense-in-depth is a very important concept relative to our power plants in terms of making sure that we do not allow fires to happen; to make sure that, if they do happen, we're able to mitigate the effects of those fires, and the defense-in-depth program for fire protection is really based on three primary considerations.

We have trained and qualified personnel. We have comprehensive procedures that address our behaviors relative to the fire protection issues and plant operation, and then we have some plant-specific features that are designed for

mitigating the effects of fires and for preventing fires from spreading.

With respect to the personnel, we all have a safe fire protection engineer on-site. A number of units have additional fire protection --

DR. APOSTOLAKIS: Excuse me. You are blocking the screen. Could you point to the screen? That's good. Thank you.

MR. GORMAN: WE have safe fire protection engineers that are assigned to the site that work on a day-to-day basis with the fire protection program, on-site fire brigades, and then with respect to our post-fire safe shutdown capability, we have system engineers, we have electrical engineers that review the circuits, the effects of fire-induced failures on the systems and the equipment that we use for post-fire safe shutdown, and then we have engineers that are assigned to design and assure that the fire barriers that we use to prevent the spread of fire in the plant are adequately addressed.

DR. POWERS: Can you give me an idea on how frequent fires, say reportable fires, are at the BWRs?

MR. GORMAN: I can speak probably for Susquehanna better than I can speak for, say, just BWRs as a whole.

DR. POWERS: Just give me a feel for it. I won't hold you to the exact number.

MR. GORMAN: Periodically, we will have a fire. Typically, the fire that will occur at Susquehanna would be a fire that might occur due to an electrical short in a panel, electrical panel; occasionally, due to work in process in the plant during an outage, potentially there might be weld spatter that would ignite some material in the vicinity of where the work is being performed.

I know from a plant operations standpoint, any fire that occurs in the plant is viewed as a concern and any fires that occur in the plant are looked into, they're discouraged in terms of take corrective actions to prevent those types of things from occurring again.

I know whenever we do hot work, which would include welding in the power plant, people doing that type of work are required to have a permit before they can go out. There's a fire watch that is specifically assigned to make sure that if there is any inadvertent ignition of materials, and typically that might be construction materials, those fire watches are there to make sure that things spread.

So for the specific numbers, I haven't seen maybe more than one to two per year at our facility. Now, there have been a couple of fires related to transformers and those are more significant and typically those are also in areas that are external from the power plants.

MR. SIEBER: They're outside.

DR. SEALE: And there's a lot of mitigation for those kinds of events built into their location and everything else.

MR. GORMAN: Right. The specific hazards, like a transformer, have specific fire protection features that are included to make sure that they don't become a problem.

We also have a lot of procedures related to fire protection. We have procedures that limit the amount of in situ combustibles that can be placed into the power plant.

We have controls over the amount of transient combustibles. If you're going to take a transient into the plant, those combustibles need to be authorized by people involved in the fire protection program at the sites.

As I had spoken a little bit before, we have programs for control of ignition sources, fire watches, permits for hot works and those types of things. We have inspection requirements for our passive fire protection features. We inspect our fire barriers on a -- I believe it's an 18-month basis at this point. That would include the physical walls themselves. We have daily surveillances on fire doors to make sure that those doors are in the proper position.

We have, on a cycle basis, inspections of the raceway fire barriers that are used to protect the redundant

safe shutdown systems.

We perform testing of the active fire protection features and make sure that they're functional and that they will be able to perform their job. We have training for our fire brigade personnel and we have training for our engineering personnel.

With respect to the plant design features, we have fire detection systems which are in just about all locations in the power block. We have fire suppression systems, that includes automatic and manual, the manual systems being our fire extinguishers and our hose stations.

We have fire barriers that separate our fire areas. We have fire barriers to protect our redundant safe shutdown circuits. We use low combustible materials by design in the power plant, and we've also provided emergency lighting and communications in the event that communications between plant operations and personnel in the power plant are necessary.

DR. KRESS: The fire protection systems, are they smoke detectors or infrared, or both?

MR. GORMAN: At Susquehanna, for example, most are smoke detectors, although we do have some heat sensors at certain locations.

So with respect to this defense-in-depth program, we try to prevent a fire from starting. We try to detect it

and suppress it if it does start, and we do provide the passive barriers that we've talked about to prevent the spread.

In addition to that, we also demonstrate the ability to achieve and maintain safe shutdown for the event of a single fire in any plant area.

So these features, the defense-in-depth features are really designed to prevent fire from starting. In addition to that, we also make assumptions, from an analytical perspective, that we do have fire damage, and I'll go into that a little bit more, and with that fire damage, we also make sure that we still have a protected or a hardened safe shutdown path that will allow us to bring the unit to safe shutdown.

DR. KRESS: Do you evacuate personnel from your plant if you have a fire?

MR. GORMAN: I think the procedure is that if you notice a fire, you're to call the control room and then personnel safety would instruct you to leave the area. Upon notification of the control room, the plant control room dispatches somebody from the Operations Department to investigate it and activates the fire brigade.

So most of the fire-fighting is done by trained members of the fire brigade, not the man on the street, but people on the street are instructed and trained through their general

employee training to notify the control room in the event of any abnormalities.

So with respect to the safe shutdown capability, what we're required to do is to identify systems that can perform the required safe shutdown functions of controlling reactivity, controlling pressure, providing inventory makeup, removing the decay heat, and any support systems that are necessary for those primary functions to be performed.

We then identify all the equipment that's necessary to have those systems perform those functions. We identify all the cables that are necessary to have that equipment work and that would be to control power, the mode of power for it, and any support systems, any interlocks.

We're then required to go out and identify the physical locations of all of those cables, the raceway in the power plant, and then we do an analysis that takes a look at each fire area, postulates a fire within the fire area, and, as a result of that analysis, we assure that we've got one safe shutdown path with the capability to safely control the plant and bring it to safe shutdown.

MR. SIEBER: Ordinarily, since you have two trains in the plant, if the fire isn't in the control room, one of those trains serves as a safe shutdown path, provided you have 20 feet separation.

Is that the way you interpret that?

MR. GORMAN: For the fire in the control room?

MR. SIEBER: No. For a fire not in the control room.

MR. GORMAN: Not in the control room. Typically, yes. You start with your divisionalized paths and then you select equipment within those paths that can perform the required functions and you do what is necessary to protect and make sure that those are hardened against the effects of a fire.

MR. SIEBER: Right.

DR. APOSTOLAKIS: Why do you emphasize one safe shutdown path?

MR. GORMAN: Well, that's what the requirement has us do.

DR. POWERS: I mean, it could have been the same font as the rest. Is there a message there?

MR. GORMAN: Let me see, George. No. I wanted to be able to demonstrate I knew how to use the underline and the bold font.

DR. APOSTOLAKIS: You succeeded.

MR. GORMAN: I guess the emphasis is that it is a difficult and it's an information-intensive analysis and it does direct at assuring that you do have one path that is available.

And if you had to do more than that, it would be even more of a significant challenge. I'm not sure it could be done, based on the current rules that we apply.

MR. SIEBER: A question relating to Susquehanna, since you're most familiar with that.

MR. GORMAN: That's what I know, yes.

MR. SIEBER: When you installed the cables, I presume you used pull tickets and then somebody typed all that stuff into a computer so you can do the analysis that's required.

Is the information at Susquehanna specific to cable trays or just rooms?

MR. GORMAN: Our information is specific to cable trays, conduits and raceways within rooms. For example --

MR. SIEBER: You know what tray in what room has what wire.

MR. GORMAN: Right.

MR. SIEBER: That's not true for all plants, though, right?

MR. GORMAN: I think by this point, most plants have had to go out and gather that information and that is a -- some of the older plants, I think that was a real difficult task to get to that point.

MR. SIEBER: So you would say, in general, and I'm not holding you to this, but people have that kind of

information that would allow them to know what tray in what room a given circuit goes.

MR. GORMAN: That would be my impression, yes.

MR. SIEBER: All right. Thank you.

MR. LEITCH: Jack, I feel sure that's the case at Limerick.

MR. SIEBER: It was for us, too.

MR. LEITCH: But, of course, Limerick is the same vintage as Susquehanna.

MR. SIEBER: Right.

MR. LEITCH: So that's not surprising, perhaps.

MR. PRAGMAN: Peach Bottom is a slightly older plant and we have maybe 5,000 safe shutdown cables we have to keep track of, and we can tell by looking at a drawing where our cable trays are, but we can't tell by looking at a drawing where our conduits are.

So every cable that's in conduit has to be walked down practically hand-over-hand to verify what rooms it's in and what rooms it isn't in.

MR. SIEBER: Yes. I guess if you review the associated circuit analysis done by Sandia and published about six months ago, the failure effects treatment for cables in conduit is different than it is for cables in cable trays, as far as hot shorts versus browning out against the conduit.

DR. SEALE: When you say you have to go through and walk these down, is that on an as-needed basis or is that something that you're trying to systematically remedy?

MR. PRAGMAN: That's something we had to do to meet Appendix R originally in the '80s. So anytime we add a cable to the plant now, if that cable is going to be a safe shutdown cable, because it's involved in a safe shutdown circuit, then we have to capture that information as part of the installation process.

DR. SEALE: And what about catching up?

MR. PRAGMAN: For all the Appendix R cables, it was done --

DR. SEALE: You've done that now.

MR. PRAGMAN: It was done originally.

DR. SEALE: But the non-Appendix R cables are still --

MR. SIEBER: Wherever you find them.

MR. PRAGMAN: Right. The other 50,000 cables --

MR. SIEBER: Running loose.

MR. PRAGMAN: -- that aren't safe shutdown --

MR. SIEBER: They're running loose.

MR. PRAGMAN: If they're in conduit, I'm going to have a hard time telling you where it's at.

MR. SIEBER: Yes.

DR. SEALE: Usually, if something fails, you don't

replace it. You just put another circuit in.

MR. PRAGMAN: Sure.

MR. GORMAN: Okay. With respect to the fire protection program, we have the defense-in-depth measures that we described. We really view these defense-in-depth measures as the means that we expect to use to prevent fires from damaging plant equipment and if we do damage plant equipment, we consider that to be a failure.

In addition to that, we do this safe shutdown analysis that we've talked about and within the safe shutdown analysis, there are currently a number of things that we consider to be conservatisms.

DR. APOSTOLAKIS: Can you explain a little bit what unprotected equipment and unexamined equipment are?

MR. GORMAN: Yes. Can I do large fire area first?

DR. APOSTOLAKIS: It's up to you.

MR. GORMAN: Let me do large fire areas first. These are just the backup slides that I think everybody has a copy of. People that accompanied Dana up to Susquehanna I'm sure are familiar with this. This is just a site plan and I just wanted to give you an overview of the site. You can see the cooling towers, the large spray pond, and there are a couple of buildings that are bolded, reactor building, control structure, the diesel bays, and our emergency service water pump house out by the spray pond.

Those are the areas where we have essentially our equipment that is used for post-fire safe shutdown.

Then this just kind of gives you a little bit of a blow-up on the two reactor buildings, which are side-by-side, the four primary diesel generators, and the control structure. The big circles in the middle are the primary containments.

There's a view of the primary containment, which essentially separates --

DR. WALLIS: It will focus better, I think.

MR. GORMAN: Better focus?

DR. WALLIS: It's not in focus in the middle.

MR. GORMAN: There we go. Now we lost the bottom one. So this is a big essentially 88-foot diameter reinforced concrete structure that's inerted during primary -- during operations that separates the north and south sides of the reactor building.

And then this particular view is a view through the two reactor buildings that based on where the view was taken, you don't see that primary containment structure.

And the heavy lines -- the heavy lines outline the fire areas that we have at Susquehanna and the significance of a fire area is that with respect to our analysis, we assume that a single fire will damage anything within the fire area.

So if you had a fire down on elevation 645, we would assume there is a potential for equipment damage all the way up to elevation 779. We would make that kind of assumption. So we have large fire areas, and I think this is typical of other plants, also.

So there are large fire areas and there are conservative assumptions made relative to fire damage within those fire areas.

DR. APOSTOLAKIS: But you don't always assume that all the equipment and cables are damaged, do you?

MR. GORMAN: Yes, that's the assumption. We go off, we identify systems that can perform the functions, the equipment necessary for those systems to operate. We then find the cabling that's necessary for the equipment to operate, locate the cables either by -- if you're fortunate enough to have information available to you, use that information, or if you're like Chris, at Peach Bottom, you go out and chase it down in the power plant.

And then having identified where the raceway and where the circuits are, you would postulate a fire in a given fire area and you would say any of those circuits that are in that fire area could be damaged, and you would not --

DR. APOSTOLAKIS: That's different than saying all of them will be damaged. You say any could. That's different from all will.

MR. GORMAN: You assume that they are damaged.

DR. APOSTOLAKIS: You assume that they're damaged.

MR. GORMAN: You assume that they're damaged, unless you can demonstrate that they are not damaged.

DR. APOSTOLAKIS: Unless?

MR. GORMAN: Unless you do something extra to demonstrate that they will not be damaged.

DR. APOSTOLAKIS: But let's look back at your figure.

MR. GORMAN: Okay.

DR. APOSTOLAKIS: So you said that on the left, if there is a fire down there, everything in that large area has the potential for being damaged, but you don't necessarily assume immediately that everything is damaged.

MR. GORMAN: That's the initial assumption, is that anything within that boundary is damaged and it's not available.

DR. APOSTOLAKIS: But if you get into real trouble, then you relax that, don't you?

MR. GORMAN: If you get into real trouble, then what you have to do is a specific analysis that demonstrates that you have --S

DR. APOSTOLAKIS: So sort of a screening approach.

MR. GORMAN: Yes.

DR. APOSTOLAKIS: Okay.

MR. SIEBER: Well, you may have to take additional steps, like suppression, detection and suppression or shielding or fire barriers or something like that.

MR. GORMAN: Right.

MR. SIEBER: On the other hand, if you actually had a fire, whatever operates operates and you would use it.

MR. GORMAN: Right.

DR. SHACK: Are Unit 1 and Unit 2 truly asymmetric here or is that just an error in the diagram?

MR. GORMAN: Unit 1 is kind of a -- if you took Unit 1 and you slid it over to the left --

DR. SHACK: I just meant some of the fire areas don't seem to be the same. I've got dark outlines around some areas that look to be --

MR. GORMAN: There is a little bit of asymmetry, yes.

MR. LEITCH: They're mirror images, aren't they?

MR. GORMAN: No.

DR. APOSTOLAKIS: Not quite. Not quite.

MR. GORMAN: Unit 1 is a slide-over of Unit 2, so it's not a mirror image.

DR. APOSTOLAKIS: So where is the reactor?

MR. GORMAN: It's on this center line and on the other center line over on the Unit 1 side.

MR. LEITCH: Now, the area heavied up in bold, is

that the -- where is the fuel, the spent fuel pool? That area heavied up there, is that the reactor --

MR. GORMAN: The spent fuel pool is up on the refueling floor, up here.

MR. LEITCH: In the center there, is it?

MR. GORMAN: Yes, it would be in this area here. Cask storage pit and spent fuel pool on the other side of that.

MR. LEITCH: It's a common fuel for both units?

MR. GORMAN: No. There's a fuel pool for each unit, with a cask storage pit that's between them with removable gates that allows you to communicate.

MR. LEITCH: But you don't consider that a large fire area.

MR. GORMAN: Actually, the upper elevations are really included to be part of both of the fire areas, down below. Most of the equipment that is required to safely shut down the plant is below this elevation. There is not much up above it.

Also, the areas up above it are big, large areas that don't really have any physical separation in them. So those are kind of looked at as a top hat on top of the individual fire areas and you could say damage is assumed to occur up there, also, but when you end up chasing down all your cables, you find out that you really don't have any up

there anyway.

DR. SEALE: I don't see any isolation between the two and the upper level. So does that mean that I've got problems with both units if I have a fire?

MR. GORMAN: Potentially, for us, we look at that. What we do is if we have a fire on Unit 2, we protect the way to shut down Unit 1 and Unit 2.

DR. SEALE: And you assume that you have damage in the upper regions there on Unit 1 if you have a problem in Unit 2.

MR. GORMAN: Right. And as I said before, there really isn't much of anything above elevation 779, but you look at certain systems.

So our philosophy is I'm only looking at certain systems. I don't know that there isn't a cable that somehow got over here that could affect Unit 1 and would cause it to shut down, so I assume that I have a problem on Unit 1 when my fire is on Unit 2 and I make sure I can shut both of those units down.

DR. SEALE: If you've got a problem on two, one is not in the bank.

MR. GORMAN: Right. So that's the large fire areas. The unprotected equipment and cables within the fire area are assumed to be damaged. So if you noticed, and I don't know if we did, each one of these fire areas has

little Roman numerals with a circle around it. That's the path that we would be using for safe shutdown in that area.

So the assumption right off of the bat is the other path is lost. If there were any equipment from the other path in there, we would just say it's damaged, we wouldn't even look to use it, unless we were to do, again, an additional analysis that looked at additional considerations relative to physical locations, fire spreads, fire protection features and those types of things.

The next item is unexamined equipment and cables are not credited for mitigating the effects of the fire. At Susquehanna, we've got about roughly 2,000 safe shutdown components and we've got roughly 25,000 components.

So we have examined the 2,000 components relative to the function or relationship between the circuits, the components and the systems. The other 23,000 have not been treated with that same degree of rigor and, therefore, those 23,000 are assumed to be damaged by the fire.

Again, that's kind of like what we do with Unit 1 for our Unit 2 fire. You don't know everything about Unit 1, so you assume it's impacted. With respect to those 23,000 components, we don't know everything about them, so we assume that they are impacted.

And then we often make assumptions about damage to equipment that -- on one hand, we'd be making an assumption

that it was damaged; on the other hand, if it benefited us, we would not make that same assumption, and maybe an example of that was -- didn't have a very good one at the last meeting, but let me try this one.

For example, the MSIVs, we would assume that the MSIVs would be closed because all we really do is make sure that we protect the capability to isolate the MSIVs. So we would make the assumption that they were driven closed by some kind of a fire-induced damage, except in the event if we were using an alternate shutdown cooling mode, where you would flood up the vessel, flood the main steam lines, then we would not make that assumption that those MSIVs were closed, because they could then present a flow diversion for the shutdown system.

So these are basically the conservatisms that are built into the analysis and, again, this is an analysis that's predicated on the concept of defense-in-depth, where we don't want a fire to start, we don't want to damage plant equipment. If anything does happen, we want to mitigate those effects quickly and, in addition to that, we protect one hardened path and we make sure we can achieve safe shutdown with that path.

So I think when you take the perspective and you look at the defense-in-depth aspects of it, you look at these large fire areas, these types of assumptions, the

protective features that we have, our basic position is that although fires are not necessarily infrequent, the type of a fire that would get us to the point where we would end up using, testing our analyzed safe shutdown systems, we believe, would be a quite infrequent fire.

MR. LEITCH: I'm still just a little confused by the meaning of the heavy lines. For example, over on the right, I guess that's Unit 1, there's a vertical line that's -- or vertical wall there that's not heavied in. It seems to be heavied in on the other side.

MR. GORMAN: Right. That's the main steam tunnel and on Unit 2, we needed to make that a fire area boundary, whereas on Unit 1, it wasn't necessary to do that.

DR. APOSTOLAKIS: And the necessity was dictated by what?

MR. GORMAN: Typically, cable routing. You look at these more current power plants and when you look at them, they are generally very well separated from an equipment perspective. You've got a room for RHR Division 1 equipment, room for RHR Division 2, core spray has got its own room, HPCI and RCSI, they have their own rooms. You've got separate fire areas, separate rooms for your four KV switch gear and everything looks generally to be pretty well separated, until you start doing all the cable chasing and the raceway chasing and then you find out that the

configuration of the plant dictates where the individuals that put the raceways in and put the cables in were forced to route those things and typically, for us, those become the challenges.

So you really have to chase down all these cables and find out where they go and you're often surprised at what you find.

DR. WALLIS: So the cables weren't located by design to be in optimum position for fire prevention.

MR. SIEBER: Sometimes not.

DR. WALLIS: You just have to find out where they happen to be.

MR. GORMAN: The design for optimum fire protection was kind of evolving, at least for a plant like Susquehanna. Originally, we routed cables in the power plant under an electrical separation criteria that said three foot, five foot separation on redundant trains, one to two feet on your cable trays and your raceways.

That was the original thought process that was used to design these things. And then after most of the raceway was installed in the plant, most of the cables were installed into the plant, things evolved from the Brown's Ferry event hat got us more into essentially divisional separation and there were certain features at Susquehanna that really dictated that the north side of Unit 2 and the

south side of Unit 1 are the bad places to be.

And those are the ones that essentially communicate with the control structure.

MR. LEITCH: There's also some issues, too, that the primary containments are symmetric. At Limerick, at least, though, I believe it's the same thing at Susquehanna, but the reactor buildings are mirror images.

So, for example, although the reactors are identical, HPCI, for example, is outboard on each unit. So that gives you some different cable raceway configurations.

MR. GORMAN: Yes. Like for Susquehanna, if you took a -- if you go through the center line on each reactor building, you have your divisional separation, so you've got, I think it's Division 1 is primarily located on this side, Division 2 is on this side. Since the plants are slide-over, you've got most of your Division 1 equipment on Unit 2 here and your Division 2 equipment over on the other side.

Now, those reactor buildings each have the emergency switch gear rooms in them, whereas the control structure has the 125-volt DC distribution system in it. So there's a lot of communication between control structure and the switch gear rooms.

Another thing you find for Susquehanna is our main steam tunnels on both units are right here.

So when you came in from the control structure, on most elevations, you couldn't go this direction without going through 11 feet of concrete and a high radiation area. So most of the routings went through this area. So what we find is that those two paths of each reactor building are in the area where we have the most props from the cable routing perspective, and then you're trying to match both of those up with a control structure that's divisionally -- for us, it's divisionally split about a horizontal plane.

So you find out, on Unit 1, where you've got primarily Division 2 protected equipment that you're trying to protect, it's going down to the lower elevation of the control structure, which is the Division 2 area, and as a result, the lower elevations of Unit 1 have problems. The higher elevations, which are going up to the higher locations in the control structure have the Division 1 problems.

Those are the types of things that we figured out in the last couple of years and the people that were building the plant and routing the cables and the raceways were never made privy to that information.

So given all of that, we have come to what is an acceptable way to safely shut down the plant in the event of a fire, given the defense-in-depth programs, given the

conservatisms we used in the analysis and given the fact that the likelihood of getting to the point where this is all that is available and remains available to you is very low.

And the BWR Owners Group has proposed that it is acceptable to use the SRVs in our low pressure systems, and we have a position on that and I will give you that in a little bit of a discussion, and then I'll tell you a little bit about how we drew that conclusion.

MR. LEITCH: When you say SRVs, are you differentiating between ADS SRVs and other SRVs?

MR. GORMAN: No. It could really be either. It could be your ADS SRVs or it could be your normal SRVs, and for our plant, we have 16 safety relief valves. They all have an individual ability to be opened.

Six of them are ADS SRVs and there are additional solenoid valves from Division 1 and Division 2 that provide power to open those SRVs.

So there is an automatic function associated with opening those six SRVs. There's a manual capability built into opening those SRVs. It's a part of the automatic initiation logic and then there's also key lock switches in both our upper and our lower relay rooms, where a separate control can be used to open any one of those six SRVs.

MR. LEITCH: But you don't have any manual means

to open the non-ADS SRVs.

MR. GORMAN: You do, yes.

MR. LEITCH: You do?

MR. GORMAN: Yes. They all have individual solenoids and key locks or switches in the control room that you can use to open them. That's not necessarily true of everybody, but that is the Susquehanna design.

So the position that the BWR Owners Group has put forth is that the use of the SRVs in low pressure systems is an acceptable methodology for achieving redundant and/or alternative safe shutdown in accordance with the requirements of Appendix R.

We also believe that the use of these systems, we don't consider it to be a change. We believe it's something that we had been doing all along. We believed it was okay to be doing it all along and we just got to the point where there was a difference of opinion relative to that.

So we don't view this as --

MR. SIEBER: I'd like to ask a question about that. Not only does 3G1, 2 and 3 talk about and set requirements for safe shutdown, but so does Section L and L2 and 3.

And beyond that Generic Letter 81-12 is the implementation guidance for interpreting what the 3G and 3L say. By adopting this position, you're basically saying to

me that you don't want to -- you want to re-interpret what Generic Letter 81-12 says. Is that true?

MR. GORMAN: No.

MR. SIEBER: Do you understand where I'm going?

MR. GORMAN: Yes.

MR. SIEBER: This has to do with uncovering the core.

MR. GORMAN: Yes. 3G1 essentially says that you have to have systems free of fire damage that are capable of achieving hot shutdown and that you need to be able to make repairs within 72 hours to get to cold shutdown. So that's the guidance in 3G1.

Then 3G2 says for the circuits that are necessary to do that, you need to do -- if they're affected by the fire, you could do three things. You can protect them with a one-hour fire barrier, as long as you have suppression and detection.

You can protect them with a three-hour fire barrier if you don't have suppression and detection, or if you've got 20-foot separation, no intervening combustibles and suppression and detection, then that's okay.

So with respect to 3G1 and 3G2, that's all the guidance that we have. And if we had done that, which is what we have done with our SRVs and low pressure systems, the way we've used them, we believe we have met those two

requirements.

MR. SIEBER: Generic Letter 81-12 gives you performance criteria as to what plant parameters, how far they're allowed to go in the process of shutting down using the equipment trains that you selected.

MR. GORMAN: Right. Now, what happens is if you can't meet the separation requirements of 3G2, then you end up in 3G3 and 3G3 says if you can't do one of those three things, then you need to provide an alternative or a dedicated shutdown system and the alternative and dedicated shutdown systems need to be independent of the fire area.

So you've got to have something that's totally independent of the fire area and that's where you get tied into 3L.

MR. SIEBER: But you're always forced into that, are you not? Because everything in --

MR. GORMAN: Into what?

MR. SIEBER: G3.

MR. GORMAN: No.

MR. SIEBER: Because everything ends up in the control room.

MR. GORMAN: In the control room, that is the area where we do --

MR. SIEBER: That forces you into L.

MR. GORMAN: That's primarily the area, control

room and, in some cases --

MR. SIEBER: Cable spreading rooms.

MR. GORMAN: -- cable spreading rooms, right. But for the balance of the plant, typically --

MR. SIEBER: Everything else you can probably engineer right out of it.

MR. GORMAN: Right.

MR. SIEBER: But for those two areas, you can't. So that forces you into G3 and L.

MR. GORMAN: For those two areas, right. Now, for the rest of the plant, w say it's primarily 3G1 and 3G2 and in our defining the term so that we can communicate on this issue, we said let's call 3G1 and 3G2 shutdown, let's call that redundant and if we can't do redundant, then let's -- the other one would be either alternative or dedicated, if you go to 3G3.

MR. SIEBER: And the other thing that it appears you have done is you have philosophically said I don't want to use different methods depending on which section of the regulation I'm in. Is that correct? If you're in G1/G2, you want to have the same shutdown methodology that you would if you were in G3 or L.

MR. GORMAN: No, it would be different. Again, I'll talk about Susquehanna, but for Susquehanna, for the fire in the control room, what we have is a remote shutdown

panel.

MR. SIEBER: Right.

MR. GORMAN: So the fire is in the control room. We leave the control room. It's a common control room for both units, and go to each unit's --

MR. SIEBER: But it's still a low pressure shutdown, right?

MR. GORMAN: No, it's a high pressure shutdown. So what we're primarily -- the discussion we've been primarily having with the NRC is related to 3G1 and 3G2 shutdown, redundant shutdown and the use of the SRVs in the lower pressure systems in regard to that.

MR. SIEBER: Okay. I can follow you from here then. Go ahead.

MR. GORMAN: Jit doesn't like it when we talk all the 3G.1's.

DR. APOSTOLAKIS: The last bullet confuses me a little bit. It's not a change, but rather an endorsement of what has consistently been done. By whom?

MR. GORMAN: The BWRs.

DR. APOSTOLAKIS: And it has not been endorsed by the NRC? I don't understand what it means, has been done.

MR. GORMAN: Our position was we've used it as a shutdown method for 3G.1 and 3G.2. We believe it's been approved by the NRC to be used for 3G1 and 3G2. So we're

just coming back in and we're trying to put together our story that demonstrates those points.

DR. APOSTOLAKIS: But obviously it has not been approved.

MR. GORMAN: It has.

DR. APOSTOLAKIS: It has?

MR. GORMAN: Yes. We've provided licensing citations for specific units, where the units --

DR. APOSTOLAKIS: So if it has been approved, why do you need an endorsement? Am I missing something?

MR. SIEBER: I think that you're assuming that it's been approved, because you've had Appendix R inspections and nobody said anything, right?

MR. GORMAN: No. We've been able to cite specific licensees, where they have been told it's okay to use this shutdown methodology.

DR. POWERS: Have they been told that by exemption or specifically?

MR. GORMAN: Specific SERs without an exemption.

DR. SEALE: Okay. Fine. But --

DR. APOSTOLAKIS: What's fine?

DR. SEALE: But who blew the whistle? I mean, clearly --

MR. GORMAN: Why are we here today?

DR. SEALE: Someone -- yes.

DR. APOSTOLAKIS: Yes. I don't understand why --

DR. SEALE: Someone said hold on. Now, is this an overzealous inspector or what?

MR. GORMAN: Most of the issues came up during inspections and I would say based on the amount of work that we've had to go through to convince everybody on both sides of the table that it has been improved, it is acceptable, it is okay, that it's reasonable that an inspector may not have seen it, is obviously approved.

So what we're trying to do is we --

DR. SEALE: Well, there's difference of opinion as to what the implications of those prior SERs really meant when they were issued.

DR. APOSTOLAKIS: But it's not an issue of inspectors anymore. Now it's the headquarters people who have to be convinced.

DR. SEALE: The remedy is to get a headquarters endorsement, which essentially sets aside all of these other problems.

DR. APOSTOLAKIS: But then if that's the case, it is a change.

DR. SEALE: Only in the minds of some people.

MR. LEITCH: I'm a little confused, though. Isn't the --

DR. APOSTOLAKIS: There is no 1.174 for the minds.

MR. LEITCH: The classical way you take a BWR to shutdown in a small break LOCA with HPCI unavailable is you ADS and then go with your low pressure injection systems.

MR. GORMAN: Right.

MR. LEITCH: And in that sequence, the core is momentarily uncovered. I mean, that's new information to me. I never particularly understood that to be the case.

MR. SIEBER: It can be.

MR. GORMAN: It depends on when the blow-down occurs. It depends on -- and from an elevation perspective, it depends on the number of SRVs that you're using to blow down.

MR. LEITCH: But that's an accepted approach.

MR. GORMAN: That's an accepted way.

MR. LEITCH: To shutting down a BWR. Now, the fire doesn't make it any different, does it?

MR. GORMAN: Exactly.

MR. SIEBER: But it really also depends on the plant, because it's a matter of capacity, right? How much water you have.

MR. GORMAN: It depends on what your shutdown approach is and how many SRVs you have, how many you have protected, what their sizes are, what your procedures tell the operators to do.

MR. LEITCH: At Susquehanna, for example, the core

can be momentarily -- in other words, the level can be below the top of active fuel momentarily.

MR. GORMAN: Not by our calculations. What we've done is we've -- we follow our EOPs. We'll below down when level reaches the top of active fuel and the core -- the downcomer level, the indicated water level will drop below the top of active fuel, but the core is always covered.

MR. SIEBER: But what do you do if you get to that point where you say it's now time to quit doing that and the pressure is still too high?

MR. GORMAN: If what?

MR. SIEBER: And the pressure is still too high to inject.

MR. GORMAN: Well, ADS will take pressure down.

MR. SIEBER: Okay.

MR. GORMAN: We have another slide that tries to depict that a little bit. It's an excerpt from the report we submitted to the NRC on this issue that shows the behavior of the --

DR. SEALE: Four years ago.

MR. SIEBER: Let me ask one further question, then we can charge ahead.

For Susquehanna, the core doesn't become uncovered even though you're -- if you were looking at the collapsed volume, it may be. Is that true?

MR. GORMAN: I think if you took a collapsed volume, you would show a lower level, yes.

MR. SIEBER: Now, does any BWR using this system to shut down, cool down, have an uncollapsed volume that's below the top of the core?

MR. GORMAN: There may be some, because some people, I think, might use fewer than six SRVs and I think the information that NRC provided on the 17th showed that, I think, for as few as three SRVs, fuel temperatures are still well within the acceptable range.

DR. SEALE: As I recall, wasn't -- didn't Susquehanna take a contrarian position to the overall BWR Owners Group position on how far down you would let the water level go in this maneuver? In fact, you said you would not uncover with the uncollapsed water level, whereas the overall Owners Group position, and maybe that's changed now, I don't know, but at that time, the overall Owners position was that there could, in fact, be some dropping f the water level below the top of the core.

MR. GORMAN: I think that issue was related to the ATWS and I think it related to should you tell the operator to blow down at a certain point because of your suppression pool temperature, your heat capacity temperature limit, and I believe our people believed that you shouldn't let the heat capacity temperature limit drive you to do the

blow-down. And it wasn't really -- it was just don't blow down because the heat capacity temperature limit, because we don't really think that that's going to give us a problem relative to failing the containment.

But if we're in an ATWS condition and we blow down the core, we're pretty sure we're going to have a problem with the core.

So we said let's protect the core rather than worrying about the containment and we think that there is sufficient margin in that protection for the containment, that this is the smart thing to do, and I think that got resolved.

DR. SEALE: I remember there was a difference in the position, though.

MR. SIEBER: Now,. Just in summary, so we can take a great leap forward here, since we're behind time. As far as Susquehanna is concerned, using ADS and LPSI comply with Section 3G, 3L and 81-12.

MR. GORMAN: With respect to Susquehanna, what we do is we believe we comply with 3G.1 and 3G.2. Like many others in this area, we're not 100 percent clear on what all of the requirements were relative to Appendix R back in the middle '80s. We processed a deviation, which is another legal term. It's like an exemption for a plant that's not required to meet the law, back in 1989, that said our

process variables could be worse than for a loss of normal AC power and we processed that to the NRC.

But the position of the Owners --

MR. SIEBER: And that was accepted, right?

MR. GORMAN: Yes.

MR. SIEBER: Okay.

MR. GORMAN: The position of the Owners Group --

MR. SIEBER: That's understandable.

MR. GORMAN: The position of the Owners Group is that the critical criteria relative to 3G.1 and 3G.2 is that you don't damage the fuel, you don't damage the primary coolant boundary, and you don't damage the containment.

MR. SIEBER: But that's different than what it says.

MR. GORMAN: It's different than what 3G.3 and 3L say, but 3G.3 and 3L, our position is, do not apply to the redundant shutdown.

MR. SIEBER: I shouldn't have taken engineering. I should have been a lawyer. Let's charge right ahead here now, so that we can have a little time for 805.

MR. GORMAN: So with respect to an actual plant fire, we would not expect that they would interrupt power operation and the ones that we have have not.

If we did have an event that affected our plant equipment, we would expect the operators to use any

available plant systems. The defense-in-depth concepts that we apply for the fire protection program, we believe, really minimize the challenges to any of the plant equipment.

But if there is something that challenges plant equipment, the operators are trained and the operators are expected to use what is available and we, as the fire designers, do not want to tell them to do anything any different than that.

If the response to the fire requires an entry into the EOPs, we expect the operator to enter those EOPs. The operators are trained to enter those EOPs and we expect them to perform in accordance with those EOPs. And the protected safe shutdown path that we provided is really a hardened fire path relative to the design concepts that we've applied for fire protection and plant safe shutdown.

DR. POWERS: Do the operators enter into the EOPs for expected events, like, say, for instance, a loss of off-site power?

MR. GORMAN: Loss of off-site power would give you an entry into the EOPs, yes. The MSIVs would go closed, you'd have a level pressure transient. Those would be entry conditions into the EOP. So you would be in your EOPs and once you're in your EOPs, you'll stay there until you have stable control of the unit and are able to exit through those procedures.

DR. POWERS: It seems to me that what you're proposing here is that I've got a bunch of events that I can imagine will happen to a plant -- it won't happen everyday, but in the lifetime of the plant, I might have several of these, and I want my operators to respond to them in sort of a consistent fashion.

MR. GORMAN: Yes.

DR. POWERS: That is that one of these events, be it a loss of off-site power or a fire of some magnitude, they kind of do the same thing. They're not expected to say, oh, I go this bookshelf or this bookshelf, I go to the same bookshelf all the time.

MR. GORMAN: Right. And that's critical, because we don't want the operator in the control room trying to figure out what's going on in the power plant on his own. We want him to work within the bounds of the symptom-based procedures and there's a lot of uncertainty relative to fires.

As we said, most of the fires are not fires that are going to challenge anything. If the fire response says use this shutdown methodology, well, I don't think they're going to do it. We'd have a hard task to get them to accept anything like that, from an operating perspective.

But what we try to do is we try to give them a hardened path and we try to give them a heads up as to, in

the particular areas of the plant, what it is that may happen relative to fires, with the expectation that they will follow their procedures, use the available positions, and if they're in the EOPs, they follow the EOPs.

MR. SIEBER: Now, a fire is not a design basis event, correct?

MR. GORMAN: It's not one of the design basis accidents, that's correct.

MR. SIEBER: So you don't need pedigreed equipment to respond to it. That's one of the things that allows you take this methodology.

MR. GORMAN: Well, this is equipment that we would use for design basis accidents and typically you end up relying on that type of equipment, because --

MR. SIEBER: Sometimes you -- it depends on the plant.

MR. GORMAN: Right. If you can justify the availability of others, you can use it.

MR. SIEBER: Well, we installed stuff that was not 1A in order to take care of all -- I'm from PWR, so all our aux feed pumps were in one room. You can't get separation like that. So we built a whole new system. To give us separation.

MR. GORMAN: So the approach we used to draw our conclusion is that we reviewed the regulations and the

regulatory guidance and a lot of the documents that you're referencing, Jack, and we determined that what we're doing is consistent with those regulatory requirements.

We assured that the approach did not present an unsafe condition and the basic starting point from that is that these are safety systems that are designed to control the power plant, they're accepted as original design basis systems within the power plant.

We did a review of that just to demonstrate that and then we did a qualitative examination of the relative risks associated with this option versus other available options under the Appendix R scenarios.

DR. KRESS: Are you going to tell us what those relative risks were? Do you have the numbers?

MR. GORMAN: It's qualitative. It's difficult to do a quantitative one for fires, because you need about 17 billion more pieces of information than we generally have available to us.

DR. KRESS: We understand.

DR. APOSTOLAKIS: Careful now.

MR. GORMAN: Sixteen billion.

DR. SEALE: 16.9.

DR. APOSTOLAKIS: Be careful.

MR. GORMAN: I'll put this one up real quick.

DR. APOSTOLAKIS: What is that?

DR. KRESS: That was quick.

MR. SIEBER: I thought it was just fine.

MR. GORMAN: And our overall conclusion is that these shutdown systems and this shutdown methodology, they represent an accepted shutdown methodology in the original design basis for the GE BWR. They're a technically acceptable means of shutting down the plant, they're a safe means, and they're a means that are consistent with the current procedures and the operator training.

In addition to that, they satisfy the safe shutdown goals for post-fire safe shutdown and they can accomplish all the required safe shutdown functions.

DR. SHACK: If this is not approved, what will you have to do?

MR. GORMAN: For me, I'll have to go look for another safe shutdown path. We've got -- at one point in time, the discussion was this is an acceptable methodology from an alternative shutdown perspective, which is the 3G.3/3L stuff we were kicking around before.

The way we've used the shutdown methodology, though, we've used it by protecting it in accordance with the one-hour wrap, the three-hour wrap, or the 20-foot separation. So I don't have independence.

So if I can't call it a redundant of 3G.2 or 3G.1 shutdown methodology, I don't have it independent of the

area, so I can't call it alternative, so I don't have a shutdown path.

So then I would be going back and I would be taking my HPCI systems, my RCSI systems, all of the cables for those, all the equipment for those. In Chris' case, down at Peach Bottom, he'd be going out and walking down a whole bunch more conduits to find out where things are in a particular location for those paths and then we'd go into the process, not unlike what we just finished up with, the Thermo-Lag issue of providing fire rated barriers or whatever we needed to protect those particular circuits.

So we've estimated maybe ten to 20 --

MR. LEITCH: The problem is there's only one HPCI. So once you postulate the fire in the HPCI room, then you're kind of between a rock and a hard place.

MR. GORMAN: Then you've got to have your RCSI system, so then you --

MR. LEITCH: And I'm not sure that RCSI has the capacity to -- well, I guess --

MR. GORMAN: Well, for this event, you don't need a lot of capacity.

MR. LEITCH: Right. This would be okay, yes. You could perhaps do it with RCSI.

MR. GORMAN: Yes. RCSI is another way that it could be done, yes.

MR. LEITCH: But those rooms are pretty close to one another, they're usually adjacent to one another.

MR. GORMAN: They're right next to each other, for us.

MR. LEITCH: Right. But if this is not an acceptable method of shutting down in a fire, it's not an acceptable method of shutting down otherwise, right? I just don't see what the fire has to do with it. This is the way you shut down a BWR within a small break LOCA with HPCI unavailable.

DR. APOSTOLAKIS: So where does that leave us? I don't understand.

MR. SIEBER: We're at the point in the agenda where we --

DR. APOSTOLAKIS: I'm not talking about the agenda. I think that was a very important comment. Let's say the staff does not endorse this. What does that do to other regulations?

DR. POWERS: What I see here, if I can find these things, when I look at these things, I see sentences that go something like this; based on the above, for those licensees who propose the use of ADS and LPSI for alternative shutdown in the event of fire, we consider their proposal as a request for an exemption to the requirements to Section 3L of Appendix R and intend to grant such exemptions.

MR. SIEBER: So that you will end up okay regardless.

DR. POWERS: Right. It seems -- I mean, this particular phrase was written by the staff in 1982, that they have granted it as an exemption from Appendix R, and seemingly, in a blanket fashion.

MR. SIEBER: I don't know that, but it would appear to be that way.

DR. POWERS: The issue that comes to my mind is something like this; that fires happen. Frequency, one to a half a year. Most fires are not very bad fires. So do you want a process that stresses the safety systems for responding to those fires? And it seems to me that going into this low pressure -- into a low pressure environment puts some stress on the safety systems.

Do you want to do that routinely?

MR. WEISS: This is Eric Weiss. I'm Chief of the Fire Protection Section.

I think I can add a little perspective to the comment that was made. What we're talking about here is a fire that has been sufficiently challenging, that it has affected all non-safety and all safety systems and all we have left is this one protected path.

As Dr. Powers has said, not all fires rise to that level of significance. So if the operators were confronted

with a small fire or a fire, you imagine whatever you want, a fire in a trash can, a fire in a remote corner of a room, you wouldn't expect operators to immediately go to ADS low pressure system. They would shut down normally. They would use their turbine and their bypass valves and they would shut down in a normal fashion.

Now, in the case of this postulated fire that the regulations contemplate, where we assume everything that's not protected is engulfed, everything, that includes all non-safety and all safety systems, and all we have left are those systems that are explicitly protected to the requirements of Appendix R, then you would be using ADS/LPS. I don't think it's fair to say that every little fire will result in the use of ADS/LPS, is the point I'm getting at.

DR. SHACK: But then is it safe to say that you do plan to continue granting the exemptions?

MR. WEISS: I have a presentation on that, but to make a long story short, the language that was referenced earlier regarding exemptions was concerning 3L. That was the specific topic under discussion under 3G.3.

And the issue on the table for us right now is a proposal by the BWR Owners Group to consider this generically, as appropriate, as a redundant means, meaning 3G.2.

On the advice of our Office of General Counsel,

the acceptance criteria under 3L, which is 3G.3, do not apply to 3G.2. As an engineer, I think the issue is, is the core safe, is the reactor safe, is the public health protected.

As a regulator, the issue is, are the regulations met, is it acceptable and is it consistent with what we've accepted in the past.

And I guess I'm jumping ahead to my presentation. I will attempt to show you the context in which this appears, some background information, the safety issues that we considered in examining this, if you wish.

We had planned to do that a little bit later. We have a lot of things on the agenda. But I hope to bring some perspective to it.

MR. SIEBER: Well, it seems to me that's the most important question we have to ask at this point in time. Maybe it would be okay if we would go ahead with NRC's presentation right now, so that we have some continuity. Then we can go back to the NFPA-805 after that.

DR. POWERS: I guess what I'm interested in is the salient discrepancy or difference between 3G.1, 2 and 3L, the core uncovery question.

DR. SEALE: The what?

DR. POWERS: The core uncovery question, is that the really significant difference between the two?

MR. WEISS: From a regulation point of view, I think there is a difference. That's what the Office of General Counsel tells us. But I would also like to add the perspective that Appendix R is a design requirement. It says, in effect, the features of the plant, in order to be licensed, have to have these design characteristics.

Having said that, there are EOPs and EPGs and they tell licensees how to operate plants and they're a little bit different.

As was alluded to earlier, we have one set of EOPs that are symptom-based and we wouldn't want to tailor a set of guidelines for fires that were different than the other things that got you into this. You have one set of EOPs and the operators follow them and the licensees are required to do an analysis that shows that those EOPs are acceptable in terms of their implications for the core and public health and safety.

But as Mr. Gorman made reference to, whether you uncover the core or not depends upon the assumptions that you put into your analysis when you use the system, how many SRVs there are that are used. We have with us today, we have Dr. Ulses, from the Reactor Systems Branch, who can discuss the core thermal hydraulics perspective on this that we considered in developing a safety evaluation that is presently in concurrence.

MR. GORMAN: That's kind of a key point. Use of the system does not necessarily result in core uncovery. You could get to the point where you uncover the core when you use the system in conjunction with your emergency operating procedures, because they instruct the operators to wait until you depressurize.

Now, one of the things we had looked at at Susquehanna in terms of satisfying what appeared to be a legal concern relative to that was, well, we can tell the operator to blow down at minus 91 inches and then the core -- the level in the core, as well as the indicated water level, would always be above the top of active fuel.

And if we were to do that, then what we would be doing is we would be telling the operator to do something different in the event of a fire than what he's instructed to do for everything else that he does.

DR. POWERS: And that just gives me real pause to do that, because the more "if then" statements that you have in EOPs, the more chance there is for a mistake, because it's not clear the operators has perfect information coming in here to make -- to go through these "if then" statements.

Similarly, if the issue is -- if the telling discrepancy that we're worrying about is a momentary uncovering of the core, we have to understand that it's relative to the collapsed level, it's not a loss of cooling

to that core.

MR. GORMAN: Right.

DR. POWERS: And we need to be a little bit risk-informed here. This may be a highly deterministic regulation, but we can't ignore risk.

On the other hand, I'm also thinking of a grander scheme of risk. I don't want to put unnecessary stress on safety systems for events that are very frequent.

So I'm coming from a totally risk perspective on a deterministic rule, which is always going to get me in trouble.

MR. SIEBER: Well, it would seem to me that this method is seldom used.

DR. SEALE: Yes. Our experience --

MR. SIEBER: If at all.

DR. SEALE: Our experience -- this is one case where the experience base is large enough to be predictive of a relatively low level of having to resort to this procedure. You don't do that very often and there is enough experience to confirm that.

DR. POWERS: Is there, within our thinking on this, any reason to believe that that frequency with which we do these things is going to change? We might well think that, for instance, if we were pressurized -- I know, the pressurized reactors, that you guys go like this -- that we

could anticipate that steam generator tube ruptures might actually go up as an event that you have to handle.

DR. SEALE: Yes, but not on BWRs.

DR. POWERS: I was using that as --

DR. SEALE: I understand. Is there a generic problem like -- of similar import that could suddenly impose a high frequency of this kind of thing.

DR. POWERS: I mean, nothing comes to mind.

MR. SIEBER: Would it be satisfactory if I changed the order of the agenda to hear from the NRC on this matter at this time?

DR. POWERS: I think we ought to get it all in one package, if we can. We've got a little time, because the topic that's going to follow you has been truncated substantially and we can shift it later, if we need to. It's fairly important to get this all lined out, because this has some significant -- this has potential significant impacts on paperwork, if not some poor fellow having to walk down trays at Peach Bottom, which I wouldn't want to do for love nor money.

MR. SIEBER: I'd like to get it right the first time.

DR. BONACA: Can I ask just one more question? I'm intrigued by it. Was this issue created by the implementation of the EPGs?

MR. PRAGMAN: No.

DR. BONACA: So it wasn't the fact that the EPGs drive most scenarios in a certain way and, therefore, you must also address the Appendix R.

MR. PRAGMAN: If I could use Peach Bottom as an example, the EPGs were available just as we were developing our original Appendix R submittals and designs in the '80s and when we looked to the EPGs, we said let's find different ways of shutting the plant down that are a subset of the EPGs and get all the locations with cables and equipment for those.

So when it came to a way of shutting the plant down with low pressure systems, we asked GE how many SRVs are we going to need to protect to make this work. So it was kind of reverse engineering, figuring out, run different cases until they say, well, two is not enough, three is just right, four is more than you need, that's how many I have to protect, just three. So that was all worked into the design originally.

DR. BONACA: Okay. Thank you.

DR. SEALE: That was a very helpful presentation, by the way. Just at the right level. Very clear and you're very knowledgeable, so we appreciate that.

MR. HANNON: While Eric is taking the microphone, this is John Hannon, Plant Systems Branch Chief. There was

a question posed that I don't think we fully answered about the exemption process, and I wanted just to revisit that.

Were we to have an application for an exemption under 3L, yes, we would process and grant it. But what we're talking about now is a different case.

MR. WEISS: As the slide says, I'm Eric Weiss. I'm Chief of the Fire Protection and Special Projects Section in the Plant Systems Branch. What we have in front of us is a BWR Owners Group submittal that was submitted I September of 1999 to use safety relief valves in low pressure systems as a means of redundant post-fire safe shutdown.

This is distinct from alternatives, so we're talking 3G.1 and 2.

And was already said by the Owners Group, the reason this came up was that on certain inspections, it was not clear what this was acceptable or not.

The Owners Group position as that this was approved and it was part of their licensing basis and we were asked to go back and clear the record, so that there wouldn't be these issues during inspection.

Now, in considering this, there were certain regulatory background that we took into perspective. I mean, as a regulator, one of the things you want to do is you want to ask yourself is this consistent with what we've

done in the past, is this consistent with what we accept now in other arenas, what is the regulatory background.

And as I'm sure the committee knows, SRV and low pressure systems is part of the design basis of all boiling water reactors. It's used for loss of coolant accidents. So it's a fully safety grade system, very high quality components.

It turns out that SRVs in low pressure systems have also been accepted as part of the licensing basis for all boiling water reactors in order to meet the single failure criteria of GDC-34.

The NRC has an SE that accepts it for those plants, you know, if you have a failure in a single drop line, you're required by GDC 34 to have another means of reaching shutdown and it's been accepted for that purpose.

Also, SRV in low pressure systems have already been accepted by the staff widely as an alternative means; that is, it's a 3G.3 means. Now, the issue is will we accept it as a 3G.2 means.

DR. POWERS: And this is where they've been accepted by --the statement I have here -- as an exemption.

MR. WEISS: In some cases, that's the case, yes. The staff did a regulatory and core thermal hydraulic analysis and said that this was an acceptable way of achieving safe shutdown as a redundant means to meet 3G.2.

That was an internal memorandum from our Reactor Systems Branch to us.

And as I alluded to earlier, we have Tony Ulses with us, who can go into greater detail about the thermal hydraulics.

On 4-25 of this year, the staff met with the Owners Group to provide technical, regulatory, risk and legal feedback. We looked at seven major sub-issues during our review. The existence of plant-specific licensing bases on which the staff has approved SRV/LPS as a redundant means of post-fire safe shutdown, the Owners Group identified five plants. They said look at these SEs, and we did, we consulted with our Office of General counsel, we had our engineers look at it, and, indeed, we had approved for those plants the use of SRV/LPS as a redundant means of achieving safe shutdown.

I must say that in some cases, it took a little bit of effort, but we reached that conclusion, and it's because of that effort that it's unfair to expect an inspector to pour through pages of an SE and say, aha, I see the light, I see what you're talking about. And to be frank, in some cases, it was just too obscure for us to reconstruct all of the different pieces many years later as to exactly what was in the mind of the reviewer and what he thought he was approving and under what conditions.

So anyway, we found five cases where we're quite confident we've already approved it.

DR. SEALE: And there may be more.

MR. WEISS: And there may be more. I mean, it's certainly arguable.

MR. WHITNEY: Excuse me. This is Leon Whitney, from the Plant Systems Branch. It's interesting to note that if it was truly redundant, there would be no submittal required by the licensee. So the question initially going into that review was why is there being a discussion of this at all, wouldn't this be in response to an alternative shutdown request, which did require submittal in accordance with 50.48.

But even after that pause, thinking about that, when you read the words, you could come to the conclusion that it was approved redundantly.

MR. WEISS: Whether SRV hot shutdown procedure existed was one of the issues we looked at and the Owners Group produced EGP-4, which, as we alluded to, is a generic procedure, and we also looked at the likely depressurization, top of active fuel, the hot shutdown maintenance capability.

It turns out, as I'm sure the committee knows, that shutdown for a boiler is defined as above 200 degrees and that means that plants certainly have the design

capability and they have the operational capability, if they wish, to remain at hot shutdown for some length of time.

Latent heat or vaporization of water means it's not hard to stay above 200, particularly when you've got decay heat in the core.

We looked at the non-applicability of Appendix R 3L. That we got some assistance on from our Office of General Counsel. The non-applicability of the single failure criterion and the potential increase and risk from what we hypothesized in some cases could be the abandonment of the suppression and detection features that are required by 3L.

In other words, if you convert something from an alternative to a redundant system, and, to be frank, what we constructed was a deterministic SE, but we did look at the risk issue and we have with us Steve Dinsmore, of our PRA branch, to talk to that.

But the bottom line on it is it's in kind of a gray area. It doesn't preclude what we want to do and it doesn't shout for us to do it, either, but it's the way the risk analysis came out.

The number of protected SRVs for core thermal hydraulic safety during depressurization was another issue we looked at based on --

DR. POWERS: Let me come back to the previous

slide on the risk analysis. You said it was in a gray area. Can you give me some feeling for what the importance measures were from the risk analysis?

MR. WEISS: I'm going to defer the risk argument to Mr. Dinsmore and let him speak to that.

MR. DINSMORE: This is Steve Dinsmore. I did the risk analysis part of this. It was relatively difficult, because it was a generic analysis on something that's very situation-specific, and I have some slides, but I could also answer the questions directly.

There wasn't an importance measure, per se. What we did is we looked at the equipment that would be in a room, if this thing was called alternative, and the equipment which would be in the room if this path was called redundant, and tried to figure out the difference in risk from those two situations.

DR. POWERS: And could you give me a feeling for what the difference in risks were?

MR. DINSMORE: Yes. For specific rooms, we figured the risk could go up by a factor of ten if you labeled this thing redundant instead of alternative. In other rooms, the risk could go down by a factor of two if you labeled this path redundant instead of alternative.

DR. POWERS: Now, factors of ten and two get me excited if I'm working from ten-to-the-minus-four to

ten-to-the-minus-three. They don't get me too excited if I'm working ten-to-the-minus-eleven or ten-to-the-minus-twelve.

MR. DINSMORE: Yes. Well, the absolute level of risk has got more uncertainty in it. That's why I was kind of avoiding that. But if you take some kind of generic assumptions on area ratios and severity factors and that kind of -- and fire initiation frequencies, it looked like most of the rooms, when you called this thing alternative, would be less than ten-to-the-minus-six, quite a bit less.

So if you change it to redundant, you pick that up by a factor of ten. You're still kind of down in the ten-to-the-minus-six change.

DR. APOSTOLAKIS: For what?

MR. DINSMORE: Core damage frequency. There were some rooms that maybe, if you call this alternative, would be around ten-to-the-minus-six. So that when you call it redundant and you take out the fire detection and suppression equipment, it would bounce up to ten-to-the-minus-five or so.

And that's what Eric was meaning, that there's no real yes or on. We expected most things to be risk-insignificant. There might be some areas, these kind of outlier rooms -- it depends on what is in the room that you could get a risk increase of around

ten-to-the-minus-five and there might be other areas, again, where you'd get this little decrease, and we didn't really try to sum it up, because it depends on how many of these different types of rooms are in the plants and stuff like that.

DR. POWERS: But you've given me a feel for the numbers. Thank you.

DR. APOSTOLAKIS: And how many billions of information did you need?

MR. SIEBER: Seventeen.

MR. DINSMORE: I think I used about eight, but I wouldn't take this to court.

DR. APOSTOLAKIS: Eight billion.

MR. WEISS: Getting back to the issues that we looked at, we looked at the number of protected SRVs for a core thermal hydraulic safety during depressurization. We looked at some vessel material concerns related to the cool-down rate.

After looking at these issues, we decided that we could write an SE and we have one in concurrence --

DR. SHACK: Excuse me. Did anybody look at the frequency at which you would expect this to be used?

MR. WEISS: Well, obviously, the risk people did, but consider how many times in the -- how many hundreds of years of reactor operation we had this, how may fires have

produced this, you might be able to argue Brown's Ferry, but Brown's Ferry didn't have this system protected, according to this.

I guess the long and short of it is that if you use -- if the issue is the materials concern, there are separate caps on the materials issue. In other words, one would use up the vessel if one used this too much and that would be handled in a separate arena.

Does that address your concern?

DR. SHACK: Right.

DR. APOSTOLAKIS: It confuses me, but that's okay. Dr. Shack is helped.

DR. SEALE: But so far there's only one fire that would potentially -- if this system -- if this alternative were available and was a protective system, there's only one fire so far that might have brought this challenge into play.

MR. WEISS: First, I'd say that this system has been in the plants for a long period of time. We've approved it already, without dispute, on a number of them.

The issue now is are we going to accept it generically across the board, no argument, this is a redundant system.

So yes, this system has been in place and we're not expecting to see every fire result in the use of this

system. This is for the stylized fire that destroys all the non-safety systems, gets rid of the turbine and the bypass valves and the way you shut down ordinarily, gets rid of HPCI, gets rid of RCSI.

It's just terrible, it destroys everything, but the only thing left is SRV/LPS, and then the licensee's operators would enter the same EOP that they enter for a host of other events and shut down the same way with confidence that they had a protected system.

MR. WHITNEY: Let's take it to its logical extreme. The -- never mind. Thank you. It will just confuse things unendingly. I'll get myself in a hole. Never mind.

DR. SEALE: A wise man.

MR. WHITNEY: I was about to get legalistic with you, but we don't want to do that today.

DR. APOSTOLAKIS: So you expect to concur, is that --

MR. WEISS: Yes. We have an SE in concurrence now and barring some other tech review organization or OGC non-concurring in a way that would preclude us from processing the SE, I would expect it would be out --

DR. POWERS: Am I wrong in looking at this and saying that all you're doing is reconfirming what has been done since

apparently 1982?

MR. WEISS: We're trying to clear the air is what we're trying to do and I must say if you go back and look at SEs that were written 20 years ago and that were amended and you have all of these different plants out there with different reviewers, with different amendments and exemptions and so forth, it's not an easy thing to construct.

And so it's really unfair for everyone. It's unfair for the licensee and it's unfair for the inspector to put the burden on them to say, now, you go back and sort out this mess.

So the Owners Group came in with a proposal that asked us to clear the air, as you put it, and we think we have a regulatory context. We think we have a safety basis and we think we have a legal, a regulatory basis upon which to accept this, and our SE is in concurrence.

MR. SIEBER: When do you expect to issue the safety evaluation?

MR. WEISS: As I say, it's in concurrence. I could lose a lot of money by betting on the day that it comes out. I am asked to do that as part of my job for a number of things and I usually build in some contingency, because invariably it gets to some branch and somebody has a question. It's not just signing off on it, but they want to

have a meeting, they want to talk about it.

But I would think --

MR. SIEBER: I can withdraw my question, if you'd like.

MR. WEISS: I would think it would be a few weeks.

DR. BONACA: I'd like to ask just a question about how many BWRs do you expect to use SRVs and LPSI for safe shutdown, all of them?

MR. SIEBER: All of them.

DR. BONACA: Then the question I have is, I mean, you have a rule that says you have to use a HPCI in one method, the other one is RCSI and --

MR. WHITNEY: The smart thing for us to do would be to defer to the BWR Owners Group representatives to answer that kind of a question. However, if you look at the expense involved in reanalyzing your plant, and I must have heard ten times in my career from senior licensee officials that they just aren't going to reanalyze for the hell of it, because it costs real money.

I would expect that plants that already have the SRV/LPS redundantly in place, of course, will leave it. Plants that have it alternatively in place will leave it, and a very small number -- now let's hear from the BWR Owners Group.

MR. GORMAN: This is Tom Gorman with the BWR

Owners Group. We did a survey to check the number of BWRs that actually used the shutdown methodology and I think it was on the order of about ten or 12 out of the 20 or so plants.

Some plants use it in selected areas on a selected basis and others use it very widely as a shutdown methodology. We talked a little bit the contrast against HPCI and I think when I look at all the available paths out there for safely shutting down the plant, I think if you get to the point where you're using any of them, it's going to be a challenge for you for this kind of an event.

DR. BONACA: I wasn't questioning that. I thought that the number would be larger. In that case, I would have a problem in having a rule that says you have to have this and that and then there is an exception that seems to be the rule. But that's not the case.

MR. WHITNEY: The exception has always existed for alternative, as a planned exemption, based on submittal. The question here is whether or not the redundancy is inherent within the rule. I think that's what we're trying to answer.

The BWR Owners Group position was that it was and is and the SER that's currently in concurrence agrees that it's inherent within the structure of 3G.2 and 3G.1.

DR. BONACA: Okay.

MR. SIEBER: Any additional questions? I think this whole matter is complicated to understand, and so I appreciate all the information that you've provided to me, because I think I do now understand it. I hope there's no written test, however.

MR. WHITNEY: I could pass it, having worked in the area every day. That's about it.

MR. SIEBER: Well, as long as you give the same answers every day.

What I would like to do now, Mr. Chairman, if you don't mind, is move on to the NEI presentation on --

DR. POWERS: I wonder if it would be appropriate to take a break at this point. So why don't we come back at 25 after the hour, and it allow us to at least clutch and then we can shift gears.

[Recess.]

DR. POWERS: Let's come back into session. We're going to be discussing a new and different issue.

MR. SIEBER: More complicated, I hope.

MR. SHUMAKER: We can make it that way.

MR. SIEBER: No, no.

DR. POWERS: Don't feel any obligations.

MR. SIEBER: Well, I respect the fact that you waited for us and allowed us to rearrange the agenda to help us pursue to some conclusion on our first topic, but what I

would like you to do now, Mr. Emerson, is introduce your fellow speakers and give us your presentation on NFPA-805.

MR. EMERSON: Thank you. As usual, it's a pleasure to be here. The purpose of my presentation is basically to introduce Denis Shumaker's presentation, since his Salem plant was the subject of the pilot evaluation which is nearing completion on NFPA-805, and he is supported by Bijan Nijafi of SAIC.

DR. APOSTOLAKIS: It confuses me a little bit why NEI is introducing the NFPA standard.

DR. POWERS: Because we asked them to.

DR. APOSTOLAKIS: Is that the reason?

MR. EMERSON: I'm sorry. Because we are producing? I didn't understand your question.

DR. APOSTOLAKIS: Why are you introducing the NFPA standard? That's a society, isn't it? They should have -- why is it -- what role is NEI playing in this?

MR. EMERSON: NEI has been supporting the standard, from an industry standpoint. We asked EPRI to fund the pilot evaluation for it and we have basically just a central point for all of the industry activities.

And rather than have the same speakers that we had two and a half weeks ago, I'm just planning to summarize what many of them said and introduce Denis. That's why.

MR. SIEBER: You also have a companion NEI

document. I guess it's not truly a companion, but it's an implementation guide.

MR. EMERSON: Yes. We will be doing one. We don't have it yet.

MR. SIEBER: You have pieces of it.

MR. EMERSON: We have one guide that's under development for circuit failures, which is not at issue here, and once the standard has been approved and is out, then we will be writing an implementation guide in furtherance of the NRC's rulemaking to adopt it.

MR. SIEBER: Thank you.

MR. EMERSON: I'm going to go through this presentation fairly quickly, because as I say, the real meat of the discussion comes in what happened during the pilot evaluation at Salem.

The NRC direction for working on the standard came from several documents, the most recent of which was the SRM for SECY-98-058. This slide provides an indication of the Commission's direction to the staff and supporting the development of 805, and both industry and staff personnel for the last several years have provided extensive support for this standard.

In terms of process, there's been a lot of process that's -- a lot of water that's gone under the bridge up until now. This slide represents what remains ahead of us.

On November 15, in a couple of weeks, the NFPA membership will vote for whether to adopt the standard or not, based on its current format. The options that the committee has, that the membership has is to either accept it as is, to accept it based on four amendments that are offered at the time of the meeting, or return a portion or portions of the standard to the committee for additional work, or return the entire standard to the committee for additional work.

Those are the options that lie ahead of the NFPA membership.

If it's approved, the NFPA Standards Council will issue it in January and it will be published in March and April.

MR. SIEBER: At this point, though, it is not a mandatory requirement, it will be something that licensees can accept.

MR. EMERSON: The necessary is probably better equipped to deal with this than I am, but the process by which it becomes a requirement is the rulemaking process that the staff has currently begun.

DR. POWERS: Well, there are a lot of things to be done, need to be done. A rule could become an acceptable way of meeting the existing requirements.

MR. SIEBER: Like a reg guide.

DR. POWERS: Yes.

MR. EMERSON: The document is organized into six chapters and six appendices. The NFPA style requirements provide that the body of the standard is enforceable; in other words, if the rulemaking adopts it as a requirement, then what appears in the chapters is enforceable.

The appendix material is for information or guidance only. It's just an acceptable way of addressing the requirements that appear in the basic chapters. And this document applies to existing light water nuclear reactors.

I will spend a couple of slides just giving an overview of what is in the various chapters.

The first chapter provides goals, performance objectives, and performance criteria to lay the groundwork for the application of the rest of the standard. It addresses nuclear safety, radioactive release, life safety, and plant damage, and business interruption has been at various times in the standard, but it's been deleted from the final revision.

Chapter 2 is based on the goals, objectives and criteria established in Chapter 1 and it provides for either performance-based or deterministic options for addressing the issues.

Chapter 3 provides a fundamental set of program

elements for the standard that are, for anyone adopting this in its entirety, each -- the licensee would have to fulfill these requirements.

These requirements are things that are deemed necessary for any plant using the standard that they have to do. There are options for other program elements beyond these that are performance-based, but Chapter 3 consistently throughout the standards development has been deemed to be prescriptive and that was deemed to be the way that these fundamental elements would be implemented.

Chapter 3 addresses such things as the fire protection program and administrative controls and procedures, the fire brigade activities and content and the organization and the fire protection systems and components.

Chapter 4 is where you get into the determination of fire protection systems and features. It requires one success path to remain free of fire damage and it permits the use of either performance-based or deterministic approaches. It references back to the methodology that was established in Chapter 2 for these things.

Chapter 5 addresses fire protection during decommissioning and plant shutdown, which is basically a deterministic approach. And Chapter 6 is just a summary of NFPA references.

DR. SEALE: Recently, we have been infatuated with

the problem of spent fuel storage fires and this is, in part, in connection with decommissioned or shut down plants.

Are spent fuel fires included specifically in your Chapter 5 or is that another issue?

MR. EMERSON: Denis tells me that they're addressed in there.

MR. SHUMAKER: Right.

DR. SEALE: It is included.

MR. SHUMAKER: That's correct.

MR. EMERSON: The appendices, Appendix A provides explanatory material for information in the rest of the standard itself. It expands on specific points, provides additional guidance, et cetera, for specific requirements that are laid out in the body of the standard.

Appendix B provides an acceptable method for demonstrating that cable and equipment damage for those types of things, that sufficient equipment remains available to address the nuclear safety performance criteria which were laid out, and, again, those criteria are in the areas of reactivity control, inventory and pressure control, decay heat removal, vital auxiliaries which support those functions, and the process monitoring which supports those functions.

Appendix C provides for the fire modeling and it indicates methods and considerations for doing that.

Appendix D describes the use of fire PSA methods in the standard, which support the change analysis process, which is embodied, I think, in Chapter 4, if I'm correct.

Appendix E provides, again, more guidance on the deterministic approach for addressing fire damage and business interruption. And F, again, is publications which support Chapter 6.

As I indicated, the NFPA Technical Committee on Nuclear Facilities has been working on this standard for several years now. This process started without a model of an effective performance-based fire protection standard to work from, since the NFPA is in the process on several fronts of establishing such types of standards.

So basically the committee started from scratch and had a lot of work to do to develop an effective performance-based standard, when the only guidance that we had available was the prescriptive methods that existed in the existing regulation.

So I would say having observed this process for the last two years, that the committee has made considerable progress in the right direction toward achieving a true risk-informed performance-based standard.

The process, the NFPA process will permit revision of the document if new information comes to light.

An overview of the use of PSA within the standard.

The fire risk evaluations include an analysis of core damage frequency and LERF. The criteria for whether these are acceptable are determined by the AHJ or the authority having jurisdiction, which, in most cases, is the Nuclear Regulation Commission. These evaluations, similarly to Reg Guide 1.174, have to consider defense-in-depth and safety margins and you can't come to a conclusion based on risk alone. Those other factors have to be weighed in.

Uncertainty has to be evaluated and all potentially fire risk-significant scenarios have to be considered.

The methods that have to be used have to be acceptable to the AHJ and Appendix D provides acceptable methods that can be used.

The risk-informed approach requires PSA evaluations for all changes that use a performance-based approach. These PSA evaluations can include qualitative or quantitative evaluations of the modes of operation.

It requires monitoring, availability, reliability and performance in order to validate the assumptions that were made in the PSA analysis, and, obviously, supporting documentation, as well.

One of the discussions that took place during the development of the standard was whether it should require a full risk evaluation for the use of the standard.

Initially, we started out that way, but after a while, it became apparent that that might be an unnecessary burden. So we revised it to include a change method that required a PSA evaluation to support changes rather than being necessary for the standard as a whole, since a deterministic approach is also allowed.

In the area of fire modeling, it's a performance-based approach. The performance criteria are established in the area of identifying equipment and targets, damage thresholds, fire scenarios and determining the protection required for equipment and targets, and the risk evaluation and change analysis provide for the likelihood and extent of fire damage.

For completing the standard, I indicated earlier what the steps were ahead of the NFPA for doing that. From the industry standpoint, the potential benefits of having the standard in place are it provides an alternative performance-based risk-informed licensing basis as an alternative to the existing basis.

Not a mandatory one, but an alternative that a licensee can choose to adopt within the context of the rulemaking that's underway.

It provides, also, if a plant does not choose to change its entire licensing basis in line with the standard for a -- provides a context for the use of risk-informed

tools to support exemptions and deviations within the current basis.

As we discussed somewhat during the subcommittee meeting several weeks ago, these tools do exist, but the standard provides a framework and a established guidance for using them in the regulatory arena.

Now, we support completing and implementing the standard. We have been supporting it for the last two years. We think it is going to provide useful tools, and I think Denis will give some indication of what is usefulness is in his talk.

But there are issues that still need to be addressed, and I will spend a few minutes going through what those issues are.

The principal industry issues are, first, on this slide, with Chapter 3. As I indicated earlier, Chapter 3 provides for the fundamental elements that will apply to any fire protection program for a licensee who chooses to adopt this standard.

We have no difficulty with the concept of fundamental elements that apply across the board, but we feel that a risk-informed performance-based standard ought to allow more flexibility for the way that you achieve these fundamental elements than the current standard does.

DR. POWERS: This is the 256 foot fire hydrant

issue here?

MR. EMERSON: That's one example.

DR. POWERS: That's an example of where the prescription has been retained in a less than flexible manner, because you can't ascertain why 256 and not 257 or 255 or something like that.

MR. SIEBER: It's how long the hoses are.

MR. EMERSON: We believe that there are ways that don't degrade the importance of the fundamental element and then there are alternative approaches that can be taken, and it would be a benefit to the licensees who will be asked to consider adopting this or who may consider adopting this to have more flexibility and equal validity in the methods that they might consider.

The other factor is that it adds new requirements that aren't addressed in current licensing bases, which, by itself, is not necessarily bad, but if the licensee has no flexibility in how he does it, then he might be forced to spend a significant amount of money, what we would feel unnecessarily, to achieve the goal of the fundamental elements.

DR. POWERS: That's the step that perplexes me a little bit and presumably we've gathered together an array of people that have expertise in fire. They came down and they said, okay, you need this fundamental element. Now,

that fundamental element didn't happen to appear in Appendix R or any other kinds of regulations.

But I don't know that anyone ever claimed that the people that authored Appendix R were all knowledgeable and all saying. Why shouldn't we just accept the fact that the fire protection community now believes this is really honestly required, to have an adequate fire protection?

MR. EMERSON: Again, it may be required, and, again, it's not necessarily -- that's a fact that we have a requirement to do something that hasn't been addressed previously. It's the way in which it's specified that it has to be done. We don't necessarily argue that this requirement should exist in the standard. It's just that if you allow no flexibility in how it's done, then the licensee is --

DR. POWERS: If it was part of your first bullet, I'd say fair enough.

MR. EMERSON: The two are interactive.

DR. POWERS: If that was the concern alone, but it seems like it's just that it's in addition to a requirement. The world has moved on. They know more now than they did when they wrote Appendix R.

MR. EMERSON: Have I answered your question?

DR. POWERS: I'll sit here and say it's all part of the first bullet.

MR. EMERSON: It's closely tied to the first bullet.

MR. SHUMAKER: I'll talk about it more.

MR. EMERSON: Yes. Denis will elaborate on it a little bit later. I don't want to steal Denis' thunder here.

DR. POWERS: Sure.

MR. EMERSON: Okay. The other issue is the circuit analysis provisions in Appendix B. In NEI, we've spent a lot of effort over the last couple of years, in cooperation with a number of industry groups, to develop a risk-informed method for dealing with circuit analysis and the Appendix B, the way it's currently configured, is basically a prescriptive method for how to do it, with the exception that it allows for the use of other risk-informed methods that are with the authority having jurisdiction.

We believe the appendix needs to go farther in B an adopt the same sort of risk-informed approach that the process that we're developing will have. That process isn't done yet, but we've provided a lot of information on how it's supposed to work.

But we feel the standard would be better served if the guidance that's in place matches up much better than it currently does with the prescriptive nature of the circuit analysis guidance that's in there now.

MR. SIEBER: On the other hand, if the standard is adopted, it's voted out by the membership, then what's in there now becomes the fact of the standard, is that not correct?

MR. EMERSON: That's correct.

MR. SIEBER: So it would require a future revision to modify that, except to the extent that it's in an appendix, which means it's not enforceable.

MR. EMERSON: If the standard is adopted and the appendix stays the way it is, then the provision in the appendix that allows the use of other methods would still allow the use of the method that we're developing.

DR. SEALE: That's probably what your people would invoke.

MR. EMERSON: I expect that would be the case, yes. We would like to see it not be an exception to the rule, but the guidance that exists overall.

MR. SIEBER: Let me ask a couple more questions about associated circuits. It seems to me that this has been an issue for a long time and part of that issue stems from the fact that not everybody interpreted what an associated circuit was and how it's to be analyzed and what the definitions are, the same way through the years, which has caused some confusion. Is that correct or not correct?

MR. EMERSON: There have been differences between

the staff and the industry in how the regulatory guidance that's supported the regulation was interpreted, and primarily Generic Letter 86-10 yes.

MR. SIEBER: Now, when I look at the NUREG that is basically the staff's inspection plan for fire protection, which is 7111.05, the latest edition of that, which came out in September of this year, has a caveat in it regarding inspection of associated circuits, which basically tells the inspector he doesn't have to inspect specifically for associated circuits, that if he runs across one in the course of some other aspect of the fire protection inspection, that he should note it as an unresolved item.

And this is sort of an exemption that's pending work that NEI and the industry are doing to further define what the expectations are for the analysis of associated circuits.

Could you describe two things, one of them, what is that you're doing, for the benefit of the full committee, and what do you hope to achieve and when do you think you will be in a position to have achieved it?

MR. EMERSON: What we're doing, to respond to your question, about two years ago, when we had spent some non-productive meetings just arguing the issue with the staff, we had the staff put on a workshop where we proposed the use of a risk -- development of a risk-informed method

for -- rather than continuing to argue on a strictly licensing basis, to determine the safety significance of these failures that we had been discussing.

We formed a committee, a task force to do that. The task force is developing a document, designated as NEI-00-01, that provides a combination of deterministic circuit analysis practices based, in large part, on what the BWR Owners Group has developed, but extended to PWRs as well.

And it will have two risk-informed methods. One is a preliminary screen for the use of the method and one is a tail-end safety significance evaluation method as one means of mitigating the potential circuit failure if the analyst has determined it to be a potential issue.

So what we hope to gain from it is to determine whether, on a plant specific basis, whether circuit failures that are of concern to either the staff or the licensee to determine if they are -- how -- what level of risk significance they pose.

I won't speak for the staff and what they hope to gain from it, but that's what we hope to gain from it. Remove it from the issue of you should have done this versus you should have done this and come up with a more objective means to measure the significance of actual failures, rather than generalize about the significance of potential ones.

And as far as when it will be done, we will -- one of the key elements that will be supporting this activity is a series of tests which we expect at this point to be conducted in about a month from now. After that point, we will finalize our document. We will conduct an expert panel to develop probabilities from the results of the testing and earlier testing that's been done in support of this.

We will conduct pilot evaluations at several nuclear plants and we expect to submit it to the staff late in the first calendar quarter of 2001.

MR. SIEBER: I presume you're familiar with the June 13 document, which is the letter report from Sandia National Laboratory, circuit failure mode and likelihood analysis.

MR. EMERSON: Yes.

MR. SIEBER: Are your methods in general agreement with the findings that Sandia found in that report?

MR. EMERSON: We had some initial concerns about the Sandia report, which we -- we've had a number of discussions with them about it. The principal concern had to do with the direct association of a hot short with a spurious actuation, whereas in reality, there's a lot of things that have to happen before a hot short becomes a spurious actuation.

Sandia spent a lot of time and effort going

through existing test reports, some of which is work they had done and some of which is work that outside groups had done, and I thought did a very good job of summarizing the results.

MR. SIEBER: That was basically their approach.

MR. EMERSON: Yes. Now, I think we're a little bit concerned about the high value that they place on the potential for hot shorts and we would like to --

MR. SIEBER: Like .7?

MR. EMERSON: Something like that, yes.

MR. SIEBER: Yes. That was interesting.

MR. EMERSON: And while our testing is designed not specifically to address the Sandia number, it's intended to broaden the evaluation so that we can assess the impact of a number of different parameters on what does influence the likelihood of spurious actuations.

We would hope that the number ends up being somewhat smaller than that.

MR. EMERSON: Well, I think the .7 number was a number that said that if I have a group of cables in a cable tray of a certain -- I think they were referring to 14 American wire gauge and poly insulation, that the likelihood of getting a hot short was .7, but they did not go beyond that, as I recall, to say that that hot short that you got would result in a spurious actuation of a critical piece of

equipment.

I think that that's the area where risk information becomes important.

MR. EMERSON: They've clearly distinguished since then the difference between the two in discussions that we've had.

MR. SIEBER: So you don't see yourself in basic conflict with the circuit analysis methods that they used.

MR. EMERSON: I don't see a conflict. I'd say we'd like to -- they have reviewed a lot of testing which was the applicability of the testing to the conclusions and issues that we're trying to deal with are somewhat questionable. They've tried to look for everything that could possibly bear on the determination of probability and they've done a good job of looking at all that information.

What we would like to do is to expand on the knowledge that we have in that and to come to more pointed conclusions as to the likelihood of these things.

MR. SIEBER: But the amount of tests that you would conduct would not be statistically important enough to say that you're establishing a new database, I would presume.

MR. EMERSON: That's correct. We aren't going to be doing hundreds of tests to address that. Since our subcommittee meeting, we have taken your suggestion and had

it reviewed by the University of Maryland, our proposal, and they have provided some additional suggestions, which we have incorporated and they indicated that generally we were pretty much on the right track for the type of information we would be able to glean from this round of testing and addressing the parameters that were important.

MR. SIEBER: I'm sure this committee would like to hear the results and your progress in this area as it unfolds.

MR. EMERSON: We'll be happy to provide that information.

MR. SIEBER: I have one final question. You had a slide that was entitled NFPA-805 Process, which was the calendar of future events. It was right in the beginning, the fourth slide. Prior to November 15, however, the committee itself had to vote out NFPA-805 in order to get it to the full membership vote.

MR. EMERSON: Right.

MR. SIEBER: And I understand that vote was not unanimous.

MR. EMERSON: I don't know that I can do justice to the methods that accompanied the vote and what the exact conclusions were.

MR. SIEBER: I'm not trying to drag out who voted what way. On the other hand, perhaps you could give us an

indication of those who did not vote in the affirmative, what their concerns were, in general.

MR. EMERSON: Well, there were a variety of issues that were being voted on and it wasn't all a -- some parties who voted negatively on things were concerned about some issues. Other parties were concerned about other issues.

So it wasn't -- we weren't just lining up for the -- you know, the NRC may have been -- representatives may have been concerned about certain things, industry representatives may have been concerned about other things.

So not all the negative votes pertained to the same issue.

MR. SIEBER: Does anybody else have questions?

DR. APOSTOLAKIS: Yes, I do. I'm sorry, go ahead.

MR. LEITCH: I just had a follow-up on Dr. Seale's question of a few minutes ago regarding whether the spent fuel issue was discussed in Chapter 5.

Somebody, I think, answered affirmatively, that it was. But it looks to me, though, that Chapter 5, in the intent, is referring specifically to ISFSI facilities, and I really think Dr. Seale's question was getting at the window where a decommissioned plant still has spent fuel stored in the spent fuel pool rather than the ISFSI.

And I guess I'm wondering, is that -- I don't see where that's covered in Chapter 5. Maybe it's implied, but

Chapter 5 seems to be speaking more to --

DR. SEALE: It's conceivable that the position would be that the same rules apply for the spent fuel pool during operation.

MR. LEITCH: During operation, yes.

DR. SEALE: That would still apply in -- you pass that window. Now, I don't know, that might be the position you take.

MR. LEITCH: It's just not quite clear here.

MR. SHUMAKER: I'm Denis Shumaker. I guess what I would submit to you is that to get into NFPA-805, there's a number of elements that you need to look at. One of them is radioactive release and within that element, you do need to look at those parameters.

I would also suggest that that would be a component, as well, of Chapter 5. It's a requirement of the standard itself to look at radioactive release in general.

DR. SEALE: Well, there's some real hairy physics and chemistry right along in there.

MR. LEITCH: I understand.

DR. SEALE: That we haven't been able to get all the answers we would like to have, and that's not something that's going to happen anytime soon on the kind of period you're talking here.

MR. SIEBER: It's probably unlikely to happen in

805.

DR. SEALE: Yes.

DR. APOSTOLAKIS: I guess we're not reviewing the standard itself today. We'll have a presentation on the pilot.

MR. SIEBER: Well, it's not approved yet, so I think this is just a briefing to bring us up-to-date.

DR. APOSTOLAKIS: I must say I'm having a problem, the same problem that I had with the ASME standard. I don't know that if I pick up this standard, I will know what to do. In particular, if I went to Appendix D, which has a title Use of Fire PSA Methods in NFPA-805, and basically tells me that I have to consult nine references which are reports in order to see how I could actually do it.

If the purpose of a standard is to facilitate review from the NRC staff, this doesn't do it.

DR. POWERS: I think that's the point that emerged most clearly concerning 805 in the subcommittee meeting, is that with respect to the risk-informed portion, it is not a how-to on the risk analysis. And, in fact, they look to some other people establishing the standards on how to do the risk analysis.

MR. NIJAFI: This is Bijan Nijafi. I'm sitting in for EPRI. In fact, Appendix D, that's how the initial draft of it started and then later on in the process, it was

recognized it's not the presence of a standard, to write a guide, to write a guide even as part of its appendix.

So it was concluded the best thing is to raise basically the level of instruction, provide basically what you need to cover when you do a risk analysis, but to get to the how-to in a guide, sort of in order to preclude future evolvement of the techniques and methods and even then fact that there are more than one acceptable methods, there is not only one.

Just leave that to the supporting documentation as long as they meet certain attributes. So we decided to basically talk more of attributes in the Appendix D as opposed to a guide or a how-to.

DR. APOSTOLAKIS: I still don't know how supporting these references are, because I see reports from all over the place, some dated back to 1983, and I think you would be better off just deleting all of them.

I mean, if I view this as a set of minimum requirements, high level requirements, maybe then it's okay. But other than that --

MR. NIJAFI: I would call it more an attribute of what is required of you when you're going to do that, I mean, things you -- minimum requirement may be one word, but --

DR. APOSTOLAKIS: It's obscure. It's obscure.

For somebody who hasn't done it, to be hit with a sentence, if the analysis partitions and empirical fire frequency is the partitioning method, should reflect the physical characteristics. That doesn't mean anything to people who have not done a fire analysis. Unless I've done the analysis, partitioning empirical fire frequencies means nothing to me.

So I don't know how helpful this is.

DR. POWERS: Well, I guess the question really is, is it the objective of the standard to train people and I think what you're telling us is that no, it really isn't. That an untrained person would never be reading that appendix or should not be reading that appendix. They should be reading something else first.

MR. NIJAFI: And you can -- I'm sorry -- you can say the same thing about what is in the fundamentals in Chapter 3, not a fire protection -- somebody who is not a cognizant fire protection engineer would not recognize a lot of the words that's in Chapter 3 or the rest of it, or pick up NFPA-101, you won't understand probably two-thirds of it if you're not a fire protection engineer.

DR. APOSTOLAKIS: Well, where I'm coming from is I've heard a lot of discussions that with the ASME and ANS and NFPA standards, the whole process of risk-informing the regulations will be accelerated. And what I'm saying is

that it will not. It was a misplaced hope.

Now, I may have misunderstood the purpose of these standards, but I don't think that the staff can do much with this.

MR. NIJAFI: Appendix D is not intended to risk-inform, in and of itself, anything. It just says that if you know what you're doing in your process, the main body describes the process. So if you know what you're doing there --

DR. APOSTOLAKIS: That's my problem. There is my problem. If you know what you're doing, you don't need this. And if you publish it because you expect the NRC staff to nod its head and say yes, they're not going to do that, because they have to look at the detail. So the big question, in my mind, is why publish it.

But then, again, other people feel other ways, so. I mean, if the staff has to review the details of your analysis and I have to have an expert to read this to understand it, I really don't understand what the purpose of the standard is, but maybe I have the same problem with all standards.

Now, you say here some things that I see that have value, like the analysis should include consideration of seismically induced fire scenarios. I mean, that's specific, that tells me I have to do that. Now, how to do

it is a different story. But the rest of the stuff is -- anyway, that's one man's view.

MR. NIJAFI: Well, that's been the challenge of the whole process. We have about 60 people --

DR. APOSTOLAKIS: I'm sure you were challenged.

MR. NIJAFI: -- the consensus that, I mean, you get 60 opinions.

DR. APOSTOLAKIS: I guess we'll have to have a regulatory guide someplace.

DR. POWERS: I think I'd like to challenge, it's emerging, is that the risk assessment community has to hone in on the approaches and methods and ways of doing things in a consensus and not ask the fire protection community to do that.

DR. APOSTOLAKIS: Well, if I want to be a little negative here, all these things have been put on hold because the NFPA has been developing the standard. So, I mean, if a society with the prestige of this particular society says we're going to develop a standard, I don't think anybody else would be willing to spend money doing that, but evidently now, after the standard, they will have to do it.

MR. EMERSON: I think the purpose of the NFPA was to develop a standard for fire protection programs rather than a standard for fire PSAs.

DR. APOSTOLAKIS: But if the PSA is part of it -- I think I made my view clear. Do you want me to repeat it?

MR. SIEBER: Okay. Are there any further questions? If not, what I would like to do is invite Denis Shumaker to give his presentation based on the experiences of the pilot plant at Oak Creek? Salem.

MR. SHUMAKER: Salem. Salem.

MR. SIEBER: Close.

MR. SHUMAKER: Thanks, John. As John said, I'm here to discuss today the EPRI pilot of NFPA-805, and Bijan Nijafi, who spoke previously, is on my left. He is the project manager basically for the project and a significant contributor. So he is here, as well.

First of all, I'd like to thank you for the opportunity. We've done a lot of work on this and we appreciate the opportunity and the interest on the part of ACRS to listen a little bit and ask how the pilot went.

AS you will notice, we say in the first slide that the pilot is a -- this is preliminary results and while I would suggest that most of the learnings, we believe, have been identified, the pilot is, in fact, a work in progress and it will complete in the next presumably by the end of the year, I think is our current target.

I am going to talk briefly about what the benefits are and I'm going to take the opportunity to reiterate my

support of risk-informed performance-based standards, why a pilot, why we as the industry decided we wanted to do a pilot of the standard, why Salem, why did Salem put their hand up and volunteer to be the pilot.

Then we'll talk about some of the results and conclusions of the pilot.

First of all, and, again, I know this is somewhat reiterative, but use of risk-informed performance-based strategies gives us the ability to better understand and manage our risk, and in this arena, our fire risk. We were also one of the pilots for the SDP functional inspection process and I think the learnings we've had through a couple evolutions, that and the opportunity to be part of the pilot, we're already starting to implement some of the insights that we've gained from that opportunity.

We did have the opportunity during the IPEEE to have some similar -- to understand those benefits, as well. We're going into a more refined mode at this point.

Use of these in the NFPA standard or the guides provided in NFPA, and I will basically allude back to what George said, this isn't really a bunch of new tools and new stuff. There is some new things in it, but, in general, we're just consolidating and we're pulling together the existing tools we've had in the industry, the existing documentation, kind of standardizing it and putting together

a package.

So this provides us with a basis for reviewing fire protection attributes by, first of all, assessing the current plant configuration and better understanding fire risk in that environment; understanding fire protection issues that arise, that would be impairments or problems that come up in the plant, and understanding and relating those to fire risk and using that for things like how quickly do we need or should we respond to those issues.

And it also gives us an opportunity to look at different modifications that we do. Often, when a plant is going to perform a modification, they have a couple avenues to do it and by having a good tool, you can actually look at the various options and understand which modification option gives you the most risk benefit.

So we are looking at those and the bottom line there is it allows us to spend our dollars where we can get the most risk gain and most risk benefit within the plant.

Why pilot? We wanted to test the standard. We wanted to determine whether it was complete, whether it was practical, whether it was cost-effective, and whether anybody would use it, and whether it was useable either in whole, that would be as a substitute for your current fire protection program, Appendix R, if you will, or useable in part, maybe to substantiate exemptions, deviations and the

like.

How did Salem get involved? We have an issue with fire wrap at Salem. We're looking at some of the areas. I looked at the hazards in the room, the room geometry, the defense-in-depth features and risk-informed performance-based strategies seemed to make a lot of sense.

So we did a feasibility study of a number of areas, I guess 18 fire areas in the plant that had wrap and we concluded that several of them had a very high success potential and, again, you don't really need the tools to see it.

You go into these rooms, there's basically no combustible loads, there's suppression. Cable trays are very high in the room and they have the fire -- some fire resistant barrier applied to them already.

So we volunteered to participate in the pilot and are looking at risk-informed performance-based strategies for some of the resolution.

I'd like to go into and talk a little bit about the pilot. First of all, NFPA-805 has a number of performance criterias contained with it. The first one, the one we think about most, I think, is the nuclear safety component. There's also the radioactive release component, the life safety component, and then the property damage and business interruption component. We've piloted actually

the nuclear safety component and radioactive release component and have not piloted life safety or property damage and business interruption during the pilot.

Now, the elements that we exercised in the pilot include the fundamentals that Fred talked to you about previously in Chapter 3. Fire modeling, change analysis, other modes of operation, radioactive release, and the programmatic issues that are contained within the standard itself.

I'll start by talking briefly about the fundamentals section and the results of that. AS mentioned previously, these are considered -- the attributes of Chapter 3 are considered to be a basic element of a fire protection program and the standard requires that you meet those elements.

It does provide some allowance for items that were previously reviewed and approved by the NRC as being exemptions or having precedence. But basically, this is the foundation type documents for a fire protection program.

And I think one of the significant issues to consider here and one of the things the pilot looked at a lot was that there are a number of different pieces of Chapter 3 and some of those pieces are things like control of transient combustibles and control of ignition sources and things like that, which are important and difficult

maybe in some respects to performance-base. There's other attributes, as well, and some of those come out of existing NRC guidance.

But one thing to consider now is as and if we move 805 into a rule, basically it no longer becomes a guidance document, which has some flexibility in the part of the staff and the utilities for options, but it now becomes a regulation which becomes more of a legalistic attribute as far as reviewing and working within those standards.

From a results standpoint, the pilot plant complied with most of the elements or we had an alternate strategy in place that had been previously reviewed and accepted by the NRC.

There are attributes of Chapter 3 that are not performance-based and possibly could, and I provided a couple examples. One of them is metal trays and conduits for electrical raceways, and that's pervious guidance and it makes good sense, but we do have cases, for instance, where we've used core duct sleeves embedded in concrete or other types of raceways in the plant.

Another one would be separation of fire pumps with fire barriers. Again, previously, we required separation between fire pumps with a fire barrier, the 805 talks about separation of the fire pumps from the building with barriers, and it's actually more prescriptive and more

restrictive than Appendix R, which would allow you to use spatial separation and things like that as part of your requirements.

DR. POWERS: Do we understand why the authors of 805 took the more restrictive point of view?

MR. SHUMAKER: I wasn't a participant in enough of those meetings to know how all that transpired.

MR. SIEBER: Fred?

MR. EMERSON: As to how it got that way, it was introduced by -- each of the sections of the standard had a writing committee to develop them, in which there were various participants, some were industry, some were NRC. And the result of the committee development of Chapter 3 was this.

The committee negotiated and ended up in this particular boat.

And as the speaker who addressed the subcommittee on Chapter 3 indicated, there was a number of votes relative to Chapter 3 during the process of developing the standard and consistently the committee supported the prescriptive approach.

The details fluctuated somewhat from vote to vote, but generally the prescriptive approach was upheld by the committee.

DR. POWERS: What I'm coming back to is -- I mean,

here is a requirement that's more restrictive than what you would have under Appendix R and we have all these luminaries of the fire protection field have gathered and come to the conclusion that you need something more than what's in Appendix R.

Knowing something about how these things get written, it could be an accident, somebody wrote it down and nobody ever looked at it to see if it really was more prescriptive, that there was some rationale for it, or to be some conscious decision on the writing group that said, no, what's in Appendix R is just not adequate, that we have to have a more stringent approach here.

I'm trying to understand how they --

MR. EMERSON: I'm sure it was a conscious decision and I'm sure it was debated back and forth before, first, the writing committee and then the full committee decided that that was the appropriate way to characterize it, but I doubt if it was an accident.

MR. SIEBER: I would imagine, though, and just picking up on your point, Dana, that there ought to be a technical basis when you make something more prescriptive.

For example, the 20-foot separation criteria that you have for alternate safe shutdown is there because of some analysis of what a fire does in a room in a certain location with regard to the plume and heat and so forth.

The same thing that occurs with fire pumps, for example, there is a certain inventory of combustibles, which is basically the lubricating oil or a diesel, a fuel tank or day tank, that can create a certain size fire that will last a certain length of time in a certain geometry that says either I put a fire barrier up or I move the next one far enough away that it's not affected, and somebody had to do that, I would imagine, in order to come up with a rule like this.

DR. APOSTOLAKIS: Well, Jack, we've been told many times that a lot of the regulations that we have in place were developed without any such technical analysis and why should they be any different from us.

MR. SIEBER: But that was supposed to be the method of the past and now we're supposed to be enlightened and risk-informed.

DR. APOSTOLAKIS: No. It took us 25 years to get to be risk-informed and for those guys, it's still new.

MR. SIEBER: What I'm saying is that perhaps we need further advancement or further scrutiny for some of these or at least some flexibility so that you can make a technical judgment on your own.

DR. APOSTOLAKIS: I think it's a cultural issue. They're used to a very prescriptive approach.

DR. POWERS: It's not the prescriptive or

non-prescriptiveness that I'm interested in here. We've accepted prescriptiveness. Here, it's the question of why should it be more stringent than what's in Appendix R. That's where the conscious decision must have come about somehow.

MR. SHUMAKER: And I guess I would suggest that some of these are somewhat subtle until you sit down and start piloting the standard and one of the things I will mention is that we -- the EPRI pilot did meet with NFPA at one of their -- at basically their last meeting before they voted on the comments and revisions to the standard and because of the time in the process, they were able to incorporate some of those. They were not able to incorporate some of those thoughts, but I think when you actually start applying the standard to a real plant and start looking at it in a real life situation.

And I will give you an example. Salem and Hope Creek have their own fire water system, which are tied together with a -- which are tied together. So basically we have two sets of fire water pumps that are five or six hundred yards apart. They are not separated by fire barriers because they're five or six hundred yards apart.

So we don't prescriptively meet maybe this requirement, although we do have fire water pumps that are separated.

So I guess what I'm saying is there are some subtleties here that really start to, I think, come out when you start applying it to real case issues, and that was the intent of the pilot. That's why we piloted the standard.

MR. SIEBER: Thank you.

MR. SHUMAKER: Okay. Then the other two examples I used, I used Dana's 250-foot fire hydrant issue and also --

DR. POWERS: I don't own this one.

MR. SHUMAKER: What's that?

DR. POWERS: I don't own this. This is just my favorite example of prescriptiveness gone mad.

MR. SHUMAKER: Also, there's a ceiling of conduits with fire seals with some guidance with respect to this and over the years, there's been a number of fire tests which demonstrate that for small conduits with lots of distance runs from barriers, you probably don't need seals and a number of plants have implemented that kind of philosophy and Chapter 3 does, in fact, require the sealing of these conduits.

Those would be some examples of basically cases that could be more performance-based.

DR. APOSTOLAKIS: This is not the only example of prescriptiveness.

MR. SHUMAKER: No, these are examples.

DR. APOSTOLAKIS: I mean, in other areas, similar things have been done.

MR. SHUMAKER: Right.

DR. APOSTOLAKIS: Not just fires.

MR. NIJAFI: One other thing to point out is that the composition of this committee, it also includes people with heavy NFPA background. So some of these concepts of what we're talking about could have sort of come into it even though it's outside of Appendix R, because it is, in the fire protection community, a good practice thing to do, whether it's a nuclear power plant or a movie theater, is that some of these -- I mean, it's not -- that's it.

MR. SHUMAKER: Okay. I'll continue on. There's another set of elements, as well, that were not previously required prior to 805, at least not for the early plants, and some of those examples I have identified here, as well. One is a requirement for, and I apologize for the typographical error there, but it should say requirement for interior finishes, which are required to meet NFPA-101, Class A for walls and ceilings and Class 1 for floors.

And while there has been like control room floors, we try to maintain those types of materials, that would essentially be a new requirement. And because it is a new requirement, the plant license would not -- would be silent with respect to any kind of approval on this issue, even if

it had been looked at or considered.

It just would not have been something that would have shown up in any of the licensing paper.

Other examples include a requirement for using plenum rated cable above ceilings. As many of you know, we've used typically IEEE-383 cable throughout the plants and where we have suspended ceilings, we -- and older plants typically do not have plenum rated cable. And another one would be the requirement for seismic category one, class 1E electric fire pumps, particularly when diesels are available as backups.

So I guess in conclusion, while it would seem maybe that the review of Chapter 3 should be more of a verification process, with the exception of maybe some what I would call, if there were any new issues that you would consider safety significant, this would be a good time to put them in.

It was not a verification process going through it.

I'll go on and talk a little bit about our results from fire modeling and basically the standard requires that we select an appropriate fire model and we modeled two scenarios. One is a model based on the worst case plant configuration. I say worst case because there are transients that move around and things like that that need

to be considered in worst case that aren't typically or generally in the plant.

And then also modeling that model, changing the parameters in a means or an effort to violate the performance criteria, and basically that's used to define what the margin is. We call the first one maximum expected fire scenario, and the second the limiting fire scenario.

The pilot project has reviewed three fire models or is in the process of reviewing three fire models. They are CFAST, MAGIC, which is from France, and, also, the FIVE, and they have plans to review COMPBRN-3E, as well. And as most of you know, that was the -- the industry does have significant experience with COMPBRN and so we kind of focused on the other three initially.

DR. APOSTOLAKIS: So I guess the industry hasn't learned how to spell it yet.

MR. SHUMAKER: I'm sorry?

DR. APOSTOLAKIS: There is no U, Denis, in COMPBRN. Don't let Nathan see it.

MR. SHUMAKER: Okay. Results. First of all, we've determined that simple zone models are acceptable for --

DR. APOSTOLAKIS: Can you tell us a little bit about what your preliminary conclusion is regarding CFAST, MAGIC and FIVE? Leave FIVE out. I don't want you to say anything about FIVE. MAGIC and CFAST.

MR. NIJAFI: One point to make throughout, I guess we didn't say it at the beginning, is that this pilot exercise was primarily in order to demonstrate proof of principal and learn. So we really did not go exercise these models as much as the other parts of the standard to the depth.

The intent of these was to -- whether we feel that, again, the same bullets, as far as the modeling is concerned, whether the standard is complete, provides enough instructions, is it practical, can it be used with the existing tools, is it useable.

So within that context, what have we learned that basically generally is simple scenarios. If we -- with acceptable margin, they are adequate tools, which we knew before, these can deal with it.

DR. APOSTOLAKIS: Do CFAST and MAGIC estimate the time from the beginning of the fire until some cables are damaged?

MR. NIJAFI: Yes.

DR. APOSTOLAKIS: They do.

MR. NIJAFI: They do provide you the time to damage, time to detector actuation. Those are actually further scenarios that we selected. That's what we -- yes.

DR. APOSTOLAKIS: Because there was a time when they did not.

MR. NIJAFI: Yes. They are -- and, in fact, part of that is -- I mean, admittedly, we put in variable heat release rates, slow growth, rapid growth fires and different kinds of fires.

DR. APOSTOLAKIS: Okay. WASH-1400 type of dependence here.

MR. NIJAFI: And we're trying to basically find out whether -- I mean, this standard requires going out there and developing a completely new model, because it -- I mean, those kinds of things.

That was completeness, usability, effectiveness, and the conclusion is basically that the fire modeling part is not going to be a prohibitive thing.

DR. APOSTOLAKIS: It never was, but it always had the reputation for being the prohibitive thing now, which is a mystery to me.

MR. NIJAFI: Well, part of the fact is that, I think, in my opinion, contributes to the fact that the fire modeling is something that directly and indirectly has been used in the fire protection practice more than other elements of the standard, let alone the fundamentals and whatever have you.

But the fire modeling has been used since the days of NFPA or SFPE or whatever, goes back decades that the people have used these things and exercised them.

DR. APOSTOLAKIS: Not estimating times.

MR. NIJAFI: Well, one way or another, they have used different --

DR. APOSTOLAKIS: In the last 20 years, no. We looked when we developed --

MR. NIJAFI: But I'm talking even outside of the nuclear community. I'm not talking -

DR. APOSTOLAKIS: Yes, but they were not estimating time to damage. They were estimating other things. The time to damage really came from the --

MR. SHUMAKER: But CFAST does it, MAGIC does it.

DR. APOSTOLAKIS: Now.

MR. SHUMAKER: Now, right; in the past, did not.

MR. SIEBER: I would like to ask a question that may display my ignorance, but does the fire model that you're talking about here work with or does it replace the old fire hazards analysis that used to be required?

MR. NIJAFI: Fire hazards analysis basically it has a wide -- let's just limit only the part of the fire hazard analysis that deals with the fire and its effect, where does it start, how big does it get, and what does it do.

That part of it, in a way, it does these kinds, could replace what the FHA does for that purpose.

MR. SIEBER: For that area.

MR. NIJAFI: For that area, for that piece of the equation. Like when we defined, going into a room, the standard defines the scenarios, these fire scenarios will become your design basis fire scenarios for that particular fire area.

In the past, FHAs have used very simplified assumptions or you can call it models to determine that damage. It's either in the form of everything in the room is damaged or in the form of the crude 20,000 BTUs per square foot is a fire that lasts one hour or something like that.

But that is sort of a simplified concept of fire dynamics. I mean, as simple as you can get.

DR. APOSTOLAKIS: I think these models, Jack, they attempt to various degrees of approximation to describe the thermal environment in a room or in a compartment.

MR. SIEBER: So from that, you can determine what kind of duration your fire barrier may need --

DR. APOSTOLAKIS: That's exactly --

MR. NIJAFI: That's exactly right.

MR. SIEBER: So when it used to say have a three-hour barrier, you may find it it's an hour and a half.

DR. APOSTOLAKIS: Exactly. Not only that, but the detection and suppression time depend on this.

MR. SIEBER: That's right.

MR. NIJAFI: In a way, in the past, since your fire growth estimates were so crude, you tried to come at it backward and say this is the kind of protection I need, therefore, that's what I do. You didn't deal with actual hazard in the room.

Now we're trying to predict the actual hazard as opposed to say this is the hazard, go deal with it. We're just saying, okay, what is the actual hazard and the point about the simplicity that I wanted to make is that -- which may be, again, common sense confirmed, that if you're willing to accept certain level of -- I mean, robustness, you can use back-of-the-envelope calculation and find your exposure all the way to the detailed model, if you want to really analyze to that time to damage with high level of confidence as the configuration changes.

MR. SIEBER: But these issues become important when you think about things like internal flooding from an overly designed suppression system and if you put enough water in there, you fill the room.

MR. NIJAFI: And I will -- I agree, even to use somebody's word, that a little bit of a protection in a lot of places at times is better than a lot of protection in fewer places.

So this is the kind of thing that if you can demonstrate -- I mean, like, there are examples that, I

mean, if you were supposed to have a three-hour protection in one area of the room and you had something else here that you could have credited, but you didn't, because you assumed all engulfing.

But now if you can say this is only an hour and a half, one hour, but your analysis shows that this -- so you have actually two for an hour instead of only having one for three hours.

So that may be then a better thing in the scheme of things for fire safety than it is --

MR. SIEBER: Okay. Thank you very much.

MR. SHUMAKER: Okay. So we'll go back and discuss some of the results from the fire model. We've kind of gone over those, but as we alluded to, we had determined that simple zone models are found to be acceptable for most cases.

For the maximum expected fire scenarios, there's adequate guidance provided within NFPA-805, but with respect to the limiting fire scenario, additional guidance would be recommended, would be something that we would possibly put into an implementation guide.

Because in some cases, it's physically impossible to create a fire big enough to actually cause damage. And in some cases, it's not always the size of the fire that's really the critical parameter, but maybe some geometric type

things, the other issues.

So those were basically some of the results.

DR. APOSTOLAKIS: Denis, maybe you said it and I missed it, but the pilot is testing all aspects of the standard, every single chapter?

MR. SHUMAKER: No.

DR. APOSTOLAKIS: Or selected? For example, what I'm particularly interested in is what is called, in Figure 2-2, the deterministic approach. Are you testing that or are you doing a PSA risk-informed type of test?

MR. NIJAFI: I'll come to -- okay. If you want to talk about that. Basically, we are testing that in the sense that the example problem that we selected within the room, part of the room, it does meet the requirements, let's say, the three-hour barrier, and we're not -- I mean, we're looking at the combined room. And I'll come back, actually --

DR. APOSTOLAKIS: That's fine. Now, the question is, when you talk about fire models, CFAST and so on, are these to be used exclusively on the performance-based risk-informed approach or also the deterministic approach?

MR. NIJAFI: It could be used on both sides.

DR. APOSTOLAKIS: It could be used on both sides.

MR. NIJAFI: The way you use it in the performance-based side is two ways, either --

DR. APOSTOLAKIS: I understand. But we are not going to get from the pilot some sort of evaluation of whether it is better to go the left branch or the right branch on Figure 2-2. You will not do that.

MR. NIJAFI: No. But the intent of the pilot is to provide any lessons learned from how -- what are the questions that may come up in implementing the standard. Is it clear enough to whether go to the left or to the right, those are the kinds of things.

DR. APOSTOLAKIS: That's, by the way, for my colleagues, handwritten page 54.

MR. NIJAFI: And I've written -- by the way, that question has come up even before, so I wrote some notes that I --

DR. APOSTOLAKIS: I'm sorry for not being original.

MR. NIJAFI: That's fine, no. I'm just --

DR. POWERS: We really need to move this along.

MR. SHUMAKER: Okay. I'll try to do that. I'll go on to the change analysis, which was the next element that we piloted, and we reviewed basically the core damage frequency and LERF, which is large and early radioactive release.

DR. APOSTOLAKIS: This is a fundamental question I have here. When I read the standard, I don't recall the

standard saying anywhere you have to do this, and yet they talk about the change.

So you concluded that you actually had to do a baseline evaluation. Is that a correct statement? I don't recall anywhere in the standard -- I mean, the figure, again, says evaluate change, without really specifying what that change is. So you concluded that in order -- it says standard requires. Does the standard require that you do a CDF and LERF?

MR. NIJAFI: Yes, it does.

DR. APOSTOLAKIS: Maybe you can point me to where, but not now, though.

MR. NIJAFI: I can point you there.

MR. SHUMAKER: It doesn't require that you do a change, though, you just do a fire PSA.

MR. SIEBER: You do a before and after.

MR. NIJAFI: Right.

MR. SIEBER: Go ahead.

MR. SHUMAKER: So what we did is we did a quantitative estimate for the CDF and it was based on the maximum expected fire scenario and then we did a qualitative estimate for LERF.

Again, we didn't exercise the standards all the way through. In some cases, we just did a -- and that was the case with LERF. We did basically a walk-through

quantitative assessment as to how it would be done and what kind of results we would expect.

With respect to the results from the change analysis, the first result, Salem, like many plants, when they did the IPEEE, they did it as a shot in time type document and they did not maintain it. So the first step is to update the IPEEE to reflect the current plant configuration and, also, to identify or update some of the technical issues and quality issues that are associated with it.

So that was one of the results.

The second one we spent a considerable amount of time on was the determination of baseline risk. As you know, when you look at it back from a compliance standard, in Appendix R, you basically have three options in 3G.2 for compliance, the three-hour fire barrier, one-hour fire barrier with suppression and detection, and automatic suppression and detection, and also 20 feet of spatial separation.

And 3G.3 also gives you a baseline strategy, if you will, for alternate shutdown and many plants, like Salem, also have an exemption strategy, as well. So those would be your regulatory, if you will, compliance strategies.

And the plants are dynamic. On a day to day

basis, cables are added, things are taken away, things change. So you actually have somewhat of a dynamic plant and trying to decide what is, in fact, the baseline that you're going to use, is it the DCPs that are going to be done tomorrow that are already generated, not installed, is it where you were in 1981 when you implemented the original program.

So that became a discussion point within the pilot and it's a more significant issue than it would appear at first, when you first go through it, because each of those compliance strategies will give different kind of baseline risks.

DR. APOSTOLAKIS: But hopefully not with dramatic differences.

MR. SHUMAKER: Well, hopefully, none of them would be unacceptable risks.

DR. APOSTOLAKIS: No, no. Dramatic.

MR. SHUMAKER: Yes. You wouldn't have --

DR. APOSTOLAKIS: You're not going to jump --

MR. SHUMAKER: You're correct. You're correct. You're correct. But they would be different. They would be different.

DR. APOSTOLAKIS: Sure.

MR. SHUMAKER: And how you model it up front has an impact on the maintenance requirements down the road, as

well. So you need to be real cognizant of that when you prepare your model.

The determination of risk acceptance criteria which the standard doesn't -- it currently remains undefined in the standard and there's been some discussions about that being an implementation guide issue. There's been discussions about how this relates to Reg Guide 1.174, but basically I will just identify that the acceptance criteria is currently undefined in the NFPA-805 standard, as it now sits.

And then the evaluation of spurious equipment actuations, which we talked about earlier, which is really an issue because it's an industry issue that we're resolving in another area.

MR. SIEBER: What I would like to do is to get quickly to the bottom line. Could you go to slide 19 and go through the programmatic part and then to the conclusions? Then we can leave some time for the staff to provide their comments.

MR. SHUMAKER: I can do that.

MR. SIEBER: The things we're skipping is radiation area, which I think is pretty straightforward.

MR. SHUMAKER: Right. Well, there was -- the other issue you're skipping, just so you know, is the bundling issue we talked about in the subcommittee meeting.

MR. SIEBER: Right. How many can you put together to come out even.

MR. SHUMAKER: And as long as you recognize you're skipping that, that's fine with me.

DR. APOSTOLAKIS: When will you have a report on this?

MR. SHUMAKER: It should be done by the end of the year. So the final element we piloted was a programmatic issue and, of course, being a nuclear plant, we do maintain configuration control, we do maintain procedures and the like.

So generally, the standard requires that you do that sort of thing. And basically, the result was, with the exception of the PSA, which is really, for our purposes, the IPEEE, the attributes are currently addressed, with the exception of some of the items that were credited in the IPEEE.

They may not be well defined in the design drawings. So there were some recommendations that came out of the programmatic review that would require updating some of the design drawings to identify features credited in the PSA. Some additional site training would be anticipated, particularly with respect to things like transient combustibles, they become a lot more critical.

Basically, your fire becomes your design basis or

becomes the design basis type issue and, also, additional monitoring of equipment and plant features, which support the fire PSA.

So I will go to conclusions. The first question we started out with is, is the standard complete, and the answer we came up with was that, yes, with an implementation guide to address some of the things we discussed, it could be complete or would be complete.

There are some open areas that need to be addressed and we talked about those. Is it practical, and, again, yes, based on the quality and content of that implementation guide. Is it cost effective, and there are some items out there that could impact cost, the Chapter 3 issues we talked about, circuit analysis issues, quality, and monitoring issues potentially. I don't expect that, but there are some effectiveness issues.

Is it useable in whole, and our answer to that was yes, and is it useable in part, our answer to that was yes, as well.

I'd like to, again, thank the committee and if there's any specific questions, we can --

MR. SIEBER: Does anyone have any questions?

MR. NIJAFI: I'd like to add, if you have a minute, maybe just about this question that had been asked several times. Maybe it takes one minute, I'll just read

it, just so we don't --

MR. SIEBER: Just one minute.

MR. NIJAFI: This is about the issue of deterministic, probabilistic, whether this is fully performance-based or whether you go to the left, right.

The standard, in general, is not an exclusive RIPB approach; rather, a hybrid of deterministic and RIPB approach. The examples are not limited to only the Chapter 3. The example of that hybrid exists throughout the standard in other places; example, where the performance criterias are not probabilistic and, at times, the basis for the deterministic are not tied into the performance goals and objectives.

The pilot findings, I mean, what have we learned; that even though the hybrid approach does not at present challenge implementation of the standard, however, even though it presents some challenges in implementation, but does not prevent use of the standard in an effective way.

It does, however, impact the cost effectiveness of the standard, this dual mode, both in a negative, by added requirements, and positive, which will prevent RIPB application, where acceptable, deterministic fire protection measures do exist.

The other finding is that basically the hybrid approach does not unleash the full potential of the RIPB

concept and understanding and managing plant fire risk.

That's all I needed.

MR. SIEBER: Thank you very much. I'd ask the staff to step forward to give us their thoughts on NFPA-805. In the meantime, each of you has before you a group of slides that were prepared by Leon Whitney, which is on the topic of inspection activities, which is not on the agenda, but there are a lot of slides here. You may want to look through those, since we probably won't have time to go through that.

I did mention that the inspection of associated circuits has been suspended indefinitely for the time being, until industry completes its program. You should understand that there is a significance determination process with regard to fire protection and that there is a baseline inspection procedure, a resident's monthly procedure, and triennial procedure.

And the triennial is pretty much a performance-based inspection, but does cover a fair amount of associated circuits at this time, which has been suspended.

So this becomes a relatively recent inspection document.

DR. POWERS: What I see in the documents is the assertion. What I have not seen is the justification, which

says that in suspending examination of these circuits, we are still providing adequate protection of the public health and safety.

Does that exist in anything that we have?

MR. SIEBER: I have not -- well, I shouldn't answer the question, but I personally have not seen the justification, other than the desire to do that.

MR. HANNON: This is John Hannon, the Plant Systems Branch Chief. We are in the process now of preparing a white paper to explain our safety rationale for that decision. Should have it available in the next few days.

MR. SIEBER: I think that it would be good if you could provide a copy of that to the ACRS for its review.

MR. HANNON: Be happy to do that.

MR. SIEBER: Thank you.

MR. SALLEY: Hello. I'm Mark Salley. I'm one of the staff fire protection engineers from NRR. This is Mr. Connell's presentation. He couldn't be here today. So I'm your 11:45 fill-in. So these are Ed's slides and I will try to do the best job I can with them.

A lot of this has been covered, so Fred did a real good job of summarizing a lot of the NFPA stuff, so I will try to cut through that fairly quick and get more to the staff opinions on a few things.

The standard, once again, is an encompassing standard for the whole site. In June of '98, the Commission approved the staff's proposal to work with industry through the consensus process, which Fred talked about, to develop performance-based risk-informed consensus standard.

The last time the staff briefed the ACRS was in subcommittee back in January of '99.

Just a quick update. Once again, Fred covered a lot of this information. It was the NFPA issued a second draft for public comment and Ed told me that there were like over 100 comments on it that the committee had to work into the draft.

The limited scope, Denis Shumaker discussed in detail, so we can skip over that.

The rulemaking plan, 09, this is the one where the Commission has directed the staff to -- if this is good, to bring it into rulemaking. And it's up for the NFPA membership.

The technical committee will bring that to the floor for the whole FNPA body and then give their presentation and the NFPA membership is, in total, to decide if it should become a standard or not.

So that's one important thing.

DR. POWERS: Let me come back to these public comments.

MR. SALLEY: Yes.

DR. POWERS: Did the public comments draw attention to the writing committee to the fact that among their deterministic or fundamentals part of Chapter 3, they were imposing requirements that were more restrictive than Appendix R?

MR. SALLEY: Fred, you're on that committee. Can you help me there?

MR. EMERSON: I wasn't involved in the writing of the chapters. I attended the more general committee meetings. I don't recall whether that was specifically identified to the committee or not.

DR. POWERS: You see what I'm fishing for is how deliberate and conscious were these additional restrictions. If I find that the vast majority of the technical community thinks the more restrictive requirements are definitely necessary, that colors my view on things a lot more than if I think, well, it was just the way the words went together and it happens to conflict with --

DR. SEALE: Is this an accident or a plugging procedure loopholes?

MR. SALLEY: Dana, I listened to your comment earlier when you talked about that being more restrictive and when I classically think of Appendix R, I classically think of the backfit sections, 3G, J and O.

In those sections that were backfit, you won't find any requirements for fire pumps. You'll have to go back and look at 50.48 and how the plant was licensed to the Appendix A or the BTP-951.

Now, if you read BTP-951, it will talk about the fire pumps. Of course, it's a "should" document, but things like three-hour barriers between fire pumps, that's always been there. It's a "should" requirements. I don't see that as being more restrictive. That was in the original thing. Of course, if a plant decreased something different, they were licensed that way and they had reason to do it, but I don't see that as being more restrictive.

Overview. Once again, I think we can just jump right over this slide, for lack of time, and get to the meat of some of the stuff here. Let's talk about the changes from Appendix R.

With the performance-based for the nuclear safety allows the use of ADS/LPS for BWRs, feed and bleed for PWRs, as the only shutdown method. This is what your conversation was about this morning with industry. They're saying that they're getting away from the one-train being free of fire damage for the shutdown and going with these other methods.

The performance-based risk-informed approach allows recovery of the systems, structures and components versus free of fire damage. This introduces a thing of

repair. Where before we said this train shall be protected, now the repairs are allowed.

The 72-hour requirement for cold shutdown has been eliminated, such that the plant can remain in hot shutdown mode.

The alternate detection -- excuse me -- alternate dedicated shutdown requirements have been eliminated, so that takes the 3G.3 and 3L out of here.

The eight-hour emergency lighting requirements have been eliminated. That's strictly on a performance base for the lighting requirements.

And it's added the specific criteria for rad release. That's typically what we'd look at in Part 20. So those are some fair changes from Appendix R.

And with this, there's a number of -- we'll call them outstanding technical issues or concerns, if you will. The first one being the nuclear safety performance criteria, the circuit analysis methodology. What is out there in 805 is pretty much consistent with the existing NRC guidelines and there's somewhat of a conflict with the BWR Owners Group/NEI approach as to how the analysis is done. So that's an area of concern.

The fact that they're allowing the recovery of safe shutdown capability, that repair thing is something new, that's a concern.

The fire protection capability following the safe shutdown earthquake, that's based on risk and I don't believe there's any requirements in there, is there, in the new 805 for that. No.

The fire protection circuit analysis are not required -- excuse me -- spent fuel pit circuits are not required to be identified. That is something new. Considering this is a comprehensive standard.

Bundling of changes for the risk impact. It's not a one-on-one as to how that is to be handled. There is some concern about that. And another concern is the grandfathering of existing plant configurations. Where a plant had been granted exemptions or deviations, how that is going to factor into the new -- if they would go to the new 805, would be a concern.

DR. POWERS: My understanding of that last one was a little more subtle than that. And I could be wrong, of course. It's that if you have configuration in a particular area that's been approved, can you extrapolate that to other areas where it has not explicitly been approved. Is that the issue here?

MR. SALLEY: Yes. That's -- I guess I used grandfathering, giving you a smaller example of a bigger topic.

DR. POWERS: Yes. It's extrapolation that's more

the issue here.

MR. SALLEY: So those are some of the outstanding items of concern of the staff today. There's also a number of questions on how we're going to implement 805, should a plant choose to use that.

The first question is a partial adoption by the licensee. Will the plant say we're going to do everything by 805 or, hey, we just want to do this one fire area, this one concern via 805, that's a concern.

We have a question of reactive adoption by licensees. Let me give you an example there. An inspector goes out, he finds a raceway that was supposed to have a three-hour fire barrier installed for Appendix R compliance. He finds it was missing. The licensee can come back, do some performance-based 805, and come back and say, well, I really don't need it because I'm in this 805 area, so I don't have to comply with Appendix R. So that's a concern as to how that will work out.

Of course, we still have to develop the NEI implementation guidance. I guess that's going to form a big part of this, as to how that document comes together.

As we advance the science of fire protection, the oversight by the regions, we're going to be asking them to be doing a lot more, if we're going to be asking the inspectors to do some fire modeling or to do some risk-based

stuff. So that's going to be a question of the regional resources.

If you adopt the new 805 standard, how are you going to control changes, the change control process. Today we go through the 50.59 and we do a number of things with the license, so that part will be impacted.

DR. POWERS: I guess I don't fully understand that. Why wouldn't the 50.59 apply here?

MR. SALLEY: I'd have to defer for some help on that.

MR. WEISS: There is an NEI initiative that the NRC is adopting. I think Fred can help us out and describe that. But basically, it says if there is another regulation or controlling mechanism that's operative, you don't need to have the 50.59 process layered on top of it.

Is that a fair characterization, Fred?

MR. EMERSON: As I understand it, yes.

DR. POWERS: And that will happen when it happens.

DR. SEALE: We will see.

DR. POWERS: I mean, it seems to me that the 50.59 is perfectly adequate for deciding about changes in the fire protection area. It comes in and says, well, is it a big change or a little change.

If it's a big change, come talk to the NRC. If it's a little change, go ahead and do it.

DR. SHACK: But it may be something like the A-4, where you have to do both analyses.

DR. POWERS: I grant you that that conflict is something that ought to be smoothed out, but barring that, 50.59 sounds perfectly adequate to me.

MR. SALLEY: Once again, these are just concerns that -- you know, how are we going to deal with change control. I guess questions we're asking in advance here as we look at it in the staff.

And the last one is the NRR oversight of the licensing implementation and if a plant chooses to go through 805, what role is NRR going to play, how detailed are we going to do a review, are we going to go through -- is it going to be a one-page license change or are we going to go through detailed every step, every analysis the plant did, just how much is going to be involved from NRR to support a change in the license.

That's the other question we have as a staff.

MR. SIEBER: How do you plan to resolve that, by just doing the first one as a pilot and figuring out what it is you need to do?

MR. SALLEY: We don't know and that's what we're trying to figure out.

MR. HANNON: I could offer that one of the processes that we are following closely is the RIP-50

process. We are learning a lot from that and we'll probably be using that as a model for the risk-informing fire protection.

DR. POWERS: I think we shouldn't overlook this line that says oversight by the regions. If we have an NFPA-805, we will have plants that are Appendix R plants, branch technical position plants, licensing condition plants, NFPA-805 deterministic plants, NFPA-805 performance plants, and then we will have the mixed bag, where some areas are one and some areas are the other.

It seems like a step into more complexity in the oversight process.

MR. SALLEY: Yes, and we're introducing new -- I guess I see it as we're introducing new things for the region. Like I said, the fire modeling, if a plant today applied for a deviation or exemption and part of their deviation or exemption was a detailed fire model, classically, the region would come to NRR for help on that and say, hey, can you review this, what do you think, through a TIA or some vehicle as such.

With 805, this would almost become routine and that's a big impact. The same thing got introduced in the whole probability risk aspect into it, for the inspectors to be qualified to review the calculations, make the determinations. So it is a big impact on the region.

MR. SIEBER: Do you expect to resolve all of these problems to your own satisfaction before you move forward with any kind of rulemaking or adoption?

MR. SALLEY: I'd like to think that, or we'd have a plan in place. If we have to do training with the regions or whatever we would have to do.

MR. SIEBER: Okay.

MR. SALLEY: In closing here, the path forward. Once again, this has to get through the full NFPA membership vote. So the NFPA, as a body, has to say, yeah, we agree with it, we can go forward. Then in December, based on that, Ed will come back and hopefully write the SECY paper to update the Commission.

Around the March timeframe, the standard will be published for use. What that means, 805 will appear in the National Fire Codes as one of the volumes, like 801, 2, 3 and 4 are today.

April 2001, we're planning a public meeting for rulemaking. That will be the change in 50.48. The proposed rule will be published October 2001 and September of '02, we'd publish the final rule.

Once again, those are all tentative, based on the standard becoming real in the NFPA fire codes.

DR. APOSTOLAKIS: We would be involved somewhere there. The ACRS would be involved.

MR. HANNON: Absolutely right.

DR. POWERS: That means we should save these slides, right?

MR. SIEBER: Thank you very much. Are there any questions? If there are none, Mr. Chairman, that concludes the fire protection section on time.

DR. POWERS: Thank you. What I think we will do, because of the unfortunate absence of our subcommittee chairman in connection with digital electronics, we will handle that as a subcommittee report and we will probably do it at the end of today's formal presentations. It will simply be an update for the members, a synoptic account of what went on the subcommittee meeting.

What I can tell you is before Professor Uhrig left, he has another subcommittee meeting taking place on the same subjects in about a week and he planned to give us a more comprehensive updating at our December meeting and discuss some report that he would like to propose to the committee. So we'll get a more comprehensive view from him and just an update here later this afternoon.

With that, I will recess for the lunch hour and return at ten after one.

[Whereupon, at 12:10 p.m., the meeting was recessed, to reconvene at 1:10 p.m., this same day.]

A F T E R N O O N   S E S S I O N

[1:10 p.m.]

CHAIRMAN POWERS: Why don't we come back in to session. With the warning that this is a contentious group today that's been fully primed by their forays into fire protection, I'll turn to Dr. Bonaca and license renewal.

DR. BONACA: Thank you, Mr. Chairman.

We met with the staff and representatives of NEI October 19 and 20 to review the proposed guidance documents, the draft guidance documents which had been prepared by the NRC and NEI. We received a good presentation focused on how generic license renewal issues have been addressed into the guidance documents, and we have invited the staff at NEI to come to the full committee meeting today and to provide us with an overview of the major guidance changes since the previous draft documents that we read some time ago, an overview of the GALL report, which has been significantly restructured, and a discussion of programs for which more is needed.

We asked them to walk us through an example of how the guidance leads a reviewer to requiring a one-time inspection, so that we will be taken through the GALL report to one specific example, I believe. We also have asked the staff to explain to us how the stakeholder comments have been addressed.

We raised a couple of issues regarding aging of components which support the EOPs in severe-accident management and whether or not they are covered. There are some issues there, because the staff guidance indicates consideration of EOPs and the one of the industry doesn't. So we'll hear some clarification there.

We asked for some information regarding cable aging. We know that GSI-168 is still open, and that's very significant to license renewal, so we'll hear something about that, and finally, some information regarding nuclear embrittlement.

With that, I'll turn to Mr. Chris Grimes, who is the chief of the License Renewal and Plant Standardization Branch. MR. GRIMES: Thank you, Dr. Bonaca.

About the only thing that I could add to that is the staff is prepared to address the specific requests of the subcommittee in its presentation today, and I would also like to emphasize that we're in the process of calling through the formal public comments on the August draft of the improved renewal guidance, which consisted of a revised generic age and lessons-learned report, an updated standard review plan, and a regulatory guide that proposes to endorse revision 2 of NEI 95-10.

We at this point can tell you about the comments, but the comment evaluation process will proceed up to and

beyond a Commission meeting to describe the comments that is scheduled for December 4, and we're going to explain the state of the guidance documents as they are today based on the interactions that we've had with our stakeholders, principally a large working group assembled by the Nuclear Energy Institute.

And so with that I'll turn the presentation over to Dr. Sam Lee.

MR. LEE: My name is Sam Lee. I'm from the License Renewal and Standardization Branch, NRR. I'm going to walk through the differences between the earlier draft and the August draft of the documents. But before I start I want to acknowledge that this has been a significant Agency effort, the NRR staff during the licensing applications, Office of Research staff, and contractors from Argonne and Brookhaven National Lab.

On my left I have Yung Liu. He's the project manager from Argonne National Lab. On my right is Bob Lofaro. He is the electrical engineer from Brookhaven.

Based on NEI comments we deleted some things from the December version of GALL. Either they are not very generic, like it's only one plan is about one concrete containment. And I guess we have some electrical equipment in the December version of GALL, but apparently they only applied to Oconee because of the hydroelectric dam. So we

took those out. And some of these are active, like the fan coolers and RSTs, they relate to the active functional components, so we threw those out. And this is not in the scope for license renewal, so we took that out.

And then we added some other generic kind of thing, the common carbon steel components and common bolting, we put it in one place, added that, so it would be consistent, rather than have it in ten different places and say different things.

And then in here we pull out the containment isolation values from chapter 5 and put it into the system where the value belongs. Chapter 7, chapter 4. But when someone looks up the system, they see the value there.

Okay, so these are the significant changes, and going forward, okay, we have been thinking about this format. Right now GALL is cumbersome, in a two-page format, it is difficult to read on the computer, it's difficult to match up, and then it's very repetitive, evaluation of programs. So we are going to be formatting it to go into single-page format, and then move information into chapter 11 in terms of each program.

And the whole purpose in here is just to make the report more readable, okay, and not to change the technical substance. We'll change the substance when we go through the corporate evaluation. But this step is not to change

the substance.

DR. BONACA: Now just a question. In addition to this restructuring, you also included some technical basis or information that you got from the experience of Oconee and Calvert Cliffs, right, since the previous --

MR. LEE: In this version, yes. That's correct. When we start walking through this throughout we just feed in information that's there that becomes available. Okay, like some of the license renewal issues, as they become available, we fold them all in.

DR. BONACA: Okay.

MR. LEE: The other document is the standard review plan, which references the GALL report, okay, and focus the staff in areas where programs should be augmented.

There is an earlier version of the standard review plan that's a '97 version that predated the license renewal applications, also predated the GALL approach. So we have an early draft in April which basically is a complete rewrite of the '97 version. Okay? And then we incorporated lessons learned from the initial reviews and we used the December version of GALL for this April version.

And after April we're going to the August version, and that time then we updated that to the August version of GALL, so the SRP and GALL would match in August.

And then we had the other document, which is the

regulatory guide, which proposes to endorse NEI Guidance Document 95-10. In '96 that guide was issued and we proposed to endorse 95-10 revision 0. In that guide we have certain exceptions to revision 0. Since then 95-10 has been revised. Now we are endorsing revision 2, and those exceptions are no longer necessary. This 95-10 provides industry guidance to an applicant in terms of how to prepare an application, okay? Like I said earlier, '96 the revision 0, and now we have proposed to endorse revision 2. And '96 version predated the license renewal applications, so most of these changes are to incorporate the lessons from the application.

Okay, for example, like in here. In '96, because there was no real application, so the -- and you are provided some examples. And because now we have several real applications, so those examples that we remove and instead you are pointed to the applications. So if you want an example, go look at the real application. And that is the major changes for report documents.

And the other item that ACRS wanted to discuss is the documents, you know, future updates. We plan these documents to be living documents, and we'll continue to update them to catch the lessons learned, like Dr. Seale mentioned last time about making it a loose-leaf document. We have been talking with the NRC publication people to see

if that's feasible, and we'll continue to do that.

There might be another option, to keep the most current version on the Web or make a CD available or something. We'll continue to pursue that. But the update frequency has not been determined.

Okay, we know there's a need to do it but, you know, we haven't decided the frequency yet.

So is there any question on my portion of the presentation.

DR. BONACA: Just one last question I have before you go beyond GALL. In addition to all the structuring and the lessons learned, were there major changes, technical changes, that you incorporated into the GALL report?

MR. LEE: Certain things like the aging management, I guess, come up with some of the programs, okay? We have changed. We have that in a few places, and some of this is like aging effects, like for carbon steel.

DR. BONACA: Yes.

MR. LEE: We decided cracking is not an aging effect in the reactor water environment. So those have been removed. This is through interaction with NEI. So actually during the process, you'll hear about that later in a presentation, NEI provided very constructive comment, okay, for the early version, and they have worked with NEI to incorporate, you know, their comments.

MR. DOZIER: Hello. I am Jerry Dozier from the License Renewal Branch. On my right I have Barry Eliot from Division of Engineering, and on my left I have the next speaker, Steve Koenick.

On the NEI comments we had for the December 6th version we had nearly 700 comments from NEI. Over 70 percent of those comments were incorporated into the document and we felt they were helpful and provided enhancements and clarity to the documents.

We did not agree with all of the comments.

The first, the use of GALL report for scoping, was probably more of a misunderstanding. NEI's position or the comments that we actually received was to remove several of the components from GALL and to minimize the set of components that we had had in there.

Through discussions and meetings we did clarify the purpose of GALL, which is basically that GALL is not a scoping document. If we include it, that scoping is a plant-specific evaluation, and just because it is in GALL don't mean it's in scope for all plants.

On the other hand, if we missed a component in GALL that does not mean that the component is not in the scope of license renewal. In that case, the plant has to do a plant-specific evaluation for that particular component, so we did conclude that it is not a scoping and I think the

resolution of that comment is resolved.

Use of minimum programs -- we agreed with NEI that we should give the minimum amount that we felt was sufficient for a program, kind of to set the bar.

In some cases though it took not one program but maybe two programs to meet the 10 elements that we are trying to evaluate. Of course, when we are looking at the component in Aging Effect we are having to evaluate those to that aging effect and in some cases we needed a preventive measure such as chemistry control and we also needed a detection method such as ISI, so in those cases to fulfill the 10 elements in our evaluation, we would put two programs.

The issue was try to get one, but like I said, in cases, there was several cases that we had to have multiple programs to make the evaluation clear.

Minimum program descriptions was primarily a comment that for example again in ISI, in GALL we were specifically putting the paragraph, we were putting the evaluation that was actually performed such as a surface examination or volumetric examination or visual test.

The comments seemed to suggest they wanted a little higher level in case ISI changed. Well, we were of course basically writing a safety evaluation and we had to really specify exactly what we are looking at to justify our

conclusion that no further evaluation was necessary.

There were some issues on aging effects. We felt that the aging effect was applicable and should be in GALL and NEI's position was that it shouldn't.

Examples of those would be void swelling and Irradiation-Assisted Stress Corrosion Cracking in PWRs.

Basically in both of those cases there is industry programs being performed to evaluate those further and new information is emerging, and until those results are conclusive we felt like that they should stay in GALL.

The last item was inaccessible areas.

CHAIRMAN POWERS: Could I ask you what was the basis for NEI feeling an IASCC should not be in the report, in the considerations?

MR. DOZIER: For IASCC being in a PWR they said that the oxygen levels were too low to actually -- I think you need a higher oxygen level and maybe you can answer that one a little bit better and in a PWR -- in a BWR it is applicable for a BWR but since oxygen levels are less in a PWR that maybe it didn't apply.

We did have operating experience though with the baffle former bolts that IASCC was -- it's not a theoretical thing. It could happen and it has happened on that particular piece and might happen in other areas.

Maybe Barry could elaborate on that.

MR. ELLIOT: I don't think they think IASCC is applicable. They just don't think it is applicable to all the components that we think it might be applicable to.

It is definitely applicable to baffle former bolts, the baffle forwards.

They have a problem and you have to ask them more or less I think is the scope of where they should be -- that particular aging effect, how many different components within the internals is really their main concern as far as IASCC is concerned.

Does that help you?

CHAIRMAN POWERS: Well, all it does is provoke, okay, why don't they think if it can happen one place it will not happen in other places?

MR. ELLIOT: And that is what our feeling is. In fact, if it is happening in the baffle former, in the baffle bolts it could happen in other places.

DR. SHACK: There was some discussion of irradiation levels that you would have to consider.

MR. ELLIOT: Right, and we would have to see a program and that is what we are doing. We need a program for that, to say how far out, how much fluence is applicable before you have to be worried about it, and we will discuss that a little bit more under my -- when we talk about neutron embrittlement later, but that I think is one of the

main issues there.

CHAIRMAN POWERS: Is the IASCC controlled by irradiation of the metal or the local coolant?

MR. ELLIOT: IASCC is stress corrosion cracking, which is by the materials, the environment, stresses, and then the assisted part is the irradiation part.

CHAIRMAN POWERS: I guess what I am asking --

MR. ELLIOT: It's all those factors determine what materials and what components are affected.

CHAIRMAN POWERS: I guess I am looking for a little more mechanistic understanding of IASCC. You have to have a sensitive material --

MR. ELLIOT: Yes.

CHAIRMAN POWERS: You have to have a local chemistry conducive to corrosion, and probably some other things.

Now the question I ask is the irradiation assisted sensitizing the material or is it creating a local chemistry conducive to corrosion?

MR. ELLIOT: I am going to ask Alan to answer that when we get up here. I think it is a combination of you have to have a sensitive material and it doesn't have to sensitized but it is a sensitive material, as Alan is coming up right now.

MR. HIZER: This is Alan Hizer from NRR. I think

the role of irradiation in IASCC is just an accelerant overall. It just is another factor that makes the stress corrosion cracking more likely to occur in the material.

CHAIRMAN POWERS: What I would like to know is whether it is causing the acceleration because of what the irradiation is doing to the metal or what it is doing to the coolant.

MR. HIZER: I believe it is the metal. It is the interaction in the lattice of the metal itself.

CHAIRMAN POWERS: Okay.

DR. SHACK: What it does to the coolant doesn't help.

[Laughter.]

DR. SHACK: But the primary thing is what it does to the metal.

MR. GRIMES: This is Chris Grimes. I would like to emphasize that at this point in the presentation the issue that we are most concerned with is that NEI's comments were directed towards establishing minimum standards for license renewal and to the extent that there are areas like irradiation assisted stress corrosion cracking and the scope of components that they sweep in, I think it was appropriate for NEI to express their view about the extent to which we have expectations about programs to manage those aging effects that Barry and Alan are going to discuss the

particulars of reactor vessel internals in response to another agenda topic related to fluence levels.

MR. DOZIER: And one of the last items was inaccessible areas. Basically I think Dr. Seale summed it up for inaccessible areas in the specific ACRS meeting earlier and he said that it looks like the Staff needs to kick a few tires to have confidence.

In the case of inaccessible areas, that was one of those areas where we needed a little more confidence and we were asking for plant-specific evaluations to justify the inaccessible areas issue.

The Union of Concerned Scientists has also been actively involved with the license renewal process. They have attended public meetings. They have also provided us with reports to evaluate and consider in the GALL reports.

We did evaluate the five reports that they gave us. We broke them down into the component and aging effect and we looked in GALL to see if it was appropriate for them to be in GALL, and we identified two pieces, the jet pump sensing line and separator support ring, and we added those to the August version of GALL.

Any questions?

[No response.]

MR. DOZIER: I will turn it over to Steve Koenick.

MR. KOENICK: Hello. I am Steve Koenick, Project

Manager, License Renewal Branch. I was assigned to project manage the license renewal issues inventory.

Basically as you know the inventory was largely based on the 1997 draft SRP. This was substantially rewritten to incorporate the GALL report and it was issued in April and revised and issued in August with the rest of the renewal guidance.

Basically the disposition of the inventory was articulated in a letter dated May 4th and that was to NEI and UCS and on the slide I have provided the basis for the disposition.

It is basically the August 2000 draft incorporated the GALL report. The license renewal inventory was incorporated into the revised guidance and basically the aggressive review schedules for the GALL and SRP enveloped this license renewal issues inventory.

Basically the stakeholders -- we had agreement with them on this approach and that is basically how we dispositioned them -- if you have any specifics -- and also what we did do was we mapped the license renewal issues to where it is in the revised guidance and we discussed that at the subcommittee meeting.

If you have any specifics?

DR. BONACA: Are all the issues resolved?

MR. KOENICK: No, sir.

DR. BONACA: Right, and so how -- so the resolutions, some of them would be resolved and then incorporated in the guidance at a later time?

MR. KOENICK: That's correct.

As Sam mentioned, the GALL report is a living document.

DR. BONACA: Right.

MR. KOENICK: It will be updated accordingly and as Jerry has mentioned in his presentation, several of the issues -- IASCC -- what we did to incorporate those in the report is we said activities are ongoing, however look at it in this context.

DR. BONACA: So the document right now includes the guidance that the reviewer needs?

MR. KOENICK: Yes.

DR. BONACA: Although that may be changed by coming closure of the specific issue?

MR. KOENICK: That's correct.

DR. BONACA: Good.

MR. HOFFMAN: Good afternoon. I've got a couple of people coming up to help here. I've got Juan Peralta from the QA Branch. They do the methodology review for scoping, and Chris Gratton from the Plant Systems Branch, whose branch is responsible for the actual review of the scope.

The two topics that came up at the Subcommittee meeting were the scope of the rule regarding emergency operating procedures and voluntary commitments such as severe accidents.

Regarding the emergency operating procedures, they are part of the current licensing basis, consistent with the principles of the license renewal and must be maintained in extended period of operation in the same manner and to the same extent as it is during the current term.

The license renewal objective, when it was developed, was to ensure that the current licensing basis and design features of the plant carry forward into the period of extended operations.

The scope was established to ensure that systems, structures, and components of principal importance to safe plant operation were identified and evaluated consistent with the current licensing basis.

Now, the emergency operating procedures rely on systems, structures, and components within the scope of renewal, but they also rely on a lot of balance-of-plant equipment.

And the balance of plant equipment, the Commission had some concerns regarding maintenance for those, and this was identified during the maintenance team inspections as part of maintenance rule development, and they found that

there were common weaknesses in maintenance programs.

So, in response to these weaknesses, the Commission directed the staff to develop the maintenance rule to address the weaknesses. And it's actually limited to a specific set of actions to address those weaknesses and not the ares where the inspections found that the maintenance programs were acceptable at the operating plants.

So because of these concerns, the Commission intentionally made the maintenance rule scope much broader. They had a concern that the maintenance for balance-of-plant equipment wasn't getting proper emphasis. It was causing -- and degradation of this balance-of-plant equipment was causing challenges to safety systems.

So more from a defense-in-depth standpoint, they wanted the balance-of-plant equipment included in the maintenance rule.

So, the maintenance rule is going to continue on, you know, consistent with the CLB, and so the equipment that may be outside the scope of license renewal but within the scope of the emergency operating procedures, will continue to be maintained in the same manner and to the same extent as it is in the current term.

DR. BONACA: But only the active components. What I mean is that you may have a pump, the active components

are in the maintenance rule because they are required by the maintenance rule.

The passive elements are there, they're not being maintained in the license renewal.

MR. HOFFMAN: Well, they're not being reviewed for aging management under license renewal.

DR. BONACA: That's right.

MR. HOFFMAN: You know, the current activities at the plant will continue. They're not being ignored by the licensees.

DR. BONACA: The reason why the issue was raised is that again, one rule identifies the act -- the license renewal rule excludes the active components because it presumes that they are being dealt with and the fact that they are being run, they are being maintained, including by the maintenance rule.

That's why they're not including the active components.

It then focuses on the passive components, and so you have these components for which the active portions are being maintained by the maintenance rule, the passive components are being ignored.

And I raise it because I thought it was an inconsistency there, and what gives you the confidence that the aging of long-lived passive components in those systems

which are used in the EOPs, will, in fact, be just maintained, just because -- I don't know.

For all the others in scope, you have to develop a GALL report and extensive programs to deal with them. So it means that aging happens and programs are needed.

Now, for this, they will be taken care of somehow, but the other thing I wanted to ask you is that a table in the SRP specifically refers to also looking at the EOPs as s source of information.

MR. HOFFMAN: It's listed as an information source to ensure that the scope was properly established by a licensee. It was not intended to be a scoping document.

DR. BONACA: Okay.

MR. HOFFMAN: When you talk about the maintenance rule, though, the maintenance rule still is even much broader than that, because it goes into -- it's got a third criterion that deals with whose failure could cause a reactor scram or actuation of safety-related systems.

So if you're really trying to compare the two scopes, maintenance rule is much, much broader. Again, the Commission was trying to go more for their defense-in-depth philosophy there, whereas license renewal is trying to maintain the current licensing basis. There is a pathway, you know, determined as part of the original licensing basis to achieve the safety functions.

DR. BONACA: But you recognize also that the EOPs are part of the current licensing basis.

MR. HOFFMAN: Yes, it is.

DR. BONACA: They are in the FSAR and they are under 50.59.

MR. HOFFMAN: But the current licensing basis is much, much greater than the scope of renewal.

DR. BONACA: I understand.

MR. HOFFMAN: Any other questions?

[No response.]

MR. HOFFMAN: Okay, the second one was continuation of voluntary commitments.

CHAIRMAN POWERS: I'm still a little bit confused. You have these EOPs the operator is going to use.

They require some equipment that functions. Some of that equipment has passive elements to it; some of the equipment has active elements.

The active things are covered by the maintenance rule. What covers the passive things?

MR. HOFFMAN: The primary systems -- in establishing the scope of license renewal, it was looking at those specific systems, structures, and components that were essential for achieving a safety function.

The emergency operating procedures will credit additional equipment beyond that, so that it gives the

operators additional options for achieving a safety function beyond that.

But license renewal is trying to maintain that licensing basis by which we originally licensed the plant, to achieve the required safety functions.

CHAIRMAN POWERS: But didn't you tell me that the EOPs were part of the licensing basis?

MR. HOFFMAN: Yes, but if -- you know, licensing basis includes any commitment made by the licensee that's on the docket. So there are a lot of commitments, there's a lot of activities, requirements that are on the current licensing basis that don't really always deal with safety. It's much broader.

DR. SHACK: But the EOPs aren't one of those parts of the licensing basis.

MR. HOFFMAN: The EOPs are part of the current licensing basis; they're just not scoped in, because the maintenance rule and license renewal, really, the Commission had totally different -- there were different intentions.

The Commission was trying to address specific concerns about maintenance weaknesses in three areas in developing the maintenance rule. And they established their scope to address those concerns, whereas license renewal was trying to go back, you know, and maintain the CLB.

MR. GRIMES: This is Chris Grimes. I would like

to attempt to clarify that it is our expectation that because of the differences that Steve pointed out, and the Commission's objectives with the maintenance rule and license renewal, we would expect that the programs that license renewal relies on to maintain systems, structures, and components, would apply to these other structures and components that are relied in the EOPs.

And they are part of the licensing basis. However, those system, structures, and components are not designated as safety-related systems, structures, and components in the licensing basis for a reason.

And for that same reason, the Commission did not extend a requirement to maintain an aging management program pursuant to a renewed license.

That's not to say that we don't expect that the equipment is not going to be maintained; we certainly expect that it's going to be maintained.

But we're not now imposing a regulatory standard on that that has to be maintained with the licensing basis.

DR. BONACA: The reason why I expressed a concern, Mr. Grimes, was that particularly for the older plants, you know, there were very succinct FSARs, a couple of volumes. They have been expanded in the updated one, but still they are very succinct.

And they are accident analyses that essentially

cover some essential equipment, and then they relate to the operator taking action and doing something wonderful there.

So if you try to understand how you get down to a cold shutdown, you really have to go to the operating procedures. I don't think there were any procedures contained chance equipment there, they don't have only essential equipment as relied to get down to safe shutdown.

And that is really mostly what my concern was regarding for those plants, because when they established the CAT-1 systems, they pulled them out from those accident analyses.

A lot of stuff was probably missed. That's why we've been talking about scoping. That's why we look at scoping for the other plants and find such a narrow view of it, and we look at the newer plants and we see a big scope.

And that was the reason why that was raised. And because a focus purely on a narrow definition of CAT-1 systems and support systems for those, it's a very narrow focus for some plants, I mean, some older plants.

And I don't deny the logic. I think that the conversation is clarifying, and that it is important.

MR. GRIMES: I would like to emphasize that the reason that the Commission concluded that it was appropriate to maintain such a narrow focus for license renewal is because of reliance on regulatory process that makes

decisions about whether or not the current licensing basis and its definition of what are safety-related systems, structures, and components, is adequate.

Even during the review of Oconee, systems and components were added to the scope of license renewal because the licensing basis was changing at the same time.

When you say that the older plants may have missed something, it is our belief that the regulatory process reveals those continually, and that the Q-Lists are updated to add more things to that scope of what is now determined to be safety-related, because of a recognition that it's relied on to prevent or mitigate design basis accidents.

Those things are also revealed during license amendment reviews. One of the reasons that we use the EOPs as a guide to do a license renewal review is to test the licensing basis.

But if we do find that there is an issue about whether or not a system or a component is relied on and should be a safety-related system or component, we refer those to an appropriate backfitting process to decide.

So we have confidence that the regulatory process will continue to add to the scope of license renewal in the future, as part of the maintaining the licensing basis.

And that's what gives us the comfort that using the current licensing basis as the standard for determining

what should be subjected to an aging management review is an appropriate screening criteria.

DR. BONACA: Okay.

MR. HOFFMAN: Voluntary Commitments: Again, regulatory commitments, including voluntary initiatives such as severe accident mitigation guidelines, are part of the current licensing basis, like we just talked about, which, you know, is required to be carried forward in the same manner and to the same extent as it is during the current term.

So, all of the commitments will carry forward into the extended period of operation, unless they are changed in accordance with an approved process.

We have just issued a regulatory issues summary that summarizes guidance for managing regulatory commitments made by licensees. And in there, the Commission endorsed an NEI guideline 99-04, for managing commitment changes.

And Staff guidance has been put out and two NRR Office Letters, 807 and 900. Number 807 deals with the control of licensing basis for operating plants, and 900 specifically covers managing commitments made by licensees to the NRC.

So, we've got Commission guidance out there to control these commitments in the future. Specifically, the severe accident mitigation, that one's actually being

covered by a more recent initiative concerning -- the Commission directed the Staff to develop guidelines for managing, inspecting, and oversight of voluntary industry initiatives that may be in lieu of regulatory requirements.

That was just published in the Federal Register in August, and I think the comment period just ended in October. But the last I heard, severe accident mitigation guideline implementation would be covered by the outcome of that voluntary initiative.

DR. BONACA: Again, here, I wasn't worrying about carrying forward, the commitment. It means also that the equipment that supports the commitment has to be operable.

MR. HOFFMAN: Okay.

DR. BONACA: I mean, I can understand that we don't check the aging for the first 40 years, but I understand now, your clarification.

You said something about those are also part of the current licensing basis?

MR. HOFFMAN: Yes, it's a docketed commitment by the licensees.

DR. BONACA: Okay, thank you.

MR. HOFFMAN: Whoever is up next can figure it out.

MS. BLOOMER: Thanks, Steve.

Hi, I'm Tamara Bloomer. I'm with NMSS High-Level

Waste. I was on rotation to NRR License Renewal. To my left is Mary Wegner from Research. To my right, immediate right, is Jim Davis from DE. And to my far right is Yung Loo from Argonne.

I was asked to explain, going through an example of one-time inspection and how it's dealt with within GALL and the SRP. As you can see, we felt that some aging effects of specific structures and components may need verification to the effectiveness of the aging-management program, and how we propose to do that is through one-time inspection within both GALL and the SRP.

CHAIRMAN POWERS: Are items that are affected by IASCC among those subjected to one-time inspections?

MS. BLOOMER: I have a list actually of a couple of things, and I don't think IASCC is affected. That's not on the list, no. That's looked at I believe in a plant-specific and with the use of the -- Barry. MR. ELLIOT: Barry Elliot. Our last slide in this package is about neutron irradiation embrittlement, and we'll -- originally we were going to talk just about neutron irradiation embrittlement, but apparently you want to hear about IASCC. So we'll talk about that also.

CHAIRMAN POWERS: Okay.

MR. ELLIOT: On that slide. Is that okay with you?

CHAIRMAN POWERS: That's fine. I'm patient.

MS. BLOOMER: Okay. The example that I'm going to follow through is for one-time inspection. It has to deal with spent-fuel-pool cooling and cleanup corrosion. And that's using the water chemistry program.

As it says here in chapter 7, section A3, page A3-4, if you look at GALL for that, we're talking about filter housing, which is carbon steel, which does have loss of material and is identified as pitting and crevice corrosion. When you go to A3-4 in the aging-management program column, you find indications again that, very near the bottom, an acceptable verification program consists of one-time inspection of select components in susceptible locations in a system.

Then you would refer to chapter 11, where the same language is used in the water chemistry program.

And then in the further-evaluation column you have a yes and detection of aging effects should be further evaluated. That's typically how it is referred to when they're talking about one-time inspection throughout GALL.

The other case we look at is in SRP, and if you look at section 3.3, subsection 3.3.2.2.1, yes, there are a lot of them. Again, actually it's talking a loss of material that you saw in the GALL column, general galvanic pitting and crevice were the two items that we saw in the

example that I just showed you. And again, near the bottom, and actually my page has it highlighted and theirs doesn't. A one-time inspection of selected components in susceptible locations is an acceptable method. So it follows through into the SRP.

DR. WALLIS: Someone has to check up on the adequacy of this, because how you select and what you think is susceptible is up to whoever is doing the job. Right?

MR. DAVIS: That's right. Just based on experience.

DR. WALLIS: So there's a lot of flexibility here.

MR. DAVIS: Yes, there is, and it's site-specific.

DR. WALLIS: Right. So someone's got to make sure the job is done right.

MS. BLOOMER: Well, that's why the further-evaluation column says that we need to further identify it. We couldn't give every possible location for all the components and all the different plants. Thereby, by looking in the further-evaluation column, staff knows to review what they selected, and if it's appropriate for this particular component.

DR. BONACA: Now, as the time goes by, we have more applications, there will be information available to the reviewers of how this was handled for other plants. Right?

MS. BLOOMER: Correct.

DR. BONACA: So that information will be made available in the GALL report?

MS. BLOOMER: Generally the same reviewers who are doing the other plants will be doing the new plants as they come in. But yes, as we update GALL, more information will be fed in, and if some of this changes, if we find in ten years all the plants that have come through so far have no indication, this may be something that we decide to take out because it's no longer useful. Or they may begin to build a one-time inspection into their programs or when they're looking at a previous inspection go ahead and identify and say no, we see no evidence of loss of material in that component and identify that when they've put in their application.

It also appears in a couple of other places in the SRP that ties it with GALL, the table 3.3-1 and the FSAR in section 3.3, 3.3-2, which is actually page 3.3-18, I believe. Again, the first one is the aging-management program, refers back to where we got it from from GALL, the components that you need to be careful of or look out for, and then the further-evaluation column says the same as it did in GALL. And when you look in the FSAR table, actually one-time inspection is broken out in and of itself, and for the water chemistry program that I just identified, it

specifies that to verify the effectiveness of the reactor water chemistry program consists of a one-time inspection. If they chose that method, this is the program that they would be referring to, and this is what the reviewers would look into.

DR. WALLIS: Obviously it hasn't been edited. It's got "is performed" twice.

MS. BLOOMER: Well, we're still editing. It's only a draft version, so we're okay.

Are there any questions?

MR. VORA: Good afternoon, Mr. Chairman.

My name is Jit Vora and I am a team leader in the Division of Engineering Technology of the Office of Nuclear Regulatory Research. To my right is Mr. Bob Lofaro from the Brookhaven National Laboratory, who has been doing a lot of work with regards to the LOCA testing of the low voltage I&C cables in the context of resolution of GSI-168.

On October 6th the members of the RES staff had the opportunity to provide to you and discuss with you some of the technical elements and the results of the six sets of LOCA tests for the low voltage I&C cables in the context of GSI-168 and at the same time we also discussed about the pros and cons of various condition monitoring methods to evaluate the aging effects in the installed cable systems.

On October 9th the Staff had the opportunity to

present to you and discuss with the subcommittee the Chapter 6 of the GALL report on the electrical components.

Based on the direction that I received for today's presentation, I would like to present to you and discuss with you the effectiveness of condition monitoring methods for the cable aging in operating nuclear power plants and also present to you and discuss with you the impact of the resolution of GSI-168 on the license renewal.

With regards to the condition monitoring method, and strictly from the technical perspective and using my engineering hat, the issues that are involved to understand the cable aging in the nuclear power plant is threefold.

One is actually how to evaluate and how effective is the current condition monitoring techniques to evaluate the localized or the bulk properties of the insulating materials along the length of the installed cable system.

DR. KRESS: What properties are you looking for, Jit?

MR. VORA: Beg pardon?

DR. KRESS: What properties are you looking for -- thermal, electrical --

MR. VORA: We are looking at electrical, mechanical and the physical properties.

DR. KRESS: All those, okay.

MR. VORA: And these properties for the bulk

insulating materials can be evaluated in situ or you can actually retrieve the samples of the materials and evaluate those properties under controlled laboratory conditions.

The bigger challenge comes on actually how to evaluate the integrity of the entire cable system, the installed cable system from end to end, one end to the other, which includes the splices, the connectors, the terminations, and to me actually a very important aspect of this thing is what about the interfaces which actually forms a entire cable system, because many a time you can evaluate the bulk properties of localized materials or you can evaluate the insulating cables, but many times in the electrical signals and transmission the interfaces are sometimes the most weak link, and this is where you have the minimum dialectic integrity in the strength, and they become more susceptible to the various environmental conditions.

DR. WALLIS: When you test it, you test it as it is and the last time you were here I think you were talking about cables in the presence of a LOCA. How they behave in a LOCA is not the same as they behave when you test them.

MR. VORA: This is correct --

DR. WALLIS: So it is very difficult to know what to measure as a property.

MR. VORA: Exactly. I think that is one of the things we tried to do actually as a part of the LOCA

tests --

DR. WALLIS: Right.

MR. VORA: -- as I talk with the next viewgraph that there are about 11 different techniques and parameters that we used that at different times offered the pre-aging, thermal pre-aging, radiation pre-aging, before LOCA, after LOCA, and see if there are any parameters which we can actually identify by monitoring, by trending, by evaluating can we actually determine if they are able to survive the LOCA or not, so you are absolutely right with your question.

The third part is about the technical -- how to go about determining the residual life or the service life or an installed cable system.

You can monitor, evaluate the localized material properties of the bulk insulating materials in the laboratory. We can do some checking of the entire installed cable system, then by using the suitable models, using the operating experience, if you can put all of this together then can we actually determine what is the residual of life of an installed cable system. Is it 30 years, 40 years, 50 or 60 years based on the condition indicated parameters and the trending over time.

If you have that information and data, I think we can actually go about doing the residual life evaluation of the service life of the cable systems.

The technical challenge that comes about for this condition monitoring technique for installed cable systems, and please forgive me if I talk about installed cable with a big emphasis on the system, because installed cable system, that is what we really want to evaluate the integrity from the aging perspective is actually what happens for the system.

DR. WALLIS: It is the whole life of the cable that matters and if you took it and cut it in pieces to test each piece, it doesn't matter if it has got a fault somewhere. Each piece may be fine that you test but it may have a fault somewhere else.

MR. VORA: This is correct and also interfaces and all the connections --

DR. WALLIS: Right, everything.

MR. VORA: And what actually I'll talk about a little bit more is as far as the challenge is concerned is to detect and locate the incipient effects and localized anomalies in an installed cable system prior to failure.

When you have the failures in the cable, whether you have open circuit or you have a short circuit, they are readily detectable. One can actually evaluate and see when you do the functionality test or you have the signals that you can actually detect it and there are techniques which are available today which are primarily the electrical

techniques like time domain reflectometry where you can send and transmit the signals and actually see the reflections and based on the changing the impedance corrector speed you can actually evaluate the conditions of the cable. The question is when you have a degraded state of the insulating materials due to aging of the polymers, you might have a little bit of leakage current or you have some cracks or you actually have a pending failure, that is the challenge of how we can detect those things prior to when the actual occurring in the installed cable system.

CHAIRMAN POWERS: Your point is that the time domain, the reflectometry does not detect things in the cable insulation, it only detects in the wire, doesn't it?

MR. VORA: This is correct. Primarily for the wires, but if you have a gross defect or if you are on the verge of short circuit, then it might pick it up, and I think many of the technologies are being developed now, very sophisticated time domain reflectometry, the signal analyses, the microprocessors, and signal to noise ratio filtering, et cetera, and so things are happening, but we are not at this point in time.

The condition monitoring needs to not only be effective to detect the defect in the incipient state prior to failure but it needs to be non-intrusive. It will be ideal if we can actually do and scan the entire cable length

from end to end without disconnecting the equipment on either end.

It needs to be reliable. Can you actually repeat whatever condition indicated parameter you monitor for this cable system, whether it is a power factor, a modular -- is it reliable? Can you repeat these things?

There are techniques now available for detecting a partial discharge in the installed cable system, but we are not able to actually reproduce reliably the data using the techniques which are available.

CHAIRMAN POWERS: May I ask a question about cable insulation aging?

Is a better analogy for cable aging, insulation aging, a time dependent degradation that at constant temperatures is constant, or is it a process given to nonlinearities with time?

MR. VORA: I think it could happen both ways. You know, you could actually be in the linear stage, but actually at a certain point in time if you go to a certain level temperature you could go into the nonlinearity and you could have rapid degradation.

CHAIRMAN POWERS: If it's all temperature constant -- is the degradation going to proceed linearly with time or are there phenomena that will cause it to become nonlinear with time?

MR. VORA: Normally -- it would be linear, but then we combine that thing with the moisture and other environmental parameters it could go into the nonlinear state. I don't know.

Do you have any idea?

MR. LOFARO: Yes, I think if you look at temperature in itself as the only stressor acting on the cable you would probably have a linear relationship, but that is not the case typically in the plant. You have other stressors such as radiation aging that will take place as well.

There could be other things such as maintenance damage to the cable. There are a lot of things that could happen to affect the degradation rates.

I think you are probably looking at a nonlinear rate.

CHAIRMAN POWERS: If I hold temperature and dose rate, and let's put aside maintenance and those things, but just temperature and dose rate constant, is that linear on time now?

MR. LOFARO: Even holding those two elements constant it might not be linear along the whole life of the cable.

There could be instances where when you get to a certain degradation point the rate changes because of the

condition of the structure of the material itself.

DR. WALLIS: Well, eventually it fails in a nonlinear way, so the failure isn't a linear process. It is a catastrophic thing sometimes.

MR. LOFARO: It could be catastrophic when it ultimately fails.

DR. WALLIS: A chunk of insulation falls off or something.

MR. LOFARO: Eventually you can reach a state where the insulation is completely brittle, for example, and then it could actually fall off if it were damaged.

MR. VORA: Well, then I have a question. Dr. Powers, what temperature level are we talking about? Constant temperature at 100 degrees C? Was it 50 degrees C or the ambient environment? So I think the lower the temperature of course it will be more and more linear behavior but normally in reality it will start to actually change it after so many years of operation.

Did I answer your question?

CHAIRMAN POWERS: I'm just looking for some intuition. One could look at these things and say, gee, cable insulation is okay for 40 years. What is going to happen to it in an additional 20?

What you are saying is a lot can happen to it.

MR. VORA: The 20 years, depending on the -- I am

not an polymer expert but depending on the activation energy involved in and what actually happens to the chemical processes and bonding of the polymers and materials and what happens with time, temperature, super-position, will decide actually how good that will be for the next 20 years.

If we do an extrapolation in small incrementals, as long as there are no face changes I think that one is able to actually use the proper extrapolations from 40 to 50 or 60 years.

CHAIRMAN POWERS: Thank you.

The other technical challenge that comes about is for the low voltage instrumentation and control cables where you don't have the shield or the ground seal available. What is actually happening is that you have all 12 or different 15 types of condition monitoring techniques and methods and you can actually evaluate or use those things for evaluation of the localized materials or bulk properties, but to scan the entire length of the cable system from end to end at least in my personal view it has to be an electrical technique or measurement technique so you can scan the entire length of the cable system.

To actually have that effective measurement technique I think it is always useful to have a good ground shield for the grounding system available so that you can actually apply the proper voltages, the currents, and do the

effective shielding, et cetera.

For many of these low voltage I&C cables which do not have the ground shield effective and there are unshielded cables, the task becomes much more challenging.

The part of the research tests that we did and LOCA tests there were 11 techniques that were used by Mr. Lofaro in connection with the Wylie Laboratory that includes the visual instruction where one could provide a qualitative assessment of color, chafing, cracks and sometimes somebody could actually freeze that thing up about how stiff the cable is.

Elongation at break is actually the percent increase in the elongation at the time of fracture.

DR. WALLIS: How would you use that to monitor though? You would have to have a sample and break it, wouldn't you?

MR. VORA: Which one, the elongation?

DR. WALLIS: The elongation at break.

MR. VORA: It is a destructive testing.

DR. WALLIS: It is not a useful way to monitor in situ.

MR. VORA: Exactly right. This is correct.

MR. LOFARO: Right, unless you had sacrificial cables in the plant.s

MR. VORA: Then also we used what we call the

oxidation induction time, the time at which the rapid oxidation of the materials occurred when held at a constant elevated temperature in flowing oxygen environment and this has started to show some promise, the oxidation induction time and the temperatures, and Dr. Ken Gillen is doing a significant amount of work at Sandia National Laboratory and there are more and more sensitive data are being obtained to this effect.

The other technique we tried is the 40 year transformer phorespectoscopy involved in the measurement of absorption and transmission of the infrared radiation.

The compressing modular for a ratio -- the industry had developed actually a tool that you can actually take that thing directly into in situ where you have access of the cables and the materials that you could actually see and detect the properties and see the compressive strength of the material.

Of course we talked about the hardness test that is just a less sophisticated indenter and then we had the four electrical measurements which we did -- the dialectic gloss of the properties of the material, the insulation resistance, the voltage versus current, the functional performance test which probably gives a going over indications or you can do the voltage withstand test to see the dialectic strength of the cable insulation materials.

DR. KRESS: Have you tried signal analyses, just tapping the electric signal that goes through the cable itself and use something like signal analyses to see how it changes with time?

MR. VORA: This is actually -- no, these are the techniques that we use for this program but there are now new sophisticated technique being developed by the industry and especially by the Department of Defense and the other Federal agencies. We are talking about the measurement, especially with the Air Force is now very much concerned about the cable in the older jet aircraft and the NASA people are interested in it and they have developed what is called the partial discharge technique where you can actually send voltage signals and see, but you have the partial discharge and do your correlations and do the signal processing.

DR. KRESS: Yes.

MR. VORA: But again to do this thing in situ --

DR. KRESS: It would be tough in situ.

MR. VORA: It is very difficult and also at what voltage level do you have enough 600 volt cables where somebody would allow you to put 2400 volts cable, 24 volts, to do some meaningful correlations, so this technique we tried it, and there is not one single technique that we feel comfortable with which is effective to scan the entire

length of an installed cable system in operating -- which is cost effective, reliable and nonintrusive.

DR. KRESS: Do you monitor the environment these cables are in? Do you have instrumentation that tells you what or a given table, the cable spreading room or something, what the temperature and the moisture is as a function of time and that sort of thing?

Do you monitor that?

MR. VORA: I think not. Some utilities are doing it on their own.

DR. KRESS: The only reason I ask is for example one of the time limited aging analyses that are done is fatigue of various piping things. They don't go in and measure how much fatigue damage they got. They know ahead of time by lab tests what fatigue, what the environment does to it so if you could know ahead of time by sufficient laboratory tests what the environment does to, say, the insulation, then you could do a time-limiting aging analysis that is just analogous to the way you do fatigue.

I was wondering if that was --

MR. VORA: I think you are absolutely right. If you do then monitoring and analysis and combine that thing with the behavior of the materials in those environments you can correlate this. You are absolutely right.

But what is actually happening is that even though

these things are not all totally effective to detect the defects in the operating nuclear power plants, one could do the periodic walkdowns and inspections. One could do actually the monitoring of the environment and see what are the temperatures and what kind of hot spot might be existing there.

To give you some idea, there are some cables the manufacturers have rated them for 90 Degrees C, good for 40 years, and we know from these tests now that if you actually do the 90 Degrees C for 40 years they would not survive, so if you know the temperature, however it's the same cables, if you know that they are not exceeding the 60 degree environment and which is the case in most of the plants, that operating environments are much lower than the rated temperatures, you are able to have confidence that, no, those cables would be okay for 40 years, so you are absolutely right.

If you know the environment, that will give us much more data and information to base on and determine some of the residual life of the installed cable system.

But with regard to that advanced technique, I had the opportunity to work with NIST and the Air Force Program for the measurements of partial discharge.

Detroit Edison has started to now develop sort of current comparators that can monitor the behavior of the

current signals associated with energized cable system and correlate to the partial discharges.

The Department of Defense is evaluating the Air Force -- what they call the impedance spectroscopy and also the DOE EPRI Program through Dr. Ken Gillen is developing some advanced techniques and we are keeping track of all these programs to see where we go with regard to the condition monitoring of the cables, so that is the status of the condition monitoring cables.

With the issue of cable aging and the resolution of GSI-168, I think for license renewal the EQ cable is considered a time limited aging analysis, because the equipment normally is qualified to a specific life usually of 40 years.

The requirement of 10 CFR 50.41(20)(c) however provides the options to demonstrate the continued EQ during renewed life system. The equipment if it is originally qualified to 60 years or the equipment can be requalified by test or by analysis for 60 years or one could actually rely on some sort of condition monitoring or the feedback mechanisms.

If you do identify those condition indicator parameters of an installed cable system and if you do the monitoring and trending of this condition indictor over a period of time, for 10 years, 20 years, 40 years, that could

give actually the health of this cable and do some predictions whether they are good for the next 20 years or 40 years or 60 years.

For EQ equipment the licensees are expected to continue to comply with the requirements of 50.49 during the renewed license period. The regulatory process is in place for license renewal to address the EQ of the electric cables for the license renewal period for nuclear power plants.

DR. WALLIS: How do you keep track of when licensee replace cables? Presumably if the cables are part of a safety system they have to write a report, but if they are not then you don't know about it, do you, if a cable has to be replaced by a licensee?

You would presumably like to know.

MR. VORA: If they are within the scope of 50.49 --

DR. WALLIS: Yes.

MR. VORA: -- they are actually required by the --

DR. WALLIS: There must be other cables which are not you wouldn't know about at all?

MR. VORA: Correct. But however, in the space of the license renewal we are asking not only for the EQ carries over for a licensed period of time, however for the non-EQ cable the licensee is to demonstrate and have an Aging Management Program.

We learned our experience from the Calvert Cliffs and Oconee that, yes, it is really an effective way to address the non-EQ cables.

The GSI-168 that we talked about on October 6th, the Staff is still evaluating the various options for the resolution of GSI-168 and for non-EQ cable the licensees are expected to propose an appropriate Aging Management Program for license renewal.

DR. WALLIS: You say evaluating options. The impression I got was that you might not have a good option yet.

MR. VORA: I think one of the points of what actually happened, to give an example of it, we had some actually issue some of these banded jacket-insulated cables and we had some catastrophic failures during our test program.

We interacted between the two offices. We interacted with the industry and NEI actually issued and surveyed and we got input from the 103 operating nuclear power plants where these types of cables are used and under what operating environment or temperatures are used, and we got very significant good feedback from the industry about these cables, where they are used.

With regard to the overall cable aging research, we have not yet communicated. We are in the process of

communicating this result from the industry and I think that is going to be a very, very significant input to get the industry feedback, to get their ideas and thoughts about it would also be useful towards the resolution of GSI-168, so we still have to do a little more homework.

Any other questions?

DR. SHACK: I am a little confused between what is going to be done for the non-EQ cables and the EQ cables. Again, I can sort of see the trouble with the EQ cable is that the real test of it is something that you are in an environment that you can't test that, I mean but the cables that aren't EQ qualified you can actually test. They operate in the environment they operate in.

MR. VORA: But also on the non-EQ cable what we are finding, Dr. Shack, that some cables are accessible, some others are not.

If you have the buried cables, then we cannot do any inspections or get the materials, but there are techniques which could be used for non-accessible cables, for instance like Duke Power or what we did at Davis-Besse. We were able to use some electrical measurement techniques to understand --

DR. SHACK: Yes, but wouldn't that be reasonably effective for those cables because -- you mean you are actually testing under the conditions you are interested in

and the problem with the EQ cable is you can't do the tests?

MR. VORA: Yes, and the question is whether it will survive the LOCA --

DR. SHACK: Yes.

MR. VORA: -- the bottom line.

DR. SHACK: But the non-EQ cable doesn't have that problem. You can do the electrical tests and if it passes, it passes.

MR. VORA: Correct. You can monitor the power factor. You could do the functionality test. Various options exist for the non-EQ cables, that's correct.

DR. SHACK: So basically your 13, 14 slides are really for EQ cables?

MR. VORA: This is correct.

The GSI-168, the focus only for the EQ cables and low voltage I&C cables.

DR. BONACA: Since you are here, as part of the GSI-168 has there been any consideration of taking cables from plants which have operated for 30 or 40 years -- there are big plants out there -- and using those under accident conditions rather than just using laboratory aging?

MR. VORA: As a part of this overall program, Dr. Bonaca, what we did, we were able to obtain the cables which are 10 years old and 24 year old cable, naturally aged cable from decommissioned operating nuclear power plants, and they

were indeed the part of this overall test program.

What we found out -- and this is very interesting -- that this naturally aged cables, 10 years or 24 years old, which were actually qualified according to the old DOR guidelines, performed better than the artificially aged cables so we got some very significant input and data from those two tests but we are not able to get any 40 year old cable.

DR. BONACA: Okay.

MR. VORA: We tried to get some cable from the Shippingport Atomic Power Station where we interacted with Admiral McGee, and got some cables but they are, first of all, very very hot environment and also we are not able to the get the pedigree and the data and documentation on those cables, which is very important to have to make some sort of correlations.

DR. BONACA: Thank you.

MR. VORA: Thank you.

DR. KRESS: I would like to thank the speaker. I thought that that was a very good talk --

DR. BONACA: Very good.

DR. KRESS: -- with very few slides, and very informative.

DR. WALLIS: The thing that I am still not sure about is whether or not this is a problem that has been

resolved and how would I explain it to my colleagues back home or something if they ask me is there a problem with cables? I am not sure how I would answer it.

DR. KRESS: It is not resolved but there are things that you can do --

DR. SEALE: There are things that are being done.

DR. WALLIS: There are things being done, yes, but how close are we to knowing that we have some confidence that things will be okay?

DR. KRESS: That is a good question.

DR. BONACA: Right.

DR. KRESS: We will know in 20 years.

DR. SEALE: Here comes the alchemist.

DR. APOSTOLAKIS: Go ahead. He has to do something. Please go ahead.

MR. ELLIOT: I was originally going to talk about neutron irradiation embrittlement but as a result of the discussion that I have heard so far, I think I am going to expand the discussion.

We are going to talk about neutron irradiation. To my right is Alan Hizer of Material and Chemical Engineering Branch and to my left is Frank Grubelich of the Mechanical Engineering Branch.

Neutron irradiation in internals causes three mechanisms. They are void swelling, IASCC -- which is

irradiation assisted stress corrosion cracking -- and neutron embrittlement.

Void swelling causes a swelling of the component, changing dimensions, and could possibly lead to cracking.

Irradiation assisted stress corrosion cracking is stress corrosion cracking, which is enhanced by irradiation and again is a cracking mechanism.

Neutron embrittlement affects the material characteristics, the ability of the material to resist fracture. It is not cracking; it is a fracture-resistance issue.

I originally was going to talk about neutron embrittlement, but we are going to talk about all three.

With respect to GALL, the intent of our -- for these issues in GALL we identified all the components that we thought in the internals could be affected by these aging mechanisms, and essentially it was all the components in the internals.

The only place that we describe in the GALL where there is a screening criteria for these aging mechanisms is for neutron embrittlement and the only screening mechanism we have is the irradiation of 10 to the 17th and it's just the neutron embrittlement.

There is no screening criteria for void swelling and there's no screening criteria for irradiation stress

corrosion cracking. All the components for those two mechanisms are identified.

All the components are identified for neutron embrittlement but in this case we have allowed a screening criteria of 10 to the 17th and that we developed, we determined that from our current regulations.

In the current regulations the neutron embrittlement or void swelling or irradiation stress corrosion cracking of internals is not within the current, not identified as issues in the current regulation per se.

However, neutron embrittlement of reactor vessel materials is addressed in the current regulations.

DR. WALLIS: This is a fluence unit or something? There's no units on your --

MR. ELLIOT: Yes.

The current regulations on reactor vessels, there are three regulations.

There's Appendix G, Appendix H, and then there's the PTS rule.

In Appendix H we have established that if the neutron fluence is less than 10 to the 17th neutrons per centimeters squared that irradiation is not going to impact embrittlement. Now we have carried that forward for reactor vessel internals. Now the reactor vessel is a ferritic material. It's carbon manganese steel. The internals are

stainless steel. They are wrought, cast, and weld material.

At the moment we do not have any way of screening out for these materials what should be an applicable screening method other than the one we chose.

What we proposed for the previous applications is that they would develop a program to develop these screening criteria and then in addition selective locations that are most susceptible would be looked at, and that is where we are today.

Now I will open it up to any questions.

MR. LEITCH: In the previous presentation I guess there was, I think it was pointed out that there was some difference between the NRC Staff and NEI --

MR. ELLIOT: Yes. Do you want me to discuss that?

MR. LEITCH: Yes, would you please? Also, just a corollary to that question is that I thought I also heard that there were some indications that certain areas in the reactor vessel were already well in excess of 10 to the 17th.

MR. ELLIOT: You mean reactor vessel internals?

MR. LEITCH: Well, that is what I am not quite clear about.

MR. ELLIOT: Okay. Let me clarify that.

The reactor vessel belt line, all plants have exceeded -- the belt line is the vessel material adjacent to

the active core. All of the reactor vessel materials have exceeded 10 to the 17th by now.

The same thing holds for the internals in that region.

Now the higher up you go on the internals above the belt line it would be much lower fluences, so there could be internals that are high up above the core that have not received that neutron fluence.

The Staff position is, as I said here, 10 to the 17th is the only screening criteria that we think should be used at this moment based upon our knowledge.

NEI I think has proposed 10 to the 21st. We don't have enough data yet to reach a conclusion that that is the applicable screening criteria, not for the reactor vessel but for the internals and in particular for the three mechanisms I said that we are looking at.

DR. WALLIS: That is a factor of 10,000?

MR. ELLIOT: Yes. DR. KRESS: That's quite a jump.

DR. WALLIS: That is quite a jump.

MR. ELLIOT: Right, but you have to remember this study is in its infancy.

Currently the internals around the core, in the belt line region, are projected to see 10 to the 21st within the current license --

DR. WALLIS: Well, they have 10 to the 21st. How many of the atoms have been knocked significantly out of the lattice?

MR. ELLIOT: Displacements per atom -- we have that in displacements per atom too.

DR. WALLIS: That makes some sense.

MR. HIZER: Ten to the 21st -- that's about one DPA, about one displacement per atom.

DR. WALLIS: But that sounds big to me.

MR. ELLIOT: That is going to occur within the current licensing life for the internals -- DR. SHACK: Or it anneals out.

MR. ELLIOT: But will not happen for the reactor vessel. The reactor vessel we are talking about the maximum it will go to is like in five or six times 10 to the 19th.

MR. LEITCH: In 40 years --

MR. ELLIOT: In 60 years.

MR. LEITCH: -- in the original surface.

MR. ELLIOT: In 60 years.

MR. LEITCH: 60 years.

MR. ELLIOT: The fluence for the internals is much, much higher.

MR. LEITCH: Sure.

MR. ELLIOT: But that doesn't mean we have this -- we have different materials here, so the radiation

embrittlement that affects ferritic materials may not affect the austenitic materials, the stainless steel materials that are in the internals and that is what we are looking at right now.

DR. KRESS: You are not apt to get much data on that, are you, unless people pull things out of the vessels and you have a good knowledge of -- and you take them away and test their properties?

Is that how you, what you intend to do to get this data? I don't know how you deal with the 10 to the 17th for stainless steel unless you have some data.

MR. HIZER: Well, let me try to expand a little bit.

What we were looking for was a conservative level. We didn't want to set the bar way high that there could be problems developed below the criteria we set.

DR. KRESS: Okay.

MR. HIZER: Admittedly we have a very conservative level. We do have somewhat of a regulatory tie.

DR. KRESS: How do you know it is conservative for --

MR. HIZER: Ten to the 17th?

DR. KRESS: Yes.

MR. HIZER: I think we're --

[Laughter.]

MR. HIZER: -- very comfortable with it.

DR. KRESS: You have a theoretical basis that you know what all these displacements do to the properties?

MR. HIZER: There is some data at lower neutron fluence levels -- you know, 10 to the 17th, 10 to the 18th, 10 to the 19th.

DR. KRESS: Yes.

MR. HIZER: You know, the 10 to the 21st, 10 to the 22nd, the kinds of levels that we are looking at --

DR. KRESS: It takes a long time to get them up there.

MR. HIZER: Well, where you do --

DR. KRESS: It's hard to even do it in a test reactor.

MR. HIZER: You do highly accelerated experiments and the Office of Research and some international activities are developing data for all three that as mechanisms that's the kind of exposure levels that we are interested in.

DR. KRESS: Oh, okay.

MR. HIZER: Sort of the philosophy that we tried to take with the two applications and within GALL, knowing that the research activities are going on and they are going to fill in a lot of the uncertainties, let's set the bar fairly low. Let's come up with a list of components --

DR. SHACK: You set it very low, like all fluence

levels. That's very low. I mean how about 10 to the 20?

DR. SEALE: Yes. If the number you are after at the end of the life is 10 to the 22nd that you expect, then you can get 10 to the 17th in three months.

DR. SHACK: But for the mechanisms for the IASCC and the swelling 10 to the 17th isn't even a warmup.

DR. SEALE: That's right, that's right.

DR. SHACK: I mean you do have data, Alan. I mean you could go to the fast breeders for swelling and --

DR. SEALE: Sure.

DR. SHACK: -- and look at what fluences you need to get swelling at, say, 400 C, which you know would be a conservative estimate.

MR. HIZER: Yes, and again the philosophy we tried to take was to come up with a list of components that could be susceptible and with Calvert and Oconee what they have agreed to do is to do inspection on the most limiting components, the most susceptible, so it is not as if every component that is screened in they are going to have to go out and do inspection every 10 years.

DR. SHACK: So they are really only going to inspect the limiting component which is well up there?

MR. HIZER: Right, and the idea is that if problems are found with those limiting components then you ratchet your inspection sample down to include some of the

other components.

Is it a conservative methodology? I think everybody agrees that it is but until we have a lot -- until we have firm models that have been validated that have good mechanistic background, we thought that this was the best approach to try to handle things.

We are going into territory that hasn't been charted at this point and could we be less conservative? I think everybody agrees. Maybe a factor of 100, 1000, 10,000, but --

DR. KRESS: It is always hard to decide how conservative to be.

MR. ELLIOT: I mean if industry in response to our goal had come up with data that said this is a better number, here is the data, you know --

DR. KRESS: Then you could have looked at it.

MR. ELLIOT: But they haven't.

MR. HIZER: Here's a mechanistic model and here's some validation data --

MR. ELLIOT: In response to our positions in GALL there answer is we expect that it is not going to happen, it's not going to be a mechanism. Well?

DR. SHACK: I would certainly agree that no reasonable screening criteria would eliminate the highest fluence components and that is really what you are looking

at anyway, so whether you have the screening criteria or you didn't, you would still be looking at those components.

MR. HIZER: Right.

MR. GRIMES: This is Chris Grimes.

I think in fairness to the industry their concern is with the commitment to the extent. It is not that it won't -- whether or not the effect is occurring. Certainly the effect is occurring. What they are looking for is a threshold for action where they think the effect is demonstrably occurring as opposed to checking in anticipation of damage occurring.

That is part of the industry concern about void swelling is, you know, until there is some more demonstrable evidence of that, the extent of damage and how it affects intended function, don't make me -- should the licensees be required to be looking for it, and I think our approach is one that is intended to make sure that we have in the terms of the safety evaluation reasonable assurance that actions will be taken to ensure the intended functions, and so we are reluctant to push the thresholds out to demonstrably needed standards.

Therein lies the difficulty with trying to push the state-of-the-art too far, too fast, from the Staff's perspective.

CHAIRMAN POWERS: If I screened all of the

components I had that had fluences of 10 to the 19th and higher and saw nothing, would I then have to screen down to 10 to the 17th? I am asking if there is a nonlinearity here?

MR. ELLIOT: Are we going to raise the screening criteria to 10 to the 19th? Is that --

CHAIRMAN POWERS: No. I am asking the question of I am in a plant. I am worried about embrittlement. I have gone through and I have screened everything at fluences of 10 to the 19th and higher.

DR. KRESS: What do you mean, screened them? You went in and looked at them?

CHAIRMAN POWERS: I looked at them, whatever I had to do.

MR. ELLIOT: Well, let me just say that the current requirements is not to screen anything. The current requirements is to --

CHAIRMAN POWERS: Well, I just did this.

MR. ELLIOT: I mean the current requirement is to do a VT-3 for the internals and we think that for many components that may be acceptable.

The question is is it at high fluences. There might be some components that that inspection is not sufficient and that a more powerful, better inspection might be necessary. We are not yet at the point where we can say

what fluence is necessary before we need to do a more, a better inspection. We aren't there yet where we can say that.

That's all I can tell you today is that we don't think we are at that point yet. That is a "today issue" that we are looking at as far as the baffle former bolt issue is necessary today, at today's fluence levels, what components.

DR. SEALE: There is another point, and Bill just briefly mentioned it. In the FAST reactor program, there was a fair amount of -- I say "fair" -- there were data that were accumulated up to around 10 to the 22nd.

DR. SHACK: Well, I mean void swelling is a big problem in a FAST reactor.

DR. SEALE: Yes, right, and so it is not as if there hasn't been any experience, any evidence or whatever of these things. It's something that you know is there and you know how to recognize it when you see it.

MR. HIZER: Part of the problem with that data in particular is how to extrapolate it back to --

DR. SEALE: That's right -- but if anything the effect is probably less significant than it was with the FAST reactor, for the same fluence.

MR. HIZER: Probably, given temperature differences and things like that would be the main thing.

DR. SEALE: That's right. Annealing was greater.

MR. HIZER: But again I think what we are looking for in the enhanced ISI programs is looking at the highest stresses, highest fluences, things like that from a standpoint that you can then bound other components that have lower fluence, lower stress and maybe there are welds versus non-welds. Then I think you do not have as much of a concern with the lower ranking components, so from that standpoint no, you wouldn't expand your sample size if you don't find anything with the most susceptible components.

DR. WALLIS: Well, should I have a warm feeling after this or not?

MR. HIZER: I think you should have a warm feeling, yes.

MR. ELLIOT: I think we have given you what we think is a program that we can push through to give you license renewal -- we are talking about something that is going to happen in the distant future and we have identified all the components and we are not going to leave anything behind.

Whatever program results we get from the current programs we are going to apply those to all the -- for the license renewal, and that is what our approach is here.

DR. SEALE: And I think given --

MR. ELLIOT: We haven't answered the present

operating license what is going to be necessary, so certainly we don't want to leave anything out for the license renewal period.

MR. HIZER: Given the ongoing and planned work, in five years GALL may look a lot different on these three topics.

MR. ELLIOT: Right.

MR. HIZER: But at this point we don't feel we have sufficient knowledge to --

DR. WALLIS: You're going to stay alert then?

MR. HIZER: Right.

MR. ELLIOT: We have today's issues that we are dealing with and it's going to affect license renewal.

DR. SEALE: But when they get ready to do those 60 to 80 year ones they'll do it.

[Laughter.]

DR. BONACA: Any other questions from the members?

DR. SHACK: It will be all saturated by then.

MR. ELLIOT: Thank you.

DR. BONACA: Okay. This I guess concludes the presentation by the Staff?

MR. GRIMES: That is correct, Dr. Bonaca.

MR. WALTERS: Good afternoon. My name is Doug Walters with the Nuclear Energy Institute. I have responsibility for license renewal, and I appreciate the

opportunity to be with you again today.

I initially was planning to talk through our guidance document with you, but I'll ask you indulgence, and let me take what time we may have left to approach this whole GALL SRP issue from maybe a different perspective, and that's the process.

I'm more process-oriented in what I do at NEI than I am technically-oriented, and I can't answer your questions about IASCC and the like, and although I find that discussion very interesting, I'm not sure I'm going to be able to satisfy all your questions in the technical area.

But what I'd like to do is talk about the process, because our comments really are focused on the process. If I can go back just a little bit in time, GALL is the outcome of the existing program issue that we raised with the Commission last Summer.

We were very concerned that it wasn't clear how existing programs would be credited in license renewal. And when you sit around and talk about a lot of these technical issues, it raises at least in our minds, well, why aren't we talking about that today?

What's so magical about that 40-year number? You heard in the last presentation that there are three areas in embrittlement arena, two of which aren't, at least if I understood it correctly, addressed by the regulations.

But you're going to have to do something for renewal. And so when we sat down and looked at GALL, we wanted to understand the technical rationale or basis for why a one-time inspection was necessary, or why a program enhancement was needed.

And that's our -- that really is the underpinning of our comments. We felt that was very important to understand.

And so our comments, in turn, if we didn't see that, we said, well, why are you asking us to do that? Or we don't think the threshold needs to be at that particular level; it can be here.

The question was raised -- and I think the Staff captured our comments pretty succinctly, on, I think, page 7 -- the answer to the aging effects question is, in fact, one of scope. I mean, that is correct.

And, again, it's making sure that we understood why was a particular aging effect identified in GALL? If I go back a little bit in history, we when we changed the rule, we were very specific about saying the purpose of license renewal should be managing the effects of aging to ensure functionality, not the mechanisms, because the effects are readily identifiable.

You can go through the GALL, and you can see that listed in there. So, again, I go back to the process.

When we commented, we thought about this threshold that was being established. Somehow there's a threshold you go over when you go into the renewal period and you have to do something different.

Well, how is that threshold defined? What's the basis for that? And that helps us identify what we think we need to do.

I'm sorry if I'm jumping around. I just made a couple of comments based on what I heard, and I wanted to be responsive to that.

There was some discussion about the inaccessible area issue. I will tell you that we still don't understand that one, particularly when there is a rule that indicates, at least by our reading of it, that in 50.55(a), what you do for inaccessible areas today is okay for renewal.

And why all of a sudden there's some change to that, I'm not sure. And the reason that all this is important, obviously is, we want to get through the process and know that at the end of that process, we're going to have success, meaning that we get the renewed license.

And so GALL is, other than the submittal of the applications, this is probably the most significant undertaking on the -- I think, on the Staff's part and the industry's part since those -- other than the applications being submitted, as I said.

So we want to get it right because the next wave of applicants are going to rely on it. We need to understand what's in there.

We react -- just another example: We kind of react like this when we hear or we read -- and I pulled the copy of the slide out, the discussion about the water chemistry programs.

And if you read that, there is -- I thought I pulled it out, but maybe I didn't -- but in any event, there's language that says -- let me just get it, so I don't -- it talks about the EPRI reports.

And then it says: However, high concentrations of impurities at crevices and locations of stagnant flow could cause...

Okay, it could. Does that mean we need to manage it for license renewal? There's a fine line there, I think. We heard that in the last presentation; you could have these effects. So where do we draw the line between what we really need to manage and what's real and what could cause or could occur? And that's -- I mention this again, only to give you a framework or a reference of how we prepared those 700 comments or the basis for those 700 comments that we prepared.

One-time inspections was discussed, and I made a note about that. It's kind of interesting to me that we

heard, well, if over ten years, there's nothing that comes out of those, then we could eliminate them.

Well, it would seem to me that if you're imposing a one-time inspection, you might anticipate that something is going to come out of that. That ought to be the basis for doing the one-time inspection; that you think there is something going on there that you might want to see.

Again, that's a reference for our comments. Let me just close by offering one observation on the disposition of the issues, the issues list that Steve Koenick talked about.

I do think we were fairly satisfied that we got at least to the high priority items, and I think we came to resolution on a majority of those, and the ones that aren't are in GALL, and we'll deal with those separately.

But we're fairly satisfied with the way that that came out. I also would just like to acknowledge that I think where we're headed is in the right direction. We have differences, some of which I just tried to give you a thumbnail sketch of.

Those will always exist, in my view, because of the nature of the document, and you can't address every situation.

We're headed in the right direction; it's a good document and it will be very useful to the next wave of

applicants.

I would mention one other concern, and probably the most overarching concern is we're still not sure how GALL's going to be used. An example of that is in the tables that are in your handout.

There's -- I'll just reference A3-1.1 as the item number, and if you read what's on the right-hand side of the page, if you will, it talks about the aging management program as ISI, Generic Letter 88-05, no further evaluation required.

Well, we are obligated to do, as licensees -- well, I'm not a licensee. But what licensees will be obligated to do is even though that says no, there is still a large amount of work that they need to do. They need to look at their program, make sure that it matches what's in GALL. And I think the words in the SRP are that we need to certify that our program looks like the program that was evaluated in GALL.

We don't know what certification means; we have a meeting set up with the Staff to try to flesh that out so that there's -- we're all speaking from the same page, if you will.

But that's our overarching concern, is, we don't really know at this point, how GALL would be used, and what does it mean to certify that you've got a program that looks

like the program that was evaluated in GALL?

I have confidence that we're going to get through that. I don't see that as choke point at this point in time, but that is something that we do need to consider.

So, with that, I appreciate the opportunity to just share a few thoughts with you. And if you have any questions, I'd certainly be happy to try and address them.

CHAIRMAN POWERS: I guess one of the -- I guess I have a couple of questions. The first one is maybe directed to the staff, as long as you're sitting here: What does certify mean?

MR. GRIMES: Certify means the same thing that it has in the past for submittal of anything under oath and affirmation. We used that term with an expectation that the licensees would understand how they attest to something before the Staff.

In this situation, it's somewhat unique, because instead of the applicant or a licensee writing out the language or their choice to certify under oath and affirmation, the Staff wrote it out in a report that the licensees and applicants are now trying to figure out how they're going to certify under oath and affirmation.

And we do agree that we think it's appropriate that there should be a clear understanding of what that expectation is.

I think I would say I am a little concerned and disappointed that they didn't understand that to begin with, but then the licensing process evolves.

DR. SEALE: Well, presumably, Baltimore and Duke did something.

MR. GRIMES: They submitted their applications under oath and affirmation, and we verified through inspection, that the contents of the application and the evaluation basis were reasonable and well supported by evidence in the plants.

CHAIRMAN POWERS: The next question comes back to the crevice corrosion issue that you brought up. I mean, it is -- is there some doubt in your mind that crevice corrosion can occur?

MR. WALTERS: No.

CHAIRMAN POWERS: Then maybe your point is lost on me. Maybe I missed the point.

MR. WALTERS: Well, I think the point is that I'm not sure what -- I'm not sure what --

[Laughter.]

MR. WALTERS: Let me try to not address, necessarily, crevice corrosion. I think the issue is that when you say there's no requirement to deal with it today, but you've got to do something in the renewal term, just as a practical matter, I don't understand that.

I mean, what's so different about operating in Year 41? Why aren't we concerned about it today and doing something about it today?

Now, we heard that there is work underway that will impact what we do today. But, you know, I'm looking for, on all these issues where we have to do something, I'm looking for the basis. I'm looking for the rationale that justifies making a license renewal applicant go that extra yard.

And in most cases, I think that's been provided and we're reasonably satisfied that we understand that. But there are some situations where -- because, look, let's be candid: There's no backfit protection under license renewal, and if -- and I'll just leave it at that. DR. BONACA: Any other questions for Mr. Walters?

[No response.]

DR. BONACA: I would just like to say a couple of things: Not having participated in the meetings between the Staff and the industry, but having seen some of the products, I really believe that this is a major undertaking.

And I think that it's a successful undertaking in many ways. I feel also that looking at the progress, for example, the changes in the SRP between the previous version and today, they are much more clear.

I know that the industry provided a lot of

comments. I was curious about those, and I found that they were really an improvement in that.

I think that I believe that the industry and the Staff should be very much complimented for a massive undertaking here. So, I think I'm expressing the views, probably, of many of the members of the Committee.

With that, Mr. Chairman, I'll give it back to you.

CHAIRMAN POWERS: Okay. Can you tell me when we're going to risk-inform this whole thing?

[Laughter.]

MR. WALTERS: If I could, I mean, I would second that. I'm not here to criticizes or necessarily point the finger at anybody.

DR. APOSTOLAKIS: On the risk-informing it?

[Laughter.]

MR. WALTERS: Well, risk-informing it would be okay. It has been a very -- DR. SHACK: It might be too much for you.

MR. WALTERS: It has been a very successful effort. The interactions with the Staff have been absolutely first class, and very productive.

The series of meeting we went through in whatever it was, February through July, were very productive; there were a lot of good exchanges, very open minds, and a willingness to really listen to one another and make changes

as appropriate.

So it has been successful, and I do believe it's headed in the right direction. There are just a few things that we need to focus on, and then we'll move on. But it has been successful, and you're right.

CHAIRMAN POWERS: I guess I'm a little surprised you didn't have more to say about this GSI-168.

MR. WALTERS: Well, I'd be happy to talk about it.

[Laughter.]

CHAIRMAN POWERS: You looked at the clock.

MR. WALTERS: Well, I'm not sure even where to start with that. I mean, I would answer the gentleman's question and say I don't think there's a problem with cables, but -- DR. WALLIS: What is that based on?

MR. WALTERS: Well, just for example, there was mention of the cables that failed the 90 degree C-40 test, Okonite single bonded jacket cables.

We found six plants that have them, and two of those plants, they're jumper cables. They plan to replace them.

And in the others, the environment that they're seeing is nowhere close to 90 degrees. So while I respect the fact that the testing was done, I would say that we need to be careful when we look at those results, and we need to go out and find out what's really going on in the field.

So I don't get too alarmed when I hear those test results, because we've done the survey and we know what's really out there.

CHAIRMAN POWERS: I thought you might be more alarmed with the implication that you're going to -- your licensees are going to be cast in the role of having to prove a negative; show me some technique that shows from cable end to cable end, that this system doesn't have a flaw in it that's going to get me in some period of time.

MR. WALTERS: Right.

CHAIRMAN POWERS: And if you take a chunk out of this cable and go test it in the laboratory, you still haven't satisfied me. That's where I thought you might be modestly agitated.

[Laughter.]

MR. WALTERS: Well, we are. I don't think that's the only area where that occurs, but actually, my take on 168 is that we're going to wait and see what the proposed resolution is. That's all we can do at this point.

CHAIRMAN POWERS: That's a fair comment.

MR. WALTERS: If it's proving the negative, then we'll comment on that. I would mention to you, though, that I believe this issue was discussed in front of ACRS -- I forget the date -- and subsequently, I know that some letters were submitted to try to provide some industry views

on that whole task action plan for 168. I believe they were sent in by EPRI, so --

CHAIRMAN POWERS: Any other comments on this?

[No response.]

CHAIRMAN POWERS: I think that brings us to a close of our transcripted agenda.

MR. WALTERS: Thank you.

CHAIRMAN POWERS: So we can dispense with the transcription.

[Whereupon, at 3:12 p.m., the Committee recessed, to reconvene in unrecorded session.]

CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

477th ACRS MEETING

Case Number:

Place of Proceeding: Rockville, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission transcribed by me from recorded tapes provided by the Nuclear Regulatory Commission, and that the transcript is a true and accurate record of the foregoing proceedings to the best of my belief and ability.

Natalie Perino

Transcriber

Ann Riley & Associates, Ltd.