Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title:	Risk-Informing Post-Fire Shutdown Circuit Analysis Inspection
Docket Number:	(not applicable)
Location:	Rockville, Maryland
Date:	Wednesday, February 19, 2003

Work Order No.: NRC-788 Pages 1-225

NEAL R. GROSS AND CO., INC.
Court Reporters and Transcribers

1323 Rhode Island Avenue, N.W.
Washington, D.C. 20005
(202) 234-4433

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

+ + + + +

PUBLIC WORKSHOP ON RISK-INFORMING

POST-FIRE SAFE-SHUTDOWN

CIRCUIT ANALYSIS INSPECTION

+ + + + +

ROCKVILLE, MARYLAND

+ + + + +

WEDNESDAY,

FEBRUARY 19, 2003

+ + + + +

The workshop was convened in the Auditorium of the Nuclear Regulatory Commission Headquarters, Two White Flint North, 11555 Rockville Pike, Rockville, Maryland, at 9:15 a.m., Francis "Chip" Cameron, Facilitator, presiding.

PRESENT:

FRANCIS CAMERON   Facilitator
FRED EMERSON   NEI
JOHN HANNON   NRR, NRC
DENNIS W. HENNEKE   Duke Power Company
ROBERT KALANTARI   EPM, Inc.
ELIZABETH KLEINSORG Kleinsorg Group
BIJAN NAJAFI   SAIC, EPRI

PRESENT: (CONT.)

STEVE NOWLEN	Sandia National Laboratories
CHRISTOPHER PRAGMAN	Exelon & BWROG
KEN SULLIVAN	Brookhaven National Laboratory
MARK SALLEY	NRR, NRC
ERIC WEISS	NRR, NRC
KIANG ZEE, P.E.	ERIN Engineering & Research

A G E N D A

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

(9:22:03 a.m.)

MR. CAMERON: Thank you all for coming out today. We know travel has been difficult. My name is Chip Cameron, and I'm the Special Counsel or Public Liaison here at the NRC, and it's my pleasure to serve as facilitator for your meeting today. And the topic of the meeting is Associated Circuits for Post-Fire Safe-Shutdown of a facility, and as your facilitator, I'm going to try to help you to have a productive meeting and to achieve objectives that the NRC has for the meeting today. And the Staff is going to go more into objectives when they give their presentation, but I think a simple statement on objectives that the NRC would like to have out of this meeting today is to identify the most risk-significant associated circuits post-fire safe-shutdown. And the goal would be for the NRC to use those risk-significant circuits as the basis for its inspection program.

My job as the facilitator will be to help you keep organized and focused, to make sure that everyone has a chance to participate, to help you with problem solving, keep us on schedule, and keep track of your progress as we go along through the day.

In terms of the format for the meeting, we do have a round table up here with representatives of the affected interests, people who are knowledgeable about this issue from one perspective or the other. And we not only want to hear from each of you on what your perspectives are on this issue, but to get the reaction of your colleagues around the table to those perspectives, and to try to have a discussion on these issues.

Although the focus of the meeting is on the people at the table, we are going to go on to those of you in the audience after each major agenda item to hear any comments that you may wish to give us, so you will have a chance to talk if you have something to say.

In terms of ground rules, each of you has what I call a name tent in front of you, and what I'm going to do is ask you, if you want to talk, put that up like that, and that way I'll be able to keep track of who wants to speak, and you won't have to keep waving at me or whatever. I may not take the name tents in order they come up, because we want to try to follow discussion threads as much as possible, but that will also help us to get a clean transcript. We have Heather here who is our stenographer, and there will be a transcript of this meeting that will be available to people on the NRC website, or possibly through a hard copy if that's what someone would like to have. And because we are keeping a transcript, I would just ask you to just one person at a time speak so that Heather knows who's talking, and also so that we could give our full attention to whomever has the floor at the time.

There may be issues that come up that don't fit squarely into the agenda item that we're talking about, or perhaps don't even fit under the focus of the meeting. I'm going to keep track of those over here in what I call the parking lot, and we either go back to them at an appropriate time for discussion, or the NRC will have that list of issues that they may need to consider outside of this meeting in another forum.

What I'd like to do, I want to go over the agenda with you and see if anybody has any question about it, but first of all, I think it would be appropriate for us to introduce ourselves around the table. And if you could just give us your name, and affiliation, and maybe a couple of sentences on what your interest or concerns are on this particular issue. I'm going to start with Eric Weiss.

MR. WEISS: I'm Eric Weiss. I'm the

Section Chief for Fire Protection in NRC's Office of Nuclear Reactor Regulation, and my obvious interest is congruent with the purpose of this meeting, which is to identify the most risk-significant circuits and associated circuits so that we can focus our inspections in a way that is productive for the public, predictable for the industry, and serves NRC's underlying mission, so with that I'll turn it over to the next guy, John Hannon

MR. HANNON: Good morning. I'm John Hannon, Plant Systems Branch Chief, DSS at NRR, and I'm responsible for the NRC's Fire Protection Program.

MR. SULLIVAN: Good morning. I'm Ken Sullivan from Brookhaven National Laboratory. I've been involved providing technical assistance to the NRC for approximately 17 years in this area, both in discussions and performing safety evaluations.

MR. KALANTARI: I'm Bob Kalantari with EPM, Engineering Planning Management. I'm involved with the safe-shutdown appendix on analysis for the last 18 years. I'm hoping, I don't think we'll get there today, but what to get today is a clear definition of a number of issues that has been kind of putting industry on hold to do a complete safe-shutdown analysis. As a consultant, I work with a number of clients, and I think I know the right answer, but I can't tell them because it's not clear yet. And the document that Ken wrote, I reviewed it, and it clarifies a lot of issues. I hope we can put this to bed.

MR. SALLEY: I'm Mark Salley. I'm a Fire Protection Engineer with NRR.

MR. NAJAFI: Bijan Najafi. I'm with SAIC. I've been responsible for EPRI's Fire Research Program for the past 10 to 15 years. I've been involved in most of the methods for fire-risk assessment, development and also in the NEI-001. My interest is pretty much to see what is the issues and roles related to these post-fire safe-shutdown in a risk assessment, because currently we're developing a methodology or upgrading a methodology that needs to reflect in part some of these issues that we discuss today.

MR. CAMERON: Okay.

MR. ZEE: Kiang Zee with ERIN Engineering. My background has been a lot in the fire risk assessment area. My actual roots are in traditional deterministic electrical design, electrical analyses, so I kind of go back to Appendix R compliance. And again, to sort of chime in a little bit with Bijan, what I'd like to see is have this all come together, if you will, in a consistent framework.

MS. KLEINSORG: I'm Liz Kleinsorg with Kleinsorg, and I've been working with fire protection since about 1978. I'm also helping NEI write implementing guidance for 805.

MR. PRAGMAN: I'm Chris Pragman. I'm here from Exelon and also representing the BWROG. I've been doing fire safe-shutdown analysis for 12 years, I am currently conducting analysis on plants for Exelon, and one of the things I'd like to get out of the meeting in some sense of stability that the methods used for analyses are not changing constantly, and some degree of comfort that when we go make changes in a plant that whenever the NRC has to come and inspect that the changes were acceptable.

MR. HENNEKE: I'm Dennis Henneke with Duke Power, and I've been doing PRA for about 20 years. I'm on the ANS Fire Writing Group for the Fire PRA Standard, and worked on the NFPA 805, and NEI-001. And I guess my main goal in life right now is to not only respond to our three sites, fire issues and circuit issues, but kind of bring -- hopefully bring all these things together like 805 and circuit analysis, and the Fire PRA so they're kind of all heading in the same direction, and supporting each other, so the Fire PRA and the methods we develop really kind of support a regulatory approach and finding the right answer for circuit analysis.

MR. NOWLEN: Hi. I'm Steve Nowlen from Sandia National Laboratories. I guess I have many hats here. I've been involved with the U.S. NRC Research Program for about 20 years. I've been leading the program for about 15, so I'm involved in the requantification studies that we're doing in coordination with EPRI, and Bijan, and SAIC. I'm also involved with some contract work, either directly or through research for NRR and various aspects of circuit analysis. We're working on the SDP revision. I'm also a member of the Writing Committee on the ANS standard, so I've got a number of risk-type hats here that make me very interested in what happens here today.

MR. CAMERON: Okay. Thank you very much all of you. I should note that Fred Emerson from NEI will be joining us. He's running a little bit late, and we have a couple of other participants who may show up some time during the day.

In terms of the agenda, and in just a few moments, we're going to go to John Hannon, who just introduced himself, to give you a formal welcome from the NRC, and talk a little bit more about objectives for today's meeting.

After that we have two context pieces, so to speak, so that everybody gets an understanding of the background on these issues. I know that all of you are experts on this, but we wanted to try to clearly set some context so that everybody knows how all these moving parts fit together. And our first context piece is going to be done by Eric Weiss, and then we'll go to all of you, including the audience for any questions that you might have.

By that time, Fred Emerson should be here, and Fred's going to tell us about the NEI Circuit Failure Issues and some of their work, then go for clarifying questions, and at that point take a break. And then we're going to come back for our first discussion period, which is called "Discussion of Threshold Questions".

In other words, if the goal is to identify four, five, fifteen, whatever the most risk-significant associated circuits as the basis for the NRC Inspection Program, what issues do you need to agree upon first before you get into those specifics. Two issues that stood out for us were one, what is the definition of associated circuit. And secondly, when we talk about risk-significant, what are we talking about there? What are the components of that?

We'll then go to lunch and try to figure out who's going to escort this group to lunch, since we're not operating on our usual more flexible process here, but we'll figure that out. When we come back, we want to start to talk about potential candidates, these are associated circuits candidates or ranking. And we're going to have a slide, what I call a taxonomy, that Eric and his staff have put together as sort of an opening on that for you to think about. And then we're going to try to categorize these candidates into most significant, medium significance - perhaps those can wait for incorporation into the NRC Inspection Program. And Eric is going to talk a little bit more about this. Or perhaps those that need more research before we can establish that they should be in the inspection program. And what are the low significance items that then do not need inspection program. And we're going to continue that for the rest of the day, and then do a sum-up at the end. And I would just encourage you to give us your views, and one thing that as a layman that I've noticed more so in this area, perhaps, than in a lot of other areas, is we use a lot of acronyms and, of course, we know what we use acronyms, because it's efficient. And I don't want to discourage you from doing that today, but I would ask that when we first use an acronym, for example EGM, ROP, we could go on and on, that we identify, and I'll remind you of this, what that is, so that the transcript will reflect at least in the beginning what that acronym stands for.

You've heard the agenda. Before we go to John, are there any questions about the agenda? Is it clear what we're trying to do? Okay. And we can do agenda checks, obviously as we go along through the day, to see what's going to be the most productive around the table. And with that, I'm going to turn it over to John Hannon.

MR. HANNON: Thank you, Chip. I'd like to thank everyone for coming. There's a few people in the audience I want to recognize. Susie Black, the Deputy Division Director for DSSA is here with us, will be here for at least the first part of the meeting. We also have Joe Birmingham, Program Office, who's helping us with this topic. A couple of people from the Division, Roy Fuhrmeister is here from Region One, and we have Charlie Payne on the phone with us from Region Two. Charlie, can you hear us okay?

MR. PAYNE: I hear you fine.

MR. HANNON: Okay. I think just from the brief introductions that we've heard, I would suggest that we have critical mass talent in the room here, and I appreciate the level of interest, and the number of people that were able to get here under the adverse weather conditions, but I do think we have the necessary talent assembled here to reach a real good conclusion at the end of the day.

Just to briefly recap, Chip's mentioned the purpose. The NRC needs to resume inspections in the area of associated circuits. We want to do it in a risk-informed way consistent with the Reactor Oversight Program. I am committed to withdraw the Enforcement Guidance Memorandum which placed the inspection of associated circuits on hold by the end of this fiscal year, by October. I intend to have that EGM withdrawn, enabling a resumption of inspection activity.

I would remind everyone that this is not about the final resolution of the issue. Some of you have mentioned some agenda topics that would be constructive toward reaching a final resolution. That's not what we're here to discuss today, so if those kinds of issues can be put in Chip's parking lot, we'll attempt to do that so we can keep focused on the resumption of inspection activities.

Now the goal of this workshop is to, as you've heard, identify and rank risk-significant circuit analysis areas to focus our inspection. I intend for us to obtain alignment on the areas that should be inspected for maximum safety benefit. Notice I didn't say there has to be a certain number of items, I just want it to be an alignment on what needs to be inspected obtaining the maximum safety benefit. So a successful outcome of this meeting would be that we conclude today with a ranking of circuit analysis items that are risk-significant for inspection purposes.

We want to be able to focus our inspectors on the risk-significant area, obtaining the maximum safety benefit using our limited inspection resources. I'd like constructive participation. It's important that we stay focused on the outcome we're seeking. Chip is here to facilitate and we have a transcriber here to record the meeting to help us stay on target.

Important that licensees prepare for the resumption of the inspection, so what we determine today will be important for the licensees as they move forward in this area. Are there any questions from me before we resume or continue with the meeting? I'd be happy to take any questions right now at the opening. Okay. If not, then let me turn it over to Eric who's going to open up with a technical dialogue.

MR. WEISS: Well, I want to welcome you to the Facilitated Workshop on Associated Circuits. We have with us today a broad range of technical experts, engineers, scientists from the NRC, utilities, NEI, National Laboratories, consulting firms and others. What we want to accomplish today is to see if we can, as reasonable engineers representing many viewpoints, agree on the most risk-significant circuit configurations so that we can remove the Enforcement Guidance Memorandum, the EGM, that suspended inspection in this area, and resume inspections.

What we identify as the most risk-significant items will go in what I'll call Bin One. In the second bin, we're going to identify those other associated circuit configurations that are of medium significance or need further research to decide on whether they're appropriate for inspections. The third bin, as I'll put it, will have those things of low significance, where we'll have to decide how to deal with them in regulatory space so that they are no longer contentious.

Everyone should benefit from this approach. The public will get the most efficient and effective inspections. They'll get the most safety per inspection hour. The industry will get inspection predictability, which will make their processes more efficient and effective. Their dollars will be wisely spent and give the public the most safety, and they won't be involved in contentious matters with NRC to no apparent purpose. And NRC will be able to resume inspections in this important area, and serve our mission.

As a word of caution -- Dan, can I have the first slide, please. As a work of caution, I want to remind everyone that what we're doing today will in no way change a plant's licensing basis. We're talking about a risk-informed approach to resuming inspections. Next slide please, Dan. The landscape of associated circuits issue is complicated with plant unique licensing bases, and the regulation that has generated some unclear expectations. For this conference, we've provided participants through the web with access to the NEI-001, which is their approach to handling the circuits analysis issue, and a copy of the NRC's draft NUREG on the subject, which represents our perspective on historical viewpoints, definitions and so forth, so that we could all speak the same language.

We're considering endorsing NEI-001 in a regulatory guide, but the outcome of today's meeting is directed at inspection guidance. Next slide please, Dan. As most of you know, the Brown's Ferry fire was the seminal event in nuclear power plant fire protection. It illustrated the vulnerability of power plants to severe consequences should a fire occur affecting circuits for safe-shutdown. And there was a SECY 80-438A, which was the Commission paper that resulted in the famous Appendix R rule, that explicitly requires addressing associated circuits.

Next, Dan. Here on the screen is the most relevant portion of the rule. Anyone associated with the subject is already familiar with the difficulties that this regulation has sometimes caused in terms of its expectations. I won't read the slide to you though. The next slide please, Dan.

Here is a definition of associated circuits for the purpose of nuclear power plant fire protection. I know there are many people in the room who are experts in electrical engineering, but I would point out that this is not the same definition as used by the institute of electrical and electronic engineers that appears in their standards. This is the definition that we use in nuclear power plant fire protection.

Implicit in this definition is that understanding that Appendix R requires the physical protection of required circuits by one of three methods that I'm sure you are all familiar with as experts, three-hour barrier, one-hour barrier with suppression detection, or 20 feet with no intervening combustibles in suppression detection. Next slide please, Dan.

Attempts were made to clarify the associated circuits issues in the past. There was a Generic Letter 81-12, and subsequently Generic Letter 86-10. Note on this diagram that appears in the Generic Letter, that there is an illustration of one of the three types of associated circuits. Next slide, please.

Here are four examples. The first example illustrates the importance of an associated circuit. Certainly, those consequences are important. Note that the three types of associated circuits are indicated by the underlining in the remaining examples. It is generally the last type that is the most difficult to identify, and the most controversial once identified. Next slide, Dan.

What we want to focus our inspections on are the most risk-significant areas of the associated circuits, and remove the Enforcement Guidance Memorandum, the EGM, so we can resume inspections. Undoubtedly, some things will remain controversial with their risk-significance at issue, and those things deserve further study. We will give the public the best possible inspections if we focus on the most risk-significant items. We, as regulators, do not want to focus our inspections on the least risk-significance items because it doesn't serve anyone's purpose.

Licensees should expect predictability in their inspections, and that's what we're trying to do, not only in this workshop but in our subsequent actions to resolve the associated circuits issue. We plan to deliver that by following the existing Reactor Oversight Process, the ROP, and focus on the most risk-significant associated circuits. I look forward to working with you in the balance of this workshop. Thank you very much.

MR. CAMERON: Okay. Thank you, Eric. And you can either stay there or come back down to field any questions that the participants might have. And particularly since Fred isn't here yet, and he's going to be on next, I would just encourage you if you have questions about Eric's presentation, comments that you want to make about that, please feel free to do so. And if you could just, you know, use your name card. Does anybody have a question for Eric about what the NRC's objectives are, or anything that he said about the fire protection framework? Great. Let's got to Bijan.

MR. NAJAFI: I guess this is bringing down your objectives to the second tier a little bit more tangible. I'm trying to look to see what kind of answers this group is supposed to arrive at by the end of the day. I mean, I guess we talked about what I call 5,000 feet elevation. I want to bring it down a little bit. Let's say ideally, are we looking for a, first, generic set of type of issues and questions, that it be grouped in significant and not so significant groups? Are we looking for attributes that defines those circuits or systems or components into significant and not so significant, or what is it that, let's say at the end of the day, we're looking for? I mean, a list of components, a list of attributes, a list of circuit types? Can you sort of provide a little bit more specific --

MR. CAMERON: Well, that's a real good comment, because it may guide how we march through sequentially the various issues. What do we need to get to the --

MR. WEISS: Well, I tell you, I have some preconceived notions about how we might best approach the subject, and when we get to this afternoon's session, I'm going to throw up a slide that might be an approach, but the field is wide open. If you have a better idea than I do, or the person sitting next to you, we welcome those ideas. If there's a way to approach this subject that's going to be clearer, easier to implement than what we've conceived of, that's in large measure why we're meeting today, is to see if we can't come up with the best possible ideas. And like I say, I personally have something to kick the discussion off with if no one else does, but I think we should, given the level of expertise in this room, be able to come up with, I don't know, five to twenty kinds of associated circuits where we can all agree that they're risk significant. And if we find them in a nuclear power plant, we should do something about them. We have processes to deal with that, the Reactor Oversight Process.

I realize I'm -- the downside is I'm

giving you a non-answer in terms of I'm not laying down a strict ground rule for what has to be done, but on the other side of the coin, the positive side is I'm indicating that we're receptive to new ideas and new ways of thinking about things, and we want to arrive at this answer collegially. We want to have volume from the community of people who understand the issue the best.

MR. CAMERON: And, Bijan, before you go again, and I want to get -- this is an important issue, because this is really sort of agenda setting. I want to get feedback from others. The 11:00 session was meant to try to identify, I think, some of the attributes - maybe that's the wrong word, but to try to establish that macro set of criteria attributes that would be used to then focus in on the specific associated circuits. And Eric does have a taxonomy on that, but let's test this out and make sure that we're all going in the right direction on this. Bijan, what do you have to say after you heard Eric?

MR. NAJAFI: I guess in that case, I would re-encourage for people that are on both end of the inspection, the inspectors and the people who respond to these inspectors, actively participate in this discussion, because speaking for myself, I'm not sure what kind of information would be helpful to an inspector or somebody who can respond to that inspector. What angle of that information could be effective. I can talk to them a certain attribute that they can tell me in the field is really not going to make their life any easier, so we -- I think it's very important to have participation from both the inspectors and whoever responded to them from the -- I mean, the licensees or the plants to participate in this, to make sure that those that we come up with is useful and practical.

MR. CAMERON: Right. And, Bijan, you've I think put your finger on a key element here. It's that the idea of identifying these "risk-significant" circuits is to resume the inspection program. How do you give clear guidance to an inspector so that they know what they're looking for, where to stop, and that's why we need to have that type of input from all of you.

Could we get some reaction to this, Chris?

MR. PRAGMAN: A few years ago we tried asking ourselves this question, the BWR Owner's Group effort to write their guidance document, and what we found when we discussed it with different plants was what may be a very risk-significant combination at

Plant X really had no risk-significant at all at Plant Y, how the cables are routed, some underlying original plant design that you are basically stuck with, the plant was just laid out that way. So by the time we were done, we thought we would be doing a disservice to make a list of components and say are all BWRs should look at this component. And instead we've focused more on attributes: is there something that could cause an immediate and unrecoverable condition, no matter how good your safety-shutdown analysis is, you can't bring the plant back. And that's where we essentially had to leave it among ourselves because we weren't really helping anyone by looking at specific components. And if you all brainstorm about what is important, there might be something out there that Plant Z has that we haven't considered. So by actually making a list we are limiting the fire protection a plant has.

MR. CAMERON: Can we get some input from Eric on Chris' point? And also, maybe for my benefit more than anybody else's, is we've heard the term "attributes" twice. Can we make sure that we're using the term attributes in the same way? I'd like to understand what you mean by attributes, and we need to get a reaction from Eric, and apropos of making sure we hear from NRC Staff in the Inspection Program, we will go out and get a comment from you.

Eric, do you want to just start off with a reaction to Chris, and then I'd like to firm up this definition of attribute. Go ahead.

MR. WEISS: I agree with Chris. I think we would be getting ourselves into trouble if we tried to develop a list of components. To clarify the attribute issue, I think maybe the best way to do that, and it's a shame that Fred isn't here to do it for us, would be to talk about some tests that were conducted at Omega Point Laboratories under NEI and EPRI auspices, where they examined a number of attributes, if that's the right word, of some cables. There are probably people better in this room to describe what happened at Omega Point than I, but just to throw out on the table for those people who aren't familiar at all with what happened at Omega Point, there were a series of tests conducted on control cables largely, both multi-conductor and single conductor cables, thermal set and thermal plastic insulation in cable trays. They were configured in different ways, and these attributes, if you will, thermal plastic, thermal set, armored, not armored, whether you got a ground or a hot short. These sorts of things are what I would regard as candidates for attributes for inspection.

I guess to reduce it to the absurd, suppose we found an associated circuit that was in a multi-conductor cable, and it only took one hot short in that cable to achieve an unrecoverable situation leading to immediate core damage or otherwise preventing a plant from achieving safe-shutdown. I think most people in the room would say well gee, that's a circuit I'm -- if I find it in an inspection, I think the licensee ought to have an answer for that situation, so maybe there's some people in the room that would like to jump in and volunteer the attributes that were tested at Omega Point, and a synopsis of what happened was.

MR. CAMERON: Before we go down too deep in this, I want to hear from our NRC Regional Staff, but from what you're saying, Eric, it sounds like depending on how we define, if we all define attribute the same way, that what we'd be looking for coming out of this, is to focus on attributes, not specific components but attributes. That would be the basis for the inspection program?

MR. WEISS: Yes.

MR. CAMERON: Okay. We're going to come

back up to all of you at the table, but let's go for NRC Regional Staff. And please tell us your name.

MR. FUHRMEISTER: I'm Roy Fuhrmeister from Region One, and one of the first questions that comes to my mind is how are we going to define risk-significant? Are we going to define it as high consequences if it's not mitigated? Are we going to define it as achieving an unrecoverable condition, or are we going to define it as the most likely to occur? And that will change our target set when we go out and do our inspection.

MR. CAMERON: Roy, let me make sure I understand this. You're saying that depending, and we have that definition of risk-significant on the agenda for discussion, but what you're saying is that depending on how we define risk-significant, and you gave three possible ways to do that, that the attributes that you look at will change?

MR. FUHRMEISTER: Yes.

MR. CAMERON: All right. Thank you. Let's go to Dennis, and then we'll go to Steve, and then back over to Bijan. Dennis.

MR. HENNEKE: Yeah. And I think the testing and the actual panel elicitation associated with NEI-001 came up with a number of the attributes that we can look at. When we want to point to where to look, the first thing you go to from a PRA perspective would be Table 7-2 of the expert elicitation in the EPRI Report, expert elicitation. But what that says is that a plant that doesn't have armored cable, for example, you may have a scenario that may be risk-significant, and you go to plants like our Duke Plants that have armored cable, and it won't be. So you could change a single attribute and go from risk-significant to non-risk-significant. But more commonly even would be multiple attributes, and that's kind of where we're trying to figure it out.

It might have even an armored cable situation where it's over a large fire source or, you know, multiple cable trays can be affected, so it would be just the fire source itself can now be an attribute; whereas, if that same scenario were over a single electrical panel, say a termination can that didn't have a high heat release rate, it would be very hard to damage more than one cable tray. Then it's not risk-significant, so the attributes are kind of a hard thing to balance. You know, if we would have known all of the attributes for risk-significant scenarios, we would have already gone out and identified them, and taken care of them, but that's kind of the hard thing, to go look at all the attributes in our plant and try to figure out where our vulnerabilities are. It's kind of a hard thing to do.

MR. CAMERON: Dennis, are you sort of affirming what Roy had said about, that you need to wrestle with this definition of risk-significant, where you can get into the attributes?

MR. HENNEKE: Actually, what we've been trying to go with NEI-001 was to standardize what risk-significant is, and with regard to the other SDP processes, and that's core damage and large early release, and so to have some other consequence that's outside of that bounds, that may be different than that, would be kind of counter-productive, and not similar to the other types of inspections.

For example, we had in our last inspection at our Oconee Plant, we had an issue where we had an emergency feed-water, aux feed-water over-feed event, and the scenario resulted in a loss of subcooling, and so we were out of bounds of our design basis, but it didn't lead to core damage. I mean, we had too much cooling, and it wasn't an over-cooling event that resulted in core damage.

Eventually when you shut the over-feed

down, subcooling would return. Those are the types of things that it's a different consequence than what we'd normally be looking at in PRA space. Those are the types of consequences we think would be counterproductive to be going after. We'd be more interested in looking at core damage and release to the public as a consequence.

MR. CAMERON: Okay. Thank you. I'm going to ask Steve to try to maybe put this all in context. Steve.

MR. NOWLEN: Oh, gosh. Okay. Well, I was going to respond to Chris' comment. I think he's exactly right, to try and develop a list of generic components and systems is not going to be very productive because it's going to be varied from plant to plant, so I think you're exactly right there. You've got to look at it in the context of the plant that you're examining so it's right on target.

Roy mentioned -- I would rephrase in the risk context a little bit what Roy said. We think about, and maybe this will get to Chip's challenge here. We think about risk usually as having three pieces, the likelihood that you get a fire, the likelihood that the fire causes damage, and then the consequences of the damage that you see. So those are sort of the three pieces of risk, and I think you have to be a little -- don't get too hung up about how you exactly slice which little item goes in which of those pieces, but those are the three big pieces. I'm not sure where this particular workshop wants to go in terms of those three pieces. I mean, we've got a pretty good handle on fire frequencies. There's lots of stuff out there on that. Fire modeling, I think there's a lot of other activities.

I can almost suggest that perhaps we're focused on that third piece, the consequence piece today. And with that, I throw in how the circuits behave given damage, so I'm fairly broad on what I'm defining there, so I think that's a good place for this panel to focus.

Final point is, going back to our requantification studies that we're doing for research with EPRI, we had this same kind of a discussion the other day, and we also were leading down this idea of attributes. And we were even thinking about how you might classify attributes. You'd have physical attributes, and electrical attributes, and functional attributes, and how important is this particular thing to your plant, for example. So I think there's a framework you can think about in terms of these attributes and, you know, to go too far down that path, we're a little ahead of the game. But I think that's the correct way, and so the idea would be again, as Dennis mentioned, a preponderance of attributes that lead you to conclude that something is more risk significant than something else.

That's probably a good enough answer for right now. I don't know that we need an absolute answer, is it ten to the minus four, is it ten to the minus three, is it -- you know, it's not there but, you know, I don't think we need an absolute answer. I think a relative answer for today is probably good enough.

MR. CAMERON: Steve, let me just go back and clarify some things with you before we go to Bijan. The three components of risk, I just wanted you to repeat that for everybody. One was likelihood of fire.

MR. NOWLEN: Yeah, the likelihood that you'd get a fire. The second one is the likelihood that the fire causes damage to some set of plant equipment. And then the third piece is the consequences of that damage state, how that impacts your plant safety.

MR. CAMERON: Okay. And then you talked

about, good points about preponderance of attributes and relative to this. Can you connect -- and you said that the focus should be on those three elements. Can you tie the focus on consequences into the identifying the preponderance of attributes, just make that connection for us.

MR. NOWLEN: Yeah. I guess I'll phrase it in what it means you probably don't want to spend too much time on, and I would say, you know, this panel shouldn't spend too much time thinking about fire frequency, because I think we've got that pretty well handled. I'm not sure we should worry too much about fire growth and damage, which is that second piece. You know, again there's lots of things out there that handle that.

I think the challenge for this group, especially given the makeup here, is to think about circuits, how they're going to respond to fires, and what are the sorts of features or attributes, or characteristics, however you want to say it, that lead you to certain types of damage being more risk-significant than others. I mean, certain categories of events, certain types of circuits, certain functional elements of the plant. It seems to me that's where this group could be most productive.

If we get into the things about, you know, worrying about suppression and detection, and timing of all that, I think we're going to get bogged down in a lot of stuff that isn't the best use of this group's time.

MR. CAMERON: Okay. Thank you. That's very useful, I think, for discussion. And let's test this out with people around the table to see if they, first of all, understand what you're saying. And second of all, whether they agree with it.

Bijan, what do you think about Steve's suggestion about what the focus should be?

MR. NAJAFI: Well, I guess I'd like to sort of trace back a little bit. And I almost -- I mean, the definition of the risk that you suggested, I agree that basically there's three pieces of it. And even today to make that decision of what attributes should be in which category, we have to go through this mind exercise of combining all three. Even though we focus on the consequence third piece, we have to have in mind that that accounts for the other two, so that's part of the challenge. But I do agree that, if I understand it correctly, the objective today is to focus on the third piece which is the consequence, and not to worry about the first two.

I guess now I have a question for the Staff, that the logical point or place for these three to be linked together in an inspection process is SDP. And since that revision is being done, how the results of today's discussion is going to integrate into that SDP revision.

MR. CAMERON: Could you do the acronym for us?

MR. NAJAFI: Significance Determination Process.

MR. CAMERON: Okay.

MR. NAJAFI: That there is a group of people that is developing these revisions for these, I guess in the next three months, I assume. And there are meetings tomorrow for some test, and one of the group involves safe-shutdown systems and component surface circuits. And I would suggest that this is basically in direct relevance to that kind of revision, so there's got to be sort of the two link, and sort of be consistent.

Coming back to -- I mean, we have -- I notice that through this discussion we have dropped from what I called 5,000 feet elevation, we're coming down. I mean, another level below these consequences, I think what you need to focus on is that there is a series of attributes that account for the circuits, what kind of circuits we consider important, whether it's basically three phase circuits, grounded DC circuits, or multiple high end feed-in faults, so those try to define attributes, including the -- I mean, the type of the cable, thermoset versus thermoplastic, and a number of attributes that Eric was mentioning in these testings about the intra-cable versus inter-cable, and so on and so forth.

I would also recommend, depending on how these are to be used, there are attributes associated to the components and the function of those components. Is it easier to tell an inspector that don't worry about valves in two different systems, to try to provide those attributes from a component sense, versus to provide those attributes from circuit sense. So there's two set at least to come one level below those, is a component system set of attributes, I believe, and there is a circuit set of attributes. I'm not sure at this point which one is more useful to an inspection process. In some cases, and I suspect that depending on the conditions, one may be more useful than the other, and at times maybe a combination of the two may be useful.

MR. CAMERON: Okay. Let me try to sum this up. First of all, it seems like you're agreeing with what Steve was saying about the focus being on consequences. I think we need to get to the rest of you around the table and see what you think about that.

You also raised an issue that perhaps we can have a short answer for now, which what are the implications of the SDP, and Steve may be able to give us a little snapshot on that. But I did put that up in the parking lot. You may want to spend more time on that later.

And then, Bijan, you've fleshed out a little bit more about this attribute issue, which could be -- you could have attributes of the component, as well as attributes of the circuit that contribute to the consequence part of the equation. That's what I heard. And, Steve, do you want to just do the SDP implications for us before we go over to Chris?

MR. NOWLEN: Yeah. I am involved in the SDP, and I'm on the team that's been assigned the circuits issue. The strawman recommendation was not to attempt to put circuits in the SDP rewrite at this time. There are some real challenges to doing that.

I don't want to go into those, but it's definitely a challenge.

That decision is not final by any means. There is a panel that's going to be discussing it. Fred Emerson is a member of that panel, as well. And there are those who would like to see the circuits brought into the SDP, so that's a topic of current discussion.

MR. CAMERON: Okay. Thanks. John.

MR. HANNON: If I could add to what Steve -- what I would anticipate is that this -- the results of this workshop would inform the SDP development. What we come up with today may be instructive to the group that is tasked with revising the SDP, to the point where it may be less challenging for you to include circuits in the SDP. We have to get this job done first, and the results from this effort would inform your work on the SDP.

MR. CAMERON: Okay. Great. I think that's very clear. In other words, what comes out of here, may be useful for the SDP effort in terms of how they consider circuits. Let's go to Chris, and I want to make sure I check in with the rest of you on what we're developing here, and particularly with the NRC Staff to see if we're heading in the right direction, as far as what they want to get out of the workshop, so we'll go around the table, and eventually we'll welcome Fred who just came in, and bring him up to speed on where we are. Chris.

MR. PRAGMAN: I just want to add a little more fuel to the fire on the SDP response to Bijan. We had a task team meeting. Dan Frumkin is leading it, Ken Sullivan was also involved. We talked about what is a safe-shutdown finding, how to put that into the SDP process. And we quickly devolved into what circuits we were interested in separating and are we protecting them or not, so maybe Steve's team is trying to skirt around the issue. We may have driven right into the center of our task force. I think it's going to end up the other way.

MR. CAMERON: Okay. Thanks for that add-on on SDP. Let's go to Bob, and then we'll come over to Dennis. Bob. And maybe push that mic over to you a little bit so it's facing you. All right.

MR. KALANTARI: I guess what I'm hearing is we're trying to come up with processes to help the inspection team, the NRC to go out and do the inspections in the near future. The problem I have is, we are still far from identifying the requirements to do deterministic Appendix R analysis, the fundamental issue with regard to the shorts, hot shorts, how many shorts, how many serious actuations. Those have to be defined before we can identify what's significant, what kind of failures we have to postulate. Those are all input to the analysis. Okay?

Without those, we cannot identify what's significant. This document came up with a number of examples. What happens when your HPSI pump starts and, you know, in 60 or 90 seconds you fill up the reactive, and you didn't even have RCIC or safe-shutdown system component in this case. Now that start of HPSI pump could be based on two hot shorts, a cold short, a hot short, things that the industry is still struggling with. And those have to be defined and finalized before we can go there.

We are not there. We have written the NEI document for revision with so many comments. We have Ken's document. We have 805 Appendix D, and we still haven't addressed that. Without that, I don't think we're going to get there.

MR. CAMERON: Can I get a reaction from Eric on that. Eric, can you try to place that into the context that we've been talking about here?

MR. WEISS: Well, yeah. On the issue of

do we need to clean up the deterministic space? I agree, we do. Can we use risk to focus inspections in the most risk-significant areas while we're cleaning that up? I think we can. I don't think we need to decide whether it's end circuits or end factorial circuits. What we need to decide is, is there an unrecoverable situation that will be caused by a high probability, high consequence event? And if the plant has that, then we need to put that into our existing regulatory processes and deal with it. That way the public gets the most bang for their inspection buck, and in the meantime while we're sorting out the SDP and closing the many problems in the circuit analysis arena that go beyond this, we'll be providing safety, and we'll be providing predictability. And we'll be providing efficient and effective inspection.

I think as plants move into the 805 environment, for those that choose to move that way, they will be inherently adopting a risk-informed performance-based approach, which means that an answer that we come up with today should be exactly congruent with their licensing basis. Those plants that have a licensing basis that's in old deterministic world and is somehow out of kilter with what we find today, we do have an existing process to deal with that, and that's the Reactor Oversight Process, so that's my short take on it. I don't see that one precludes the other. I don't see that proceeding in a risk-informed way precludes us from approaching the deterministic problems and vice versa.

MR. CAMERON: Okay. Thank you. And, Bob, we may -- I'm going to put that up in the parking lot. We may come back to that, and I'm going to ask Dennis to give us his views. And then I'd like to try to summarize this for Fred so he knows where we are, because he's going to be going on next with some context. Dennis.

MR. HENNEKE: Okay. Earlier Steve had mentioned three categories of attributes that they were thinking about, and that was the physical attributes, electrical attributes, and the functional attributes, and it kind of struck a chord that that's exactly the type of thinking that we had put forward in NEI-001. And in particular, the preliminary screening.

Now the preliminary screening, it may be a little bit too simplistic, it may miss some -- miss everything that we really need to cover in order for it to be effective, to screen out fully scenarios that could lead to failure of function or core damage, but from -- if you reverse that in looking at things that are important, you could use the attributes we put in it. There's a little matrix in there that has frequency and consequence on the matrix. And if you look at physical attributes, we had put in with regard to frequency of the fire, in the long run you also have to look at the damage. And basically, how big can the fire get, and how much damage can it cause, so physical attributes are generally the frequency of the fire and the size.

The electrical attributes are basically the spurious operation probability, which we look at for the EPRI document for expert elicitation. And then the functional attributes are does it fail to function? Does it lead directly to core damage? And so in ranking things, things with -- frequent fire with a high spurious operation probability that does fail to function is our highest category of concern. If you start having a less frequent fire but it fails to function and has a high spurious op, that would be less important and so on, until you get down to the very right and bottom of the matrix where it's a low frequency fire, a low spurious operation probability, and it doesn't fully fail to function. There's still some function or operator action available to mitigate core damage, those are of less concern.

That's kind of where we were looking at it. If we could bring that into the picture with regard to inspections to say look for these type of attributes, maybe that would be helpful.

MR. CAMERON: Let me clarify this. We were talking about focusing on consequences, and Steve I believe noted these three types of attributes. And Dennis talked about this in terms of frequency, odd consequences. Can you comment on that for us?

MR. NOWLEN: Yeah. I had a little different intent when I meant physical characteristics. I was thinking of things that would be say cable trays versus conduits and, you know, one layer cables versus five layers of cables. You know, those kinds of physical attributes that would indicate a higher or lower likelihood of certain types of faults.

In terms of the electrical, I was thinking in the context of, for example, internal faults within a multi-conductor cable versus cable-to-cable faults. We know that's an important attribute. Going back to even physical, I don't know whether you put this in physical or electrical, but things like thermal plastic versus thermoset. Those were the kind of things that I was thinking in terms of the physical, but I'm still in that third piece where I'm thinking about the consequence side of this, you know, what does this circuit do to me? So I hadn't really included the thought of putting a fire frequency in as a physical attribute on this particular one.

MR. CAMERON: Okay.

MR. NOWLEN: It's certainly part of the risk equation but again, I'm trying to focus on that third piece.

MR. CAMERON: All right. Thanks, Steve. I'm going to try to sum this up for not only Fred Emerson, but for all of you, and then if there's comment from the audience, and then go to Fred for his presentation, because I think we're making a nice segue into that. But it seems that what people -- what I've heard is that we should focus on the consequence in terms of this workshop, the most productive thing that we could do is to focus on the consequences of that three piece risk equation that Steve gave us, to focus on what are the consequences of the fire, and that in looking at the attribute of circuits that we would look at the attributes that would give us certain types, certain levels of consequences. And Bijan clarified that you're not only looking at the attributes of the circuits, but you may be looking at the attributes of the component system, as well.

Now somewhere in here we have this well, there's physical attributes, functional attributes, and I'm forgetting what the third one is. Electrical attributes. As Dennis pointed out, you can look at those attributes in terms of frequency, as well as consequence, but what I heard around the table is people think we should focus on consequences. Now I'm not setting that out as some sort of a concrete conclusion here. We can still go back and question that, but that's sort of where we've been so far. And before we go to Fred, and Fred, you can apply some of this, relate some of what you're going to say to this.

Let me go on to the audience, and then let me go to Ken for one final comment before going to Fred. And please give us your name and affiliation, if appropriate.

MR. TRUBATCH: Hello. My name is Sheldon Trubatch and I represent the law office of the same name. We are focusing on consequences, so I have to ask myself the consequences of plots. I guess the consequences of plots are the scenarios that we have to consider. And it seems to me then that what we're looking at, somehow bounding the scenarios that we have to consider by looking at the attributes, determining which of those scenarios is to be considered to have sufficiently high risk consequence or improbable to occur.

MR. CAMERON: Sheldon, you're taking us back up to the frequency probability part of it. Okay. Wade.

MR. LARSON: Wade Larson, EPM, I have been involved in fire protection since 1977, starting with Appendix A, Appendix R, have been associated with the issue of interpretation of Appendix R since the beginning. I think that Chris Pragram's his first comments need to have some additional information. Chris focused on unrecoverable events. The team members that he interfaces with recognize that if you take a plant passed a certain point, you don't know where you're going to be, and you get into a somewhat unrecoverable state. We see that when we run plant time lines and we look for inflection points, and we know we have to have certain operator actions occur before certain other things occur. If you draw a time line for operator actions, a time line for post fire activities, we have a pretty good understanding of what you have to accomplish by when. I think Chris' points that his team know those issues. I think that we have to have something simple where we look at what those are, what is taking place there, what can get us to those situations, and to disaggregate the events leading up to that. I think that's hard for inspectors to go out and do inspections. We have to work up an inspection process that makes sense from an operational point of view.

MR. CAMERON: Thanks, Wade. And on that note, let me just check back in with Roy who had a question for us earlier. Roy, you've heard this discussion. Is it becoming clearer to you what's going to happen here?

MR. FUHRMEISTER: The problem that I see coming out of the gate is that if we're going to use the classic revised Oversight Program definition of risk-significant as a change in core damage frequency or large early release, I'm going to have to run a full significance determination on every one of these things that comes up in order to determine should I pursue it. And I don't want to go there, and you don't want me going there, because that's not efficient, so we're going to need some kind of a screen coming out of this to tell us up front which ones do we pursue, and which ones do we walk away from, without having to go full-blown significance determination to come up with the "risk-significance" from the ROP standpoint.

MR. CAMERON: Okay. Thank you, and let's get two final comments here, and then go to Fred's presentation, and then we'll take a break. But I guess I would like to get some reaction from Eric or John, Mark to Roy's point about using the definition of risk-significant that's used in the SDP process, how using that is not going to get us to where we want to be coming out of this meeting. Do you want to do that for us, Eric, now?

MR. WEISS: Yeah, I'd like to give it a shot. It seems to me that if we lifted the EGM, the Enforcement Guidance Memorandum, and we said inspectors, go find these associated circuits that are risk-significant, because whatever, they have these attributes, they lead to core damages, and it's whatever, thermoplastic, thermoset, whatever, it's one hot short, or two hot shorts. And we will be introducing into the inspection process a great deal of efficiency, because it has come to our attention in the past that there have been controversies associated with things that aren't risk-significant. And if we can dispense with those, we're serving everybody's purpose.

Now ultimately yes, I stipulate that the SDP needs to be consistent with what we're doing. Do you need to run a full SDP on each and every one of these? Well, I think every inspector before he goes out has a bagman trip and he establishes the plant's licensing basis. And if it's clearly within the licensing basis, and it's clearly something we've identified as risk-significant, I don't think the industry, the public, or the NRC will have any disagreement that these things need to be addressed and put in the corrective action program.

If it turns out that the licensing basis is not clear, then we have to confront the existing processes, the Reactor Oversight Process, the backfit process, and we have to use those processes appropriately, so I think that it is possible to construct an EGM that will serve everyone's purpose, that will get the public the safety that they need, the licensees the predictability that they need, and to get the NRC back in the business of inspecting associated circuits. And hopefully, we won't trip over the SDP process on the part of what we need to do, which I don't expect will be the case in the majority of instances.

MR. CAMERON: Okay. Are you finished, Eric?

MR. WEISS: Yes, thank you.

MR. CAMERON: Let's have two final comments, and then let's ask Fred if he's ready to tell us a little bit about NEI-001. First, Ken, comments and then we'll go to Bijan. Ken.

MR. SULLIVAN: I guess my comment is more in line with a question. I guess from the inspector's perspective, I think what he needs to have is clear definition of what an unacceptable consequence is. Is it sheerly core damage frequency, or is it an inability to maintain performance criteria within those specified regulations? So if we can come up with what an unacceptable consequence is, I think it would help inspectors tremendously.

MR. CAMERON: Okay. So I think what I'm hearing is --

MR. SULLIVAN: There's certain performance criteria specified in the regulation for safe-shutdown systems, and an unacceptable consequence in one inspector's mind be the inability to maintain those parameters within those performance criteria. Another inspector may think well, it's not going to lead to core damage; therefore, it's not a high consequence.

So if we can define that a little clearer, I think it will help inspectors a whole lot.

MR. CAMERON: Okay. So you're not -- I mean, you're basically agreeing with the fact to focus on --

MR. SULLIVAN: The focus should be on consequence, but you need to define what a high consequence is. Is it purely core damage frequency?

MR. CAMERON: And when you said "high", I guess you're saying high would be your -- high, you used unacceptable, but --

MR. SULLIVAN: Unrecoverable condition.

MR. CAMERON: Okay. All right. Okay. Thank you, Ken. Bijan.

MR. NAJAFI: Well, I guess my question is -- I mean, I'm listening to all of this. I'm going back to my very first question, what is the end result that we're trying to get out of this process? I mean, what is the end of the day our desired outcome, because I thought I was more clear, now I'm a little bit more fuzzy again what the desired end result is.

First of all, with respect to what Ken said, that changed my question a little bit now, is that I thought the objective of this meeting is to define risk-significant, so that risk is becoming our figure of merit by stating that our objective is to define what is more risk-significant, or prioritize into groups based on risk, so risk is our measuring stick.

But coming back to the three part, to the risk that Steve was talking about and focus on the consequence, to define the risk-significance you have to have the whole picture. With one variable in the equation you can't define risk. You have to have the other three, so now we are faced with two possible end outcomes, is to provide a set of attributes or tools that somebody can take and with some tool, whether it's NEI-001 or SDP process, to determine risk-significance using the other two pieces on their own, or we come up with a set of attributes for only the consequence piece which we determine to be independent of the other two. So we're saying forget about the first piece and the second piece. These attributes, like for thermoset or whatever, or our table, don't worry about it if we can defend it, then we either have to define an independent set of attributes for consequence alone, or to provide a vehicle that those attributes can be combined into a risk decision tool.

MR. CAMERON: Okay. Thank you, Bijan, and I think we need to at some point try to get a resolution to that issue. In other words, do we just independently look at consequences as has been suggested, and/or do we try to define attributes by looking at all parts of the equation that were brought up? Is that basically what you're saying?

MR. NAJAFI: No, what I'm saying is that if we define the attributes as they will not be independent of the other two pieces, we do not need to talk about the two other pieces of the equation.

MR. CAMERON: Okay.

MR. NAJAFI: But we have -- we in turn, in a way, expect the user to know enough to use whether the SDP or any other one to convert the attributes that we told them to a decision, what we told them directly do not lead to a decision, because it's -- risk is not driven by consequence alone unless you make it independent in some way of the two other pieces of the equation.

MR. CAMERON: All right. Thank you. Thank you, Bijan. Fred, are you ready to talk to us? And I think you've sort of got a flavor for what we've been talking about up to this point. Fred Emerson, Nuclear Energy Institute.

MR. EMERSON: It sounds like you've had an interesting discussion so far. Next slide, please.

These are the topics that I intended to cover. I'm going to talk a little bit, this is more or less a brief walk-through history, which hopefully we won't have to relive much longer. Then I'd like to spend a little bit of time talking about NEI-001 and what it was intended to do, and what it was not intended to do. And lastly, I'd like to address some specific proposals for this workshop, as far as binning types of things that the inspector should be looking at.

Before I get into that, I'd like to just say up front, I think this workshop has a very useful purpose, if the purpose is to define what the inspector should be looking at, but I'd like to extend that a little bit further. Part of the reason that NEI-001 came into existence in the first place was because there was a difference of interpretation of the regulations between the licensees and the Staff, which emerged over the last five or six years. And we needed something -- we need to end up with something where the inspectors and the licensees are on the same page.

I've gotten numerous phone calls on this and other issues where it was clear that that was not the case. When the NRC inspectors come in with one set of expectations, and the licensees have another set of expectations, that's a formula for trouble. And I don't want -- we've had enough discussion on this topic in the deterministic and regulatory sense for the last six years. And whatever we end up with, we need to have clarity on both sides of the regulatory fence so that everyone knows what the NRC expects, and what they should be doing to address those expectations. Okay. I'll stop philosophizing.

As I said, the basic issue was differences in interpretation. I'm not even going to try to state what all of those differences were, but that was the reason why early on there was an exchange of correspondence between the Staff and the industry where we both drew lines in the sand. And about a year later, we finally decided that it was time to try to resolve this issue through another means, so the NRC organized a workshop which I'm sure many of you were at. And emerging from that workshop was a mandate for the industry to develop a risk-informed method for determining what the significance of circuit failures was, so we could quit arguing over whether it was or whether it wasn't in their licensing basis, or whether you should be looking at one or two, or six, or more. So emerging from that, we got a mandate to go forward. And parallel with that, the

Boiling Water Reactor Owner's Group undertook a mission for their members to develop a deterministic method which they felt that if - Chris, you can raise your hand if I misstate this - which they felt would address things from a deterministic standpoint, that it was a fair compilation of the regulations and practices to address the regulations, and should represent a way to address the issue and put it to bed.

Next slide, please. That document went through its own set of regulatory discussions, and eventually ended up being rolled into NEI-001. And in April of 2000, we began working on it. We supplied the first draft to the Staff. It was clear that we needed to provide some data to go behind, to try to lend some clarity to the things we were arguing over, the phenomena, because we really didn't have a whole lot of data to work with. So NEI conducted a series of 18 tests at the Omega Point Laboratories in San Antonio, where we -- and building up to these tests, we worked with the staff very closely ensuring the test plan had several rounds on comments, tried to work in the NRC perspectives, and there were some very valuable additions coming to that test plan from the Staff.

We tried to cover as much a variety of parameters as can be covered in a limited series of tests, so we were trying to address the big contributors that we thought would be to whether spurious actuation occurred or not. So when we went through that series of tests, we ended up with reams of data which it took us a while to sort through, and it eventually ended up being published in an EPRI report.

After the tests, we provided a second draft of the document to Staff. Next slide, please. And on that second draft we got many, many, many comments that our committee spent a good bit of time sorting through and responding to. Many of the comments were very good ones, and we incorporated them in the document. There were others that we didn't agree with.

There was a process building on the testing which was called the expert panel, and this was a group of regulatory independent and industry people whose function in life was to, using the test results and other data that existed, to create a set of probabilities for circuit failures for open circuits shorts to ground, and of primarily spurious actuations. This team published, ended up. The process was led by an expert, Bob Budnitz. There was several other people in this room were represented on that task force, and we eventually ended up with a product that was published as an EPRI report, which has been out for about eight months now.

In September, we conducted a series of pilots. We finished the series of pilots, and published an EPRI -- I'm sorry. This was a jointly funded activity by the Owners Groups, and we conducted a series of pilots of NEI-001, primarily the risk side of the equation because the deterministic pieces were generally reflected already in plant practices, and we didn't see a need to repeat that type of history. So we wanted to see how well this document served its purpose of determining significance of fire induced circuit failures. And I think the result that we agreed with on the part of the industry folks, and there were several NRC observers who participated in portions of the pilots that the method turned out to be, as we thought, fairly workable.

In October, we finished addressing the NRC comments, and provided a lot of additional changes to NEI-001 to reflect the circuit failure testing, to reflect the pilots, to reflect the NRC comments, and that's the current document as it exists today. In

December, we finally published the EPRI report, which consists of a CD with 400 pages of text, and mountains of data. Next slide, please.

Now I'd like to spend a little bit of time talking about what NEI-001 is supposed to do, and you may see a bit of repetition in the slides. I'll try to skate through this fairly quickly. There are two primary pieces of 001. One is Chapter Three, which is a deterministic method which is built largely on what the Boiling Water Reactor Owners Group did, and was modified to take into account PWR issues, as well as BWR.

The BWR method was considered to be pretty much applicable to PWRs, as well, but we made a few changes to make it universally applicable as far as we could tell. This method provides, as I indicated earlier, a comprehensive method for addressing safe-shutdown analysis from a purely deterministic standpoint.

The other primary piece is the risk-significance method which is in Chapter Four, and was intended to provide two separate screening methods, one a simpler qualitative screening method which is built on quantitative methods. And the second was a more quantitative screening method using a risk equation, which I don't have in the presentation, but I've put up in public many times before.

What this is not intended to do is to require any licensee to go out and do a wholesale re-examination of his safe-shutdown analysis. The principle being that every licensee has had a safe-shutdown analysis reviewed and approved by the Staff. Sometimes there are still questions remaining open about it, but we're not trying to reinvent the deterministic side of the wheel.

This is just basically a table of contents. These are the topics that are covered in there, some introductory matter, Chapters Three and Four of the primary pieces, and then definitions and references. There are several appendices which cover the topics you see on the screen. Section B provides some of the insights that our task force developed over several years of effort, how to characterize deterministic circuit failures. Some of that involved providing justification for eliminating consider of multi-conductor hot shorts using power cables or elimination of Multiple High Impedance Faults from further consideration. And I'll leave you to read those to provide the justification for that. I'm not going to go into here. Next slide, please.

We dealt with high/low pressure interfaces, alternative dedicated shutdown requirements. We made an effort to deal with manual actions and repairs before it became the issue du jour, and provided some supplemental selection guidance for any plant who decides he wants to go out and see whether he's missed anything in his previous analyses. Okay. That's it for that table of contents.

This is, if you can believe it, a simplified flow chart, which again I'm not going to try to walk through. Basically, the left side of the flow chart is the deterministic piece. The right side of the flow chart is the risk-significance piece. If you look at the bottom left-hand box, that says what the licensee should do with the results of his analysis, and I'll get to the -- what we say NEI should be doing with the results in a minute.

Basically, you walk through a deterministic pathway if you want to identify circuit failures. Most every plant has done that. The risk-significance method starts with a qualitative screen, as I indicated. If things don't screen out, you do a risk-significant, a more detailed quantitative risk-significant screen, and you evaluate and you use those screening techniques to come up with a measure of safety-significance.

Now if you look at the wording right down there next to NEI at the lower right, you'll see safety margins/defense-in-depth satisfied. And I can't emphasize this strongly enough, because we're talking -- if we're discussing risk versus consequences. Now we recognize that risk methods have a certain amount of uncertainty associated with them, so for every screening process we put in there, we put in a step to determine using guidance very similar to that in Reg Guide 1174, a last screen to determine whether safety margins and defense-in-depth were satisfied, and we put in a set of criteria that were consistent with those from 1174. It's a last check to make sure you have not produced a false negative. You cannot screen anything out without going through that last safety margins/defense-in-depth, and that was part of the process that we tested in our pilots. Next slide, please.

Some general guidelines for the use of NEI-001. Its use is at the licensee's option. Nobody is going to be forced to do anything with this document. It's an opportunity, rather than a requirement. It's not intended to expand the existing approved licensing basis. Licensees have 20 years of history that they've -- a lot of time and effort, and money that went in to develop their existing licensing bases, and what we have on the deterministic side is intended to reflect those factors, not telling the licensee he has to go out and do something brand new and revise his licensing basis to encompass that.

It's intended for use on identified specific issues. If there is an open URI that the licensee has open from years past when we were still doing inspections, or if he has identified an issue that he is unclear on, that's the primary purpose of this method, is to determine how significant is it.

At any time the licensee can say I don't want to do this risk stuff any more, and I'll put this into my corrective action program, or I can do even more detailed risk significance screening. The licensee is completely flexible on how he approaches this.

The next two slides I'd like to emphasize. This one talks -- this slide talks about issues within the -- clearly within the licensing basis. The next slide talks about issues that are not clearly within the licensing basis. And the focus of these slides is to say what does the licensee do with the results of his risk-significant screen.

For issues that are clearly within the licensing basis where licensee, staff, everyone agrees that this was a licensing basis issue, you go through the risk-significant screen. If you find it's risk-significant, you address it through the Corrective Action Program, and I would expect that if it's significant, most licensees will conduct some kind of a fix. If it's not risk-significant, they still need to address it through the normal licensing process, so they can either decide to fix it anyway, or they can submit an exemption or deviation request. Obviously, you have appropriate reporting requirements for this type of discovery, as well. Next slide, please.

If it's not clearly within the licensing basis, if it's one of these interpretation issues we've been arguing about for five or six years, if it's clearly outside the licensing basis, you do a risk-significant screen. If you find that it's risk-significant, if you go back and look at the previous slide, you'll see that the wording is virtually identical. You address it, if it's significant, whether it's inside, outside, or nobody knows where it is in the licensing basis. But here, if it's not risk-significant, you don't have to do anything further. You don't have to chase an insignificant issue, and deal with it further. Next slide, please.

These are some general guidelines for the use of the deterministic method. And honestly, I don't know how many licensees are going to use it. It presents a way to do analysis, but again, most licensees have already done analysis to their's and the NRC's satisfaction. Next slide, please.

Now the risk-significance method can be used with any deterministic method, however you choose to do a safe-shutdown analysis. It can be used to address any identified single or multiple spurious actuation issues, or other types of circuit failures, and maybe even some things outside the circuit failure area. You have to consider all fire areas where a failure or combination of failures exists. You don't just look at one fire area where the cables of interest are. You have to consider the risk-significance throughout the plant for any particular failure, or combination of failures that you choose to look at. And as I indicated before, before you screen anything out, you have to go through this conservative safety margins/defense-in-depth analysis to make sure you aren't screening something out inappropriately. Next slide, please.

We think it provides -- the risk-significant method provides a robust method for resolving the issues. I'd like to spend just a minute or so on the pilots that we did. We conducted pilots at two plants, one was a boiler, one was a pressurized water reactor. We tested all of the risk-significance methods that we have in there. We tested the safety margins/defense-in-depth method. When we were testing the early qualitative screening method, we set up a rule in advance that even if we screened something out, we were going to subject it to the full risk-significance method to make sure that our initial feel as to what was qualitatively acceptable or not was, in fact, borne out by the numbers of a more detailed analysis, and generally we found that they were.

As I say, we tested that safety margin/defense-in-depth method to make sure we weren't screening out things inappropriately. And the conclusion we came to was that this seems to be a pretty robust method. Several of the people, industry people in here participated in it, and can speak clearly to their views of that.

Resolution. Now we had a meeting on February 4th where we addressed the Resolution more carefully. What we're doing here today is one aspect of Resolution, what should the inspectors be looking for? But there are other aspects that we wanted to be sure are not lost in the emphasis on developing new inspection guidance. Those are, you know, what is the NRC's expectation for licensee use of NEI-001? Does the NRC have open issues that are going to create remaining difficulties in the licensee's use of NEI-001? How does the NEI-001 fit with the SDP and the other risk-informed techniques that are being developed to address fire protection issues?

There's a number of things that have to be addressed, and since the purpose of this workshop was not to do that, we want to be sure that those are covered. We intend to revise NEI-001 yet again, to address the final NRC comments, and the industry comments, as well, expect to submit it in a couple of months. We would like NRC recognition that the deterministic methods do hold water from a regulatory standpoint, and we would like the NRC to accept a risk-significance method as an acceptable way for the licensee to do that, whether as part of the SDP, or as part of a separate process. Next slide, please.

As I indicated at the start of my talk, our goal is clearly understood resolution methods. The licensees and the staff need to know what the end point is, how we're going to get there, and what products we'll be using at the end of the road. We have spent far too much time and effort arguing about this, far too much time and effort addressing areas of uncertainty, far too much time and effort addressing inability to communicate effectively, and we need to be sure, which I need to try to put those behind us to the maximum extent.

So we're going to revise the document. We need to have a clearly understood pathway for NEI-001 acceptance or whatever pathway we wend up choosing. We need to prepare the inspection guidance, conduct training. We need to address the existing URIs. I don't know if you want to spend some time today discussing that, but it is an inspection issue, and we need to address risk-significance determination, how that relates to this document that the industry prepared.

Now I'm going to state the goals. Now the last few slides, and I do have a few hand-outs, certainly not enough for this crowd, but the next few slides outline some specific proposals that we are making for the three lists that I expect that we would be developing here today, so we can perhaps, since I'm already way behind schedule, defer those slides to the point where we start talking about specifics. We can do that, or I can introduce them, go through them quickly, and at least give you a look at what we're planning to talk about later today.

MR. CAMERON: Maybe it would be useful for you to just quickly go through that so that people have that in their minds.

MR. EMERSON: All right. I can do that. Okay. The first two slides, or the next two slides are areas where inspection should not be required. I'm not even going to get into the risk versus consequence discussion you've been having.

I should say that the conclusions that you're going to see on these slides are based largely on what we saw from the EPRI/NEI series of tests. If you have not had a chance to look at the EPRI report that was developed and put out in December, you'll see a lot of what we're taking comes from that. It also comes from the results of the expert panel, the other EPRI report that I mentioned earlier. Frankly, it also comes from standing there at Omega Point with -- smelling cable smoke for quit a few weeks, and watching what happens when you burn cables, and try to create spurious actuations. So I think the conclusions we've come to have a reasonable amount of support from the data that we saw during these tests.

Okay. This is a long, complicated sentence. It basically says, "Multiple spurious actuations", I'll talk about other types in a minute, "thermoset or armored cable", recognizing the robustness of those two types of cable, "involving a single component with current limiting devices, such as control power transformers." Now that's a lot of gobbledygook, but there are at least four pieces of things in there that say why these are low probability. Thermoset or armored cable, single components, current limiting devices, and multiple actuations. Next slide, please.

This is a long list of things for considering of any spurious actuations. Again, this is based primarily on the EPRI results. It considers thermoset cable, armored cable, cable-to-cable, spurious actuations versus intra-cable, the temperature to which the cables are exposed during a fire. That piece came from the expert panel results, three phase hot shorts, DC motors, AOVs and PROVs that return to the desired position with power removed. WE think there's a reasonable technical basis for excluding these. And we think we've introduced a reasonable technical basis for eliminating multiple high impedance faults from further considerations, and open circuits as an initial failure mode.

Now what things should we be focusing on? Based on the test results, if we have a multi-conductor cable, and we have two components running in a single cable where you have significant consequences resulting from a fire affecting that cable, that might be something you need to look at. Next slide, please.

You need to consider several different criteria. Obviously, consequences is one of them, but also you have to consider how likely it is that you're going to get a fire that's going to cause damage in the first place. You have to consider the likelihood that you have mitigation from current limiting devices once you do have fire causing damage to a cable. Next slide, please.

These are areas that we think require additional analysis. We're going to talk a lot later, I'm assuming, about what additional steps may be necessary to address scenarios in this category, but I guess I would lean on the side of we have a lot of tools, and I'm not sure how much additional testing. If we're driving toward an early resolution of this issue, I'm not sure how much additional testing is going to tell us, especially if it's spread out over a multi-year period. We've already had multi-years, and we have some good data, and I don't think we have to do a lot more in that area.

We have risk tools. We may not have risk numbers for every possible scenario, but we have risk tools that address the other elements than just the spurious actuation or circuit failure probability. That's it.

MR. CAMERON: Okay. Thank you very much, Fred. I think that we need to see if people have any questions for you. And I guess I would ask people to hold questions on those last couple of slides that address conclusions, and I think we also need to take a break here soon, and come back and address some of these threshold issues. And, Fred, one of the things we've been discussing is whether the focus should be on consequences or it should be a broader focus. And I take it from at least what I think Chris and Dennis said, and from what you said, that the NEI-001 took a broader focus than just consequences and what significant is. Is that correct?

MR. EMERSON: Yes. As I'm sure the members of our task force indicated, Dennis and Chris being two of them, we started with a look at what things are we going to look at with this method, and we determined fairly early that we ought to be looking at high consequence events, but we can't really stop there. There are things that have very high consequences that are also very low risk, and I don't think you can ignore the risk that Bijan was saying earlier. I don't think you can ignore the front end of the risk equation and just focus on the back end without some consideration of how you got there, because otherwise, we're going to have nothing in the list, or have everything on the list of what inspectors should be looking at, and nothing on the list of what inspectors shouldn't be looking at.

MR. CAMERON: Okay. Thank you. And I think that that's going to be perhaps the big focus before we adjourn for lunch, is what to explore that a little bit more fully. But let's go to Chris, and I guess, Bijan, you wanted to add something. Chris.

MR. PRAGMAN: I just wanted to offer a slightly different perspective. On one of Fred's slides, he said that NEI-001 is not intended as a wholesale re-evaluation of the safe-shutdown analysis. I know why Fred put that there, because we're not trying to compel plants to provide another analysis, but I would like to emphasize for Eric that if I ever find myself in a position where I need to re-evaluate safe-shutdown analysis, my preference would be to use the guidance in NEI-001 to do that. So having that

NRC seal of approval on it that guidance document would certainly help me a lot to do that kind of a change if I found myself in that situation.

MR. CAMERON: Okay. Thank you, Chris. Bijan.

MR. NAJAFI: I wanted to add one other perspective on this issue of consequence, whether we're looking at the consequence or the risk. Even the NEI-001, it's true that looks at the entire picture, and determines the risk-significance or the risk value of certain combination of circuit failures. But as the first step requires that you select or determine, or pick through a different process a set that you determine have the potential for risk-significance. And when you go through that first step, which I believe the same way whether you use an SDP, even though it's not within the current shape, you're still faced with that kind of question. I mean, you still have to in both of these approaches, the screening approaches, what I call screening approaches, one of your first step is to sort of put your problem in a manageable set, and then decide whether these combinations I looked at, they're risk significant or not. Some may be risk, some may be not, but the issue of -- I thought at least some of the objectives of today, or the main objective, to find ways or attributes so that we can select those initial set, because obviously those set, the sky is the limit. If you want to open it, that's just -- I can say that theoretically that set is infinite, the number is infinite.

I mean, we have gone through the exercise through these projects, and it could be infinite, so you have to -- and how you define that in some ways you define it on a consequence mentality for the most part, because you look at what can -- that's why our sort of separation of the line of not looking to the before, which is the other two factors in the equation, looking to the after, what does it do after? And what does it do after, which is the consequence, so that's the distinction I wanted to make, that it's not that we don't have to look at the total risk equation, but we will be forced eventually to make our initial decisions before risk-significance determination on consequence. And that would be where these attributes of what's important to the consequence will come into the picture. I don't know if that's confusing or not, but there --

MR. CAMERON: Okay. I think I hear what you're saying, that we're here to select these attributes fort the inspection guidance, and we've been talking about focusing on the consequences. And I think what you're -- and we've also -- we've heard Fred say that there has to be some consideration of other elements in the risk equation. But I think what you're saying, Bijan, is that you can make some initial decisions by solely focusing on consequences. Is that correct?

MR. NAJAFI: I'm saying that you have -- in order to go through your risk-significance determination, you have to do an initial phase that comes up with a batch of stuff that you look at, and that you tend to do it on its consequences, and not do that on the bigger picture of all in your head, or in your looking at your PNID, looking at the fire all the way from the beginning to the end. You can't just do that through a qualitative exercise. All I'm saying is a pre-step comes before all of these risk determinations.

MR. CAMERON: Okay. Let me check in with you because we are -- we started a little bit late. We're running late. We're on this threshold question of what we're going to focus on to try to get to what Eric and John want to get to at the end of the day, which are some specific attributes that the NRC can use as a basis for reinitiating the inspection program.

Do you want to take a break now, at least to go to the rest rooms or perhaps to get coffee, and come back and try to settle these threshold issues, if we can. And then take our lunch from perhaps a quarter to 12 to quarter to 1, and get into the specifics? What's your pleasure? Eric, what would you like to do here? Do you want to take a short break now and then come back and have some more discussion of these issues, and then go to take lunch?

MR. WEISS: Yeah, I vote for that.

MR. CAMERON: Yeah.

MR. WEISS: Could I have a sense of the audience? Does everybody think that's a good idea?

MR. CAMERON: All right. And I know that we have some comments here. We have some people in the audience who want to say things. Let's take a break, and because we're on the orange alert, I don't want to take us up another level accidentally, but you need an NRC staff person to escort you if you want to go up and get coffee.

MR. WEISS: Joel is standing in the back of the room. Raise your hand, Joel. He's an intern that can escort you. I can escort you, Dan, John can escort.

MR. CAMERON: If we can match up NRC people with groups who want to go upstairs and get some coffee, why don't you go up and do that. Use the rest rooms, come back and we'll close out this part, and then we'll go to lunch.

(Off the record 11:19:43 - 11:46:02 a.m.)

MR. CAMERON: Okay. WE'VE been having a conceptual discussion here to try to set the framework for developing some specifics this afternoon, and I guess what I need your input on is to see if we can try to agree on a perhaps imperfect, but to agree on an approach that we're going to use this afternoon to try to identify the risk-significant circuits that at least might form the basis for an NRC Inspection Program. And to sum up, I think that we're looking to identify these attributes, these. Obviously, we don't know what these are, but we're trying to identify attributes that can be given to the inspectors to guide the inspection program for associated circuit.

In terms of selection criteria, you heard a lot about focusing on consequences. Some people said that you have to take frequency into account some way. Some of you, this spectrum of where you focus, some of you are perhaps on one part of the spectrum, others are on the other part of it. And in terms of consequences, we heard Ken Sullivan today use the term "high", use the term "unacceptable", so even if you are focusing on consequences, what types of -- how are you going to determine what consequences are unacceptable?

I think what we need to do, and it may be that we can take this whole spectrum into account. Fred Emerson's presentation showed that the NEI document, although it looks at consequences, it also looks at frequency. And I think what I'd like to do in terms of our discussion this afternoon is see if we can get some agreement on what our approach is going to be, so that when we come back this afternoon we're going to say let's identify those attributes where there's an unacceptable consequence or whatever you want to use there, or let's figure out how we're going to factor in frequency in terms of risk-significance so we can really get to some specific example, such as the couple that Fred up at the end of his talk, and I think Eric has some other suggestions there. So let's see if we can do that, and then break for lunch. And there may be other perspectives that are larger than this exercise here that people want to offer.

What I'd like to do is to get all of this conceptual discussion, see if we can get those points out so that we can focus in this afternoon. Let's go to Steve and then over to Fred. Steve.

MR. NOWLEN: Okay. Yeah, I just wanted to be sure everyone is clear on what I was proposing when I talked about the three terms and what the focus would be. I am not arguing that fire frequency and the likelihood of damage are not important. They are clearly critical to the final answer of what's really risk-significant, very important terms. My only point was which piece of the pie do you want to try and work today? You know, what's your objective for today? Do you want to talk about how we deal with fire frequency? I would argue no, that's not the purpose today. It's a part of it. It's important. We have to consider it, but not today, and the same with core damage.

Now Bijan's point about dependency is an important issue. You have to think about even on the consequence side, you know, you have to have in the back of your mind that these other two pieces exist, and they may have an impact on what you do with that third piece of the pie. Again, my only argument was to try and focus this group on the one piece today for today's objectives.

MR. CAMERON: Okay. And I'm going to treat that as a proposal for discussion. In other words, even though there are dependencies, is it profitable for us to address the consequences today? Focus on that piece, or are there other things that we should focus on? Fred.

MR. EMERSON: When we were developing NEI-001, as I think Chris may have mentioned earlier, we were trying to get a handle on what things we should focus NEI-001 on, and we began -- after some discussion we began with the regulatory position that seems to be embodied in the regulations and the guidance. There is a differentiation, for instance, when you consider high/low pressure interface as to whether you look at three phase hot shorts or not, and so there's a -- so for that type of scenario only, there's a requirement that you look at three phase hot shorts. And that seemed to be a regulatory boundary between what was high consequence and what was not.

Something that would -- loss of high/low pressure interface is something that would result in things going south very quickly, with little opportunity to mitigate it. And that was the general type, and I emphasize general type of criteria, and we tried to build into the things we should be applying in NEI-001 too, so Ken earlier asked a very important question. He said how do we measure consequences? Is it core damage? Is it some sort of regulatory consequence or -- Ken, maybe I'm paraphrasing you wrong but to me it's not just core damage. It's how rapidly you get there and what you can do about it, because everything has a core damage frequency, every scenario, if you throw enough failures at it, so core damage frequency by itself is not -- or core damage by itself I don't think is an appropriate consequence, but how rapidly you get there seems to be something you should consider when you're considering what types of consequences you should be addressing.

MR. CAMERON: Okay.

MR. EMERSON: I guess in a very long-winded way I'm saying maybe that's a starting point for looking at what a consequence, appropriate high consequence is.

MR. CAMERON: But do you, for purposes of this afternoon, do you think it would be acceptable to focus on that consequence part of the equation to identify its attributes. And then we can figure out what type of consequence we want to focus on, but do you think that that would be where we should go this afternoon? Because I think that that -- I just want to make clear or understand that that's where we're going to focus.

MR. EMERSON: I think we should start with consequence, but we should not ignore how you get there in terms of what the inspector can look for. If you just consider high consequence events without considering what it takes to get to the high consequence, and you ignore the types of - I don't know - precursors for lack of a better word that the inspector is in a position to look at easily, I think we've not done our job entirely.

MR. CAMERON: And when you say "precursors" are you talking about this frequency part of the equation or --

MR. EMERSON: Yes.

MR. CAMERON: All right.

MR. EMERSON: Not doing risk calculations. I'm talking about things that the inspector can see that would allow him to use some judgment as to whether this is a high consequence event he should focus on or not.

MR. CAMERON: All right. Let's continue in this vein. Mark, we haven't heard from you.

MR. SALLEY: Yeah. I'm trying to be in a

receive mode and get as much as possible rather than speak. You know, Chris alluded earlier that we can't make this as simple as a table. And from the regulator's standpoint, I wish we could. I wish we could put a table down, put ten things on it and say Roy, here's your ten things to look at. These are the most risk-significant, you know, have at it. It's not going to be that simple.

The point that Steve made, consequence, I think that's where we need to focus. I'm in 100 percent agreement with him there. Fire frequency, we've got databases, industry has databases, and we can split hairs between the exponents on those at any time.

The second part that Steve talked about, likelihood of damage, again NEI ran a real good test program. We do have some good numbers to work with, and I think that's doable, but the big question is going to be the consequence. That's where we need to focus. Now when we look at consequence, CDF and LERF, those are noble causes, and that's the end game. And that's where most of your PRA work is done. However, Kenny brought a point up here earlier about, you know, how the regulation is written in Appendix R, and the end game there is hot shutdown. Now if you make hot shutdown, obviously you've prevented core damage, at least I hope so. So I think we need to define what that consequence is going to be. And once again, that takes it back to where Roy is at, because he's working to that regulation when he does his analysis to meeting Appendix R, which is hot shutdown, and cold shutdown in 72 hours, so we need to define exactly what that consequence is I think to focus in on it.

MR. CAMERON: Okay. Good. Thank you. That's helpful. Let's go to Ken, and then we'll come over to Kiang, and this side of the table. Ken.

MR. SULLIVAN: Yeah. When you talk about consequences in a shutdown scenario, as Fred said, there's a timing sequence to be accomplished. Systems that are needed immediately to bring the reactor to hot shutdown conditions, any impact on those systems could have a high consequence, so I think you could define it by function and timing. You know, actions that have to be performed, let's say within the first two hours of a fire event could be high consequence events, so I think you could break it down by both function in terms of hot shutdown versus cold shutdown, and timing in this shutdown sequence. And my personal opinion is I think inspectors should be focusing on those systems and actions necessary to achieve and maintain hot shutdown.

MR. CAMERON: Okay. We're going to get some input from other people on that. Okay. You would use this function.

MR. SULLIVAN: Well, that's a specific function attribute. Then you've got other attributes that are more circuit specific, like Steve was talking about before, whether the cable is armored, whether the cable is separated, whether it's a multiple, what kind of cable tray its in, the cable fill of the tray. Those are --

MR. CAMERON: But those would be --

MR. SULLIVAN: Those are down the road.

MR. CAMERON: Those would be over on --

MR. SULLIVAN: The first thing you focus on is the function to be performed. In the hot shutdown --

MR. CAMERON: Right.

MR. SULLIVAN: -- systems that are needed immediately to bring the plant to a hot shutdown condition, damage to those or fire induced impacts that could impact the operability of those systems or the shutdown capability could, in my view, have a high consequence on the ability to achieve and maintain hot safe shutdown conditions.

MR. CAMERON: Okay.

MR. SULLIVAN: Now if it's a cold shutdown system, we may not focus on that so much.

MR. CAMERON: All right. Let's -- we're going to the table and then to you in the audience. Okay. Kiang, you see where we're going with this. What do you have to say?

MR. ZEE: Well, in general I'll agree this notion of starting with consequence with a framework for timing and frequency probably is something to visit, but talk about likelihood of damage I think I just want to make it more clear. It seems almost as if talking about likelihood of damage in the context of only a single defined target or space area that we're worried about. Often times we get these fire circuit failures and if we start getting into the multiple failures and try to get there, they may have target area widely spaced in an area so I think in the context of likelihood of damage, I think if spatially separate, you have to revisit that at some point in time when you start asking the question about consequence. Where are these targets relative to the circuit, so I think we want to try to stay away from these other factors, but at some point in time we may have to visit at least qualitatively actions about those factors.

MR. CAMERON: Okay. And that seems to be consistent with what Fred was saying.

MR. ZEE: Right. I don't think we can completely not visit the other factors. I think at some point in time we may find ourselves being dragged to that. I think the trick is -- not make it quantitative, to find some higher level qualitative framework.

MR. CAMERON: Okay. Let's go to Chris, and then Dennis, and then --

MR. PRAGMAN: I just want to build on what Fred had said earlier about the high consequence of areas that may occur. We haven't really fleshed out yet, and hopefully the PRA folks can help with this. Many times a failure can be mitigated with some action, or failure may be acceptable because some other complimentary system may be able to perform a function that also leads to success. Maybe not something that's in my Appendix R analysis, but something that nevertheless may be available, so we need some way to stir in those two aspects. I think looking at complimentary redundant systems is already in full power SDP worksheets, but I'm not really sure how the SDP worksheets address recovery of systems.

MR. CAMERON: Okay. Thanks, Chris. Someone may say something else on that. Dennis.

MR. HENNEKE: Okay. I guess to kind of parrot a couple of other people. I agree that consequence is the area of controversy. When the inspectors get their guidance, they have to account for frequency if they find -- frequency or damage, if they find a circuit that's over a switch gear. Where it's high frequency and high release rate, that would be a different consideration than in a room with no cabinets and just transient fires, and so that should be part of the equation. But there is really not much controversy, you know. Okay, in the second digit we might argue about the frequency, but generally there's not a lot of controversy in that area. And the controversy lies in the consequence.

Ken mentioned hot shutdown as a consequence, and I guess that's where we're going to disagree. The other regulatory approaches, other SDP risk-informed approaches have honed in on, and from Reg Guide 1174 and the other supporting Reg Guides, core damage and large early release. Now large early release is a surrogate for dose release to the public, and so to protect the general health and safety of the public, we would -- in the case of an accident, we'd like to minimize the probability and frequency of a release that could cause significant dose, and that's why we measure LERF, and we measure core damage. And core damage we have a higher criteria for that just in case there is a failure of containment, which is one of our levels of defense-in-depth.

So to use the design basis for Appendix R and for safe shutdown for hot shutdown, if we can't maintain or we can't get to hot shutdown as a criteria for consequence would be the wrong approach in a risk-informed environment. There are core damage sequences and LERF sequences where hot shutdown is required, and if that's part of the core damage sequence, then that should be part of the equation for determining risk-significance. But if does not lead -- if you can't get the hot shutdown but it does not lead to a core damage event, then it should not be part of our high consequence consideration, so we have -- now if you look at Fred's slides, he's saying if it's not -- if you can't maintain hot shutdown, that doesn't mean our licensing basis, it's still an issue. It still has to go in our Corrective Action Program. We still have to correct the issue to meet our licensing basis. It should be not be posed as a risk-significant scenario if it doesn't lead to core damage, or shows a very low likelihood of core damage and large early release.

So we've heard high consequence. We got that comment back on NEI-001 a number of times, but I have yet to see a high consequence event that is a potential impact to the general health and safety of the public that does not fit the category of core damage or large early release, so that's where I would say we need to focus, still core damage and large early release.

MR. CAMERON: Okay. Thanks, Dennis. And I want to come back and focus specifically on that issue after we go to Bijan, and then see if there's comments out here. But I think that it seems like people are agreeing that yeah, let's focus on consequences, although I think at the end of the day we might want to come back to a discussion of this frequency issue in terms of what Fred called precursors, in terms of what Steve said. We have to consider this qualitatively, so I think we know where we're going there, but there does seem to be this debate over how you're -- even if you focus on consequences, what consequences are you really concerned about that are going to get you to the attributes that are going to tell you the associated circuits. Bijan.

MR. NAJAFI: I may have said something

before that caused a bit of confusion, but when I say you need to look at the consequence at the beginning, I'm not saying that you can ignore or not use the other two elements, whether the likelihood or the propagation aspects of it. In either exercise, I guess the question is that how do we want to present this information to the inspectors? One option is to provide them with a set of attributes that they can directly -- consequence attributes they can directly use for inspection. Don't inspect MHIV, MHIF period. Or we want to provide them with a set of consequence attributes, if that's the direction that we're headed, that it needs to be put through some risk measure, NEI-001 or SDP, to determine whether it needs to be inspected or what needs to be done with it.

Depending on what route you take, either way your first step to make the problem manageable, you have to select what is the combination of circuit faults, component lost, multiple, whether it's more than two that you're going to examine. If you try to pick those combinations, as I said before, by definition infinite, if you can keep these other two equations that are -- two pieces of equations that are relevant in your mind and do it all in your head and pick up the right circuit, all the power to you, but it's not trivial. It's not trivial to walk in the room and say -- and on top of it to say whether these circuits are too far or too close. You don't know that.

In most of these cases, there are those that you don't know. You don't know where the circuits are. I mean, it's just putting the cart before the horse, so some of these issues -- if these are components, and circuits and the fault modes that you already know in your Appendix R, then you can use any of these methods, analyze, determine their risk-significance. It's an arguable approach, there are tools there, but the question is those that you maintain you do not know, so how do you determine the risk-significance of a combination you do not know? And to determine that, you have to sort of decide on bounded attributes, and trust the answer you get within the knowledge that you have, period. That manageable set, whatever that is. Establish those ground rules, make them a manageable set.

MR. CAMERON: And the bounding could be done through --

MR. NAJAFI: The attributes, the consequence and the attributes.

MR. CAMERON: The consequence.

MR. NAJAFI: Focus on the consequence. Pick the attributes that its consensus appropriate, drove those consequence and the attribute to pick the pairs, and the combination, and the circuits that you think you can look at, and then the risk determination can come then.

MR. CAMERON: Okay. Let's see if there's comments from the audience, and let's come back to the table to focus on -- go back to this issue Ken said, hot shutdown, Dennis said CDF/LER, and of course hot shutdown could be part of that, but you should not just focus on hot shutdown itself, is what I heard. And Wade, do you have something?.

MR. LARSON: I had one comment on an experience I shared with Mark Salley. We found a situation where we wiped out the suppression system if there is a fire, no suppression, I don't know where you go with consequences after that. Is suppression on your list? Do you check the suppression systems to see if you've got a common mode failure that could take out suppression systems?

MR. CAMERON: Okay. We'll come back up for discussion of that example, when we come back up for this question.

MR. FUHRMEISTER: I think Bijan made an

extremely important point. As an inspector, when I go out to the site, I've got 200 hours total to do this inspection. I cannot look at every circuit in the plant. I have to pick and choose which ones I'm -- when I walk in the door, I do not have a core damage frequency or a large early release fraction for every component, so what I typically do, and what I'm hoping to get guidance from here, is how to pick those circuits, and we have to look at a manageable set, and we have to pick our circuit to look at intelligently s something that's going to have a meaning to the ability of that plant to meet its licensing basis, for one thing, and to protect the public health and safety for the second thing. So what we've typically been doing in Region One when we pick circuits, actually when we were still doing that years ago, what we would do is we would take the major flow paths and the inventory management, and we would look for what component can cause you to have a big problem? What component could cause you to not be able to meet the functional requirements to achieve and maintain safe shutdown? Inventory management, feed activity control, makeup and cooling, and that was how we picked what components we were going to look at, because we've got to have somewhere -- we need guidance on how to pick the circuits to review because we can't look at them all.

MR. CAMERON: Okay. Thank you, Roy. I think that's very useful to focus the discussion. Coming back up to the table, I don't see anybody else. One other gentleman. Yes, sir. And please tell us your name.

MR. OATES: I'm Ron Oates of Progress Energy, retiree, involved with Appendix R since 1980, currently Appendix R Solutions, Appendix R.com, or whoever is paying my salary. This is a big elephant I think we're all talking about here, and we're still up in this theoretical kind of discussion.

I think, Fred, you mentioned high/low interfaces. I think in the dialogue that the group has, if the group is using a real example, you know, some kind of high/low interface that you could all kind of visualize, that might be a good way to walk through the consequences and the other two properties you talked about, because certainly the high/low interfaces would be a high consequence situation. And so by looking at that and having a dialogue around high/low interfaces, for example, it would probably carry you back to what conditions could put you in the situation where you'd have a high/low interface. And

I would just offer thinking about using some sort of example, and if you work through that, then maybe at a later date, they can consider the associated circuit, the multiple high impedance fault, some of these others and walking through those kinds of examples.

What we learn from the high/low interface kind of dialogue or discussion would probably help set some criteria that would help us look at some of the less significant kinds of situations.

MR. CAMERON: Thank you. Let me go to Fred on that. Fred, how does the -- you brought up the high/low interface. How does that tie in with the hot shutdown suggestion that Ken Sullivan made, or with Dennis' CDF/LER criterion? Go ahead.

MR. EMERSON: Understand that I'm not a safe shutdown expert, but I think what Dennis said, what Ken said, and what several people have said about high/low pressure interfaces are -- it's kind of like different ways to get at the answer of what high consequence event is. And I guess one thing that I see as perhaps being a useful task after lunch would be to list attributes such as we've started here, hot shutdown, LERF, high/low pressure interface, other things that sort of get at the issue of what is high consequence and what isn't.

None of them define by themselves what is high consequence and what isn't, but collectively it gives the inspector a starting point on what he might consider a consequence event. List those things, and then make a separate list of the mitigating factors that - I'll call them risk factors - that would help you decide whether that was a high consequence event you wanted to look at or not. And I think then we've achieved the best of both worlds. You've given the inspector a starting point based on consequence. You've given him a way to decide which high consequence events to look at, and which ones to not look at.

MR. CAMERON: And to use specific examples.

MR. EMERSON: Yeah. Specific examples are always good, because if you want to keep --

MR. CAMERON: There's a suggestion for an approach to use after lunch. All right. Okay. We're going to -- Eric has a matrix that he's going to put up that may help us with this. Keeping in mind what Fred just suggested, in other words, not to just look at one particular way of defining high consequence, and then there's the mitigating factors part of it, but don't pick one specific way, but take a look at a couple of different ways of defining high consequence. What do people think of that proposal? In other words, don't focus just on hot shutdown or high/low pressure interface. Ken.

MR. SULLIVAN: I agree with what Fred said, and I also understand completely what Roy said. I believe our objective here is to give inspector guidance, not to -- if you just tell inspectors to go out and look for circuits that are going to cause core damage, you know, it's an impossible task. They have to have a specific set of criteria to go on. And what I'm getting at from an inspector point of view, systems that are going to get you in trouble right away are those systems that are needed immediately after shutdown, and that's where I'm coming from, those in my view a high consequence system. They were affected by fire.

Now in the SDP process, if it turns out that inspectors looking at these potentially high consequence events, and it turns out that other systems not analyzed in the safe shutdown analysis could be available for a fire in that specific area to prevent core damage, well that's resolved through the SDP process. But from an inspector point of view, he needs to have or should have a specific list or focus, not a list but a focus on the direction that he should be going on, and one of those should be systems required immediately after shutdown.

MR. CAMERON: Okay. Thank you. Bob.

MR. KALANTARI: During the break I talked to some folks, hallway conversation, and a few people commented we came in confused, and we're going to walk out of here confused. And they understood what I said this morning with regard to setting up the criteria for figuring out what's failure, how do we get there, how do we determine the consequence?

Fred just mentioned that he wants to know how you get there, how do you determine the consequence? Kiang Zee had a different idea that, you know, you may have circuits, two different trays far away from each other. Again, he's talking about criteria before I decide what's failing, what's the consequence of that failure?

Roy said he needs to know what circuits he needs to go after. You put the circuits in the parking lot, not outside there. That's what I was saying this morning. Without the criteria, you can't get there. Okay? We need to figure out what's our criteria, what's the circuit selection criteria, what's the failure criteria? Can we assume two table trays in cable spreading room 20 feet apart with no major hazards too often would not catch on fire simultaneously within the first 20 minutes, first half hour? These are the things we need to look at. Other than that, we are not going to get there. To me, that's important and everybody in different words are saying the same thing.

MR. CAMERON: Well, let me ask you about what you just said. You say we need the criteria. Okay? And correct me if I'm wrong, but I thought that what we were doing was trying to determine what the criteria would be in terms of consequence frequency for identifying those circuits. When you use the term "criteria", what do you mean by it?

MR. KALANTARI: Criteria again I go back to the fundamentals. In 1997 there was a big difference between the way the plants were doing their analysis. And an issue initiated, as Fred said, the Owners Group BWR, NEI-001, and we are no Rev D. This is six years plus later. In conjunction with that, a separate activity was NFP 805, circuit selection and all that. Then we have this document prepared recently by NRC that talks about what circuits, how many hot shorts, how many cold shorts, how many spurious actuations and all that. None of this is finalized yet, so how do we figure this out?

I want to do an analysis. It's going to be very different. Every plant you go to, you're going to get a different result. When that criteria is different from plant to plant, it's going to be different. One plant, the spurious actuation of pump is going to be an issue because he's postulating two spurious actuations, not simultaneously, one at a time. Same thing with two hot shorts could cause that.

Ken didn't mention this, but he had a good idea. He says why don't we focus on low consequence issues. Maybe those we can agree on. I mean, let's say MFHI, I think most people agree that's, you know, low probability of occurring multiple. You know, limit that to two, to three, limit that to one and get it over with. Right now I have clients that are asking me should I do MHIF analysis? Well, right now it's an 8610. It could be anywhere from 50 to $500,000 analysis. What does that buy you?

At the end I say if you have an MHIF, go with the breakers, you know, close the ones you need. Okay. A lot of effort for nothing and, you know, maybe we should look at that. Define high/low pressure. It varies from plant to plant. Some plants have 18 high/low pressure valves, some plants have two, has been accepted. These are the things we need to agree on, set the criteria, then go further.

I don't think we're going to get there without these fundamentals. We need to know how to get there, what's the failure criteria. And to add to that, then we add fire frequency, what's the probability of fire in this area? Then we add the consequence of the fire. Where is my hazard? My hazard is in this corner. The most that hazard can do is get the cable trays above, and the most the fire can travel is 10 feet. The cable tray 50 feet away is going to be unaffected for at least the first hour of my fire. These are the things, but without the criteria, I can't do this analysis.

MR. CAMERON: Someone help me out in terms of trying to tie what we've been talking about here with what Bob just said, and his reference to without the criteria, we're not going to get anywhere. Now I keep thinking that we're trying to work on the criteria, and Bob's premise is that somehow we're not working on the criteria, so could someone try to put what Bob said into context of what we're discussing? Dennis.

MR. HENNEKE: Yeah. I think Bob had -- is kind of putting the cart before the horse. In a similar way that I guess I put the cart before the horse in talking about only CDF and LERF. And that is agreeing that an inspector doesn't know where a circuit is, they may be in the same cable tray, they may be in ten A fire areas. They really don't know. They can't walk in with those criteria ahead of time. Those criteria, and similar to measuring CDF and LERF are when you determine risk-significance, and that's where we've really been focusing on in NEI-001. So okay, that needs to be worked out, but not initially for the inspectors when they walk in the door, that they can only choose circuits that are within 10 feet of each other or something of that sort, or within three cable trays. That's all later on when we look at fire modeling and risk significance, and maybe that can be criteria in that regard.

When an inspector walks in the door and wants to look at circuits, there are other things we should be focusing on. Now Ken mentioned looking at hot shutdown. I want to clarify that. The problem on that, of course, is most hot shutdown systems, and especially those early systems in the first two hours, if they're hot they're going to lead to core damage anyway. At some point in this, and that probably is a good place for an inspector to look as an initial point.

At some point there's going to be a system that's needed for hot shutdown that won't affect core damage. And the Oconee over-feed example, and in fact over-feeds in most plants, PWRs, are an example where we would over-feed, and if we have a turbine driven pump you can't run the turbine driven pump because you have no steam, or you might loose subcooling so you can't get the hot shutdown because you can't cool down because you lost subcooling.

At some point that has to be thrown out because it doesn't lead to core damage. It's a no never mind. It just means we've over-cooled, shut it off. You wait a couple of hours. It'll heat back up by itself, and then you can regain subcooling and start cooling down. At some point that has to fit in. It would be nice if we could put that up front, but agreeing that an inspector can't say first question, does this circuit affect core damage? Hot shutdown is a good place to start, and not have to focus at least on the cold shutdown circuits to look at circuit analysis.

MR. CAMERON: Okay. Good. Let me, before we go back up to Bob and Ken, this gentleman had something in response to what Bob said.

MR. CICHON: My name is Ron Cichon. I work for Framatome. I actually, I think the panel is really saying the same thing. And as an engineer trying to understand all this and put all this in perspective, what I'm getting out of this is that the first thing we should do is determine the attributes of the circuits to be inspected. Then when that's done, focus on the hot shutdown systems. That narrows everything down for the inspectors. Then the consequences of the failure of that particular circuit, and from there you could take it down. Well, can that be coded, can a manual action be done showing that a time line analysis would mitigate that problem? If it can't, then you are placing the plant in an unrecoverable situation. That obviously is a much more important issue, so I really think everyone is saying the same thing, but I think we have to start with the determining of the attributes of the circuits.

MR. CAMERON: When you say "attributes of the circuits", what do you mean?

MR. CICHON: Similar to what Bob was again talking about, exactly, you know, what -- how many hot shorts or whatever electrical considerations you want to give to those circuits.

MR. CAMERON: Okay. Bijan.

MR. NAJAFI: Well, I guess when it turns around the question changes, because initially I wanted to address what Roy mentioned, which goes back to what I was saying earlier on. The important is to understand how the inspector, how best the inspector can use the information.

For example, what you need because when you set the examples of the systems, I noticed that you're focusing on the consequences. You do not focus on the risk, even though our task today is determine the risk-significant circuit failure combinations. I guess we will have to do that prior and provide you with a set of attributes of the system. For example, look at the injection valves, or multiple injection valves to the makeup system, or do not look at the instrument components that could potentially cause drainage -- in a spurious operations cause drainage of a tank, I mean things like that.

So I guess my first question is that, would it be of any help to you to define certain attributes to the circuits, as well as the systems and components, what I separated this morning to the component system versus circuits. How valuable the issue of not looking at MHRF is to you, or how valuable is don't look at circuits with armored cable, or dedicated cables and dedicated conduits, I mean things like that. Is that a value to an inspection?

MR. CAMERON: Roy.

MR. FUHRMEISTER: Yes. That would be valuable because I go in and I pick components to review. And then when I look at the circuit, if I need more than two shorts to make a malfunction, how likely is that? That's now -- is it risk-significant in that even though it may have consequences, is it very likely to happen? If I have an armored cable in a tray, it's very unlikely, to my understanding, that I'll have a hot short coming from another cable in that same tray, so if I have one component control circuit routed within an armored cable, that would be a circuit that would not be likely to suffer hot shorts, and that would not be a good use of my inspection time. So those are the kind of things that I need for circuit, as well as what the component consequences are.

If I have a component, it doesn't matter whether or not I get the hot shutdown, and there's no consequence and it's not worth looking at, because there will be no risk. When I walk on the site, the only thing I really know is consequences of a component not functioning. Will I lose my injection path? Will I have a flow diversion? Will I lose my inventory because we've now opened up a two inch hole at the bottom of the vessel by spuriously opening a valve? That's what I know when I walk on site, and I use that to pick which component control circuits to re.

MR. NAJAFI: For example, would it be of value to you if I tell you you wouldn't have to worry about multiple spurious operation of valves in different systems?

MR. FUHRMEISTER: That would only be of value if they can show that they haven't run all those valves through one cable tray. If I've got 12 valves all running through one cable tray, and I have a fire under that cable tray, I have the possibility of 12 valves going south, so to say that, you know, multiple spurious actuations is not an issue is very much dependent upon the specifics of the cable routing for a control circuit.

MR. NAJAFI: Yeah, because it goes back to some of these situations is where you don't know the circuits yet, so with that information, not knowing where the circuits are, probably you won't use it as a guide.

MR. CAMERON: Okay. I think we have to release you for lunch soon, but let's go to Ken, and back to Bob.

MR. SULLIVAN: I'd just like to point out that I think buried in all this discussion, I think we agreed on something. We agreed on the need to focus or have inspectors focus on hot shutdown systems as a guideline, if you will, from a risk perspective, focus their circuit analysis issues on hot shutdown systems required to achieve and maintain hot shutdown.

MR. CAMERON: Does anybody -- I mean, there may be subtle nuances here, but is anybody in violent disagreement around the table, first of all, about what Ken said? Okay. And is that going to be -- is that conclusion -- I mean, we've reached agreement on this, but is that helpful for proceeding forward?

MR. SULLIVAN: Well, I think from both an inspector's point of view and a licensee's point of view, I think it is. You want to focus your efforts on those that could potentially be risk-significant. And getting there from an inspector's perspective is those systems that are needed to achieve and maintain hot shutdown.

MR. CAMERON: Okay. Fred, do you have

something to say on that?

MR. EMERSON: Yeah. I think that's a good starting point, but it's not the only consequence we should consider.

MR. SULLIVAN: Absolutely not. It's a starting point.

MR. EMERSON: Right. It's a good starting point, and maybe we can build on that after lunch.

MR. CAMERON: All right. Bob, did you have anything else you wanted to say?

MR. KALANTARI: Yeah. I just want to go back to Roy's request as one of the inspectors. When he goes out there he says he has 200 hours to do this inspection. Two hundred hours is not enough for him to do any detailed analysis of circuits and components, so when he walks in there he needs to be able to ask that utility what is your component selection criteria, what's your cable selection criteria? Review that and do a sample checking on a couple of components by looking at the drawings or whatnot.

Again, I'm going back to the fundamentals. If we don't set that criteria - okay - and, you know, he can't hang his hat on some defined criteria, his cable selection identifying the safe shutdown circuits is going to be different. He's going to have a different set of cables compared to what the utility did, because his criteria could be different.

I mean, right now in the industry we have plants that do not consider two valves in series as required for safe shutdown, because by definition one of them is going to survive. None of the cables are required for safe shutdown again because no matter where these cables are, one of those two valves is going to survive because the regulation, or some wording in some document said assume one spurious up period, So two valves in series became not safe shutdown components.

We need to define that because when he walks in there, he's going to ask them where is this component? Oh, it's not required because the criteria is this. We haven't even settled on these. I think it's important, so this is not putting the horse in front of the cart but really -- cart in front of the horse, but the other way.

MR. CAMERON: Okay. Thank you, Bob. Let's have a final comment from Chris, and take some lunch. And I'd just like to briefly caucus with the NRC Staff before they go to lunch. All right. Chris.

MR. PRAGMAN: I think one caution trying to meet Roy's needs is even if you had more time to do the inspection or a larger team, or guidance to help them focus on specific systems, you're still doing a sampling, because he's really not given the opportunity to do 100 percent review. And so if he goes into a plant and picks a few components, it could just be because of the roulette wheel, that those have nothing in common, that doesn't raise his eyebrows, and doesn't give him concern for that inspection.

He comes back a few years later, picks three different ones, and all the cables are in the same cable tray and that gives him great concern, so even if we fill him with all kinds of guidance and knowledge, we're still, I guess potentially a victim to the fact that he has to do sampling just because of the situation he's in with his inspection process.

MR. CAMERON: And that's a reality that's always going to happen no matter what criteria are given to Roy. All right. Why don't we take an hour. It's about 20 to 1. Why don't we come back around 20 to 2, quarter to 2 at the latest. Fred.

MR. EMERSON: Do we need to be escorted to the lunchrooms?

MR. CAMERON: Yeah. And I'm going to ask NRC Staff who are here to escort people up there. And there shouldn't be a line at this point. You can leave everything here, not guaranteeing it'll be here when you get back.

(Off the record 12:37:05 - 1:50:19 p.m.)

A-F-T-E-R-N-O-O-N S-E-S-S-I-O-N

(1:50 P.M.)

MR. CAMERON: As you can see, the easy part is coming now. Okay? But what I'm going to suggest is using consequences as the criterion, guided by consequences in terms of hot shutdown which may be the first part of the sequence for CDF or LERF, but certainly there's other ways to view consequences. But we did agree at least with that for a starting point, see if we can identify some attributes for risk-significant associated circuits.

We also heard Fred Emerson talk about let's talk about some risk mitigators and fold that into that discussion. Also, keep in mind that though everybody agreed that let's start with consequences, that at some point there has to be some consideration of frequency.

People have referred to a number of situations of well, what can be taken off the table as the inspector not have to look at? I think Fred had a couple of examples of those. Very important point translating these attributes into workable guidance for the inspector. That may not happen today, it may be something that Staff takes with them after the attributes are determined.

Bob Kalantari was talking about the deterministic issue before, and that's why I have a little asterisk there, is that we're going to be looking at attributes in terms of consequences, at least starting with that. And there may be other ways to look at attributes from other perspectives, but as I understand what the Staff wants to do, it's to try to look at these "risk-significant" circuits.

So with that, could we start off with at least trying to get specific in terms of attributes, in terms of consequences? I was going to ask Steve to perhaps start us off on that one. And if you have problems with this, we'll get into that, but that's our methodology so far.

MR. NOWLEN: Okay. Well, again thinking about consequences as having perhaps functional electrical physical kinds of attributes, one functional attribute as an example that you could think about would be a diversion path. Your functional attribute is opening up a diversion path, and then I think you'd probably want to think about how you would measure that, you know. Do you do it, for example, in terms of the makeup capacity. You know, if you do it just in terms of the relative size of the diversion versus your capacity to overcome it, you know, that might be a measure that you could use. If it's a 10 percent diversion path, I'm not going to worry about it. If it's over 50 percent diversion path, maybe I'll worry about it. I don't know what the thresholds are. That's the sort of thing I had in mind.

MR. CAMERON: Okay. So opening up a diversion path, how would that -- can we put a little bit more gloss on that in terms of if we were going to be identifying associated circuits in terms of opening up a diversion path, how would you frame that? And, Ken, do you want to comment on this too? And I don't want to forget, we have a matrix that we'll put up in a minute that Eric prepared to help perhaps guide us through this, but go ahead, Steve or Ken.

MR. SULLIVAN: In terms of opening up a diversion path?

MR. CAMERON: Yeah.

MR. SULLIVAN: Well, it's typically a diversion path.

MR. CAMERON: Speak into that mic.

MR. SULLIVAN: Well, many times when you're talking about diversion paths, you get into the issue about a single spurious actuation or not, and that depends on whether it's two normally closed valves in series. For example, the inspector may look at it and say well, if both of these valves open up, I could have a significant impact on my shutdown capability but, you know, the licensee may have taken a position that he only assumes one of those valves would spuriously operate in the event of fire, and didn't go any further in terms of locating the cable. Okay?

So it's the type of issue where it may be risk-significant or it may not be, depending on if the plant evaluated for it and has identified mitigating actions to take in case it did happen, or to prevent it from occurring.

MR. CAMERON: You said -- can we get some more discussion on this to make sure if we're going on the right direction on this? Fred, what do you think about this opening up a diversion path in terms of an attribute? And I'm still not sure that's the right way to frame it.

MR. EMERSON: Well, a diversion path is one attribute. Another might be loss of cooling. That might be another attribute that would impact hot shutdown.

MR. SULLIVAN: The loss of cooling though, I might add, that if you're talking about a valve that's in a flow path or required shutdown system, that's a required circuit. That's not an associated circuit that we're talking about today. That's required to be protected.

MR. CAMERON: Okay. So loss of coolant would not be an attribute because it would be a required circuit rather than an associated circuit?

MR. SULLIVAN: If it's a normally open valve that could spuriously close as a result of fire damage and it's in a required flow path, that's a required circuit. That should be protected or separated. That's a required circuit. That's not an associated non-safety circuit.

MR. EMERSON: I guess I hadn't divided it by associated circuits or not. I think I was looking at consequences.

MR. CAMERON: Okay. I think that that's a fair comment. And I think what the Staff is focusing on though is what are the associated circuits that need to get inspected. Any comments on diversion path? Go ahead. And let's get you on --

MS. KLEINSORG: I don't actually think that's true that we're only looking at associated circuits. Aren't we looking at the circuit failure issue in general? And so is a required circuit more important than a flow diversion path?

MR. WEISS: Well, our -- excuse me, if I could jump in. We have an Enforcement Guidance Memorandum that suspends inspection on associated circuits, not required circuits.

MS. KLEINSORG: Okay. So you handle them differently then.

MR. WEISS: Well, right now if a license -- if an inspector goes out and finds a licensee has not protected a required circuit, then that's -- we know how to deal with that. What we don't know how to deal with is the associated circuits issue, because there's been so much controversy in that area.

MS. KLEINSORG: So the flow diversion path is less important than the normal.

MR. SULLIVAN: It depends upon the consequences.

MS. KLEINSORG: Okay.

MR. SULLIVAN: It could be more. It could be just as important. You're right.

MR. NOWLEN: I don't think it's an issue of importance. It's just the language of the particular issue they're trying to deal with, this suspension of associated circuits inspections. That's why we're -- not because they're less --

MS. KLEINSORG: Well, I mean it's -- the

analysis kind of gets done the same way usually. I mean, I think that's Bob's point over and over again. Your point, that the basics they get done. They get treated kind of the same, you trace them the same, you evaluate them similarly, but --

MR. SULLIVAN: Some plants do. You're right.

MS. KLEINSORG: Yeah.

MR. CAMERON: Right. Can we sort of -- can we take this -- can we use this example and take it to what the inspection guidance would look like? Let's take it and use it as an example so that we can test this out. And, Eric, you want to put your framework up. And I just want to make sure that this is getting us off on the right foot here.

MR. WEISS: Up here is the way I first started to think about the subject, and you'll notice that I have a functional class I call Power Circuits, Instrument Circuits. And over here my first sorting criteria is the number of faults leading to core damage or not recoverable condition. And by that I mean immediately, immediately in the PRA, meaning if I'm looking at a faulty, the next step is core damage. The next step is not a branch to see whether it's recoverable or not because of manual actions, or because there's an alternate system that's available. It goes right to core damage. Let me give you an example.

I have a cable, multi-conductor cable. I get two hot shorts in that single cable, and all SRVs go open, or I have an Event B. I take the core inventory and I put it in the parking lot. It's immediate core damage, unrecoverable situation in either case. That's what I'm talking about. These are very high consequence events.

Now do I need one fault, or two or more faults? It's seems likely that the control cable, to me, seems like we did a lot of testing at Omega Point and that causes things to happen. I don't need to intervene and perhaps recover the situation, and control cables have less insulation than power cables. And in any case, we test the control cables and saw a number of faults there that surprised a number of people. When the Omega Point results were presented to ACRS, several of the members said gee, that's several orders of magnitude more frequent than I would have expected. I never would have expected those results, but that's what they said so okay. So I say two, one, one. I don't have a hot short or a short to ground, open tray is much more likely, I think problematic. Multi-conductor cable is more problematic than single conductors. Single conductors have more insulation, they can be located on opposite sides of the tray, where a multi-conductor cable it's all in one tight bundle.

We know that current limiting devices, like current control power transformer makes the spurious actuation less likely, so this is the more likely result. We know that armored cable tends to mitigate against the effect. We know that having a shield on it tends to mitigate to some extent. Having neither of the above makes it really bad. And sometimes we have grounded and ungrounded circuits. That seems to be less significant, so if I were to pick out sequence here, I would say something like two, one, two, two, two, two. You see, I've just defined what in my mind is something that has a very high consequence, and has a probability of occurrence that's significant enough based upon the Omega Point testing that it was something that I would say going into this meeting is probably what we ought to be telling inspectors to go look for.

If they find this multi-conductor cable that leads immediately to core damage, all SRVs go open, I mean, I'm not making this up. They found this at some plant, or an Event B, man, that's risk-significant, in my opinion.

Now you saw some examples that Fred put up earlier that are not risk-significant, but restate the obvious. We're trying to put things in three bins. I'm trying right now to find out these risk-significant sequences, and I know I left a couple of things off of here based upon this morning's discussion I wish I had included, like the combustible loading. Does that make a difference? A room with nothing in it but the cables, is that more risk-significant than one with cabinets? We could have a column there. Maybe I should have included whether there was suppression and detection in the room.

Well, I've got to wonder about suppression and detection because if I have a multi-conductor cable, by the time the detection goes off and the suppression goes off, that hot short is probably already there. I mean, it's in the same cable we're talking about. Right? Well, I guess if the fire started external to the cable, suppression and detection would be a lot more significant. And I know that internal fires are a lot less likely than external fires.

Anyway, I'm not trying to tell you what the right answer is. I'm trying to give you what Chip calls a taxonomy, a way of thinking about it. Now I could have lowered the bar right here, and here where I say leading immediately to core damage. I mean, this will repeat some of this morning's discussion. We could say instead of leading immediately to core damage, meaning the next step is core damage or not, I could have lowered the bar and I could have said prevents safe shutdown or takes safe shutdown outside of its design parameters, or get it even lower. Those are all bars that are lower. Here the bar is up real high, real high, I'm going immediate ME, and I've got a sequence, a taxonomy here that tells me I know from my Omega Point testing it can happen. I've seen it happen in 30 minutes, and unless there's some factor that rules it out like there's no credible fire, why shouldn't I tell my inspectors to go look for that sort of thing? So at this point, I think I've reached 80/20 or whatever they call it. Well, I'll be quiet for a minute and let other people hold forth on it.

MR. CAMERON Thank you, Eric. How does opening up -- how does the diversion path fit into your evaluation? How would this --

MR. WEISS: Well, let's say for the sake of argument that part of the safe shutdown path is I have an aux feedwater pump, and it's going into the steam generator move heat, and there is a line off of the aux feedwater line, that it's not a required circuit, but this valve is large enough, for whatever reason it's there, that if it opens enough, there's not enough water going to the steam generator to cool the plant, and I no longer have a safe shutdown path.

Now that's a flow diversion, but it may not lead to core damage if there is another way of cooling the plant. You know, boilers in particular have all kinds of ways of getting heat out of plant, but I'm talking about steam generators here, and they don't have steam generators. But anyway, the point is that there may be other systems available that are not taken credit for in safe shutdown space, and that be a viable means. I mean, PRA doesn't care about the licensing basis. You can do a PRA on a plant that doesn't have a licensing basis. You just look at the sequences. You look at the configuration of the plant and the sequences, and you may say well, I have this diversion path, doesn't lead immediately to core damage, doesn't trigger this criteria, that's not something I'm asking my inspectors to go search for. Does that answer the question?

MR. CAMERON: Yeah. Yeah, I think it does.

Let's get comment from others around the table both on these ranking criteria, the diversion path, other so-called attributes. Dennis.

MR. HENNEKE: Yes. Eric, what you've put up here on your ranking criteria is in a similar way to what Fred and the group tried to do with their's, and that was to take what we know with regard to failure rates on circuit failures, and determine what's more likely or less likely and that type of stuff. And that's already -- I mean, that's in Table 7-2 of the expert elicitation. Actually, I meant to clarify that. The EPRI data that came out after the expert elicitation had two disagreements with that. I think that's going in NEI-001, that conduit failures, circuits and conduits are more likely to have spurious operations, but cable-to-cable on thermoset cables was less likely, what the expert elicitation came up with. But generally, it agrees with that, and so when you have armored cable there as a factor, that factor is already in the numbers here.

Now what we were thinking about from a PRA aspect was at some point, the spurious operation probability, or even the general sequence probability, excluding the first part, just on the consequence side, if it gets below a certain level, it's a no never mind at this point. It cannot be high risk.

The first starting point was similar to what we had in the screening criteria, that a high failure rate was .1 or above, so a single spurious operation probability of a thermoset cable or thermoplastic cable, a .3 or a .6, depending on whether it has CPT, that's high probability event. That should be first on the agenda. Even multiple spurious non-CPTs circuits is .6 each, .36 for two, so you've got two valves that don't have CPTs, they could go open with greater than .1 probability. That's the type of thing that we'd be considering high, and you have a whole series of them that are kind of medium. And then eventually if you get enough combinations or the right type of failures, like armored cable that has CPT protection and fusing, that's already below 10 to the minus 2.

Those are the types of things we're saying, and what Fred tried to put on the page, that are no never minds at this point, that you should not do that. So 80 percent what you have on your matrix up there is in the numbers, and you can -- if you look at it from an objective saying a criteria type of thing, you can put a criteria out there and say if the spurious operation probability is less than 10 to the minus 2, just don't inspect that. If it's greater than .1, those are the ones you want to concentrate on. And the stuff in the middle depends on your fire damage, your fire loading frequency, all that type of stuff. And that's kind of what we found in the pilots also.

MR. CAMERON: All right. You said that's reflected in 001? Right. Let's go to Chris, and then we'll go out. Chris.

MR. PRAGMAN: Eric, I just want to caution you a little bit about like some of the examples you used. I think if we're interested in core damage, then the question we always need to be asking ourselves is, is adequate core cooling being maintained? And for an example, like 16 SRVs opening, at some plants that may be acceptable. Adequate core cooling may be maintained throughout that transient, and as long as there's some way of putting water in the vessel, they may never depart from adequate core cooling.

MR. SULLIVAN: That's a valid point Chris, depending on what is available. It may have the same impact as if that BWR relying on its CRD pump.

MR. PRAGMAN: Right. So if you're relying on some small steam --

MR. SULLIVAN: I mean in essence, it is how we define a high/low pressure interface. Now I throw that on the table, but my view of a high/low pressure interface is a LOCA, any time loss exceeds make up capability. Other people may have different opinions about what constitutes a high/low pressure interface, but typically that's it. The loss due to your SRVs opening exceeds your makeup capability, i.e., as defined in safe shutdown analysis. You've got a LOCA that's unrecoverable, potentially.

MR. PRAGMAN: That's typically also the --

MR. SULLIVAN: That's not to say when you go to the next step, you may go outside your analysis and say oh, I've got this other pump available, you know. But an inspector is not going to know that. He's going to what's in your safe shutdown analysis.

MR. CAMERON: Let's hear from Wade.

MR. LARSON: You guys are taking this in a number of different directions. Ken, you can start putting enough energy into the torus, that you fail the torus too. When you go look at these cable trays, you started the example with one cable in a tray, but no one looked at those cable trays and find out that you've got six, to ten, to a hundred sensitive cables in that particular tray, so you've got to start looking segment by segment through the plant to see just what you've got in terms of potential vulnerability. I'm not quite sure how you're going to process this information with the inspectors.

MR. CAMERON: Any comment on that? Steve.

MR. NOWLEN: Yeah. I was going to -- some might perceive here it seems like we're kind of mixing up two problems here. One problem is basically defining the entry conditions for the inspector; that is, what are you going to look for, and how are you going to decide when you've got something that's worth chasing? That sort of is the first problem. And then the second problem is once you've identified that issue, that item, how are you going to evaluate it? And I think we're getting those all mixed up, so maybe if we think a little bit and try and separate the problem a little bit, how are we going to get into this first? And then, you know, it again falls back to some of the other things I've said, is that, you know, how you evaluate it. It has to bring in fire frequency, it has to bring in timing, it has to bring in all these other -- you know, do you a mitigation plan? Do you have manual actions you can take? All that comes into how you would evaluate the problem, not necessarily how he gets into deciding he's got something he needs to evaluate. I don't know if that makes sense. Maybe it can get us focused again.

MR. CAMERON: John, do you want to respond to that?

MR. HANNON: Yeah. Let me refocus this workshop on the first element you just described. What we'll do after we define how we would get into the inspection, we're going to prepare the guidance for the inspector. That's a separate activity. It doesn't need to be covered in this workshop.

MR. CAMERON: Okay. So we're going to focus on telling the inspector what to look for. Now I guess I'm still struggling with, in terms of a diversion path. How does that translate -- what do you tell the inspector? And I know that what you eventually give to the inspector, the guidance that you develop is going to have to be crafted in that, but just as an example, see how this would be to Roy, for example, or the other inspectors.

Can you take the diversion path as an example of risk-significant because it's high consequence, can you frame that in a way to -- here's one of those John talked about. Let's have five items, for example, come out of this workshop. How would you frame the diversion path as one of those items? Yeah, Roy.

MR. FUHRMEISTER: The way that I have described the concern of a diversion path to other inspectors is if that diversion path is big enough to impact your system functional capability, then that's a concern. If you've got a two inch diversion path off a 12 inch main header, walk away. If it's a 10 inch diversion path off a 12 inch header, then yeah, you better look close and see if it's been adequately protected because that could seriously impact system capability.

MR. CAMERON: Is that the type of thing, John, Eric, that you're looking for in terms of what is a risk significant associated circuit? I take it that, you know, just to use your words, if big enough to affect system capability, when you say take a look at it, that means you better take a look at the associated circuit with that. Is that -- I'm just trying to figure out if we're on the same wavelength.

MR. WEISS: Yeah. Let me give you a little feedback. Yeah, that's part of the answer, but part of the problem we've had with associated circuits is which ones do you look at? How many hot shorts do I have to look at? If I have a cable tray and I have, I don't know, a thousand conductors in that cable tray, do I look at end factorial combinations? Do I look at that many? Isn't that incredible? Is that what I look at? Well, yeah, I want to know, Bill, if there's something that has a high probability of occurring, so what do those thousand conductors look at?

Maybe if I look at one single multi-conductor cable, it causes that diversion, and it's only one or two hot shorts in that one -- to me, that's risk-significant. Now I don't know that it's either reasonable for the regulator or for the licensee to be asked to look at end factorial combinations where N is a very large number. And the way we whittle that down is by looking at these other attributes, some of which are on this chart, and some of which aren't, like how credible is the fire is not on this chart, but is it thermoset or is it thermoplastic? We know that they have different thresholds for damage, and if it's thermoset and the fire doesn't create a hot gas layer that will get you up to the failure criteria for the thermoset, then I don't think I should be looking at that. I shouldn't be asking my inspectors to go chase it, but I have to fashion inspector guidance, so I can't ask the inspector to do a PRA in his head. I can only ask him to use his own good judgment and the guidance that I provide, so I say go look for that, and go look for multi-conductor cables because I know that's where most of problem is in control circuits without current limiting transformers. In particular pay attention to thermoplastic, and stay away from armored, or things that have a conduit around them dedicated for that purpose.

Then I've got a reasonable set of inspection criteria, at least I think it's reasonable. I can't get it out in a few words, but I could probably make up a matrix of attributes adding these functional things like diversion or, you know, inability to control reactivity, or whatever.

MR. CAMERON: Let's go to Roy, and then we'll go to Fred, and Ken.

MR. FUHRMEISTER: But as an inspector, I can't start out from the number of conductors in a tray or the number of conductors in a cable. I have to start with a component. That component will now tell me the cables that are affiliated with that component, and then from the cables that'll tell me which trays it's in. So I need to start on it, because I can't start with a cable because we don't know what they are yet.

MR. WEISS: So what you do is you, as an inspector you go out and you look at a few components that you think have high consequences associated with their failure. You know, it's the Event V sequence, or some other sequence that leads immediately to core damage or prevents you from reaching safe shutdown. Then you go out and you look and say what's connected to those components? Ah hah, all of those components are in the same multi-conductor cable. That gives me concern. And to make matters worse, there's no current limiting transformer on them. Man, I've got something.

But on the other side of the coin it may turn out that oh, yeah, I've looked at these two components, and this one is in this armored cable, and that one is in that armored cable, and I'm just not going to chase that.

MR. SULLIVAN: I'd like to, if I could, clarify something about armored cable. If you have multi-conductor cable in an armored cable, I don't believe that mitigates the probability of getting conductor-to-conductor faults within that multi-conductor cable.

With regard to armored cable, what we're talking about is the probability of getting a cable to cable fault when both are in the -- does your data show that?

MR. HENNEKE: Yeah. The expert elicitation tables have them too, which is -- you know, everybody has participated in that.

MR. SULLIVAN: So if I have a multi-conductor cable in a conduit, I don't worry about conductor-to-conductor faults within that cable?

MR. HENNEKE: No, not conduit. So if you have an open cable thermoset or thermoplastic, it's a fairly high probability, .3 is a typical MOV circuit. Conduit is going to be slightly less than that, depending on whether the actual panel, but it'll say .1 to .05, and armored cable is going to be on the order of .01 in the cable itself, not cable-to-cable, so because the armor is -- surrounds the cable and it's --

MR. SULLIVAN: So you get more force to ground is what you're saying.

MR. HENNEKE: Yeah. Any cable like an A conductor cable, the first thing that's going to happen is that cable is going to short to ground, and it's going to blow the circuit, so the armored cable is 10 to the minus 2. What we're saying is it's 10 to minus 2 for a cable of armor, and it is -- for cable-to-cable it is physically impossible.

MR. SULLIVAN: Physically impossible.

MR. HENNEKE: You can't have that.

MR. CAMERON: Okay. That clarifies it. All right. Fred.

MR. EMERSON: Bear with me. What I want to put up here is somewhat similar to what we're doing in a related process of coming up with USB , so bear with me. I'll try to put down a concept which I think kind of puts in one place what we've all been talking about, so bear with me for a moment.

Okay. First we start off looking at consequence. Okay. Start off with consideration of consequence, and then the inspector would be asking a series of questions when he walks into the plant. The first question is, is it involved with associated circuits? The second question is, does it have consequences for hot shutdown? And there may be some sub-tier questions which he may ask himself, like does it affect flow diversion, does it create a flow diversion path? Does it involve a loss of high/low pressure interface?

These are all questions that he can ask to allow him to hone in on scenarios that may have high consequences. I'm going to separate that from how you look at it after you've determined what the high consequence scenarios might be. Let's see. There may be several other questions you can ask yourself too, which help you determine whether it's high consequence or not. Okay. So based on asking himself this series of questions, he comes up -- he's gone over. He's gotten his PNIDs. He's gone -- well, see if -- I'm curious about this one. It affects hot shutdown and it may impact a high/low pressure interface so okay. I have this scenario that I want to look at, potentially high consequence.

Then you go and ask yourself another series of questions, and this is what I meant by risk mitigators. Then you look at whether those specific scenarios can really happen or not from a realistic standpoint. Can I have a credible fire? I'm just going to list a few examples. I'm not going to try to make this exhaustive. Is there a credible fire associated with this? Does it involve armored cable, or you might say the same thing for thermoset cable. You know, does it involve circuit protection? And there's probably a whole series of questions, some of which I test on in the slides in my presentation which you could ask yourself, but the whole point of this was to first define what the possible scenarios are, going through a series of questions. And then once you pick the scenarios, you go through and you ask yourself is this scenario really possible, using these risk arguments.

We've been kind of talking about doing something like that, but I wanted to try to put it down as maybe part of a flow sheet or a series of questions that the inspector could ask himself to allow him to define high consequence scenarios, and then determine whether they really are risk-significant or not. And hopefully, would fairly quickly allow him to hone in on the ones that he really needed to go dig into further, and ask some really low level questions. Are the cables in the same -- are they neighboring cables in the same tray, which would be really down the list.

So I guess the point is, you work your way down from some very general questions on consequence, very specific questions on can this scenario happen. That's what I had in my mind for how the inspector might approach it.

MR. CAMERON: Well, let me put some questions out for the group. I think what I hear you saying is you're suggesting that the inspection guidance might be written in the form of questions like this. Is that what you're proposing?

MR. EMERSON: It may not end up looking just like this in the inspector's hands, but it's a way for us to get started on honing in on how to look at things, whether they're something the inspector should look at or not.

MR. CAMERON: Let me go to Eric, and Mark, and other experts around the table. What do you think about this approach in terms of trying to work through these to get you to where you want to be?

MR. WEISS: My first question would be how does the regional inspector see this approach? Usually when we issue inspection guidance it's not in the form of questions or think about this area. It's usually something a little more direct. Maybe Roy or somebody else from our region would --

MR. CAMERON: And to clarify what Fred said, is that he's suggesting this is a starting point.

MR. EMERSON: This is the starting point for writing inspection guidance. It's a structured approach to writing inspection guidance.

MR. CAMERON: And does this -- this may get us to the types of things that Eric has in his matrix, I suppose, these types of questions.

MR. WEISS: Right.

MR. CAMERON: Mark.

MR. SALLEY: It's a good idea. I mean, I think it's workable, Fred. To work the problem back from the consequences forward I think would be a much more successful way. And I think that's what you're doing here. And that would be a good approach. Now let's get some examples up there, you know, besides flow diversion to see how many areas we could work backwards.

MR. CAMERON: Okay. Anybody else have a comment? Bijan, and let's hear from Dennis and Chris. Go on, Bijan.

MR. NAJAFI: I think this is very consistent. I thought that so far what we've been talking about since this morning, that I guess the challenge is to try to carry these consequences to the attributes. For example, when we talk about the flow diversion, that Roy said if it is 10 inch in a 12 inch header, then I go further. I carry it, look at it a little bit more. I'll ask the question, what if in a 12 inch header you have four one and a half inch diversion path? So I guess when I say attributes to add, to continue is that what do I exclude, what do I include? Which in his practice he chose to exclude or put in a lower priority if it had four one and a half inch diversion path. To say spurious operation of all four MOVs in these four, but look at the ten instead of the four two and a half, so I guess those kinds of -- that's what I'm saying. I guess we're getting finally to the same process, start with the consequence to define the components that you need to look at, and then do the risk element, go through your step to determine whether it's risk-significant. But I guess it comes back to the challenge being to define each one of these consequence elements or criteria, and then attributes associated with each one. How can we eliminate some of the flow diversion path, but do look at others? That's what the challenge, I guess, is for us.

MR. CAMERON: Okay. And the question is how detailed are we going to get on this, in this particular discussion. Dennis, Chris, you want to say anything about this particular approach? And then let's see if we can go through it.

MR. PRAGMAN: I just want to suggest when we're thinking about consequences that we stir into the mix, that sometimes consequences are immediate, and sometimes they can be delayed if a situation goes unmitigated for an extended period of time. So flow diversion may not propose an immediate concern, but over a long period of time cumulatively it could have a concern, and there may be a way we can mix that in there to help push certain things up a ranking scale, and certain things down a ranking scale.

MR. CAMERON: Okay. Dennis.

MR. HENNEKE: Yeah, I agree with Fred. This will make it much simpler, and fairly straightforward. Of course, depending on how you answer the first page of his questions might depend on what questions you ask the second time, because for example, if you have a high/low pressure interface that happens to be an interface in system LOCA outside containment, then you may not care if it's armored cable because the consequences are high, and it would take much more of a risk reduction from these risk factors that we've included in order to make it not risk-significant. So I think depending on what consequence you're going down the path, you'd have to ask different questions. But generally, the questions would be the same, and they're kind of additive. If you have armored cable and it takes a long time to damage, and you can't have a credible fire, and maybe a series of questions, then it would be easier to throw it out if it wasn't a high/low pressure interface; whereas, if it was a high/low pressure interface then it would be much harder to throw it out.

MR. CAMERON: Okay. Where do you want to start on this? These are consequences, hot shutdown, high/low pressure interface. Do you put anything else?

MR. SULLIVAN: More PWR isolation, reactor pressure vessel isolation, PWR. You guys can jump in here.

MR. HENNEKE: Well, on high/low pressure interface it's either a LOCA or an interfacing system LOCA, and we would treat those differently. A PORV opening may or may not be considered a high/low pressure interface depending on the plant. That's a LOCA. That's not as bad as an interface.

MR. SULLIVAN: It all depends on how you define a high/low pressure interface. Station blackout or -- station blackout.

MR. CAMERON: Let me just put some of these down. Let me check in with you, Fred. Is this consistent with what you think? Take a look at all of these types of things as a starting point that could lead to high consequences. Okay. Now one question. Is it -- this is a different beast than these. I mean, why did you have this here, "Identify associated circuits"? Are all of these systems -- in other words, is it something that's over here or what?

MR. EMERSON: Just because I thought this -- what I'd understood earlier was that the scope of what we're writing is inspection guidance for associated circuits.

MR. CAMERON: Well, that's right. I just wondered why you listed that with these types of consequences. I mean, you're looking at all these. Right?

MR. EMERSON: Yeah.

MR. CAMERON: To see what associated circuits you're going to deal with.

MR. EMERSON: Right.

MR. CAMERON: Okay.

MR. NOWLEN: But it's more in the way of an overriding entry condition. It's not an associated circuit. It doesn't go here.

MR. EMERSON: It's not a high consequence thing, it's a way to focus your high consequence considerations.

MR. CAMERON: All right. Any other --

MR. NOWLEN: How about sealed LOCAs?

MR. CAMERON: What is it?

MR. NOWLEN: Sealed LOCAs.

MR. SULLIVAN: Reactor coolant pump seals?

Varies from plant to plant. These guys could probably help you out there more than I can.

MR. NOWLEN: So it's on the list. Thanks.

MS. KLEINSORG: How about aux feedwater? Is that --

MR. CAMERON: Aux feedwater.

MR. SULLIVAN: Well, it's a hot shutdown system, so it's -- any hot shutdown system I guess would fall in that category.

MR. CAMERON: Yeah. See if you can go back and try to organize these perhaps, but at least you're coming up with some things that may have high consequences, so at least that's a starting point. Anything else? Excuse me.

MR. PELLIZZARI: You are expecting a bus to be protected by electrically operated circuit breaker, somehow the power cable and the control cables and there is a fire, you lose the capability to trip the breaker. Say a loss of 125 volt DC control panel for the breakers, that would be one.

MR. CAMERON: Ken, I think that you're going to probably for the stenographer maybe just give us those things a little bit slower.

MR. PELLIZZARI: Okay.

MR. CAMERON: Okay. How would we describe that now?

MR. PELLIZZARI: You are tripping the control power for the electrically operated circuit breaker so your high voltage breakers require -- you have a fire that causes a 4 Kv power cable to fail as well as the control power for the breaker that's supposed to isolate --

MR. CAMERON: So loss of breaker --

MR. PELLIZZARI: Breaker control power.

MR. CAMERON: Loss of breaker. Anything else. Yes, Bob.

MR. KALANTARI: I don't know if you want to list ADS actuation spuriously for boilers, ADS.

MR. CAMERON: So ADS.

MR. KALANTARI: Right. Okay. Automatic Depressurization System.

MR. CAMERON: Okay. Automatic Depressurization.

MR. KALANTARI: How about diesel generator started without service water, DG start without service water.

MR. CAMERON: DG start.

MR. KALANTARI: DG start. Diesel generator starts without service water.

MR. CAMERON: Without service water.

MR. KALANTARI: How about any pumps that that start without suction opening?

MR. HENNEKE: These aren't consequences, these are just scenarios. I mean, I could come up with hundreds of thousands of scenarios. I mean, it's not necessarily leading to a loss of hot shutdown capability.

MR. KALANTARI: If you start that pump with that suction, you destroy that pump, you drain your water, you have no safe shutdown capability.

MR. HENNEKE: But there has to be a number of other failures that lead to that.

MR. KALANTARI: One pump, you close the main flow, you close the suction, you start -- that pump destroys itself. You drain your CST.

MR. CAMERON: Okay. Let's get all this. Bob, can you -- let me just get that up there. There may be a disagreement. We may be going from high consequence into listing all the different types of things that go could wrong. And I think you're going to have to try to sort this out but, Bob, what was the last one?

MR. KALANTARI: The last two I had was any pump suction closed with pump start signal, closed pump, suction closed or not opening. And then similar to that would be pump start with main flow valve not opening, or main flow closing actually if it's open. Then the pump gets that head, the reactor is at high pressure. You are trying to pump against a thousand pounds. Takes no more than 30, I don't know, 120 seconds. That pump is going to cavitate, destroy itself, put a big hole in the system.

MR. CAMERON: Fred, what do you think about Dennis' comment on some of these examples?

MR. EMERSON: I agree with him.

MR. CAMERON: Okay. So the trick is to try to differentiate between hot shutdown, high/low pressure interface, aux feedwater. How would you distinguish between say these first three that we're talking about, and say these last three? Chris.

MR. PRAGMAN: The last three are specific examples that may or may not be true for a specific plant. They're ways of certainly of losing a particular function, not necessarily the only ways. I think they're bounded by the examples we have in the first page that are more general, that just say the function can be lost.

MR. CAMERON: Okay. So in other words, these -- what Bob has given us are all examples of ways that these capabilities would be lost. Okay. So that they could be included under those as specifics. Okay. Yeah. Go ahead, Steve.

MR. NOWLEN: Yeah. I was going to suggest that as another one, you might just put in a general loss of inventory that would -- you know, that's one mechanism that you could lose inventory coolant, so it's sort of a higher level.

MR. CAMERON: We have to get -- Wade, I've got to ask you. We've got to get all this on the transcript. Okay? So let me know if you want to say something.

MR. LARSON: I think from Rich Fuhrmeister's point of view, he has to get some very specific things down, examples that would be good for inspectors, so the more specific we get in these examples, rather than going back to the generalities, the better off it will be for the inspectors. So I think we're speaking to the issue of the day.

MR. CAMERON: Okay. Good. Let's see who we have. Go ahead, Ken.

MR. SULLIVAN: I think that all of the cases that you studied and, you know, they're right. You can go on for hours to talking about specific scenarios. But in general, all of those scenarios fall under hot shutdown with regard to those that could have a direct and immediate impact on your shutdown capability. Certainly, if your pump gets a start signal at the time when the suction valve goes closed, you're going to lose that pump. But if it's a high shutdown pump or system, then certainly something -- it's an example of how a hot shutdown system could be impacted, so these are examples, not specifically -- you know, you can't define them all right here and now, that may be significant at every plant. But I think they all fall under bullet number two there of hot shutdown.

MR. CAMERON: Okay. Let's go back to hot shutdown. What else do you need to do with hot shutdown? Now Fred put these credible fire, armored cable, circuit protection. I mean, where are we going to go if you wanted to look at hot shutdown, where are we going to go next with Fred's suggested analysis? Ken.

MR. SULLIVAN: Well, the first step you do is you identify the vulnerability, which is what we did first. WE identified a potential vulnerability as far as an inspector is concerned. You have a case where this flow diversion valve could open. You know, you're looking at a PNID. You don't know what the potential of that is occurring right now. It's a potential vulnerability. That's all it is.

From there you then go and you look at where those cables are located, are they in the same fire area, are they in the same cable try, what's their spatial separation? And you consider those factors for what's the impact a fire could have on damaging those cables of concern, so the first step in the process is identifying the vulnerability. The second step is identifying the potential impacts of fire damage to cause that vulnerability, or to have an impact on safe shutdown.

MR. CAMERON: Okay. Safe shutdown on top. Right?

MR. SULLIVAN: Right.

MR. CAMERON: One thing that interferes with safe shutdown is flow diversion?

MR. SULLIVAN: Uh-huh.

MR. CAMERON: Then you have to look at where the potential vulnerability is.

MR. SULLIVAN: Right. Is there a potential vulnerability? From the PNIDs you'll identify the flow diversion path. Okay? If you see two valves located in series, and you then find through cable routing that the cables are in the same fire area, there is a potential vulnerability there. Now you don't know whether just because they're in the same fire area, that doesn't mean they're both going to be affected by a single fire. You know, maybe, maybe not, depending on the spatial separation and certain other attributes. Then the inspector would go and look, and see what kind of protection is provided, if spatial separation is provided for those cables.

MR. CAMERON: Let me ask you. Is it useful to keep talking about this particular example to see what we could get down there, that may be a good example? Dennis, what did you want to say about this?

MR. HENNEKE: Well, I think we kind of jumped ahead here, that in fact in the McGuire pilot for NEI-001 what we want to do is identify as much as we can before we traced anything. We want to know if the cables are in the area, or travel in the same area, but you don't have to go through a cable trace. In fact, during inspections I think that would be even more important when they're limited by time that they want to identify the vulnerability, and certainly look at attributes that they can quantify prior to cable tracing. So Fred listed some things here like armored cable, circuit protection, that type of stuff. And another example of it is the time available. We all know PORV cables, for example, are vulnerable. You can spuriously operate a PORV, but PROVs and AOVs actually in many cases will actually go back to their failsafe position, and the testing showed that the average time for a spurious operation was about two minutes, so it spuriously operated, two minutes later it would go back closed. Now an MOV won't go back closed. It's going to fail wherever you sent it, but a PORV or an AOV may go back closed. So if you can last say 10 minutes, or 20 minutes with a PORV open, and you're pretty certain it's going to go back closed, that would be one of the factors you want to include, and even identify that before you trace a single cable.

MR. SULLIVAN: You're absolutely right. My only problem with that is, you know -- you're absolutely right. Your test data did show that, but does that test data bound all configurations found in every plant? I'm not real comfortable with that when you start saying the PROV is going to go closed in two minutes. That occurred during a test. It may not occur for all plants.

MR. HENNEKE: Well, in fact the test didn't look at PORV cables. They just looked at --

MR. CAMERON: Let's go to Eric.

MR. WEISS: Yeah. I just want to say that

I understand the points that were made, and they're certainly valid. But to keep us on focus, we don't have to have the total answer here. We're not looking -- we're looking for a smarter way to do associated circuit inspection, so if we can agree on a few things that are risk-significant, we've accomplished what we want. We don't need to solve, you know, whether the spurious operation is bounded by a certain description in all cases. That's too much for us to try and do.

MR. CAMERON: Is this going on the right track for you, Eric and John, or --

MR. WEISS: Well, I think we are laying out an approach which is to sort of work backwards from what we originally conceived, to start with a consequence and go to the attributes that are attached to that consequence. I think we -- I had hoped that we could all agree on a few of the attributes that are well-documented, which was what I was attempting to do with my chart. I mean, it's documented in the expert panel. It's documented in large measure in NEI-001. I think we all agree that there's different damage thresholds for different types of cables. And if I go and I find a flow diversion, and I see that it's in non-armored cable, and there's no current, that's something I expect my people to go look for. Am I getting a yes out of the audience? General consensus?

MR. CAMERON: Anybody disagree with that? Anybody think that that's not useful? Bijan.

MR. NAJAFI: Yes. I think I totally agree with that, and also Dennis, that I think you do not want to go to those fourth and the fifth item. I mean, that's where you go wanting to get to this risk question that Fred has up there. I thought our objective was to go through the first three, and then under potentially vulnerable, list an attribute that allows us to determine which are the candidates, attributes that somebody can just go pick up that 10 inch valve as opposed to the four or the two and a half inch valve, so that's where you stop, I think. I mean, we don't need to go to the third and fourth, and the fifth.

MR. CAMERON When you're talking fourth and fifth, what should I take --

MR. NAJAFI: The location of the cable and separation of the -- I mean spatial separation, because those are basically -- to me it comes when you really want to determine the risk, and what is the value or effect of it, but to do that first, you have to pick that MOV that he's talking about. That's the tough part. He's got to pick that MOV among another

500 MOVs. That's the first step, pick those MOVs among 500 other ones.

MR. CAMERON: And when you say "MOV" you mean?

MR. NAJAFI: Motor Operated Valves. There's a thousand pieces of equipment, he's got to pick five or ten, or fifty, or whatever.

MR. CAMERON: All right.

MR. SULLIVAN: If I may, maybe I could clarify a little bit. Picking the MOV or two MOVs out of the 500 MOVs, that's identifying the potential vulnerability. The inspector is going to look at the PNIDs, and he's going to go through a flow diagram, and he'll come across perhaps a flow diversion path. Well, there's his two MOVs or a single MOV. That's how he picks the one, the potential vulnerability. At that stage in the game that's all it is, is a potential vulnerability. If both of these valves open up, I can have a significant impact on my hot shutdown system. Okay? That's all he knows right now.

What he's got to find out really for that, what's the potential for a single fire to cause those valves to spuriously actuate or mal-operate for a better word? From that, he's got know where the cables are routed, where are the control cables for those valves routed? And once he has that information, he can see the spatial separation for those cables, and see whether or not a single fire could affect both of those cables or that valve.

MR. CAMERON: So you're saying that these things that should be -- you're just agreeing with what Bijan was saying?

MR. SULLIVAN: Well, your vulnerability, you're identifying your vulnerability as your valve, the potential for that valve to spuriously open. Okay? And what's going to cause that to happen. The fire damage to what is going to cause that to happen? Fire damage to the control cable for that valve would cause it to happen. Where are those cables located?

MR. CAMERON: Steve.

MR. NOWLEN: Yeah, I go back to what I said before. Again, we're mixing up this problem of the entry condition versus how we're going to analyze it once we've decided it needs to be analyzed. And I think when you get into things like spatial separation, detection suppression available, all of those things are how he's going to analyze it once he's decided he needs to do that. But Roy's first problem is, is he looks at the PNID and he sees two valves in series that create a diversion path or spuriously opened. How does he decide whether he should even chase those two cables at all? Very high level. First, the entry --

MR. SULLIVAN: I thought we've already established that as --

MR. NOWLEN: No, I don't think we have. We haven't got a single attribute up there that tells him yes or no, do I chase that diversion path.

MR. NAJAFI: This goes even beyond mechanical pieces of equipment, how many instruments, how many combination of the instruments? So that's -- I mean, it's not as trivial that he's going to look at a PNID and say one diversion path, I'm going to take it. And the problem is more complicated than that. I mean, there's -- to really look at the PNID, one line diagrams, at time procedures, to pick a manageable set of whatever you can look at, which the next step then yes, location of the -- that's when you -- if you need to, you start going into cable tracing and the rest.

MR. CAMERON: Okay. There seems to be some agreement on that. Fred.

MR. EMERSON: I'm going to agree also. When I started that list of risk items, those were things that the inspector could evaluate qualitatively to help him judge how important that scenario was. I mean, Roy, you can go into a room and pretty well determine whether you think it's a high risk room or not, even based on the combustibles that are there, and the ignition sources. I mean, that's a judgment you make every day. It's pretty easy to tell what kind of cable it has, you know, and most safe shutdown engineers can tell you what kind of circuit protection they have. And I'm just offering those as a few examples of things that the inspector can qualitatively use to sort out what things he's going to look at in more detail, and what things he's not. The question of where the cables are routed in that zone requires a lot more analysis, and that's not what I had in mind as an initial sort of whether something should be looked at or not.

MR. CAMERON: Okay. Ken, did you have anything to say on that?

MR. SULLIVAN: Well, with regard to selecting fire areas, the way the inspection procedure reads currently, we only focus on risk-significant fire areas to begin with, as determined by the IPEEE or other processes, so the inspection focuses on risk-significant fire areas, i.e., they typically have ignition sources in there, or high combustible loadings already, so that phase is already done. But with regard to determining potential vulnerabilities to what could impact hot shutdown, with regard to flow diversion, I thought we already had established that. If it could have a direct and immediate impact on your shutdown system or capability, it would be one you'd pick. If it could not, forget about it.

MR. CAMERON: Let's go to Roy, and then to Wade, and see if we can figure out where we are.

MR. FUHRMEISTER: Now as an inspector, once we have identified that a component is vulnerable, our next step is we go get a control circuit schematic for that component, pump valve, whatever it is. And then we look at the control circuit schematic to determine are there potential circuit faults that could cause mal-operation? An example would be where you have the power supply cable going up to the control room in the same multi-conductor cable as the conductor that runs out to the motor control center to engage the contactor coil, so our next step, once we have identified the vulnerable component, we look at the control circuit. And that's where the inspector is going to need the next piece of guidance, how many faults. If it takes two shorts and three grounds to make the mal-operation, I don't want to go there.

That's too hard. I'm not sure it's even credible, but that's where we need actually the next piece of guidance, it's how many control circuit faults do we have to consider for mal-operation? And then once we determine is it really something we have to pursue, then we get into the cable location, the separation, the credible fire, which is all in our significance determination process, where I, as the inspector, have to develop a credible fire scenario to cause the damage to make it happen. I have to be able to start a fire. I have to be able to make it big enough, and that all gets included in the significance determination which is being worked in another forum outside of this room.

MR. CAMERON: I'm going to clean this up and put something up for your consideration after we take a break, and see if it's coherent. Wade.

MR. LARSON: I think you ought to just follow that thread and see where it goes.

MR. CAMERON: Yes. I think that's a good idea. That's a good idea. Any comments on what Roy just said. Go ahead, Fred.

MR. EMERSON: I don't.

MR. CAMERON: All right. Bijan.

MR. NAJAFI: You asked, I mean, one comment.

That's why I'm getting exactly the same kind of example you're talking about, how many control circuits do I stop at, whether three or four. This is the kind of attributes I'm talking about. It applies to the mechanical pieces of equipment as much as it applies to the circuits. I mean, how many of these valves in series do I stop at? Two is enough. Is three enough, or four or five? Those are the kind of attributes that that's what I was looking for. And when I said that even separate the attributes in terms of the mechanical pieces of components and system, and electrical attributes, do I stop at two valves, or three valves, or four valves, or four diversion paths, or how many of these, or even diversion path of one system with a diversion path of a secondary system that may be related in terms of its function for makeup, so where do I stop? And the same thing applies to the circuit, do I stop at armored? Do I stop at cable-to-cable? Do I stop at those? So if those attributes can be made at some generic level, then that's going to be helpful.

MR. CAMERON: Okay. Dennis.

MR. HENNEKE: I guess we had a similar experience in the NEI-001 pilots, and that we went and we identified the vulnerability. We looked at the circuits, and then we tried to do as much as we could with those circuits prior to having to do any sort of cable tracing at all, because cable tracing is a lot of effort. And it's also where you would have to interface with the utility and say trace me these cables, and then a couple of days later they come back with the information. And the cable tie-up and that type of stuff is pretty important. How many failures, and we did that in the NEI-001, and we tried to put that in in the screening process.

Now in that process we mixed in the fire frequency and all that, which we probably wouldn't want to do at that point, but there's a lot of things you can identify which are generally the type of failure, the type of cable you're going to be in, and how many failures it would take. But I know from our experience, you can, just by knowing the cable, you can tell where it's going from. It's going from the control room to the MCC, and it will go through the cable spreader room and the penetration room or something like that, so you can already know where it's going, and then start identifying characteristics of what it's doing, what cable type it is, and that type of thing. And that's exactly what we found in the pilot.

MR. CAMERON: Eric.

MR. WEISS: My reaction to the discussion that Bijan started about how many of these do we take into account? Should we take into account three hot shorts and two ground? My reaction to that is that goes to Steve's point, which is two questions. What should we tell inspectors to look for? And second, how should we analyze what they find?

And as a manager, I want to turn inspections on in a reasonable way, so I don't think I have to cut it too fine. I don't have to say go look for four. If I say one or two, isn't that good enough? Isn't that going to capture most of the risk? If I have one hot short or two hot shorts in a multi-conductor cable that lead to four valves opening, diverting all the AFW flow so it's not available, isn't that good enough?

I mean, down the road I would like to have answers to all of these questions, but I've got time to deal with things that are of lower safety significance and less probability, and I can ask Office of Research to give me smarter, better answers so that I don't do something that's going to put a huge burden on the inspectors, big burden on the licensees for an uncertain regulatory effect. If I just confine myself to one or two hot shorts, is there anybody in the room that would disagree with that? Is that being too coarse of a sieve for initial inspection guidance in an area where we suspended inspection because of the controversy?

MR. CAMERON: Bijan, too coarse?

MR. NAJAFI: NO, I don't think, especially if you go down to two, especially for what the scope of this is, which is primarily mechanical and control. And we really haven't looked much at the instrumentation and its impact on others, but limited to those, I think that's a reasonable first sift, the two. I think it is.

MR. CAMERON: Okay. John.

MR. HANNON: Just let me put on thing in perspective, because what we're talking about is resuming our inspection for associated circuits in October of this year. Remember that the Reactor Oversight Program is evaluated annually. What will happen is once we've gotten about a year's worth of experience in going after associated circuits with this limited approach, we're going to feed that back into the program office for evaluation, and we may want to expand our look in out years, or we may decide that what we're looking at is adequate for our purposes. But it will be evaluated on an annual basis, once we begin it again, for mid-course corrections, if we find that we need to cut back on the level of activity we have started, or if we want to expand it, we'll be able to do that. So we're starting in October. We're going to be doing limited look inspection based on the criteria that we're coming up with today, but it'll change over time.

MR. CAMERON: All right.

MR. LARSON: Just so I understand what you guys are talking about, if you go to a room with a lot of cable, a lot of cable trays and you have a fire that involves that room, two hot shorts though a small room, one cable tray, two hot shorts, how does compare with cables spreading on to something else.

MR. CAMERON: Anybody have an answer for Wade on that one? Steve, or go ahead, Ken.

MR. SULLIVAN: I believe Eric was referring to with regard to the flow diversion, if it takes two hot shorts to cause that flow diversion, you may need to consider it. I don't think he's limiting it to two hot shorts per fire event. Correct me if I'm wrong, Eric.

MR. WEISS: Well, yeah, I suppose if you had a fire in a cable spreading room, cable spreading rooms have thousands of cables in them going to all kinds of systems. I think it would be -- it might be unreasonable to assume that you're only going to look at --

MR. CAMERON: Okay. Let's go to Chris, and then over to Fred.

MR. PRAGMAN: Just to respond to Wade's question, in my experience what I'm used to seeing is that a plant will identify all the hot shorts that could possibly happen. And it's the truncation of are we looking at one, are we looking at two or multiples? That happens when the plant has to decide what am I going to do to mitigate them? So if there's an individual hot short that could lead you to an unacceptable place, I would expect you'll find the plants have mitigated those individual cases. It's when you start looking at combinations where I think you're going to find the plant hasn't necessarily contemplated two things happening in combination, that together produce the unacceptable result. And the reason I put my sign up originally was your original proposal of maybe looking at ones or twos, I think is reasonable, when you consider that for each additional spurious actuation, you are dropping down some level in the likelihood of that next one happening, because each one either has a dependent or independent probability of happening, so the probability of one is greater than two, and the probability of three is less than two, so it's going to keep decreasing. So even though you could probably dream up a scenario where ten things happen and lead you to core damage, the probability of that happening I would expect would be very low.

MR. CAMERON: Fred.

MR. EMERSON: No.

MR. CAMERON: Bijan.

MR. NAJAFI: I want to add also something, another reason that I think the one and two is not only the right, also the more practical thing to do, because as these permutation you start increasing, if our objective is to find the unknown out there, the likelihood that you can find it becomes drastically smaller and smaller. You can think about three, and four, and five. By the time you're looking for the five combination, the likelihood you get lucky is 10 to the minus 6 or something and you find it, because the permutation just exponentially goes up, so it becomes a point of diminishing return.

I mean, at some point it's not really practical. You can't find all of them, so that's I think the other reason that ones and twos are pretty much stretching the practical limit. By the time you're at three, you're pretty -- I mean, you can't find what you -- yeah, I mean it's limited by the resources and analysis that you can put in. And you can't find all of that. And the other thing I remember, the second point that is related to what weight, if I -- I understood this process the way to work is not necessarily by going through fire area by fire area, it's rather you're looking for the vulnerabilities, and you start with the PNID, so you're not saying necessarily for this exercise, not what you do for Appendix R outside of this exercise. You're not looking at cable shredding room, control room, switch gear room in that way. You start by looking at a system level on a functional level searching for combination permutation, where they're in the cable shredding room, or control room or anywhere for that matter. And if you limited it to when you get into the cable shredding room, if you have identified five, or ten, or fifteen combinations of the two that based on other attributes which we're still making the point, we need others, because even combination of the two could be a few hundred. So we need still other attributes to limit the combination of the two. Then you don't worry whether it's the cable spreading room or somewhere else at that point for identification, so you're looking at it from a functional/system/component.

MR. CAMERON: I think maybe it might be a good time to get some coffee, or maybe even something stronger, although I don't think they serve it up there. But why don't we take a short break, and see if we can do a summary of where we are, and how to go forward with the discussion. And be back at 3:30, gives you fifteen plus.

(Off the record 3:12:57 - 3:35:15 p.m.)

MR. CAMERON: People have assured me that we've made progress and have agreed on a number of things, so I'm not going to argue with that since you all know more about this than I do. We're going to ask Fred Emerson in about a minute to put the slides up that he had up earlier about associated circuits that they thought were of high significance, they being the NEI Task Force. But I just want to sort of summarize where I think we've been, and see if people agree or wanted to add anything to that.

First of all, it seems we've agreed that the focus should be on consequences, and that the entry conditions for inspection, two entry conditions. One, consequences falling from things that can affect hot shutdown and consequences flowing from things that could affect the high/low pressure situation. And then we get to well, if you find that, what's the realistic damage that you have to take a look at? This is the two or less circuits, and if those are found, then you get into things like the cable separation credible fire. Does that make sense in terms of a hierarchy? And, Roy, do you want to restate that more coherently for us, since you're on the line?

MR. FUHRMEISTER: Okay. What I have heard as an inspector is that you folks have come to an agreement that what I'm going to look at for my associated circuits reviews is vulnerabilities which can affect the ability to achieve the hot shutdown function of a system, or a vulnerability that can open a high/low pressure interface causing an unrecoverable inter-system LOCA. That's what I've heard, and I congratulate you on that. It took six years to get here.

The next thing that we need as an inspector is what is the credible damage to impose on cables and in the control circuit based upon the cable construction and installation. Is it in conduit, is it armored? Is it a multi-conductor, or is it a single twisted pair? And that's, I think, where we need to go for guidance for the inspector.

Now we've identified which circuits to look at, now we need to tell the inspector what does he consider for damage in that circuit realistically, based upon what everybody has learned from the NEI test?

MR. CAMERON: Anybody want to add anything to that? All right. We're going to go to Fred for some specific examples, and see if we can connect these two pieces of the conversation. First, Ken, do you want to add something?

MR. SULLIVAN: Well, I have to say that these would probably fall under, and let me know if I'm wrong, vulnerabilities that can impact hot shutdown, but along with those would be instrument circuit per misses and control circuit interlock. That would fall under the hot shutdown system.

MR. CAMERON: Okay. We know there's a lot of sub-categories under hot shutdown, including flow diversion and some of the other things that Bob and others have mentioned.

MR. SULLIVAN: Automation actuation and those kinds of things.

MR. CAMERON: All right. Fred, do you want to give us some examples, and you have the lavalier. Right? All right.

MR. EMERSON: Okay. I told Eric and I told the NRC folks that I'd put up my slides which said where inspection was required. In return, a small price to pay is I would be allowed a few seconds to put up slides where inspection is not required first. That would be not doing the licensees a service if I didn't do that, so I'll go just put those up, just remind you that they're there, remind the NRC that they're there, and then I'll fulfill Eric's wish. They are in the handouts. Thank you.

Okay. I get paid for playing on words, so I call this slide "Areas of Inspection Interest", rather than high consequence scenarios. That's the first one. There's a lot of sub-clauses in that. Single multi-conductor cable containing circuits for components whose simultaneous failure has significant consequences. That means there's two components in that one cable, that if they both fail from a fire, there's significant consequences associated with that. That was my first such slide. That's not a specific example. I have some more specifics in the next slide, so when you want -- is there anything anyone wants to say about that one?

MR. CAMERON: Okay. Good idea. Yeah, Chris.

MR. PRAGMAN: I apologize for putting you on the spot, but would you be able to break down at least a little bit for us why the words that are there are there? Anything that we learned from the test that, you know, led us to word it the way you did?

MR. EMERSON: Yes. What we found out, that failures within a single multi-conductor cable, the likelihood for conductor-to-conductor hot shorts and having multiple conductor-to-conductor hot shorts was considered pretty high, but the likelihood of getting hot shorts between conductors in different cables was much, much lower. We're getting spurious actuations from those hot shorts, so that's why I limited it to a single multi-conductor cable. That would seem to be an area of higher risk, and higher consequence that an inspector could profitably focus on.

Now the second part of that is do you have more than one component in there? In a lot of cases, I'm not a circuit expert, in a lot of cases you have only one component with a multi-conductor cable. Probably not going to happen very often where you have two components whose simultaneous failure will cause significant consequences, so that's why I'm saying this is one area that if you have something like this, it's worth focusing on.

MR. CAMERON: Go ahead, Steve.

MR. NOWLEN: Yeah, in a sense he's offering a caveat on just look at two at a time. If they're all in one cable, you may need to look at more than two. I think that's what this says in the context of what we were saying.

MR. FUHRMEISTER: Yeah. If it's all in one cable anything in that cable is fair game, because you cannot get too fine in your distinction as to what has a hot short and what doesn't.

MR. CAMERON: Okay. Let's go to this gentleman out here. And I want to check in with Roy, see if he has anything to say about it. And following on with what Steve said, is there anything -- is this consistent with where we've been in terms of focusing on consequences and some of these other things we've been talking about? Yes. Could you tell us your name? Oh, you don't. Okay. All right. Do you have anything you want to say about it? It's good. All right. Fred, is there anything in terms of what we've been talking about, consequences, vulnerabilities, credible damage? Is this all pretty consistent with that sort of methodology, so to speak, that we've been developing?

MR. EMERSON: I think so, because if you start from the end of that long stem, you're starting with consequences, and then you start talking about the number of circuits. And then you start talking about where those circuits are, so if you start at the bottom and work your way back to the top, you're starting with very general discussion of consequences, and you're working your way back up to the kinds of risk factors that we were talking about earlier.

MR. CAMERON: Okay. Great. Eric or John, Mark, any questions, any comments?

MR. SULLIVAN: Well, with regard to multi-conductor cables, we know that it's much more likely to have conductor-to-conductor failures within that cable than it is to have a cable-to-cable type failure. That we can agree on.

Suppose I had a situation where I had two multi-conductor cables in a cable tray, and each of those multi-conductor cables controlled one component. And a conductor-to-conductor within each of those multi-conductor cables could cause each of those components to spuriously actuate, as an inspector should I be concerned with that?

MR. CAMERON: Fred.

MR. EMERSON: I guess in terms of what we saw, to answer Ken's question in terms of the test data, we did not see in the EPRI test any cases for thermoset and armored cable where that occurred. I'm not saying it could never happen. I'm just telling you what the test data showed.

MR. NOWLEN: I feel compelled to respond to that one. There were four circuits available, so you didn't see two given four, but in a real case you may have many more of them, so I don't think the NEI tests give a lot of evidence to eliminate possibilities of two concurring.

MR. SULLIVAN: In general then, I should be as an inspector, if the component is controlled by multi-conductor cable, and has multi -- I'm more concerned with -- the basic point is I'm more concerned with conductor-to-conductor within a multi-conductor than I am cable-to-cable. I think that can be --

MR. SULLIVAN: Yes. In fact, I would offer that should be up here. Are we willing

MR. CAMERON:

MR. NOWLEN: That part should be up there.

MR. SULLIVAN: Yeah, for now. You know,

again this is not the end-all be-all answer, but for now would we not be comfortable saying let's focus on what we called intra-cable shorts, shorts within a single cable, and not worry about inter-cable, the shorts between cables? I would offer that up as another criteria for here for in, and not in for now.

MR. NOWLEN: Exactly right. I think conductor -to-conductor within a multi-conductor are much more likely, even without doing testing.

MR. CAMERON: Okay. Let's -- I think we have a comment on that. Yes, sir. Give us your name, please.

MR. WYANT: I'm Frank Wyant, Sandia. I wanted to respond to Steve. I agree with the inter-cable issue not being significant for thermoset, in terms of thermoplastic test data supported the idea that external cable-to-cable interactions could occur.

MR. NOWLEN: Thermoplastic is more likely. Again, I would still ask the question, would we be comfortable for the purposes of getting back in the business, starting with our focus on intra-cable, and thinking about inter-cable for the future? I don't -- maybe thermoplastic you're not comfortable.

MR. EMERSON: I would support what Steve said. It seems much harder to rule out interactions intra-cable than it is cable-to-cable.

MR. NOWLEN: And again, the idea here is to get back into business, focus on what's most important first. It seems to me that's a pretty good kind of -- one thing that indicates more important than not. But again, thermoplastic is a good point. The probabilities for thermoplastic on inter-cable interactions were much higher. It was a somewhat artificial configuration that sort of helped that along, but it is higher for thermoplastic.

MR. SULLIVAN: So we can't rule out thermoplastic right now is the point.

MR. NOWLEN: Again, if you're comfortable --

MR. SULLIVAN: If it's thermoplastic you may be concerned. Inspectors should follow that.

MR. NOWLEN: Well, again I think the question that the group has to answer is where's your threshold of comfort with getting back into business now? Is your threshold high enough to allow you to even say for now we're not going to worry about cable-to-cable, even on thermoplastic? If the threshold is not that high, then we've put thermoplastic back in the mix for cable-to-cable. So again, it's a question of how high is your threshold now versus things we can think about in the future.

MR. CAMERON: When you use the term "inter-cable", that's synonymous with cable-to-cable?

MR. NOWLEN: Yes.

MR. CAMERON: All right. So the suggestion here is at least for thermoset, the focus should be on intra-cable rather than inter, i.e., cable-to-cable.

MR. NOWLEN: Yes.

MR. CAMERON: And thermoplastic may be something that needs to be looked at in more detail.

MR. NOWLEN: Yes.

MR. CAMERON: Okay. Good.

MR. SULLIVAN: I don't know. I think there might be enough evidence in the testing to show that thermoplastics do fail with some level of certainty cable-to-cable.

MR. EMERSON: They fail at a lower temperature. It's not inherently more prone to failure. The same fire will cause a failure sooner in thermoplastic cable than it will in thermoset.

MR. NOWLEN: Yes. But there is also evidence that given failure, the thermoplastics were more likely to have inter-cable interactions sufficient to cause a spurious actuation. I don't remember the exact numbers of how much higher it was. It's still lower than the likelihood of intra-cable hot shorts and spurious actuation, so it's still lower. It's not quite as far down the scale as it is in the case of thermoset material.

MR. CAMERON: Let's go to Bijan, then Mark, and then Eric, and Dennis also has had his card up for a while. Let's go to Bijan, then we'll go over to Dennis and Mark. Bijan.

MR. NAJAFI: I hear when we talk, mostly we talk about thermoset versus thermoplastic; whereas, I thought tray versus conduit showed a bigger difference. At least that's what's in the expert panel report, that the difference -- the numbers drop inter-cable significantly when you go from tray to conduit. But when you have both thermoset and thermoplastic in tray, I don't see much, at least in the expert panel report, I don't see a lot of difference between those two numbers.

MR. NOWLEN: A lot of questions there, but with the conduit, there was conflicting information. Some of the results indicated that conduits were a substantial factor, but when we got the full EPRI report with all the data analysis which came out after the expert panel, it didn't really support that conclusion, so the conduits may not be that different from trays.

The thermoset and thermoplastic with inter-cable shorting, again the EPRI data, and once the full analysis was done, there was a pretty clear difference between those two cases. I'm not sure that it's reflected by the expert panel, because again the expert panel didn't have the full report.

MR. WEISS: Let me jump in. This is a classic case of bin two. You're listening to some of the nation's leading experts, two people from the same national lab, another national lab, people that were present during the testing, that were on the expert panel some of these people. This is a bin two item. If you can't achieve consensus on this, this is definitely a bin two.

MR. CAMERON: And bin two is need further research. Right?

MR. WEISS: Need further consideration, perhaps research.

MR. CAMERON: So we've got one bin two item. All right.

MR. NOWLEN: We've also got a significant concession here.

MR. CAMERON: Great. Thank you, Steve. Dennis.

MR. HENNEKE: All right. Two points. On

the cable-to-cable for thermoplastic, most of the cables that you're going to be looking at are going to have failure modes that are inside the cable itself, so you don't really care whether you have a slightly increased probability, because if it doesn't fail with itself, it will fail with the adjacent cable, so cable-to-cable for 95 percent of the cables is really a no never mind anyway. So dropping it from that standpoint would be not a big deal, so I guess I would reinforce that just inside the cable, or intra-cable is probably the way to go, whether it‘s thermoplastic or thermoset.

MR. CAMERON: Okay.

MR. NOWLEN: The other thing is, on Fred's point here is, the reason this is up here is that the expert panel and the data showed that failures a relatively independent if the cables, if the circuits are not in the same cable. So if you have two valves and they're in the same tray, or they're in adjacent trays or whatever, you can treat those as independent, and you just multiply probabilities to get the overall probability of failure. And we would have liked to have done a thousand tests to prove the independence, but --

MR. EMERSON: No, we wouldn't.

MR. HENNEKE: But we felt fairly confident that cables fail in a kind of a random way, and you're either going to ground, you know, short to ground, or you're going to sort of see the equipment. And depending on the makeup, the spurious operation probably varied based on the cable type. But when the circuits were in the same cable, the independence goes away and there's dependence. So if one occurs, the second one occurring in that cable is very likely, and you can't ignore that, so that's the characteristic that Fred was trying to put up here.

MR. EMERSON: I think we're all in agreement on that point.

MR. CAMERON: Okay. Bijan, did you have anything else to say before we go on to the next example? Did you have your -- okay. Great. Wade.

MR. LARSON: I guess I'm confused on this one point. When we used to do any and all one at a time, now we're doing any -- when we get to this situation are we doing two simultaneous failures?

MR. EMERSON: That means you can't rule out more than one. It means you might just as well have two or three, as one within a single multi-conductor cable.

MR. CAMERON: Did he answer your question?

All right. Fred, do you want to go to another example?

MR. EMERSON: Again, this I think fits into the criteria that we were -- kind of the method that we were talking about earlier. You start with a consideration of consequences. If the spurious -- and again remember, the difference between this and the last slide, is the last slide we were talking about multiples. This one we're talking about singles, so how do you -- what sorts of singles would you focus on?

Well, obviously we're going to start with ones that have high consequence based on our earlier discussion. But then the next two factors that I've listed below there would seem to be, based on the data that we saw on the testing, ways that you could determine that these were high or low risk-significance, as well as high or low consequence. If you were not able to -- if it had high consequences, and if you could not demonstrate, and you could argue over the specific kilowatt levels and the specific number of minutes, but generally if you couldn't demonstrate that the fire was low intensity for a fairly short period of time, then you might have to consider it. And if you didn't have the circuit protected by some sort of current limiting device, so our contention would be if you have high consequences plus these other two factors, you cannot rule out single spurious actuations. The converse of that is if you can demonstrate that the fire is of very short duration, or of low intensity, and does have circuit protection, you might be able to rule it out.

MR. CAMERON: How do people feel about bringing in the probabilities on this one? And, Wade, I know you have a question or comment. We'll get to you. Steve, comment?

MR. NOWLEN: Well, we're -- a couple of comments. We're crossing the line a little bit, because as an entry condition you're not necessarily going to know what your fire threats are. Again, you're working from a PNID, so --

MR. EMERSON: I understand. That's why we start with consequences.

MR. NOWLEN: Right. You're crossing the line. And the other one is on the second one, I don't agree with that criteria, 450 kilowatt fire is a big fire, and I think you have to consider that under some circumstances you can easily have damage in less than 15 minutes.

MR. EMERSON: Just going by the data.

MR. NOWLEN: Well, we could --

MR. EMERSON: We shouldn't be arguing over interpretation.

MR. NOWLEN: But for the record, I object to that second bullet, so we can talk about it.

MR. CAMERON: In the sense that it may not -- 450 kilowatts isn't necessarily insignificant. Is that your objection?

MR. NOWLEN: Yes. I would prefer to see this expressed in a time temperature sort of relationship. If I have a fire that doesn't expose me at above my damage threshold, then I'm okay. But if I've got a 450 kilowatt fire and I'm in the flame zone, you know, your damage time is seconds, so again, I think it -- you know, bringing in the concept that certain fires aren't going to lead you to damage is fine. It's a part of the risk equation.

MR. EMERSON: We could argue over the threshold.

MR. NOWLEN: Yes.

MR. EMERSON: That's probably not what we need to be doing here.

MR. NOWLEN: Agreed.

MR. CAMERON: Let's go to Mark.

MR. SALLEY: Yeah, just to second what Steve is saying. The criteria of 450 kilowatts or 15 minutes, that doesn't add up in fire science. Okay? Just to give you an example, if you take that small enclosure there, put the 450 kilowatts in there versus the sole room with a cable tray at the ceiling, a big different event, so you can't use that as a criteria.

MR. EMERSON: Okay. The point of that is you need -- the data showed that you need a fire, a substantial fire for a substantial period of time, whether it's 15 minutes, or 10 minutes, or 20 minutes, or whatever. There is a threshold that you could possibly -- probably almost everyone would agree on, but maybe that obviously isn't it.

MR. CAMERON: Okay. Chris.

MR. PRAGMAN: All right. Correct me if I'm wrong, but another way to express that might be a time at a particular temperature.

MR. EMERSON: Yeah. I think that's what Mark just said.

MR. SALLEY: Yeah. Just to go on, time at a temperature, or with radiation heat transfer, you look at an incident flux, and either one of those values we could buy into, but this is just --

MR. CAMERON: Okay. There's disagreement perhaps on what the exact conditions should be, but --

MR. EMERSON: But it sounds like there's agreement on the concept.

MR. CAMERON: Right.

MR. EMERSON: The time plays a role in it.

MR. CAMERON: Yeah. Go ahead. Steve.

MR. NOWLEN: Yeah. I wanted to ask about the last bullet, because I remember the CPT was considered a factor of like two.

MR. EMERSON: Well, what we saw with the data was that the CPT gave you much more likely to get a short to ground rather than a hot short, so we felt that that --

MR. NOWLEN: I thought the data said that hot short probability wasn't actually changed, but you couldn't get enough energy across a lot of the faults to energize the device, and so that reduced -- I think the expert panel said it gave it a factor or two, without CPT versus with CPT.

MR. EMERSON: Yes, that's correct.

MR. NOWLEN: A factor of two isn't a lot in risk space.

MR. EMERSON: The net result was that the short to ground was more likely to be the initial failure when you had adequate current limiting devices in the circuit, if you had a failure at all.

MR. SULLIVAN: Do you think the size and the rating of the CPT might affect you?

MR. EMERSON: Sure.

MR. SULLIVAN: Just having a CPT may not --

MR. EMERSON: Yeah, these are very broad criteria. And again, I don't know that we need to go there and argue specifically over voltage and current thresholds, but again, consider it in terms of the concept.

MR. NOWLEN: Yeah. I guess the other thing is to think these are things that you would put in the bin. It doesn't say the converse, you would take out of the bin.

MR. EMERSON: Well, notice I said all of the above. If you had -- if you fail to meet any of those criteria, then I would drop it out of the bin. But again, we can argue over the criteria.

MR. CAMERON: Some might -- if you just focused on consequences, obviously if it didn't meet the second or third bullet, for those people who focus only consequences, it would not drop out of the bin of area of inspection interest. Right?

MR. EMERSON: Yeah. The reason I put those two qualifiers in as second and third bullets were those seemed to be the most obvious cases of something that made a big difference in the overall risk of whether you had a spurious actuation or not. Remember we're talking about spurious actuation, not hot short.

MR. CAMERON: Let's go to -- Wade had a -- are you okay? Bijan.

MR. NAJAFI: One thing I want to point out, that remember we already set some other criterias before this between thermoset and thermoplastic, and trays and conduits, so if this CPT -- I'm sorry, inter-cable and intra-cable, if we're looking at the two wires as an intra-cable already the CPT, the effect is not going to make it negligible because it was high to begin with. But if it's inter-cable, unless we ruled it out already, that number was low to begin with to have CPT, or is going to make it even lower than it was, so I guess to me if we had made that decision between intra-cable and inter-cable then we don't need this, because the effect on the intra-cable basically doesn't support it. It makes it from .3 to .6, or from .6 to .3, from a too high to a high, and from inter-cable was already low and we discarded it anyway.

MR. EMERSON: There might be any number of other plant specific risk factors that could be applied here. These seem to be some of the more obvious ones.

MR. CAMERON: Before we go on, I always like to check in with our inspector. Roy, any comment on this one?

MR. FUHRMEISTER: Actually, I do have a comment. The second criterion, if you just changed that to the cable -- if you can impose the damage threshold on the cable, either radio flux or temperature, that's a lot easier for me as an inspector to determine.

MR. CAMERON: Great. Thank you, Roy. Staff we got that one, that comment? All right. Now are there more areas of inspection interest?

MR. EMERSON: No.

MR. CAMERON: So there's a lot of areas of non-inspection interest.

MR. EMERSON: WE figure Roy can come up with a lot of areas of interest on his own, and he probably doesn't need a whole lot of help.

MR. NOWLEN: Fred, could you go back to the previous slide, your last areas where inspection is not required? Now you've got multiple high impedance --

MR. EMERSON: Oh, you want to see not required.

MR. NOWLEN: Yeah. Well, I think this is one where consensus is developing, and I'm just wondering whether it's true or not. It's got two items on it, multiple high impedance faults and open circuits as an initial fire induced failure mode.

MR. EMERSON: All right. That's the first one.

MR. NOWLEN: No, the third one.

MR. EMERSON: Oh, the third one.

MR. CAMERON: And I think we can go through these systematically too.

MR. NOWLEN: Well, this is one -- my sense is that there is a consensus on both of these items. Can we get that expressed now and take these two off the table?

MR. CAMERON: Do you need to say anything about them to describe them so that people understand, or is this very clear to everyone? Is anybody -- I guess does anybody disagree that these should be taken off the table?

MR. NAJAFI: I just wanted to second that, and I agree that these could be taken off the table.

MR. CAMERON: All right. Thank you. Ken.

MR. SULLIVAN: I would agree that these could be taken off the table, with the exception of multiple high impedance faults. If the failure could have a significant consequence, loss of power supply could have significant consequence on your shutdown capability. By that I mean if it's powering equipment that's needed immediately for hot shutdown, you may need to consider that.

MR. NOWLEN: Well, let me rephrase it then. In the short term goal of getting back in the inspection business, with this not being the final answer for all time, can we temporarily take it off the table?

MR. EMERSON: WE could put it in bin two.

MR. NOWLEN: Put it in bin two, exactly.

MR. CAMERON: Anybody want to -- I don't know if Liz and Kiang want to say anything about this. Do you want to -- no.

MR. CAMERON: All right. It seems that a number of people think this can just be taken off the table all together, or at most, some people think that the MHIF should be in bin two for further research, some type of action in the future. Okay. Now it seems that there's agreement on that. And, Roy, I love this. I can just keep picking on you after each one of these things. Do you have any concerns about that? All right. No is the answer from our inspection staff. How about other -- I mean Eric has said -- do you want to go through the rest of these areas where inspection is not required?

MR. WEISS: If you've got time.

MR. CAMERON: Sure. Let's do it.

MR. WEISS: When are we quitting?

MR. CAMERON: I think that our goal is to aim for 4:45, unless someone wants to -- has a big urge to stay longer. But if we do have business to conduct we'll stay longer, but the goal is 4:45.

MR. EMERSON: Now I can either put up that general slide with a lot of clauses in it, or I can put up this slide which has a lot of specific examples. Which one would you rather dig into?

MR. CAMERON: Is the first one, the previous one the -- it covers all of those specific?

MR. EMERSON: This one is multiples.

MR. CAMERON: Okay.

MR. EMERSON: This one is singles. Which one do you want to talk about first?

MR. CAMERON: All right. Singles.

MR. NOWLEN: I think we already talked about the first one. You want to recap that?

MR. CAMERON: Okay. There's some debate about the temperature used, the time needs to be factored in, the amount of space.

MR. SALLEY: If we gave you that in say a temperature around the cable, or an incident heat flux, wouldn't that be good, and duration?

MR. CAMERON: Anybody have an answer for Mark on that? He's suggesting reframing that in a different way.

MR. EMERSON: I think it needs to be reframed in a way that the inspector can answer easily. He may not have access to heat flux. I don't know. Roy, you have to decide what kind of information you need to rule on that kind of a threshold.

MR. LARSON: The utility is going to have to provide it in order to make that inspector --

MR. NOWLEN: The inspector needs --

MR. SALLEY: One of the other projects that we have is some fire dynamics that we work with the inspectors, which we're going to make publicly available here in about two months for the industry to comment on, so that's a very easy way to do a calculation for hot gas layer and incident heat flux, so that would work in with this.

MR. CAMERON: Okay. So that is an area of probably bin two, further research, to be evaluated in light of what you guys are going to come up with. All right. Armored cable with fuses.

MR. EMERSON: I'd defer to a Double E to explain exactly why that's on there, but that was a conclusion from the testing.

MR. CAMERON: Any comment on that? Go ahead, Dennis.

MR. HENNEKE: Since I'm the armored guy, actually in the previous slide there was a multiple of thermoset and armored, and I don't think you guys would agree with the multiple thermoset because that's what you're asking the inspectors to look at. But the multiple armored would kind of encompass, a single armor would fuse. I mean, our criteria again was 10 to the minus 2 here for throwing it off the table, so -- and multiple, or armored with fuses was a .0075, so it's 7.5 ten to the minus three, and multiple armored was a minimum of about 10 to the minus 3 so I think, you know, from an armored cable standpoint we'd be happy just to get multiple armored, and that's justified by the data.

MR. CAMERON: Okay. Any other comments? John.

MR. HANNON: Dennis, just for clarification, the numbers that you just cited, the threshold for taking it off the table, what was that in terms of?

MR. HENNEKE: Just the probability of spurious operation. And, you know, there's no criteria, but when you throw it into the fire model, and Steve and I had talked about that before. And the probability of it -- you know, frequency of a damaging fire, and manual suppression, and severity factors and all that, that at that point, spurious operations becomes a no never mind. And it also is much more reliable than your alternate shutdown, or your safe shutdown, because your safe shutdown is already at 10 to minus 1, 10 to minus 2 system, so at that point it becomes unimportant.

MR. CAMERON: Let's go to Steve.

MR. NOWLEN: I'd suggest that this might be another bin two item, that for now we should be able to take it off the table. Multiples were -- involving multiple armored cable. I think, you know, that the amount of test data that we got on armored cables was fairly limited. There were just two tests with eight circuits basically, so it's still a little fuzzy, but I think for now I'd be comfortable putting this in bin two, the way Dennis has phrased it.

MR. CAMERON: Bijan.

MR. NAJAFI: If I remember correctly, the cable-to-cable went into bin two, as well, or went into bin three?

MR. CAMERON: Cable-to-cable for thermoset is in bin three, I think, but cable-to-cable for thermoplastic is in bin two.

MR. NAJAFI: If the cable-to-cable for thermoset is in bin three, why armored cable to armored cable is in bin two?

MR. NOWLEN: No, that's not --

MR. NAJAFI: It's intra-cable for an armored cable.

MR. EMERSON: It's a single spurious.

MR. NAJAFI: Single.

MR. NOWLEN: Well, we were talking about multiples. Do we have to consider a thousand series that are in separate cables opening, and I would argue that if it's an armored cable in both cases, then for now we're probably okay putting that in bin two for future evaluation.

MR. NAJAFI: Separate components?

MR. NOWLEN: Two separate components. Yes, we had put twosies on the table.

MR. CAMERON: Okay. Fire temperatures for various types of cable.

MR. EMERSON: That came straight out of the expert panel, the fragility curves where they postulated almost zero chance of cable failures below those temperatures.

MR. CAMERON: Mark.

MR. SALLEY: Yeah, just looking at the first one, you've got the energy in kilowatts, and this fourth one you have temperature and degrees Fahrenheit. Once again, I think we can marry those two together, make it much simpler, keep the units in this temperature for this.

MR. EMERSON: Well, the reason I differentiated them was because again, the fourth bullet is stated very explicitly on one graph in the experts panel report. There's really no question about it. The other one -- the first one of the threshold involves time as well as temperature, and one thing that was very obvious to me in watching the testing was the time, especially with thermoset cable, plays a significant role in the likelihood that you'd get a spurious actuation, because you'll likely have enough time to mitigate or to take care of the fire before it gets to the point where you'd get a spurious actuation, so the two really are separate.

MR. SALLEY: Well, they're separate, but the thing -- in your fourth bullet, you're below the activation temperature for the types of cables for them to have damage. Once again though for the, you know, servicing Roy here, as the customer that has to do the analysis, if I can give him everything in temperature it would be easier for him to work it out, rather than flipping back and forth, so I think we can combine the two. I mean, the fourth bullet is an entry statement. If you can't get a fire that's hotter than 680 degrees Fahrenheit in the ceiling, then you're wasting everybody's time. And we do that today in SDP space, so that's nothing new for us.

MR. CAMERON: Okay. Dennis, did you have a comment on this? Okay. Wade, and then we'll go to Kiang. Wade.

MR. LARSON: What's the role that the fire brigade is assumed to play in this kind of a slide when you've got times and temperatures?

MR. EMERSON: Well, that was the reason why we wanted to bring the time factor in, was to give the -- because if the time frame is long enough, that the fire brigade or automatic suppression can reliably put out the fire, there appears to be enough time for that to happen, so that's why I wanted to make sure the time factor was explicitly included in a reasonable way.

MR. CAMERON: Okay. Let's go to Kiang.

MR. ZEE: Actually, I have a question. I apologize, but back on the third bullet. For thermoplastic in conduit -- discussing that?

MR. EMERSON: I don't know that we got to that level of detail. We talked about thermoplastic.

MR. ZEE: I know we talked about thermoplastic cable-to-cable and conductor-to-conductor --

THE COURT REPORTER: Please use the microphone.

MR. ZEE: I'll try talking louder. But I guess when you get back to the third bullet, this whole notion of cable-to-cable hot shorts on armored, so forth, it would seem like -- well, conduits ought to be considered. If it's effectively the same function as the armoring on the cable for cable-to-cable.

MR. NOWLEN: Yeah. Let me take a shot at that. I would agree if the cables are not co-located in the conduit. You've got two cables within a single conduit.

MR. ZEE: Oh, agreed. This is presuming the source, the power sources are on the other side of the metallic boundary.

MR. NOWLEN: Oh, absolutely. Then I don't think anyone -- again, it's physically impossible to do that without going through ground.

MR. ZEE: Right. That's all I was saying.

MR. CAMERON: Okay. So that's clear?

MR. NOWLEN: Yeah. I think the point, if I can paraphrase it, is that cable-to-cable involving cables where one is inside of a conduit, and the second cable is not co-located in that same conduit are bin three, physically impossible without going through ground.

MR. CAMERON: Okay. Thank you. Let's keep moving on this, because you have another slide, don't you?

MR. EMERSON: Yes.

MR. CAMERON: Okay. How about the three phase hot shorts? Any problems with that being in bin three?

MR. EMERSON: Except for high/low pressure interface.

MR. CAMERON: Except for high/low. WE have a comment from Kiang on that.

MR. ZEE: Well, I guess I'm kind of struggling with this, I guess with three phase needing all the phases to come together in the right sequence in the absence of touching ground or any of the other phases. I'm struggling a little bit even for high/low pressure.

MR. EMERSON: And that was our reason for putting it on there. There's no point-- physically what has to happen, there is no difference between high/low pressure interfaces and others.

MR. ZEE: Right. I mean in general for the high/low pressure interface, I almost by definition have redundant valves that are already close. I'm already forcing one of them to go open by some other means.

MR. EMERSON: The difference is consequences.

MR. ZEE: Right.

MR. EMERSON: So if consequences has a high value in deciding what the inspector is going to look at, it would be difficult to throw that out. If what you're considering is the actual risk that this will happen, there's no difference between that and any other three phase hot short.

MR. ZEE: I guess what I'm getting at is the three phase hot short takes out one of my boundary valves. I mean, are we making the statement -- I guess, Ken, you're saying we should keep them in for high/low pressure interface.

MR. SULLIVAN: The reason that guidance is out there is because the consequences are unacceptable. That's why the guidance was developed.

MR. NOWLEN: Yeah. This is a case where you run into conflict between really adverse consequences versus potentially a very low likelihood event. I can say that from the requalification study perspective, we are not considering these. WE have not included them. We generally think they're low risk, but again, the consequences that, you know, the consequence piece is big.

MR. SULLIVAN: It's one of those areas that's very low risk potential probability, and a very high consequence.

MR. CAMERON: Okay. So here's one of those examples.

MR. SULLIVAN: So in lieu of protecting the cables, what the Commission has determined is that these consequences are unacceptable. And if you're not going to protect them, you have to show that these types of faults, given their very low probability, will not impact safety, cause them to occur.

MR. CAMERON: Eric, why don't you go ahead, and then we'll go to the rest.

MR. WEISS: Well, I understand what Ken is saying. My perspective on this though is that we're not here to really revisit licensing basis. We're here to sort of see as engineers, as experts, do we think this is bin one, bin two, or bin three? And I sort of heard like an argument that it's bin two, bin three, and an argument that it's bin one. And I wish I'd get a sense of the audience. I have a sense from over there that it's a bin three.

MR. CAMERON: Let's go to Bijan and Chris, and see if we could get that sense.

MR. NAJAFI: When you started, I thought you answered my question. That's why I turned my card, but at the end, I think you -- if you're looking at it from a risk-significance spectrum, definitely my opinion is bin three, because it's true that the consequence is high, but the frequency is demonstrated being so low that I believe the combination will justify the bin three.

However, my question was that how does it fit into the current practice of the Appendix R? I'm not an Appendix R person, but I thought that is within the bounds of analysis that most Appendix Rs have looked at, high/low pressure interface for three phase hot short. Maybe not, but --

MR. WEISS: WE're not going to the licensing basis issue.

MR. NAJAFI: Then I agree it's three.

MR. CAMERON: I've got to pull this out now. Okay. Thank you, Bijan, and John, and Dan.

MR. NAJAFI: I guess my point was, to answer your question, I believe it's bin three.

MR. CAMERON: Right. Chris.

MR. PRAGMAN: Bin three. Several years ago the NRC actually asked the BWR Owners Group is there any additional light we can shed on the specific question of whether three phase should be in or out of the regulatory context based on new insights we have today on risk that we didn't have back when 610 added this guidance, and so that's made its way into the NEI-001 appendix. And we think that's -- what we tried to do in there is provide some probabilistic information that may suggest that this particular bullet could be excluded even for high/low pressure interfaces, and hope some day maybe that when NEI-001 gets through the life cycle it's on, then Staff will accept that for licensing basis situations. But I think the data is there now to say that the risk, just from a purely risk-based decision it belongs in bin three.

MR. CAMERON: Eric, does that give you a better sense?

MR. WEISS: Yeah. I'm glad that I asked the question. I got a better sense of the audience.

MR. CAMERON: Right. How about DC motor?

MR. EMERSON: I'm going to have a hard time explaining the electrical data and electrical engineering terms so I'm going to defer to someone.

MR. PRAGMAN: I'll take it, Fred. This was similar to the previous bullet. The Staff asked us several years ago as the Owners Group, would you handle a 250 volt DC motor any differently than you would handle a three phase AC motor operated valve? And when you actually look at the way they're wired, it takes even more hot shorts of the proper polarity to make a 250 volt DC MOV change state, than it does to make a three phase AC MOV change state. So any justification that you may accept for the AC three phase MOV would surely apply to the DC MOV as well, since it takes even more hot shorts to make the thing move.

MR. WEISS: Why is that? I'm curious. There's three conductors going to the three phase AC motor. There's two conductors going to --

MR. PRAGMAN: No. It's a 250 volt motor.

It's reversing motors so you have a shunt and a field, so you actually need five separate conductors to be energized for the valve to move.

MR. CAMERON: Kiang, do you have something that you wanted to add on that?

MR. ZEE: Yeah. I'm just going to chime in and agree. I mean, you could probably conceive a way where if you put the right polarity on four to five conductors, you can get the valve to do something if you are missing some of the field strength. And for the regular DC motors, you still have the shunt field that's going to come back, where at least a regular DC motor you're back to three. For valves you have five conductors, but like I said, you might be able to conceive a way if you get the right polarity for the conductor, and it has to be in the right sequence. Otherwise, it doesn't work.

MR. CAMERON: Okay. Let's go to Sandia.

MR. WYANT: AC motors versus DC motor situation is kind of tricky. Granted going to the motor itself you do have a number of conductors, but it's an integral part of the control system, so you may only need, depending on the whole system setup, you may only need one single smart polarity short, positive to positive, negative to negative at the right spot in the control circuitry. So that probability we feel is sufficiently high enough to include it as a regular component of investigation for the requantification study.

MR. EMERSON: And I wasn't trying to suggest that this is specifically the cables from the motor control center out to the valve operator that make it move, and maybe we could add some more words to that bullet to make that part clear. That's what the NEI-001 appendix specifically is talking about.

MR. CAMERON: So you just need to be more precise on what you meant by that, and it seems like there's an agreement that that's in bin three. How about the last --

MR. NOWLEN: I don't think there was agreement that it's in bin three.

MR. CAMERON: Okay.

MR. NOWLEN: I'd want to see the clarification.

MR. CAMERON: Right.

MR. NOWLEN: It may -- with that caveat --

MR. CAMERON: Okay. Last bullet on AOVs and PORVs.

MR. EMERSON: One of the things that we saw during the test was that typically, not always but typically the -- the duration of a spurious actuation was one of the things that we took data on during the tests, and typically those were on the order of a minute or so. Sometimes they were much, much less, just a very few cases they were more than that. For AOVs and PORVs once you remove the power, once the valve will return to the safe position once the power is removed. If the duration of the spurious actuation is short, and then it shorts and the power is removed, then it will go back to its desired position, so we figured that -- we felt that given the shortness of the duration, we could take these -- we could put these in bin three. That's not true for MOVs which stay in the undesired state once they're activated.

MR. CAMERON: We have one comment out here.

MR. PELLIZZARI: Is that statement inclusive of high/low pressure interface valves?

MR. PRAGMAN: It says PORV so yes, it is.

MR. EMERSON: Well, it depends on whether you consider a PORV a high/low pressure interface.

MR. PELLIZZARI: There's plants where if a PORV stays open for a minute, they're approaching unrecoverable condition. Does your study include the application of suppressants and its effects?

MR. EMERSON: I'm sorry. Your microphone --

MR. PELLIZZARI: Does your study consider the application of suppressants with respect to duration or sustaining hot shorts keeping the valve energized?

MR. EMERSON: No. The -- just took into account how long a spurious actuation lasted independent of any suppression.

MR. CAMERON: Steve.

MR. NOWLEN: Yeah. What happened in the tests were all of the faults that were observed eventually cleared when conductors shorted to ground and blew out the control. Eventually, yeah. And I think the longest that was observed in those tests was 13 minutes.

MR. EMERSON: I think it was 8, but there were some that were a few seconds, and I think there was one that was as long as 8 minutes, most of them were on the order of a minute or so.

MR. NOWLEN: Well, my recall was there were at least a couple that were more than 10 minutes, but regardless, all of them eventually did clear, so the question is timing. And that would be my comment here, is that there ought to be some consideration of timing available. You know, I believe the averages were about 2 minutes, so for your plant, I mean maybe we need to be out at the 95 percent confidence limit, which brings us out to that 8, 10 minute time. And if you can show that that's adequate, that doesn't get you to the situation. And perhaps it's off the table, so I think the idea is appropriate, but there should be a timing factor, some verification of the time.

MR. CAMERON: Okay. Let's hear one more comment here, and I think Roy has a comment on this.

MR. FUHRMEISTER: This last bullet where the power operated relief valve is going to be very much plant dependent. WE have a facility in Region One that recently reported that if the first indication of fire damage is the power operated relief valve going open, they're going to have a steam bubble in the vessel within two minutes, so if it clears in 8 to 10 minutes, it's not going to make it.

MR. EMERSON: Understand.

MR. CAMERON: Okay. Thank you, Roy. Dennis.

MR. HENNEKE: Yeah. I mean, we're looking at it from a risk-based, having a steam bubble is not core damage, and that's kind of what we were trying to differentiate. WE're going to lose subcooling - there's no question - from a PORV being open just a short amount of time, but it takes quite a bit of time and the thermohydraulics for our plant showed 20 to 30 minutes that it would actually cause core damage. And that's all dependent on the time on ejection and so on, but it would take a substantial amount of time. And once it went reclosed, you would still have subcooling issues, but you would not have core damage, and that's kind of the point. So if you identified it, and it went down SDP space, and we showed it going back closed, then it would show low risk. I don't want to waste the time looking at low risk issues just because you lose your subcooling.

MR. CAMERON: Okay. We need to do a couple of things here. One is we'll hear Bijan on this issue. There's another area of low interest, and I think we need to try to sum up. I want to give both Eric and Bijan for some final words. And, Bijan, on this issue.

MR. NAJAFI: I just wanted to point out that if a time is added to that, and a time frame of 8 to 10 minutes is something that can be lived with, then it's appropriate to use. Otherwise, the numbers were not the same - correct me if I'm wrong - for thermoset and thermoplastic, that there were a smaller number. But this -- I guess part of this question is, was it dependent -- was it a different number at the time for thermoset and thermoplastic, because I thought that --

MR. NOWLEN: Yeah. Actually, I've got the table. The average for thermoset was 1.7 minutes. The average for thermoplastic was 2.8. Thermoplastic tended to be a little longer. The maximum for thermoset was 11.3. The maximum for thermoplastic was 10.1 minutes.

MR. NAJAFI: See, that's what I'm saying, that if we can live with the 10 minutes, then it doesn't matter whether it was thermoset or thermoplastic. If you can't live with 10 minutes, then you may want to distinguish between the two at lower times.

MR. CAMERON: Okay. It seems like some clarifications, I guess, need to be made on that, taking into account Roy's comment. Do you have one more general one on --

MR. EMERSON: Well, I had this one last one. Areas where inspection is not required for multiples. Shouldn't have to consider for thermoset or armored cable if you -- if each one has a single device within the multi-conductor cable, and you have CPTs.

MR. CAMERON: Any comments on that one? Yeah, Bob.

MR. KALANTARI: I guess it's not clear to me, we are saying multiple spurious, then we reference single component, so I'm really confused with this one.

MR. EMERSON: Okay. What that means is unless the -- if you have -- if you're considering -- let me go back just a second.

MR. ZEE: Fred, let me offer up an example. I think what this is not intended to address is your classical control cable, MCC control room where one could postulate a conductor-to-conductor short between two conductors causes spurious actuation. I think what Fred is getting at is because circuit wire configuration require two conductions to come together, and then another short, conductor-to-conduct short within that same table bundle, spurious actuation.

MR. EMERSON: Yeah. If you limit it to a single component within the cable, then you need cable-to-cable interactions to get multiples.

MR. KALANTARI: So it's multiple cable failures causing a single spurious actuation.

MR. EMERSON: Cable-to-cable interactions causing multiple --

MR. KALANTARI: So that multiple spurious actuation is -- I think that spurious actuation --

MR. EMERSON: I think it could be better worded.

MR. CAMERON: Okay. Thank you, Bob, for pointing that out. Are there -- I guess we're getting pretty close to the time. I want to make sure that Eric and John, anything that they have to say about this. We -- I haven't kept track of what has been placed in bin three, bin two, and bin one, but we do have a record on the transcript. Eric, John, anything that you want to say before we adjourn? And we'll ask if anybody else has any burning issue. Thank you, Fred.

MR. WEISS: Well, I definitely want to thank everyone for coming. This more than met my expectations. This is going to be of great assistance to us in trying to develop inspector guidance, and take a problem that has been with us for a very long time and move forward. Admittedly, we set a rather defined and narrow goal for this meeting, but I think we've achieved it, and it was a very important goal.

The other thing I wanted to say is that we're going to put all of the slides and the transcript, once we get it, on our website. I'd encourage everybody to go to the NRC's website and look for fire protection. We have a fire protection website with lots of good information on it. Tonya Mensa keeps it up for us, and as soon as we get all of this stuff put together, we'll have it on the website for your reference. And I just can't say how grateful I am, and I think the public, the industry and the NRC, we're all very well served by this meeting. Thank you.

MR. HANNON: I'd just like to second Eric's comments, and also thank Roy Fuhrmeister for bearing with us. WE put you on the spot to represent the region inspection staff, Roy, and I think you did a great job. Thank you very much.

MR. CAMERON: Great, Any other comments, perspectives before we close? Yeah, Fred.

MR. EMERSON: I think this was a good first interaction. I would hope it isn't the last one before the inspection guidance appears.

MR. HANNON: Yes, I plan to start an initiative next week to put together a draft inspection guide, and I would hope to make that available for NEI and stakeholders to see probably within the next couple of months.

MR. EMERSON: Thank you.

MR. CAMERON: Great. Well, thank all of you for coming in. Some of you had quite a bit of aggravation. Bob, go ahead.

MR. KALANTARI: I came to this workshop expecting that there would be discussions about the newly developed document, a draft by this NRC Guidance Document and NEI-001 Draft D document, at least discuss the major differences, and come to a conclusion and understanding of where we're going. 1997, 2003, and six years later, believe it or not, we are involved with doing the Unit I Appendix R analysis as we speak. And this is eight years later. They are asking us how to do this, or people sitting here is wondering how we should address certain things that has been the subject in the industry.

I did not get that from this meeting. I'm glad that NRC got what they were looking for, but there was no discussion on this document. A lot of effort went into this document, same thing with NEI. There are some fundamental differences, and I'd like to know when these would be addressed, so we can tell our clients, or we know what to do, because when Roy shows up, I want to match his expectation, and I don't think that's clear yet.

MR. CAMERON: A simple answer perhaps on relationship between the NUREG and NEI-001, when they might be finalized? I know that Fred pointed out that there was a lot of uses that they saw for 001, and that Guidance to the Inspection which was the focus of this meeting is only one of them. Eric, I don't know if you want to talk to future interactions on these documents so that Bob can tell his clients what's going on?

MR. WEISS: Well, I wish I had an answer for him that would say that we're going to come to quick closure on these items. AS I mentioned in my speech - I'm sorry Fred wasn't here to hear me - but we're considering endorsing NEI-001 in a regulatory guide. Regulatory guides take a while to get out, generally about a year to draft, and a year to final. And we haven't started yet, and that process would involve us probably taking exception to certain things that we didn't agree with. But before we can even begin that process, we have to have a final document to endorse. I can't start a Reg Guide to endorse a document that is in Draft D and is not final, but we have every intention of bringing these issues to closure. It's just that we have to take it one step at a time.

MR. CAMERON: So the first thing we need is a final NEI document. And, Fred, I don't know if you have any time frame on that.

MR. EMERSON: Yeah. I had a slide up earlier that said we were looking at a couple of months to get a final out.

MR. CAMERON: All right.

MR. HANNON: Just let me comment on our NUREG. It's our intent for that NUREG document to be a historical record of past practice, identify the definitions that we had been using in the past. And it stands by itself, stands alone as a snapshot of where we were when it was written. Now we expect to move on from there with NEI-001, so in the future when we're in the position to endorse the NEI document in a Reg Guide that will establish our future practice.

MR. CAMERON: Okay. Thank you, John. I guess with that we're adjourned. Thank all of you. Have a safe trip home.

(Off the record 4:44:53 p.m.)