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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

508th MEETING, DAY 2

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THURSDAY, DECEMBER 4, 2003

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ROCKVILLE, MARYLAND

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

COMMITTEE MEMBERS:

MARIO V. BONACA, Chairman

GRAHAM B. WALLIS, Vice Chairman

GEORGE E. APOSTOLAKIS, Member

THOMAS S. KRESS, Member

GRAHAM M. LEITCH, Member

DANA A. POWERS, Member

VICTOR H. RANSOM, Member

STEPHEN L. ROSEN, Member

WILLIAM J. SHACK, Member

JOHN D. SIEBER, Member

ACRS STAFF PRESENT:

JOHN T. LARKINS, Director

SHER BAHADUR, Associate Director

RALPH CARUSO, Senior Staff Engineer

SAM DURAISWAMY, Technical Assistant

MEDHAT EL-ZEFTAWY, ACRS Staff

HOWARD J. LARSON, Special Assistant

MICHAEL SNODDERLY, Senior Staff Engineer

MARVIN D. SYKES, ACRS Staff

MAGGALEAN W. WESTON, Senior Staff Engineer

ALSO PRESENT:

MARY ANN M. ASHLEY, NRR

SUZANNE BLACK, NRR

JOE BIRMINGHAM, NRR

JAMES BONGARRA, NRR

SUSAN COOPER, RES

JOHN HANNON, NRR

PAUL LAIN, NRR

PAUL LEWIS, RES

GARETH PARRY, RES

J. PERSENSKY, RES

STUART RICHARDS, NRR

JOSEPH SEBROSKY, NRR

I-N-D-E-X

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

(8:30 a.m.)

CHAIRMAN BONACA: Good morning. The meeting will now come to order. This is the second day of the 508th meeting of the Advisory Committee on Reactor Safeguards.

During today's meeting the committee will consider the following: draft final 10 CFR Part 52 Construction Inspection Program framework; proposed revisions to the SRP Chapter 18, Human Factors Engineering; draft final revision to 10 CFR 50.48 to endorse NFPA 805 Fire Protection Standard; recent operating events; and proposed ACRS reports.

A portion of this meeting will be closed to discuss a proposed report on safeguards and security.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Mr. Sam Duraiswamy is the Designated Federal Official for the initial portion of the meeting.

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

A transcript of portions of the meeting is

being kept, and it is requested that the speakers use one of the microphones, identify themselves, and speak with sufficient clarity and volume so that they can be readily heard.

Before we move to the first presentation, I would like to point your attention to this document, Items of Interest. There are a number of speeches -- actually, two -- from Chairman Diaz, some issues on operating plants, and in the back you have the NRC Strategic Plan 2004-2009. There is a copy of it, and that's an interesting one to familiarize yourself with.

I have an announcement also to make, which is Ms. Carol Ann Rowe, who has been with ACRS for 32 years, is retiring on January 2, 2004. Her dedication, hard work, professionalism, and attention to details have been much appreciated by the ACRS Executive Director, the ACRS/ACNW staff, and the ACRS members.

We would like to thank her for her contribution to the ACRS and wish her good luck in her future endeavors.

MS. ROWE: Thank you.

CHAIRMAN BONACA: Thank you.

(Applause.)

And we will have a celebration for her tomorrow.

I have another announcement. Mr. Noble Green has joined the ACRS/ACNW staff as of December 1, 2003. He will be Secretary to the Executive Director effective January 5, 2003. Prior to joining the ACRS/ACNW office, Mr. Green was Secretary to Commissioner Dicus.

Throughout the month of December, Carol Ann Rowe will be working with Mr. Green to ensure a smooth transition.

Welcome aboard.

MR. GREEN: Thank you.

(Applause.)

CHAIRMAN BONACA: With that, we are through with the announcements and introductions. And so we move to the first item on the agenda, which is Draft Final 10 CFR Part 52 Construction Inspection Program Framework, and Dr. Kress will introduce the presenters.

MEMBER KRESS: Thank you, Mr. Chairman.

I remind the members that the background information for this can be found under Tab 5 of your notebook, in case you want to refresh your memory.

This is about a framework. That's a key

word in this. And it's a framework on which to base development of inspection manuals, inspection manual chapters, related to what you do mostly about finalizing the certification and COL process. It requires an inspection program, and this is the basis on which that inspection program will be developed.

So, and I also remind you that this is a joint endeavor by Steve Rosen and myself. We work on this -- we worked on this issue together, so, you know, I'm just leading off is all.

So with that as almost a non-introduction, I'd like to turn it over to staff. And I'm not sure whether we start with Ann or with someone over here or --

MS. ASHLEY: No. I have the lead for this.

MEMBER KRESS: You have the lead. So we'll start with Ann. Could you introduce yourself, because I think this is the first time we've seen you here.

MS. ASHLEY: My name is Mary Ann Ashley, and I'm the team leader for the Construction Inspection Program development.

The purpose of my presentation to you today is twofold -- one, to provide information on the

development of this program, and secondly to obtain any insights you might have on where we may have missed something, and generally about our overall approach.

In the audience today I have a number of members of the team who are -- have been on this project for much longer than I have. And the most important part of this is to note that we have individuals, not only from the regions but also from headquarters, who are supporting this effort.

We have a number of years of construction inspection experience. We have individuals from the New Reactor Licensing Group. We have individuals from the Organizational Effectiveness Branch in NRR. We have folks from the Inspection Program Branch.

We also have a diverse Steering Committee. Charles Casto from Region II, who is the Division Director in the Division of Reactor Safety. We have Stu Richards, who is a Branch Chief and my boss from the Inspection Program Branch in NRR. We have Jim Lyons who is the Program Director for new research and test reactors.

So this is a combined effort, has a wide variety of staff expertise involved with it, and we believe that will be key to the overall success of

this.

As I've indicated, the development uses a team approach with regional and Steering Committee members. And also, the most important point here I'd like to stress is it builds on work that was begun in 1996.

One of the issues that came up in previous construction was the need to have an understanding of where things worked well and did not work well in previous construction inspection programs. And in 1996, a document was drafted that identified what the lessons learned were from the construction of Seabrook, Comanche Peak, South Texas, Watts Bar, and Bellefonte.

Several of the lessons included ensuring that inspection programs are properly completed. We found ourselves in many cases having to go back, searching through paper records, inspection reports, doing word searches, to ensure that we had, in fact, completed all we said was necessary in the construction inspection.

The second lesson was that we needed to have a plan for the transition from construction inspection to operations inspection well in advance of that point. A third was that we needed to be prepared

as an agency to address late-filed allegations.

Inspectors also needed to be able to have a simple method for recording inspection results. And last but not least, we needed to ensure that inspection requirements were made as objective as possible.

MEMBER LEITCH: Mary Ann, just help me. With the scope of the program, we're talking here about new construction, obviously. But is there ever a time when this program would cut in for repairs or modifications to existing plants?

For example, we heard of a plant recently that is planning to replace I think it was steam generators, pressurizer, and reactor head in one huge outage next year or the year after. I forget exactly when. Might this program be involved in that kind of an activity, or is it only brand-new construction?

MS. ASHLEY: The overall approach to construction under Part 52 licensing requires a different template for inspection. But when you get down to the last point here, the inspection procedures, they may be common to both.

Joe Sebrosky, do you have any insights?

MR. SEBROSKY: Yes. The only thing that I would add to that is this framework document is very

specific for new construction, if you look at the way the manual chapters are set up.

MEMBER LEITCH: Right.

MR. SEBROSKY: There has been some discussion as the prospects of new construction come forward that we may be able to use lessons learned from activities such as you just mentioned -- MOX fuel fabrication facilities, construction -- to help to update our inspection procedures.

So it's more us getting lessons learned from the construction activities that are taking place today to inform this. It is not -- this document is not meant to go the other way.

MEMBER LEITCH: Yes, okay. Okay. Thank you.

MS. ASHLEY: Stu, did you have something also to add?

MR. RICHARDS: I'm Stu Richards. I'm the Chief of the Inspection Program Branch. And I guess the straight answer is, no, that the modifications you were talking about are covered under the Operating Reactor Inspection Program and not this program, although, you know, we do share lessons learned.

MEMBER LEITCH: Sure. Okay. Thank you.

MS. ASHLEY: Okay. Continuing on, the

program overview for the overall inspection program has a hierarchy of documents, one being a framework document, which will establish the rules going in about how we're going to use the various inspection manual chapters and inspection procedures.

We see the framework document as an opportunity for public involvement and discussion, and when it is done will provide general guidance and general assumptions that we've made for the development of the subsequent manual chapters and inspection procedures.

We did have an industry workshop to discuss the framework document in August. We have also had a public comment period to provide opportunities for the public to send in written comments about the document.

We anticipate that the final document will be issued in March or April of next year, once we've resolved all of the outstanding comments.

I want to stress that this is a work in progress. We have not yet resolved all of the issues, and we recognize that the nature of this document, and the fact that it pulls from other aspects of the construction program, may result in us not being able to resolve every issue.

For example, the applicability of Part 21 to applicants is a point of discussion. That's not necessarily an integral part of how you inspect, but it also is an important aspect of the program that will need to be ultimately resolved. So --

MEMBER POWERS: In your introduction you mentioned several challenges that you wanted to address as you went through and prepared this document. Not the only one, but certainly one of them, was late-arising challenges and contentions, and things like that, and the ease of recordkeeping and what not.

Could you discuss with us just a little bit on how you viewed the rather major revolutions that have occurred in electronic methods of recordkeeping? And I'm thinking not only of entry into computers but the ability of -- to carry around digital cameras and things like that, and how that is factored into your program.

MS. ASHLEY: In general, what we have identified is a need to have an electronic recordkeeping system that will combine not only NRC inspection information but also will tie that information to the applicable ITAAC, which is an integral part of the Part 52 licensing.

And I have further discussion that I plan on going through in one slide I think it is.

MEMBER POWERS: That's fine. I can wait.

MS. ASHLEY: Okay. Thank you.

MEMBER ROSEN: Are you also thinking about the new challenges for inspection of these new generation of plants which will have equipment in them that is different than -- very different than existing plants, particularly digital instrumentation, multiplexers, data highways, sometimes with safety-related functions. All of that will be new challenges for the staff inspection program.

MEMBER KRESS: I think those will show up in the new plant ITAACs.

MS. ASHLEY: That's correct. That's correct.

MEMBER KRESS: And your plan is to inspect the ITAACs.

MS. ASHLEY: You're absolutely correct. And if you look at the structure of the manual chapters, what you will notice is that they are very much tied to the constructions that will be necessary to support licensing under Part 52, one of which is 2503, which is the ITAAC. So there is a large portion of the inspection program that is designed to ensuring

ITAAC completion, successful ITAAC completion.

MEMBER ROSEN: So the details of the question I was asking about would be covered in a specific ITAAC.

MS. ASHLEY: What would be covered is our approach to inspecting ITAAC, and then the details about the individual inspections to support inspection of digital systems or to support other kinds of equipment inspections would be covered in the individual inspection procedures which support these manual chapters.

MR. RICHARDS: If I can jump in for a minute, I think a couple of points -- you know, some of the operating reactors have retrofitted their plants to bring some of the digital technology in. So the staff, you know, has been looking at some of the new technology as these things come into plants and go through licensing amendment. So we have some experience.

And then I think as part of the licensing review the new reactor licensing organization will be looking at new technology as it applies as part of their review.

When it comes to the actual construction inspection phase, you know, probably for the

electronic components, because they typically come in modules or in cabinets that are landed in place, what's going to be important is, you know, the inspection aspects, to make sure they're wired up correctly to the rest of the plan and properly attached and, you know, mounted in their location.

But I don't --

MEMBER ROSEN: And the testing.

MR. RICHARDS: And the testing, that's correct. But, you know, when you -- you get into the testing and pre-op phase -- well, that's part of what we're going to do. But, you know, the fabrication of the cabinet and its applicability or its applicability in the design I think will be captured largely by our review here in NRR.

Joe, is that correct?

MR. SEBROSKY: Yes. This is Joe Sebrosky with the New Reactor Section. And as Dr. Kress knows, part of the standard certification review is a review of the ITAAC. So we, for the AP600, the APWR, and the System 80 Plus, which all use digital I&C, there was agreement and it was codified in our regulations on what those ITAAC are, what are the acceptance criteria for the digital I&C.

The issue that Mary Ann alluded to is we

know what the top level requirements are. How we go about doing our independent inspections is something that we're working on.

MEMBER KRESS: With respect to these ITAACs, your framework document suggested that you probably would not be able to inspect in detail all of them, and that you're considering a statistical sampling process to at least limit some of the ITAACs that you have to look at.

I'd be interested in knowing whether or not you -- what kind of ITAAC you think would be amenable to that, or if you've come up with the statistical process that tells you how many samples you have to take, and the details of that.

MS. ASHLEY: Certainly, Inspection Manual Chapter 2503, which deals with the ITAAC, presents some major challenges for us, because it does represent the majority of the work. And it's -- we recognized early on that inspecting everything was not possible.

The sampling process is still very much one of those things that is a work in progress. Statistical sampling will only work with a homogeneous large population. So one of the things that we have identified is the need to come up with a process that

will consider all of the important aspects and help us to identify what's most important to inspect.

And one of the things that we're looking at is risk, if there is a PRA associated with it, what is the risk associated with a particular component or a particular system.

We're also looking at opportunities for inspection. If there is only one time -- and it's important -- we need to make sure that we get our individuals there to inspect it. We're also looking at difficulty of inspection, where is it located within the plant, is it something that we actually have to see being put in place, or can we go back later and look at it.

MEMBER KRESS: Would you ever rely on just reviewing the -- what the licensee submits as a document for why they put something in or the QA or their drawings of a component or --

MS. ASHLEY: What we've discussed within the team is that that will probably be part of the mix, and there will be some things that will be of low enough risk, of low enough consequence, that it would be acceptable for us to do the review.

MEMBER KRESS: Now, I guess I was naively thinking if it ended up in an ITAAC it already was a

high enough risk to be worried about. But maybe I'm wrong.

MS. ASHLEY: I think --

MR. SEBROSKY: This is Joe Sebrosky with the New Reactor Section. The ITAAC, when they were developed, are risk-informed. But you have to go back to the requirement that's in Part 52, and the requirement that's in Part 52 is the ITAAC -- if you complete the ITAAC, you've demonstrated compliance with all of the NRC's regulations.

So there are some ITAAC in there that are more risk-significant than others and --

MEMBER KRESS: It could fall under the category of an IT --

MR. SEBROSKY: Yes. And one of the things that we mention in the framework document is the concept that we will have touched every ITAAC. Some of it may simply just be a record review, but we'll try to predetermine that as much as possible in advance.

And we will also use techniques such as if you go with the modular construction, if a shipyard is welding piping for the CVS and the RHR, we may just look at RHR welding and say, if they welded that properly, chances are they welded the CVS piping

properly.

So our regulatory footprint in the Construction Inspection Program Information Management System, the basis for us finding the ITAAC acceptable, is that we did look at the welding that was done at the shipyard. They welded more than just RHR piping. They welded a bunch of different --

MEMBER KRESS: Well, did you actually go to the shipyard and watch them weld or wait until they delivered the product or --

MS. ASHLEY: Absolutely. One of the main challenges with the ITAAC and the anticipated construction methods to be used with Part 52 licensing is that there will be modular construction, that it will be very aggressive schedules, that things will be happening in multiple locations.

The estimates are that 60 to 80 percent of past on-site construction will actually be moved to other locations. Fabrication will occur wherever, perhaps offshore, and then be brought to the site as modules and installed there. So, yes, we have looked at that, and we believe that what we come up with will be sufficient because the inspectors will follow the construction wherever it happens to be.

MEMBER KRESS: Does that mean you would go

to the firm that's doing the construction and review their QA program, QC program, or -- I'm not trying to --

MS. ASHLEY: Well, that --

MEMBER KRESS: I'm looking at how much, you know, is -- it sounds like a lot of work if you're going to go to that much --

MR. RICHARDS: That's one of the questions, you know, we're challenged with answering is how much is enough, and how far do you go. I think you're aware that, you know, presently there is a lot of components being fabricated in foreign countries for reactor head replacements and steam generators. And, of course, these same components for new plants may be fabricated overseas also.

So to what degree should we be looking at that work and their programs, those are just exactly the questions that Mary Ann's team is struggling with.

MEMBER ROSEN: Well, of course, you recognize, Tom, that it's the applicant's job to make sure that his supplier's quality assurance programs are adequate and meet Appendix B. He has to be fully convinced that that's happening, and, if not, to take -- to work with his supplier to correct the weaknesses in that supplier's corrective action program.

MEMBER KRESS: Well, it's the applicant's job to satisfy all of the ITAACs. But I think the NRC has a role in validating or verifying it.

MEMBER ROSEN: That's right.

MR. SEBROSKY: This is Joe Sebrosky with the New Reactor Section.

MEMBER ROSEN: But only in a validation or verification role. That's --

MR. SEBROSKY: Well, we have to find -- the Commission has to -- it's in the Atomic Energy Act. The Commission has to find that the acceptance criteria has been met. It's in 10 CFR 52.103(g). And the thought is that that finding is not that much different than the finding that had to be made in the 10 CFR Part 50 process before you gave them an operating license.

MEMBER KRESS: Somebody like the EDO would have to sign something that says, "These ITAACs" --

MR. SEBROSKY: Well, it's a Commission finding. So the Commission may -- may delegate that. We suspect that we had some discussion about how that was all going to work. But in the past, the way it worked was the inspection results were given to the Director of NRR.

The Director of NRR then informed the EDO

and the chain of command that he was going to make that decision. We suspect on the first couple of plants that the Commission will not delegate that, but that's up to them.

But the point that I was trying to make, the bottom line point, is this inspection process that we're developing feeds into that decision that the Commission must make that the acceptance criteria have been met.

CHAIRMAN BONACA: Some of the foreign suppliers do not have a quality assurance program like we have in the U.S. I mean, they have -- so, therefore, you have to establish equivalency judgments.

MEMBER KRESS: I think most of them have ISO 9000.

CHAIRMAN BONACA: Hmm?

MEMBER KRESS: Most of them have ISO 9000.

CHAIRMAN BONACA: Yes.

MR. SEBROSKY: But if you look at --

MEMBER KRESS: Which I think has been deemed equivalent.

CHAIRMAN BONACA: So there is already an equivalency established there.

MEMBER KRESS: Yes, I think so.

MR. SEBROSKY: This is Joe Sebrosky. If you look at the way the ITAAC are structured, though, and you look at the AP600 as an example, most of the large component manufacturing, the acceptance criteria, is that it meets the ASME requirements.

So that -- Westinghouse and General Electric and System 80 Plus, they knew ahead of time what their supplier list was going to be, and what commitments they were going to have to meet.

CHAIRMAN BONACA: Yes. Okay.

MEMBER KRESS: This framework document is supposed to be framework and guidance for developing manual chapters, and we should actually flesh it out more and put more detail in. Do you have a schedule, or will you people be the ones that develop these manual chapters also?

MS. ASHLEY: Yes, we will. The team is actually -- has many of the manual chapters already in draft to reflect some of the original thinking for the framework document. Those documents will be finalized once the framework has been finalized.

MEMBER KRESS: Do they go out for public comment?

MS. ASHLEY: They do not. Manual chapters are an internal document within the NRC that guides

our effort. So rather than put the manual chapters out, we use the framework document to get that public involvement in establishing the framework.

As you've all been noting, QA, of course, is an integral part of the success of this. We have talked to the industry at public workshops about their need to have good QA, good problem identification and resolution, and good records. That's an integral part that they can serve in the process as well.

We've also talked --

MEMBER LEITCH: Mary Ann, this Chapter 2503 entails the inspection of ITAAC commitments, but --

MS. ASHLEY: That's correct.

MEMBER LEITCH: -- I have a question back on the previous one, 2502, which I guess is the combined license phase. And in the document it says that the application must also describe the ITAAC that are necessary to ensure that the plant has been properly constructed and will operate safely.

So it seems to me that back at that stage the ITAAC is established. What you're doing in the next phase is inspecting that those commitments are met.

Now, establishing of that ITAAC is no

small job, it seems to me, and I'm trying to picture what that is. Does that become something like an FSAR? I mean, does it describe pre-op and startup test programs, operator training programs, maintenance activities, procedures? All of those types of things that we were used to seeing described in the FSAR, is that basically what the ITAAC is? Is it that detailed?

MS. ASHLEY: Joe, would you like to talk about this?

MR. SEBROSKY: I guess Mary Ann is putting up an example ITAAC for the AP600. And as part of the design certification review for the AP600, this is the ITAAC for the normal residual heat removal system, one of the ITAAC, one of several ITAAC.

And it's meant as a representative example of what an ITAAC would typically look like. You have a design commitment in the left column, inspections test and analysis in the middle column, and in the right column you see the acceptance criteria, which in this case is the RNS pump provides at least 925 gallons per minute to the in-containment refueling water storage tank.

Now, this was agreed to and approved by us as part of the design certification review for the

AP600. And if you go back -- Mary Ann, if you could throw up the slide on the Part 52 licensing process. This is also in the framework document.

You see early site permits, standard design certifications, combined license, and then you see the reactor construction, verification of the ITAAC, and reactor operation. The ITAAC are established prior to granting the combined license.

What we don't know at this point is when a -- a licensee can choose to reference in a combined license, an early site permit standard design, both or neither. It's their option. So the review that's done at that combined license stage, if we -- if they want to reference the AP600, for example, they would say, "We're referencing this certified design."

The ITAAC -- the review that we did as part of that certification does not get relooked at by us. What would get relooked at -- would get looked at us -- looked at by us would be issues that were not resolved during that standard design certification.

Westinghouse are the people that did that. They did not know, for example, what the licensee's programs were going to be for fire protection, that kind of thing. So that would be reviewed at the combined license stage -- issues that we had not

previously reviewed. And there is a possibility that ITAAC would be developed from that review.

But when we get the combined license, the combined construction permit and conditional operating license -- that's what it stands for -- one of the conditions is ITAAC. It's attached to the license just like tech specs, and the condition of being able to load fuel is that you have demonstrated that the acceptance criteria have been met.

That's high level how the process works. So the inspections that we have in Inspection Manual Chapter 2502 are a little different than what you had suggested earlier. There's a mandatory hearing associated with the combined license, and we believe, just like what we're currently doing with the early site permits and the Inspection Manual Chapter 2501, that to support the granting of an early site permit we'll go out and look at, inspect how that application was developed, the quality assurance that went with that application, and we'll issue an inspection report, and that will feed into the Commission's decision on whether or not to grant an early site permit.

So there are inspections associated with early site permits -- that's 2501 -- with combined

license, which is 2501. The generation of the ITAAC, though, is really based on inspections as much as it is review, and what, based on that review, the staff believes is appropriate for the ITAAC.

MEMBER LEITCH: Is the term "final safety analysis report" passe, then, or --

MR. SEBROSKY: No, it is absolutely not. If you look at the --

MEMBER LEITCH: When does that come into play?

MR. SEBROSKY: Yes. If you look at --

MEMBER LEITCH: I didn't see that referred to in the framework document.

MR. SEBROSKY: I don't think that we put it in that framework -- in the framework document specifically. There is, for example, a final safety evaluation report that's associated with the early site permits, with the standard design certifications.

MEMBER LEITCH: So if I come in and say I want to build this certified design on this early site permit approved, I've got an early site permit and I want to build this standard design, certified design on it, do I then have to submit with that application something that looks like a final safety analysis report, absent those features related to the site

permit and the certified design?

MR. SEBROSKY: The short answer is yes. And we would review --

MEMBER LEITCH: So I think that --

MR. SEBROSKY: The scope of our review is dependent on what they choose at a combined license stage. The scope of our review would be broader if they didn't reference a certified design in an early site permit.

MEMBER LEITCH: So things like the startup test program, the power accession program, and so forth, that -- it would be described in that --

MR. SEBROSKY: Well, there's portions -- if you go back to the AP600 and the AP1000, which currently the ACRS is involved with reviewing the design certification, you will see -- and I think it's in Chapter 14 -- you'll see a description that Westinghouse puts in there of what the startup program and power accession program should be. They give the high-level tests that need to be completed.

So the types of information that you would expect in an FSAR --

MEMBER LEITCH: Would be --

MR. SEBROSKY: -- are already -- yes, as part of the AP1000 review, that's something that we're

looking at. The details -- there are things in those standard design certification reviews that are called COL action items. The actual specific test procedure -- development of the specific test procedure, the detailed test procedure, Westinghouse did not do. That's a COL applicant's responsibility.

So they'll -- they have a thing called a design control document. That portion of it, the Tier 2 stuff, looks like the final safety analysis report. And we have a corresponding final safety evaluation report associated with it.

MEMBER LEITCH: Okay. Thanks.

VICE CHAIRMAN WALLIS: Can we go back to your previous slide about RHR?

MS. ASHLEY: Yes.

VICE CHAIRMAN WALLIS: It seems to me that the flow rate you get in the system depends upon the conditions, and you have to have the reactor up to temperature, and you can't have it up to temperature without having it up to pressure. Flow depends upon the temperature of the water and all kinds of things.

So you've got to be more specific than just saying pump provides a certain flow rate. There's got to be at -- a whole lot of conditions.

MR. SEBROSKY: Yes. Dr. Wallis, this is

Joe Sebrosky again. This is just a sub-ITAAC. You see, it's 9.d.

VICE CHAIRMAN WALLIS: Yes.

MR. SEBROSKY: If the design commitment in this particular case is that it provides heat removal from the in-containment refueling water storage tank, and it -- in the inspections test and analyses it gives you the high-level lineup, that the flow through the RNS heat exchangers when the pump suction is aligned to the IRWST and the discharge is aligned to the IRWST.

VICE CHAIRMAN WALLIS: But then the whole -- the reactor has got to be up in temperature and pressure.

MR. SEBROSKY: That's not in this -- the way the EP -- there's another test that does that for the --

VICE CHAIRMAN WALLIS: Okay. So it does 925 gpm when it's cold, and then it does something else when it's --

MR. SEBROSKY: This is at recirc. This is in recirc to the IRWST. You're basically removing water from the IRWST and demonstrating that the pump provides sufficient flow back to the IRWST.

VICE CHAIRMAN WALLIS: Under what

conditions for the rest of the circuit, though?

MR. SEBROSKY: Well, this -- I guess from a high level, what we probably need to do is show you the entire RHR system. The only aspect -- it does not matter, because the reactor is not involved in this particular test, what the reactor conditions are.

VICE CHAIRMAN WALLIS: Doesn't it affect the flow rate, just on the temperatures around the circuit for the --

MR. SEBROSKY: In this particular condition, it's recirc back to the IRWST. So it does not.

VICE CHAIRMAN WALLIS: Okay. So it's all pretty cold, right? It's all pretty cold?

MR. SEBROSKY: Yes, that's correct.

VICE CHAIRMAN WALLIS: Okay. So this particular -- it doesn't -- even that depends on the temperatures. It doesn't make any difference whether it's 50 degrees Fahrenheit or 120.

MR. SEBROSKY: That's a true statement.

VICE CHAIRMAN WALLIS: So I think you've got to be careful that the thing isn't tested under some conditions, and then it won't meet the requirements under the real condition.

MR. SEBROSKY: I agree with the point and

understand the point. The ITAAC are meant to be high level. This particular ITAAC is looking at one aspect -- the pump capability -- and flow in recirc mode for the IRWST. There's a discussion in the Tier 2 document -- ITAAC are high-level commitments. The Tier 2 document will tell you specifics on how the test would be performed, the conditions that are assumed.

VICE CHAIRMAN WALLIS: I just want to make sure you're aware of these things. You have to be curious about whether the test is fully defined, realistically defined.

MR. SEBROSKY: That's something that the staff, the systems experts for the particular -- in the review of the ITAAC is part of the design certification review. The reviewer is responsible for looking at the FSAR material and also the ITAAC that come out of that. So it's taken in context, and the system experts look at that.

This particular example, I understand the concern. But if you look at the RHR system in total, you will see other testing that is done, and it's more specific on the exact conditions that you expect.

VICE CHAIRMAN WALLIS: Okay.

MR. SEBROSKY: One of the things that you

will not see in ITAAC, though, is ITAAC are done prior to fuel load. So you don't see any testing that's done with fuel in the reactor vessel.

CHAIRMAN BONACA: Now, these ITAACs, I mean, they are derived from the vendor's plan for how it's going to test the reactor, right?

MR. SEBROSKY: That's correct.

CHAIRMAN BONACA: So --

MR. SEBROSKY: The vendor -- part of the requirements of the regulation is when the vendor submits the design certification application they provide the ITAAC.

CHAIRMAN BONACA: And you are going to define specific elements of that to determine or to validate certain criteria. Like in this case you want to validate the heat exchanger capacity, really. And then, of course, then, typically the vendor defines the temperature at which the test has to be done, and then provide the range of value for acceptability.

I mean, typically it is not just an absolute value. This must be a minimum value that you are using.

MR. SEBROSKY: It is. It says pump provides at least 925 gallons of fuel.

MEMBER ROSEN: This doesn't prove the heat

exchange capacity. All it proves is that the flow is adequate.

CHAIRMAN BONACA: The flow is --

MR. SEBROSKY: And there's another aspect associated with the heat exchange. It's one small portion, and the reason that we put it up there was to just give you an example of how -- what an ITAAC looks like. You can't take out of --

VICE CHAIRMAN WALLIS: The test components -- it's very tricky, because when you've got actually heat transfer occurring in the heat exchanger, this affects the frictional pressure drop. So it affects the flow rate, so it's very tricky to do sub-tests of just one part of the system without realistically modeling the whole system or making sure everything is representative of the operating conditions.

MR. SEBROSKY: I understand.

MEMBER ROSEN: Would you go back to the slide --

MEMBER LEITCH: I'm still concerned -- go ahead, Steve.

MEMBER ROSEN: Could you go back to the slide again that you had just before this, the one that shows the overall process?

MS. ASHLEY: Certainly.

MEMBER ROSEN: Joe, in your remarks, you talked about the ITAAC stuff on the upper right, and you said that the ITAAC and the tech -- are like the tech specs in the license. They are mandatory completion kind of things.

But are the ITAACs like the tech specs in the sense that the tech specs live on with the plant as it goes into its lifetime? What happens to the ITAACs?

MR. SEBROSKY: It's banned at fuel load. After the Commission makes its determination in accordance with 52.103(g) that the acceptance criteria have been met, the ITAAC -- and there is no requirement that lives on.

There is, as part of the ITAAC, a portion of the design control document that's called Tier 1, and the Tier 1 material contains a design description. That design description lives on, but the ITAAC themselves do not constitute regulatory --

MEMBER ROSEN: So there are no requirements from the ITAACs that live on with the plant?

MR. SEBROSKY: That's correct.

MEMBER LEITCH: I'm still concerned about the interface between the scope of supply that is in

the certification package and the rest of the powerplant equipment. In other words, a design is certified, but there's a lot of associated systems that are not part of that certification package that are, nonetheless, important to support the operation of the plant.

MR. SEBROSKY: The way Part 52 is arranged it's for the -- it's for the complete design. So you see a discussion of the turbine building, for example, in the design certification reviews for the AP600, AP1000. What --

MEMBER LEITCH: So, then, at that stage all of the ITAACs, even including --

MR. SEBROSKY: Something like --

MEMBER LEITCH: -- if there is some turbine building cooling water, for example, is -- the acceptance criteria for those kinds of systems are agreed upon at that phase?

MR. SEBROSKY: Yes. And for many systems there are no ITAAC, because there are no regulatory requirements associated with that. So if you looked in the turbine building, for example, on the AP600, I think there's a fire pump that's in that turbine building. There is ITAAC associated with that, but very few ITAAC came out of the review of that turbine

building.

MEMBER LEITCH: Okay. But it --

MR. SEBROSKY: But it was part of the review.

MEMBER LEITCH: -- it was part of the review.

MR. SEBROSKY: And it was something that was looked at, and has the -- I guess the term is "issue preclusion" at the time that they go for a combined license.

MEMBER LEITCH: Okay. Okay. Thanks.

MS. ASHLEY: One of the challenges that we have is to prepare the people who will be conducting the inspections to actually do that work. We have been using the strategic workforce planning initiative in the Office of Human Resources to identify our current resources associated with history -- the history of the construction inspection program.

And what we have identified is that there's a limited number of staff who have had any experience in implementing a construction inspection program. And many of those are late in their careers.

But one of the problems that we have is to prepare those individuals who are remaining to do new construction inspection, and we're using existing

construction activities at the MOX fuel fabrication facility, enrichment facilities, and, of course, Browns Ferry Unit 1 restart, as a way of introducing new inspectors to construction activities as well as to refresh existing inspectors with processes that they may have seen once long ago in their career.

We also recognize that there's the need to implement formal training. The program that was previously in place to prepare inspectors has been mothballed for a number of years. And what we have done is to determine that the most likely scenario for preparing new inspectors will be to use commercially available programs offered by the Concrete Institute or other commercial -- commercial companies who provide components, and get that training from them.

And it has several advantages. One, it will provide an opportunity to have small numbers of inspectors trained rather than having a critical mass of 20 or 30 all at the same time. It will also have better timing for our purposes in that those courses are available currently, and we can begin to send individuals to that training if the need is immediately there.

One of the things that you asked about, Dr. Powers, is programs and processes in a computer

system. And we have -- that was one of the lessons learned from the previous implementation of the construction inspection program, and so we have been working to develop a construction inspection program information management system called CIPIMS.

The framework for this was laid out back in 1996 when all of that construction experience was fresh in everyone's mind, and they have identified what this program would need to do. And we actually have that information for the framework of the program loaded into a computer.

One of the key areas is that this information needs to be tied to ITAAC, so that we can look at the sum total of information that we've collected in inspections about a particular ITAAC. And that's necessary so that at the end we will be able to say, "Yes, we have looked at what is necessary and sufficient with regard to a particular ITAAC or series of ITAAC."

We also believe that this will help us to address one of those other issues that was identified, which is late-filed allegations. We will be able to use our recordkeeping as a primary source of information to research issues related to a particular allegation.

MEMBER LEITCH: In the discussion you talk about some meetings you've had with architect-engineers and equipment suppliers regarding the interface between this program and their program. Do you see this as being primarily an NRC program using the same software as the architect-engineer would use or -- and how do you assure that those programs are in lock-step, that he doesn't -- you're using one software package and --

MS. ASHLEY: Right.

MEMBER LEITCH: -- and a couple of years down the road the architect-engineer changes his software package, and you're going in different directions? How does that --

MS. ASHLEY: In talking with the architect-engineers, and in talking with utilities, what they have told us is their primary vehicle for scheduling -- and that's what we would be dependent upon, both the industry and the architect-engineers, to provide to us -- is a program called Primavera.

MEMBER LEITCH: Primavera, yes.

MS. ASHLEY: And so we're working with them, and they understand our needs. Part of it is schedule that we would get from them, but another aspect of this is the recordkeeping side. So

certainly that is independent of the schedule.

MEMBER LEITCH: So you would probably be using Primavera as well?

MS. ASHLEY: Yes.

MEMBER LEITCH: But maintaining the system -- the NRC would have its separate system from the architect-engineer?

MS. ASHLEY: That's correct.

MEMBER LEITCH: But using the same software.

MS. ASHLEY: That's correct. It would provide information to us about schedule. We would download that information into our CIPIMS program, and would then use that to help us identify the timing for -- and perhaps location where particular fabrication is going to take place on a particular item related to a specific ITAAC.

MEMBER ROSEN: I'm somewhat familiar with Primavera at least, but it is only one of several different critical path construction techniques -- a schedule management technique. So are you going to stay flexible? What if an architect-engineer is hired by one of these applicants that doesn't use Primavera, he uses something else?

MS. ASHLEY: We're not locked into that,

although that is apparently the preference right now. The most important part of this is -- interestingly enough, I don't believe it's the schedule so much, or rather the program so much -- it's ensuring that what's in the program and the schedule is consistent.

One of the main problems that we have identified is that there is a need to have a consistent coding schedule, so that when licensees get information from their fabricators, a particular component, particular piece of equipment always needs to be referred to the same way, or it doesn't matter what program we're using.

Our resources here at headquarters feel fairly confident that it's very easy to do the transfer with Primavera. They feel confident that they can also do it should other programs be used, but that the underlying problem is one of consistent coding is more important and more challenging.

MEMBER POWERS: One of the problems that we face in today's electronic era is that hardware and software systems for recordkeeping tend to evolve faster than the records decay and their utility. And you quickly end up with electronic media that you can't read. What do you do about that? I mean, you have -- for any given installation you have gigabytes

of inspection information, and your software systems are just going to evolve out from under you.

MS. ASHLEY: The most important part of this is that the actual results of inspections will be in inspection reports, and will be part of ADAMS. So will be retrievable through that vehicle.

What CIPIMS is going to do for us is going to allow us to pull information from the inspection reports and record it into database table form, so that we can say, where are the various inspection results related to a particular ITAAC? So we shouldn't -- as long as ADAMS is in existence, we should be able to pull the base information out.

Does CIPIMS need to be -- live forever? I'm not sure about that.

MR. RICHARDS: I think your concern is is that the utility or the -- they might be upgrading their software, and we don't, or the two systems don't communicate. Is that the question?

MEMBER POWERS: I mean, that's one aspect of it.

MR. RICHARDS: It's a good question, and, you know, I'm not sure we have an answer. On the plus side, I think the -- you know, the industry is looking at constructing these plants in a relatively short

timeframe compared to past history. But we would have to enter into some kind of understanding with a utility to make sure our two computer systems would be able to talk to each other.

MEMBER POWERS: The other aspect of it is 20 years from now, 20 years from the completion of construction, you may well need to go back and look at those inspection reports. And can you be able to do so? And what you're saying is that, yes, as long as ADAMS is around, I can. ADAMS presumably will evolve. God, I hope it evolves. But not that --

MEMBER SIEBER: It can only go up.

MEMBER POWERS: Oh, no. Oh, no. There's lots of down side potential here. It's just that we have -- I mean, among the national laboratories, we just have mountains of data that cannot be read by existing systems.

MS. ASHLEY: I understand your point, and it's a good one, and we'll have to take that into consideration as to how we would ensure that through the framework.

MEMBER KRESS: Do you have a program or a way to test this CIPIMS before you have to go through --

MS. ASHLEY: We are, in fact, working with

Westinghouse, GE, and the folks at TVA to have them provide to us some schedules, so that we can ensure that the information can be transferred into the CIPIMS system and will -- and that the CIPIMS system will be able to hold the volume of information that's anticipated will go through it.

One of the issues now is -- it's a good one -- is when they provide information to us, some of that information on schedules is considered proprietary. So how do we protect that proprietary information that they're providing as part of a schedule update?

MEMBER LEITCH: The framework document refers to a pilot that will be run in the summer of '03. Was that pilot actually run or -- and, if so, what were the results? Is that what you're referring to?

MS. ASHLEY: That's what I'm referring to. We have not had an opportunity to do that, because some issues -- those issues about proprietary information were raised.

MEMBER LEITCH: I see.

MS. ASHLEY: In the development of the detailed inspection procedures, we recognize that those inspection procedures in many cases will have to

be design specific. So by the very nature of the inspection procedures, they may have to wait until the specific application is received.

However, our intention is to make as many of the procedures technology neutral as possible, look for opportunities to complete development, and have those procedures ready to go as we are able. One of the estimates that was put in the SECY paper on future licensing indicated that the level of effort to actually complete the inspection procedure revision is between 10 and 12 FTE. So we'll have a lot of work to do when the application is actually submitted.

What we also know is the lead time for unique designs, such as gas-cooled reactors, because it represents a newer type of technology that we may not have any experience with, may take even longer than the 10 to 12 FTE.

MEMBER KRESS: With respect to gas-cooled reactors, one of the ITAACs are likely to be specification on the fuel quality. How would you inspect for that? Would you go to the plant that makes the fuel, which would be somewhere different than the site -- than the plant that's going to use it, and would you just audit their processes, or would you --

MR. RICHARDS: I hate to speculate on what we're going to do in the future. But I know in the past that some members of our technical branch in NRR that are -- you know, oversee the fuel aspects have made site visits to fuel fabricators. They have looked at not only the fabrication process but also at the --

MEMBER KRESS: The final product.

MR. RICHARDS: -- design and engineering work that goes into it. So we've done that in the past. We've gone to fuel fabricators, and we've provided them feedback on what we think they're doing right and wrong and gotten responses from them.

MEMBER LEITCH: There seems to be an implication in some of the framework document that some long lead time modules could be actually started to be manufactured prior to the issuance of the combined license. And I guess I'm wondering, is there a possibility that some important inspection opportunities may be missed if that is the case?

MS. ASHLEY: The answer to that is yes. In our discussions with the industry, we have talked to them about the need to inform us as soon as they possibly can, and their current thinking is that at least for the first reactor to be built under Part 52

that they're not going to get too far ahead of the licensing process, and that they will probably wait.

However, they do indicate that once they have been through the process and feel comfortable and know how it's going to work, that the possibility that they could order large components ahead of time is there. And their indications to us now is that they recognize that keeping us informed is to their advantage. How that will actually play out, and to what extent they will keep us informed, and how they will do that, remains to be seen.

MEMBER ROSEN: It seems to me that's not the agency's problem. If a licensee or applicant chooses to do that, that's his problem. He takes on all the new risk. And if you want to --

MS. ASHLEY: That's exactly correct.

MEMBER ROSEN: -- inspect something that's already buttoned up, he just has to open it up. And I don't see that that is a problem that falls on your side of the table.

MR. RICHARDS: Well, I think we would like to work the details of how we'd approach that out on the front end, so if a utility wants to go forward and do that there's no surprise. I think we have an obligation to try and talk about that and see if we

can come to some agreement.

MEMBER ROSEN: I agree with that, but --

MEMBER POWERS: I sure encourage you to do that, because even if you -- you have the right to demand they open it up as you say, you know there's a cat fight associated with that that --

MEMBER ROSEN: I just don't feel that the staff should be mousetrapped by that.

MEMBER POWERS: Okay.

MR. RICHARDS: Or you could have a situation where components are fabricated, and maybe a reactor vessel or a head is fabricated before they decide to, you know, come in for a license.

MEMBER POWERS: Just don't use high nickel/low copper alloy.

(Laughter.)

MR. RICHARDS: There are a lot of challenges about the timing of things that we don't have any answers for.

MS. ASHLEY: That's correct.

MR. RICHARDS: You make good points.

MS. ASHLEY: I just wanted to summarize a few of the issues that came up during the public comment that we received from the industry. One of them that was a topic that was reflected in the

framework document but is not unique to the framework document is the applicability of Part 21 to applicants.

MEMBER KRESS: Who did you get comments from?

MS. ASHLEY: We got comments from NEI.

MEMBER KRESS: NEI, okay.

MS. ASHLEY: Other specifics had to do with public communication. The industry, by and large, would like to have as much specifics as we can possibly provide at this point. Included in that are, what is your protocol for inspection going to be? What are inspection reports going to look like? How are you going to record negative inspection results? What are they going to be called?

Those kinds of information is what the industry is seeking, and we're working on that. We don't know to what extent we're going to be able to legitimately provide that at this point, but we understand that there is a need to have that information.

And our current intent is to recognize in the framework document that we just don't have enough information to make a judgment at this time, but that in the future that information will be provided, and

identify where that information will be made publicly available and in what form and format.

MEMBER ROSEN: Mary Ann, this may be the time for me to ask my question about negative results. You raised the issue in response to the public comments. On page 16 of the document, the framework document, there is a discussion of negative SAYGO ITAAC conclusions.

And it is clear that a negative conclusion would have to be corrected by the licensee if something was -- if you couldn't make a positive conclusion, the licensee would have to go in and correct what it is that deficiency was.

It seems to me that -- and such a condition could only happen if the licensee's corrective action program hadn't fixed it before you got to the point where you were trying to make a conclusion. So it seems to me there's two issues here. One is to correct whatever the deficiency is, but more broadly -- and I don't see this -- more broadly, to correct the licensee's corrective action program deficiencies that led to that -- you being forced to make a negative SAYGO conclusion.

And, furthermore, having said that, not only requiring the licensee to correct the corrective

action program weaknesses that led to the negative conclusion, but to examine the extent of the generic implications to the whole process that that corrective action program weakness or weaknesses reveals.

And so I don't -- on page 16, under negative SAYGO ITAAC conclusions, I don't see anything about the broadening -- the need to broaden that important -- I mean, if you're going to make a negative SAYGO ITAAC conclusion, that ought to -- the earth ought to move. I mean, it really shouldn't happen.

MEMBER KRESS: Does that imply that the corrective action program has to be an ITAAC before you --

CHAIRMAN BONACA: Well, that's a good question. That was -- because, I mean, many licensees did not build their plants under the corrective action programs. I mean, it was really under the AE or/and the vendors' programs, which were not --

MEMBER KRESS: It's not part of the licensee's corrective --

CHAIRMAN BONACA: -- part of the licensee's, that's right. I think it's a good question insofar as the corrective -- somebody, I mean, has the responsibility for correcting those. I

believe, however, it falls into the AEs and vendors' structures, and they don't have a formal corrective action program. I mean, they --

MEMBER ROSEN: Vendors? Sure. They are Appendix B suppliers. They've got to have --

CHAIRMAN BONACA: At least be sure. But I'm talking about --

MR. RICHARDS: I think you've made a very good point, and it's something that we've flagged as a, you know, critical element in our construction inspection program -- is the role of quality assurance, both from -- the utility has quality assurance over all of their contractors and the vendors and how they implement that.

So if their program is robust and functioning well, I think you're right, it -- you know, it shouldn't happen. And if it does, it brings into question how come their oversight and their quality assurance program allowed that to happen?

MEMBER ROSEN: Right. And how broad is this problem?

MR. RICHARDS: Yes. What do we do if we get in that situation? So that's a very good observation.

MEMBER ROSEN: So you might want to go

back to that page 16, Section 2, that talks about these negative SAYGO ITAAC conclusions and substantially beef it up in that area in terms of the broader implications.

MR. RICHARDS: We appreciate the comment.

MEMBER KRESS: Yes. Well, I -- on the same token, I don't think it's realistic to believe that there will always be only positive findings.

MR. RICHARDS: Of course.

MEMBER KRESS: Even if they have a good corrective action program. So it may -- it may be -- a metric might be how many of these you have as to whether you go back and look at it. I mean, if you have one or two of them, maybe it's not a sign it's a bad corrective action program, it's just things happen when --

MEMBER ROSEN: Because there may be something very unique about the particular deficiency. But the fact that it wasn't corrected by the corrective action program --

MEMBER KRESS: They didn't find it themselves.

MEMBER ROSEN: -- that they didn't find it, that it had to be found by an inspector and then forced you to make a negative -- into a position where

you're making a negative SAYGO ITAAC conclusion.

MEMBER KRESS: Yes. For the benefit of some of the members, could you give us an explanation of what SAYGO is?

MS. ASHLEY: Yes, I can. SAYGO stands for sign as you go. And the idea was is that, if you look at the ITAAC, some of the ITAAC, particularly for large components, may span a long time. And the idea was that we would be able to go and look at the activities as they are occurring and would be able to sign off as we complete a particular section of the inspection, which would connote that we would not be going back to relook at that unless we got some additional information that would cause us to reexamine our finding.

And it was viewed as a vehicle for us to be able to say that's complete, we can move on, and know that we've come to some degree of closure on that aspect.

MEMBER KRESS: Would that be part of your CIPIMS input then? Or you would track that and --

MS. ASHLEY: That's correct. It would allow us to sign -- we've signed off on this, and the CIPIMS would have an ability -- would have a capability to record that we had reached a conclusion

to that point.

MEMBER KRESS: However, it would be the role of the inspector to sign off on the SAYGO?

MS. ASHLEY: That's correct. The inspector would have to sign off and say everything is fine to this point.

MEMBER KRESS: When everything else, then, is done on that ITAAC, who signs off on a given ITAAC? The inspector goes in or --

MS. ASHLEY: The licensee sends us a determination letter that says, "We believe we're complete," and then we would have to reexamine what we have done and would have to either not concur or concur with that. And then that would be -- the SAYGO record would be a record that would help us to make that determination whether or not we agree or not.

MEMBER ROSEN: Do you have a specific differing professional opinion or differing professional view process built into this process separate from the overall agency's? Or would you rely on the overall agency's process? I mean, I'm thinking of an inspector who doesn't like something, and everybody -- the licensee, the applicant, and the rest of the staff don't agree with him or her. And you need to have a process to resolve those kinds of

things.

MS. ASHLEY: We do not -- the answer to your question is we do not have a separate program for that. We had not considered it and --

CHAIRMAN BONACA: I think it's an important area, because from what I've seen it's peculiar here. You have a vendor that built the plant, and you have a project that belongs to the utility. That really should hold them accountable for delivering, you know, within spec.

However, the project often times gets so much under pressure within its own house that they tend to accept barely conforming components or systems or tests, because they are pressed for time. So you have a buyer that accepts somewhat, you know, marginal tests or things of that kind. There are other possibilities.

I mean, I have seen it, and so that's important -- that there is an opportunity for what Mr. Rosen is referring to.

MR. RICHARDS: I see that as kind of two issues. One is for NRC inspectors that have an opinion that their supervisor doesn't agree with, how is that addressed? And I think that the -- you know, the existing agency program for DPVs and DPOs would

take that on board and deal with that.

For licensees, it's one of the points that Mary Ann touched on at the very beginning of the presentation. But we need to talk with the industry about what they are going to do with their employees to ensure that they are open to employee concerns. We would much rather have the utility dealing with those issues rather than having those people having to come to the NRC. So --

CHAIRMAN BONACA: Yes. Because I've seen many resolution of issues like this with statements from the AE's acceptance. I mean, they go back to the AE when you have a non-exact conformance, and the AE makes a determination. He documents it. Often times there isn't a significant basis behind why acceptance is acceptable. And so it's an area that is open to -- at least in the past has been open to a lot of questions.

MR. RICHARDS: I think, you know, the inspection program will have elements in it to go out and check how corrective actions are dealt with and to see what -- that they're answered. So that will be part of the inspection process.

And on the utility side, I think what we would like to see is that they have some kind of a

hotline program or employee concerns program, like most operating reactors do, so that, you know, if construction personnel feel that something is not going right they have a venue to go to to bring up their concerns.

And, of course, if -- you know, if the utility doesn't respond, then there's always the NRC allegation process.

MEMBER ROSEN: Yes. Well, the takeaway from this discussion I think for you ought to be that you ought to think about and review the existing processes and see if they are adequate for this new -- you know, for taking on a significant -- as significant thing as new construction.

MR. RICHARDS: Okay. We'll do that.

MEMBER ROSEN: It may very well be, but, you know, it certainly would pay -- pay back a pass or two through that, through the OGC perhaps, and through the senior management, to have another look at that.

MR. RICHARDS: I agree. It's -- you know, both with NRC inspectors having concerns that weren't addressed in a timely fashion in past construction, and with craft concerns that came up late in the project, both caused a lot of trouble with the --

MEMBER ROSEN: Right.

MR. RICHARDS: -- construction path.

MEMBER ROSEN: Safe team approaches and all those things that ended up having to be put in place. It was quite a difficult time for the industry and the agency. The point of all this is to try to get out ahead of that if you can.

MR. RICHARDS: We agree. It's a good comment.

MEMBER RANSOM: Is there still an N-stamp program for qualifying suppliers of nuclear grade equipment?

MR. RICHARDS: I think under ASME all of those requirements are still in effect.

MEMBER RANSOM: So does your inspection include verifying that all of the suppliers are qualified under that program?

MR. RICHARDS: Maybe Joe can respond to this a little more. But I think in their application the licensee has to identify what codes they're going to build various components to. For something that's built under ASME, I think the -- you know, the requirements to qualify a vendor are pretty stringent.

When you get into some other components like cables or, you know, something that isn't a mechanical component, it might not be quite as rigid,

and we'll have to look at, you know, what our inspection process is to look at those vendors.

Joe, can you add to that?

MR. SEBROSKY: What you said was correct, Stu, that as part of the design certification reviews they -- Westinghouse, GE -- say what those various components, what code criteria they're built to. And in some cases the ITAAC contains a specific code.

MEMBER RANSOM: So not all components would necessarily be built by --

MR. SEBROSKY: No.

MEMBER RANSOM: -- people holding an N-stamp.

MR. SEBROSKY: As a matter of fact, if you look at the passive safety systems, which we're starting to review, a much smaller portion -- the RHR system, the emergency diesel generators -- are not safety-related on the AP1000. So there are criteria for what they're constructed to, but there's not a requirement to have an N-stamp.

That's one of the things that the vendors have told us with the passive designs is they build a plant, it's going to be global, it's not going to necessarily come from vendors that we have experience with in the past. A lot of the components don't

require N-stamps.

MEMBER RANSOM: But some do I guess, right?

MR. SEBROSKY: Yes. And those are -- again, getting back to your original question, and what Stu indicated is true, the criteria to what they are constructed to is part of the design certification reviews. And some of the components --

MEMBER RANSOM: All of the pressure boundaries and --

MR. SEBROSKY: Yes. For the AP600, AP1000, there are still plenty of N-stamp components.

MEMBER LEITCH: Most of your discussion this morning concerns ITAAC, the Inspection Manual I guess 2503. You also briefly touched upon 2504, preparation for operation. I guess the thinking there is perhaps not quite as well developed yet?

I mean, when you read the framework document, it talks about emergency plans and technical specifications. But it seems to me there is much, much more necessary in that preparation for operations than just those two documents. There are many things -- the radiological environmental monitoring program, the training program, the maintenance program, emergency procedures, many -- I mean, there's a whole

litany of things that are not mentioned here.

So you're still doing more work in that area, is that correct? In other words, 2503 is top of the Hit Parade at the moment, and this will come later, is that a correct perception?

MS. ASHLEY: That's correct. And that will -- 2504 will address inspections after fuel load but prior to transitioning to the reactor oversight process.

MEMBER LEITCH: Right.

MS. ASHLEY: It will be inspections in support of non-ITAAC activity and programmatic inspections.

MEMBER LEITCH: But there are many categories of issues other than just emergency plans and technical specifications, which are the only two specifically mentioned in the framework document.

MS. ASHLEY: You're correct.

MEMBER LEITCH: Okay.

MS. ASHLEY: We anticipate -- I think that you -- the issue that you've brought up, also I want to make sure that I highlight for you that these plants are not covered by the ROP, will not be covered by the ROP until such time as they are operational.

MEMBER SIEBER: Commercial, yes.

MS. ASHLEY: And we have some experience that we're drawing from to address one of those lessons learned I mentioned earlier, which is, how do you get from construction to operation? And how do you translate that inspection program?

And we're looking to our experiences with D.C. Cook right now and Davis-Besse and Browns Ferry, and their return to operation, to help us to understand what the best path is for that.

MEMBER LEITCH: Yes. All of those plants, though, have staff that are familiar with operations. I mean, the challenge here is going to be, you know, a completely new utility staff, perhaps a new type of powerplant, a new design, and so the transition to operations can be a very challenging time. And it just looks to me like this whole section is not thoroughly fleshed out in that regard yet.

MR. SEBROSKY: I think that's a good point, and we'll take another look at that.

Correct me if I'm wrong, Joe, but I think that the three applications we've gotten for early site permits are all for existing sites. So that there will -- you know, there's the challenge of having perhaps, you know, new designs, maybe a different technology.

On the other hand, it looks like it's likely that there will be people on site who have experience operating plants, and they'll have a trained department, and they'll have, you know, people that have background in those areas. They just -- they have to come up to speed on this -- the new design and new technology. So it --

MEMBER LEITCH: For example, I -- we talked a bit earlier about the quality assurance program. We had a quality assurance program for the construction phase, and then there was a different quality assurance program for the operations phase.

How that transition occurs is just one of those things that needs to be managed during that period of time.

MR. SEBROSKY: That was clearly a lessons learned I think from before. Hopefully, we won't have quite the challenge. I think you're aware there were some utilities that they built their first nuclear powerplant, and they had no operational experience when they went into operation 20 or 30 years ago.

I don't think we'll be faced with quite that challenge, but there are elements of that that we'll have to face.

MEMBER LEITCH: Yes, okay.

MS. ASHLEY: So the only thing that I have left to tell you is what comes next for us, what do we still need to do. On the top of our list is to finalize the framework document by resolving the outstanding issues that were brought up by the public comment and by our own discussions in-house.

A major challenge for us is to test CIPIMS. We have recognized its importance to our overall success, and so we're going to be working on that aggressively.

We're also looking for additional opportunities to observe construction in progress, both here and abroad. We particularly want to be able to look at modular construction. We have no experience with that on a large scale, so we need to be very familiar with that.

We need to complete our manual chapters, and that will flow naturally from the completion of the framework document. And our goal, if we can't complete the revisions to inspection procedures, and we know that in some cases we won't until we have a design, we want to be able to identify what needs to be changed.

The challenge that faces me as the leader of this group is that I have a team of people, many of

whom are going to be retiring soon. And the challenge is to get as much information out of their heads and onto paper before they leave as possible.

So the desire that I have is to at least have them tell and record what needs to be done, so that if they retire I still have the value of their thinking and their experience over the years that they've been doing inspection.

MEMBER ROSEN: You know, EPRI has worked on this issue with knowledge management and has done some interesting things with just exactly that problem. You might want to talk to some people there.

MS. ASHLEY: Thank you.

MEMBER ROSEN: I have one more comment on -- and this is on Appendix C, which is inspection sampling, talking -- where you talk about inspection sampling. And in that appendix there's a discussion of the ITAAC for AP600. And I'm not -- you know, I wasn't responsible for AP600 licensing. I wasn't on ACRS at the time it was, so I can feel free to criticize what happened.

And I'm not sure what the history is, but what we have here in front of us is a statement that the emergency diesel generators -- for example, an AP600 -- are non-safety-related.

MR. SEBROSKY: Right.

MEMBER ROSEN: However, it says here, there are ITAAC associated with the emergency diesel generators, because of their risk significance. So what we have is highly -- assuming risk-significant equipment that's not -- that are not safety-related in the AP600. Do you follow me so far?

MR. SEBROSKY: I think we follow you.

MS. ASHLEY: Yes.

MEMBER ROSEN: They are risk-significant, but they're not safety-related. What is it about this picture that bothers me? I just don't get it, and you're being forced to deal with that. You make ITAAC up for non -- for risk-significant systems, which is a good thing.

But it's -- but they're not safety-related, so my -- my feeling is that risk-significant systems ought to be safety-related, or maybe you should do away with the whole safety-related concept and not have that, just have what's risk-significant and what's not. And the things that are risk-significant should be carefully dealt with.

CHAIRMAN BONACA: I think the important thing here may be, you know, the quantitative statement. I mean, what does it mean in the context

of AP1000 risk significance? I mean, I believe that --

MEMBER ROSEN: AP600. Because we haven't gotten to this problem on AP1000 yet.

CHAIRMAN BONACA: Okay. But, yes, anyway. If I understand it, I mean, because of the reliance on passive systems, there was no idea -- this is just a backup, and I don't know quantitatively how they estimate this.

MEMBER KRESS: You're exactly right. They certified AP600 under the adequate protection route. They didn't certify it under risk regulations, and they didn't need these to meet their design basis accidents. And they relied on only passive systems. But when they went to the PRA, they showed that it had some risk significance and --

MEMBER ROSEN: In fact, they are risk-significant.

MEMBER KRESS: Yes.

MEMBER ROSEN: That's what their PRA says.

MEMBER KRESS: Yes.

MEMBER ROSEN: So now --

MEMBER KRESS: Yes. So the question is: how do you -- I mean, they meet all of the licensing requirements without making it risk-significant.

CHAIRMAN BONACA: So they still have value because it may be either 10 to the minus I don't know what, but --

MEMBER ROSEN: What I think you're saying -- we're having a discussion here that has very little to do with the construction inspection program. But it has to do with how AP600 may have been licensed -- certified, rather.

MEMBER KRESS: Yes.

MEMBER ROSEN: And what I gather from this is that the discussion is that these diesel generators don't need -- aren't needed to meet any design basis accidents. However, when you get into severe accident space, they have important functions to reduce the severity of the accident.

MEMBER KRESS: And we recognize this, the staff recognizes this, so they came up with what was called RTNSS, regulatory treatment of non-safety systems. This was one of the components with that, and they have a whole procedure for what they're going to do about these things. And they're not going to forget about them.

And they will get inspected, they will get tested, they will get -- etcetera, etcetera, under this RTNSS program.

CHAIRMAN BONACA: But if you measure it quantitatively, I don't -- I'm not familiar now with the members. Probably they are -- except in maybe terms of quantitatively, it is not a large contribution. It's simply because the core damage frequency for the plant is so far -- so low.

MEMBER KRESS: It's so low.

CHAIRMAN BONACA: It's so low. So, therefore, they --

MEMBER KRESS: But still, it's risk-significant in terms of that low --

CHAIRMAN BONACA: That's right.

MEMBER KRESS: -- you know, it contributes a significant amount to that low CDF.

CHAIRMAN BONACA: And the whole concept there of a passive system is the one of --

MEMBER KRESS: It's a different measure of risk significance.

CHAIRMAN BONACA: -- measure of active components you have to qualify under a nuclear program.

MEMBER SIEBER: Well, the design certification process is deterministic.

MEMBER KRESS: It's deterministic, exactly.

MEMBER SIEBER: Yes. And so you need to develop a design basis that meets a certain set of criteria. Once you do that, then you need to go out and do a PRA and say, "I can enhance the safety of the plant having these other systems, but the design basis says you don't need them." Okay? And so that's why you end up with -- in this sort of never never land where you have risk-important systems out there that are active that are not relied upon to meet the design basis accidents.

MEMBER ROSEN: Well, I appreciate my colleague's explanations for this, because I -- it's very helpful to me. I feel much better about that, but I feel -- I still feel pretty awful about the whole idea --

(Laughter.)

-- that you end up with risk-significant systems that are not safety-related. I mean, it just -- I mean, it just seems a way of contorting the whole process, the whole thing. It makes it much more difficult to --

MEMBER SIEBER: Well, you have my sympathy for --

MEMBER ROSEN: This is an irrational process made for irrational --

CHAIRMAN BONACA: But you could keep adding layers of these, and still they will be risk-significant. The only issue is, what does it mean quantitatively? Maybe, you know, contributing to a sequence to reduce it from 10^{-7} to 10^{-8} is still risk-significant. But, you know, so you have to stop at some point I think.

MEMBER ROSEN: But see, Mario, I wouldn't call that risk-significant.

CHAIRMAN BONACA: Well, because --

MEMBER ROSEN: When you -- it's only risk-significant when you're talking about -- when you get your microscope on and looking at the individual ADAMS.

CHAIRMAN BONACA: Because you're implying a cutoff point and --

MEMBER ROSEN: Yes.

MEMBER SIEBER: There is a practical difference, too, in the AP600, or the AP1000 even more so. You have a small break LOCA, and you use the ADS system, you know, you're going to have a messy containment when you're done. It would be far better to employ an active system where all you really had to do in the cleanup was deal with what the small break LOCA was.

MEMBER KRESS: That's their plan. That's their plan.

MEMBER SIEBER: And so, you know, it's nice -- if I had one, I'd like to have those active systems there, even though I might not rely on them.

MEMBER ROSEN: For your safety case, to make the safety case.

MEMBER SIEBER: Yes, right.

MR. SEBROSKY: This is Joe Sebrosky. If you'll look at the AP600 final safety evaluation report, and the draft safety evaluation report for the AP1000, there's a chapter dedicated to regulatory treatment of non-safety systems. It's either Chapter 21 or 22, and it provides the background on the staff's philosophy on how they determined what systems needed regulatory treatment and what that regulatory treatment was.

MEMBER SIEBER: Right.

MEMBER ROSEN: Well, if I was king of the world, I would just reclassify them as safety-related and get on with it.

MEMBER SIEBER: Okay.

MEMBER ROSEN: And then the whole thing -- problem goes away, but that's why I'm not the king.

MEMBER KRESS: Then you wouldn't have this

chart with four different categories.

MEMBER ROSEN: Right. I wouldn't have a chart at all. I'd actually have the PRA before you -- once you get the design, then you decide what's risk-significant, and you apply your QA programs to that and make sure those come out right, work fine, and you're done.

MEMBER KRESS: Did you call him a rationalist, Dana?

MEMBER ROSEN: Don't answer.

MEMBER POWERS: In a kind mode, yes. And I think you're doing violence to defense-in-depth with your autocratic approach there.

MEMBER ROSEN: No, not really. I have the highest regard for defense-in-depth, because I know I don't know everything. And the things that I don't know --

MEMBER POWERS: Now that's a revelation.

(Laughter.)

MEMBER ROSEN: I think I'll just reference Donald Rumsfeld's remarks about knowns and unknowns.

MEMBER KRESS: At this time, we're going to -- I think you're basically finished?

MS. ASHLEY: I am.

MEMBER KRESS: Yes. I wonder if an NEI

representative wants to make any comments. You're welcome to.

MR. BELL: Thank you, Dr. Kress.

Good morning. My name is Russell Bell. Hello, again. I appreciate the committee's interest in this important topic. It's clear from the discussion that you appreciate the importance of the construction inspection program, and in particular the ITAAC verification element of it. I mean, this is for the Part 52 rubber meeting the road.

I just wanted to underscore the priority that the industry places on this -- these issues for just a moment. It came up somewhat today, but just to remind ourselves, the whole reason for ITAAC -- or a fundamental purpose of ITAAC is that questions material to whether or not an ITAAC acceptance criteria is met formed the scope of the post-construction ITAAC hearing.

Now, the intent of that hearing -- the intent of Part 52 is to resolve as many issues up front at the COL as possible, and to have a very narrowly focused hearing, if necessary, at the end focused on, again, whether these -- this set of acceptance criteria was met or not.

You bet we're pressing Mary Ann and the

staff for as much clarity on the key aspects of the construction inspection program and the ITAAC verification process as we can. I mean, just to be perfectly frank, the predictability and the certainty that's expected of Part 52 derives from this whole process.

So you bet we're very interested, and we provided substantial comments to the staff on October 30th on their framework document and look forward to followup discussions on that. I can certainly -- if the committee doesn't have that, I can certainly provide -- provide that to you.

And just for a couple of minutes I could underscore what I think are -- there are a number of comments that we made back, but they all relate to a central concern, that I'd just like to paint that picture for you.

If you say that questions material to whether an ITAAC acceptance criteria form the scope of the post-construction hearing, it becomes critical what you consider material to the determination that an ITAAC has been met.

Now, the CIPIMS is going to be a powerful tool that -- take the RHR pump example. I have no doubt it will be able to spit out all of the NRC

inspections related to that RHR pump. Okay? Now, in addition to the flow rate test that showed it pushed 925 gallons per minute, I have no doubt that the CIPIMS could print out vendor audit results, receipt inspection, storage warehousing issues, the routing of the cables to the pump, the qualification of personnel running the test that we're talking about. These are all important things.

CIPIMS is going to be so powerful I guess our caution to the staff has been you need to be careful how you use it. The concern is that while, you know, vendor audits, receipt inspection, how you store the pump while it was waiting to be installed, how you routed the cables, the qualifications of the guy routing the cables, while those things are all very important, they are not directly material to that test and the result that shows that the 925 gallons was moved by that pump against a certain head.

So those other matters are relevant, but not directly material -- relevant to the pump, but not directly material to the ITAAC. And this distinction is the one that we think needs to be carefully sustained.

Now, so we need to be careful in designing the ITAAC verification program and in documenting the

bases for ITAAC conclusions. If we're not careful, we may find ourselves litigating the post-construction -- the critical post-construction phase issues that are not material to the ITAAC conclusions and were never intended to be part of that carefully-focused opportunity at the end of the process.

The NRC and ITAAC verification process needs to distinguish between the large number of inspection activities that, while important and worthwhile, are not inspection activities that are directly material to the ITAAC. That distinction needs to be made.

Put simply, the ITAAC verification process needs to respect and sustain the distinction between Tier 1 and Tier 2. That was recognized in the certifications.

I'd like to have more discussions with the staff -- and we will -- on whether this is an administrative recordkeeping issue in terms of distinguishing between how, you know, inspection reports are characterized when CIPIMS spits them out. Is this administrative, or is it a deeper philosophical difference?

I mean, do we not agree that receipt inspection process is relevant but not material to

that ITAAC example you showed? If we have a philosophical or substantive issue there, that's what we're trying to get at as quickly as possible and resolve that.

MEMBER ROSEN: You know, Russ, you're confusing me a little bit --

MR. BELL: Okay.

MEMBER ROSEN: -- with your use of the word "relevant." If you said "related," I would be more comfortable.

MR. BELL: I'd be happy to. That's my intent. I think that's the right interpretation.

MEMBER ROSEN: Because if it's relevant, then I think you probably have to deal with it. But if it's related, it may not be. You know, the way you stored the pump, you might be embarrassed and surprised -- and wish you hadn't done it that way. But once you put it in the plant and it meets the ITAAC, the discussion should be over I think.

MR. BELL: There would be a number of thing related to that pump that are not material to the conclusion that that ITAAC was met. I'd be happy to amend my rhetoric. I think it's clearer that way. And that is -- but if you're getting that, you're getting our concern.

I didn't think that that concern -- I wanted to be sure to put that concern before you while you were -- had this on your radar screen. The staff has been doing exactly the right thing in preparing the framework document, putting it out in draft, holding the workshop.

We had a discussion -- continue to have discussions on this issue. We met just last month. And so we are happy with that thought process, and we look forward to continuing to work on these issues, which are just so important to the predictability and the certainty that Part 52 is intended to provide.

Thank you.

MEMBER SIEBER: I might just point out that when you use the pump storage as an example, you know, there is a requirement you rotate the shaft through a quarter turn every so many weeks to keep the bearings from getting messed up. That probably is not particularly relevant to whether the pump will pump when it's finally installed and tested.

But there are other situations -- for example, the storage of cable. If you store the cable outside and don't bother to keep the covering on the cable reel, the cable will probably function when you install it. But you've already taken some life out of

that cable by the way that you store it.

So each one of these things, in my opinion, has to be judged on its own individual merits and not necessarily saying, you know, it's related but not relevant. And I think the inspectors in the agency need to be able to view each one of these situations on its own merits. So that would be my only comment. But I agree with you that some of these things -- the relationship is -- is remote.

MEMBER KRESS: Okay. Any other comments from members? If not, I'll turn it back to Mario.

CHAIRMAN BONACA: Thank you.

MEMBER KRESS: Thank the speakers for a good presentation.

MS. ASHLEY: Thank you.

MR. SEBROSKY: Thank you very much.

CHAIRMAN BONACA: Thank you. Any additional questions or comments from the public?

Thank you very much for the presentation.

Before we take a break, since we are ahead of time, I would like to look at the reconciliation of ACRS comments and recommendations. The evaluations are all saying that there are -- the answer is acceptable, but let's go through them one by one.

The first one has to do with Draft Final

Regulatory Guide XXXX, "An Approach for Determining the Technical Adequacy of the PRA Results." We have Mike Snodderly here that has performed an evaluation of that.

Mike, do you want to tell us as to the acceptability of the response? Dr. Apostolakis is not here yet.

MR. SNODDERLY: Yes. As you said, Mario, George isn't here yet, but I found the response to be acceptable. The key is if you look at the last sentence, they committed to developing guidance for performing uncertainty and sensitivity studies, and we're awaiting that -- that guidance. That's really the key scheduled in the future activities, and we should expect that in early 2004.

CHAIRMAN BONACA: Okay. But they have agreed to our recommendations in general.

MR. SNODDERLY: Yes.

CHAIRMAN BONACA: And they have included also comments in their document --

MR. SNODDERLY: Yes.

CHAIRMAN BONACA: -- so fine.

The second response we got was regarding the review standard for extended power uprates, and I believe Ralph Caruso performed an evaluation of that.

MR. CARUSO: It was a positive letter to the staff, and the staff responded appropriately. And we'll get a chance to see how well it gets applied with Vermont Yankee. And as I pointed out here, there are some early indications that the staff got the message in terms of the fact that Vermont Yankee took a very -- are we on the record?

MEMBER SIEBER: Yes.

MR. CARUSO: They took a position about testing which was not as rigorous as one would hope, and the staff responded --

MEMBER SIEBER: Appropriately.

MR. CARUSO: -- appropriately to that lack of rigor. So I think that they got the message.

The issue of the test -- the independent analysis, though, is open. And I've not heard much about any development of any analysis program. That's a non-trivial effort, and it has never gotten much support. But other than that, I think we're fine.

CHAIRMAN BONACA: And the third letter response to us is regarding Generic Issue 186, heavy load. And, Jack, you were the author of the letter, and I don't know who performed --

MS. WESTON: Magg. And I'm here. Yes. The -- as you know, the committee's conclusion and

recommendation was to support the staff's recommendations. And there were four action items that the staff recommended that they thought would enhance current guidance, and the committee supported that.

The EDO's response indicated that the first three items would be dealt with with NRR in terms of evaluating the capabilities of these rigging components, endorsing the ASME code, and reemphasizing the need to follow and reinforce NUREG-0612. And the other will be looked at in the Office of Research.

So the response was satisfactory. They are going to follow through with the staff recommendations.

CHAIRMAN BONACA: Okay, good. All right. We're done with this. I think we should take a break. Come back at 10:45.

(Whereupon, the proceedings in the foregoing matter went off the record at 10:18 a.m. and went back on the record at 10:45 a.m.)

CHAIRMAN BONACA: Okay. We are back into session, and we now are going to hear a presentation on proposed reviews to SRP Chapter 18, Human Factors Engineering. And Mr. Rosen will lead us in the

presentation.

MEMBER ROSEN: Thank you very much, Mr. Chairman. We had an interesting subcommittee meeting earlier this week, and we'll -- I've asked the people who were at the subcommittee meeting from the staff to come back here and talk about a couple or three different things to highlight for the full committee what the issues were. And I'll turn it over to J to lead the -- to J Persensky to go through that discussion.

MR. PERSENSKY: Thank you.

Good morning. My name is J Persensky. I am the senior technical advisor for human factors in the Office of Research. We're here today to talk about a very large package, as you all know, but it's a package that has taken many years to come by. And actually, if you look at the very last two -- they're not slides, but attachments to your slide package, there's a series of NUREG/CRs which served as the technical basis for a lot of this work.

This work has been done on a very cooperative basis with our colleagues from NRR. It wasn't just a research product. Also, we spent -- we worked hard with our contractors. Our primary contractor on this has been Brookhaven National

Laboratories as far as putting together the guidance documents and a lot of the NUREG/CRs.

Some of it is based on work that was done at Halden, some -- actually some original research that we did at the Halden simulator. The people that are here today that are -- have been involved with it, of course, are the speakers at the table, but also our colleagues from BNL are John O'Hara and Jim Higgins. Dick Eckenrode is here from NRR. Who else? Jill Kramer from Research, Gareth Parry. As I said, it's been a cooperative and long-term project on many of these.

The documents do contain a great deal of information. That was one of the things that came up at the subcommittee. But it is, again, based on a good deal of research, as well as use. Since these are revisions to existing documents, we made use of the information and feedback we've gotten from their use, both from our internal use as well as use by others.

And as I said, there was some original research. Some of it is based on stuff that we've taken from other agency standards, from international standards, but it has been distilled and adapted for use in the nuclear community as well as the -- outside

of the nuclear industry many people have been using it.

Oops. Let's go back one.

Our agenda, the introduction I'm doing now, we'll have a brief overview of the entire package, the SRP and the related documents that came with it. The subcommittee asked us to focus on some particular elements of this package, particularly NUREG-1764, and the risk-informed screening process that's part of that document, as well as some of the human factors engineering review criteria and how we made some selections and where things fit in the whole thing.

They also asked us to address some of the remarks that were made in the September 24th letter from the ACRS -- the September 24, 2002, which was a presentation that I was involved with as well as some of our HRA colleagues from Research.

Also, we received some public comments. Particularly, a speaker came to the subcommittee, an individual -- Dr. Rob Fuld, Robert Fuld -- and he made some comments that the ACRS -- the subcommittee asked us to address. We do have some slides to that effect.

And they were related in part also to your 1995 letter on NUREG-0700. Mr. Fuld's comments were

primarily related to 0711.

And I'll make some closing statements, and then we'll have ACRS discussion. Not that I'm discouraging any discussion during the presentation, but we do have a lot of material to cover in a relatively short period of time.

The next slide gives you -- basically, our purpose is to ask for your endorsement of the four documents -- the SRP Chapter 18, NUREG-0711, NUREG-0700, and 1764. These documents will be used -- are intended for use by the staff to review applications for new reactors, applications for modifications to the control room, and also for changes in operator action.

The presenters -- myself, Jim Bongarra from NRR will be presenting next, and the overview of the package. Susan Cooper from RES, one of our HRA colleagues, will be talking about the screen -- risk screening method, and Paul Lewis will respond to the comments that were made from Dr. Fuld and from others. And I'll talk to the September 24th letter.

With that, Jim, you're on.

MR. BONGARRA: Thank you.

MR. PERSENSKY: Unless there are any questions over this part of it.

MR. BONGARRA: Good morning. My name is Jim Bongarra, and I'm the -- have been the NRR technical coordinator for the material that we're going to be presenting to you today. I'm also one of several users of the materials.

And, indeed, what I'd like to do is quickly just give you a brief overview of the standard review plan Chapter 18 itself and the several supporting documents that we have to discuss today.

Chapter 18 has been around since, really, at least the early 1980s. And it was originally formatted really to cover two -- the two major areas, two major topics that the agency was involved in at that point in time -- detailed control room design review and safety parameter display system.

We, of course, finished the reviews of those two areas back in the early '90s. Chapter 18 is the agency's principal human factors engineering guidance. It's a high-level source document. It also cross references to other chapters of the standard review plan that are related to human factors engineering. For example, Chapter 13 is referenced in Chapter 18, because there's a good bit of information in Chapter 13 that relates to training and staffing and qualifications.

The most recent revision to Chapter 18, prior to the one that we're talking about today, was done in 1996. And the staff at that point revised Chapter 18 essentially to align it with the work that we were doing at that point in time related to advanced reactor design certifications.

The 1996 version of Chapter 18 was published as essentially a draft. It was a work in progress, and, therefore, really, to the best of my knowledge, was not reviewed by the ACRS at that point in time. It did, however, receive public comment.

Since 1996, there have been numerous updates to several of the documents that are referenced in Chapter 18. For example, we upgraded -- NRR upgraded sections in Chapter 13 a few years ago to address issues related to license transfers. That was a topic that we were involved in a few years ago, and we had to make modifications related to that issue.

Also, since 1996, there has been much in the way of progress made to upgrading the guidance in both NUREG-0711 and NUREG-0700 to better address changes in technology that have occurred with relationship to human system interfaces.

The revisions to all of these documents, by the way, have been sent out or were sent out back

in 2002 for public comment. And as J mentioned, I think we indeed did receive public comments on the standard review plan and the related NUREGs, and those public comments were part of your package.

VICE CHAIRMAN WALLIS: Are these reviews essentially performance based? Do you have to have some measure of performance that has to be attained by the people?

MR. BONGARRA: To some degree, I would say that they are performed based. There are different criteria, really, to assess different aspects of the areas that we're looking at. It's not totally performance based. There are -- well, for example, there are some very, as the committee knows, detailed guidelines essentially in NUREG-0700 that are essentially -- again, it's guidance, but we do review to those guidelines -- human system interface design guideline.

VICE CHAIRMAN WALLIS: That would seem to be the guiding principle. And whether you need five people or four people to do a job is really based on how well four people can perform compared with five people. So that performance would seem to be the key thing, and the thing that's difficult is how to characterize, measure, and control, monitor, and

everything, that performance.

MR. BONGARRA: I think I have a comment from John O'Hara.

MR. O'HARA: If I might. John O'Hara from Brookhaven Lab. Just to maybe say this a little differently than Jim said it. I think as the review proceeds earlier in the design, the evaluations are more based on comparison to guidelines and that type of material.

And then, as the design matures, there is more and more performance-based evaluation, so that actually the culmination of that is an integrated system validation which is performed, you know, prior to design certification. And that is performance based, using performance criteria and using simulations and things like that.

VICE CHAIRMAN WALLIS: Thank you.

MR. BONGARRA: Next. Second slide.

Okay. What changes have we made to the standard review plan? Essentially, we have revised the draft from 1996, and we've modified review elements and acceptance criteria to agree with the latest changes that have been made to NUREG-0711. We added review criteria for plant modifications, and we added a risk-informed, graded approach to address

amendment requests to credit human actions. These are the major changes essentially that have been made to Chapter 18 since 1996.

Next?

Why did we make the changes? Well, in addition to wanting to make the -- make certain that the staff is prepared to meet the future challenges of -- to human factors engineering posed by digital technology, the changes also reflect feedback essentially that we received from the public and stakeholders.

Over the years also since we were involved in the -- in completing the evolutionary reactor reviews, we have also learned some lessons, and we've attempted to incorporate the results of those lessons learned into our guidance document.

We have also received feedback from experience with foreign countries that have used the standard review plan and the related guidance documents in upgrading their plants or in designing new ones. We have also incorporated results from various research efforts into the revision -- research in the area, for example, of hybrid control room, soft control design and development, and computerized procedures.

The Halden reactor project, for example, has been a source of information for us over the years, and we have been attempting to reflect that input from Halden into our --

MEMBER POWERS: Is there something that I can look at that summarizes the utility of the Halden project for your effort?

MR. BONGARRA: J, do you want to --

MR. PERSENSKY: Well, it depends on what level of detail you're talking about. We have a --

MEMBER POWERS: Not very detailed.

MR. PERSENSKY: -- list of those Halden reports that have been incorporated into the various guidelines documents.

MEMBER POWERS: You have that list already, or is that one that --

MR. PERSENSKY: Pretty much. I think John had put that together in the past for us.

MEMBER POWERS: I'd sure like to see that. That's probably the level of detail that I'm looking for right now.

MR. PERSENSKY: Okay.

MEMBER POWERS: Okay. I just -- I mean, as you know, I have to communicate why the program is useful.

MR. PERSENSKY: I understand. Thank you. We'll get that to you.

MR. BONGARRA: To quickly summarize, SRP Chapter 18 has been used by the NRR for over 20 years. It was revised in 1996 as part of the NRR's effort to address advanced reactor design reviews. It's a principal high-level source document for human factors guidance in the NRC.

It relies on several detailed source documents for guidance to perform human factors engineering reviews, and we've also upgraded the chapter to include a risk-informed screening method to better evaluate licensing amendments that credit human actions.

Moving on to NUREG-0711, which is the human factors engineering program review model, 0711 was originally characterized, or identified rather, as the program review model. And it had its origins in the early days of advanced reactor design reviews, the early 1990s.

NUREG-0711 is the NRC's principal human factors engineering source document. The program review model was first published as NUREG-0711 in 1994, once again to support the advanced reactor reviews that the staff was conducting. It was again

revised in 2002.

It's designed to be applied to a variety of human factors reviews, ranging from reviewing conceptual human factors engineering designs, as in the case of advanced reactor submittals, to discrete control room modifications.

The PRM is applicable to the plant's life cycle, and the elements of the PRM can be applied in reviewing a process and product as well. For example, with regard to, for instance, doing a task analysis, the PRM has guidance in it to allow us to look at the process that a licensee would use to conduct a task analysis as well as the final product of the task analysis.

Also, NUREG-0711's elements are used in other related applications. For example, our new NUREG-1764 tailors the use of several of the elements in NUREG-0711 using a graded approach to reviewing changes for human actions.

This next slide is -- really illustrates the overall structure of the program review model, the 12 elements, and the major design review areas that each element is related to. The two newest elements are highlighted under the implementation and operation portion of this graphic.

MR. PERSENSKY: And, Graham, to get to your point, the -- particularly the two last columns on that would address the performance issues more thoroughly.

MR. BONGARRA: Changes from the prior revision to NUREG-0711 are really shown on this slide in some detail. The applicability of the guidance has essentially been expanded to again address all types of human factors design reviews.

The addition of the two elements that I previously mentioned and the changes that have been made were principally in the format and content of the four elements that were shown. Essentially, the technical nature of these elements did not change in this revision.

Next?

NUREG-0700 -- that is, the human system interface design review guideline -- this document dates back to about 1981. It has been used extensively by the NRC and the industry, certainly in the wake of TMI, to complete the -- at that point in time, again, the detailed control room design reviews and SPDS reviews.

It's the agency's principal document for reviewing human system interface design. And the

major categories of the guidance are illustrated in this slide, and I won't go into specific detail on those.

Next?

Again, how did we change NUREG-0700 from the previous revision? We upgraded the guidance essentially to address digital technology. And, in particular, there are guidelines now that are incorporated in 0700 that relate to computer-based information system interfaces, soft controls, computer-based procedures, and issues related to essentially -- we call it interface management and navigation.

VICE CHAIRMAN WALLIS: What do you mean by "information system interfaces?" Is that something like a GUI? I mean, is that interface between people and the computer, or is it within the computer itself?

MR. BONGARRA: It's really a combination of the two, a combination of the two. We are -- we have guidelines that identify, for example, techniques to enhance the way information is presented to users, guidelines that would envelope a broader spectrum in terms of how information should be presented on a -- you know, on a screen as well as interacting with it.

Next?

VICE CHAIRMAN WALLIS: I just wonder how -- again, are there measures for that? And in the case of the performance of a mechanical device like a pump, you have measures of performance. Do you have ways of measuring the effectiveness of the communication of information by computer to people?

MR. BONGARRA: Well, a good -- I think a good part of the way that would be identified would be through essentially the exercise of -- you know, of the actual interfaces.

VICE CHAIRMAN WALLIS: Do you try them and see which works best?

MR. BONGARRA: You try them. There is the -- the element, of course, within the overall program review model a verification and validation, although that comes at the very -- typically comes at the very end of the entire process.

There is also -- that is also an iterative process. It takes place during the design, or it's meant to take place during the design as well.

I see my colleague John also has -- John O'Hara has further elaboration on this.

MR. O'HARA: I apologize, Jim.

MR. BONGARRA: That's okay.

MR. O'HARA: A lot of the guidance that's

in NUREG-0700 is based on performance. For instance, we did a lot of research ourselves, to give one example, on alarm systems and types of alarm processing. That knowledge was gained through things like doing simulation studies, varying the types of processing, varying the types of displays, looking at the impact of those changes on the operator's use of the alarms and the alarm information.

And that cuts across the board for all of these areas. And what we did as part of the technical basis is developed this knowledge about how design characteristics impact performance. Then we abstract out of that principles that can be used to actually just review the designs themselves. But those principles reflect impact on performance.

CHAIRMAN BONACA: There was an extensive amount of this kind of verification in design -- in control room designs.

MR. O'HARA: Yes.

CHAIRMAN BONACA: Okay. So I imagine that you also utilize a lot of those insights.

MR. O'HARA: Oh, absolutely. The research that this work is based on is not just NRC research. It's the tremendous wealth of research that is available through conferences, papers, a lot of them

done by vendors because doing performance-based evaluations now is a common design practice, given that engineering simulators are so sophisticated.

And we basically look at all of that research, and we look for the common threads, and we abstract out that which is justifiable based on the research. We don't just make this -- you know, it's not just made up. It's based on what the research is telling us.

MEMBER POWERS: When I first got to the point of interacting on this human factors area, J Persensky gave me what I continue to grasp onto as keen insight he has on this overall field. And that is that it's a huge field, it's an enormous field, and NRC can't possibly expect to do things to dramatically impact the whole thing.

We have kind of a full-time job just keeping track of everything that's going on, collecting that, and then distilling out that fraction that will aid the agency's processes, and whatnot.

It's very -- it's a very interesting kind of research area for the NRC, and somewhat different than many of the other research areas, like reactor fuels. I mean, we could be the world's experts in reactor fuels. It's more incumbent on these people to

keep a breadth view than it is a specialized view, and at the same time keep the finger on what -- the line organizations that the NRC needs to get out of all of that.

He told me he had a tough job, and by the time he was done I actually believed him.

(Laughter.)

MR. BONGARRA: Next?

The next item is 1764, NUREG-1764, which is guidance for the review of changes to human action. This is the latest edition to the guidance supporting our human factors engineering views, and I know that the committee is interested in --

MEMBER ROSEN: I want to be sure you said addition, not edition. This is an addition.

MR. BONGARRA: Sorry. NUREG-1764 is a risk-informed, graded guidance document, and its purpose is to help human factors engineering reviewers to consistently determine the appropriate level of review effort to put into evaluating license amendment requests that essentially credit human action.

In the recent past, NRR has been reviewing many of these types of requests. Licensees essentially are examining their design and licensing bases now, and they're coming up with modifications

that many times involve manual operator actions to sometimes supplement equipment modifications or as compensatory manual actions.

Susan Cooper and Paul Lewis will explain in more detail the specifics of NUREG-1764. I just really want to kind of set the stage for it at this point.

Next slide.

By the way of a quick overview of 1764, the guidance consists of really three portions. There's a risk screening portion, there's guidance for human factors reviewers to use in actually evaluating the submittals, and there is a portion or criteria essentially that assists in making a final decision on the -- determining the acceptance of that change request.

MEMBER ROSEN: And, Jim, you didn't mention -- it's on your slide, though -- that when you're doing the risk screening it's different for a risk-informed submittal from a non-risk-informed submittal.

MR. BONGARRA: Indeed. That's true. I was just going to mention that. NUREG-1764 is indeed structured to address these two types of submittals -- either a risk-informed or a non-risk-informed

submittal. And there is a -- the screening process is somewhat different depending upon what type of submittal is presented to us.

1764 is perhaps a first-of-a-kind document, in the sense that -- I think anyway -- it's an attempt that the staff has made to apply risk methods to human performance issues that have been traditionally -- that is, the methods have been traditionally applied to systems and equipment performance.

And, again, I will -- won't belabor the overview here, but we're looking at this as -- and this is one of the reasons we've come before the committee -- is somewhat as a work in progress. It's -- you know, it's an attempt here at this point to really do something slightly different, and we're -- we have confidence in what we have, and the staff will present the details to you in just a moment.

Next? I'm running out of time here.

Well, this last slide actually is really, again, just a graphic -- it reiterates the relationship of the various review areas within the standard review plan and how they are treated and addressed by the different supporting NUREG documents that we've just reviewed with you.

With that, I'll stop and turn this to --

MR. PERSENSKY: Unless there are any questions, we'll turn it over to Susan.

Susan?

MS. COOPER: Susan Cooper, Office of Research, Probabilistic Risk Assessment Branch. As Jim mentioned, I'm going to be talking about one of three elements in NUREG-1764 -- that being the risk screening method. This is the method by which decisions can be made about grading, how human factors engineering reviews could be done, allowing the staff, then, to focus their resources perhaps better on the more appropriate actions.

Next slide. Oh, you're already there. Okay.

There are four major steps to the risk screening process, and they align with three inputs, and then an integration of those three inputs. The first step and first input is the determination of a risk categorization as it's been -- as performed by Reg. Guide 1.174.

The second input -- second --

VICE CHAIRMAN WALLIS: Excuse me.

MS. COOPER: Yes.

VICE CHAIRMAN WALLIS: Do you advise on

acceptable methods for calculating this change in risk due to human performance?

MS. COOPER: I'm sorry. I --

VICE CHAIRMAN WALLIS: Do you have anything to say about what are acceptable methods for calculating this change in risk due to human performance? If you changed human performance in some way, does it change in risk presumably? And the question is: how do you put this into the 1.174 framework?

There has to be a method for going from some change in the control room or people or something --

MS. COOPER: Well --

VICE CHAIRMAN WALLIS: -- to calculating the change in risk. And I'm not sure that we have methods for doing that that are --

MS. COOPER: Well, this process is not really designed to do that per se. What it's -- the purpose of the process is to allow the staff to decide which of the different human actions or different license requests that involve human actions they ought to look at to make such an assessment.

Now, as part of the process, there are -- I was just getting to step two where importance

measures are calculated for the human actions. And we do have a way to relate that to changes in core damage frequency, and then, therefore, make some different assignments based on that as to what level of review then should occur.

VICE CHAIRMAN WALLIS: So this change in risk is something that's submitted by a licensee saying that, "We want to do this, and this is the change which we calculate."

MS. COOPER: The license --

VICE CHAIRMAN WALLIS: Did you advise them on what you would accept as methods for doing that calculation?

MS. COOPER: Well, Reg. Guide 1.174 already is out there and is being used by the staff, and the public knows about that. What is contained now in 1764 is then some calculations of importance measures, just getting to step two here and getting ahead, and that's consistent also with what's in Reg. Guide 1.174.

VICE CHAIRMAN WALLIS: That sort of assumes that you can calculate the change in risk.

MS. COOPER: Yes. I mean, there's no difference --

VICE CHAIRMAN WALLIS: That's the question

I have is that there is -- I don't know that we have a good basis for calculating these changes in risk due to human performance changes.

MS. COOPER: I don't see any reason why -- if something is calculated in the PRA, a human failure event, basic event probability, why you can't -- and you can -- make the same kind of calculation for that event as you can for a piece of equipment.

Now, you can make some arguments about how -- you know, uncertainties about it or the maturity of the methods that go into making that calculation. That's a different question, and we're not really dealing with that here.

MEMBER APOSTOLAKIS: I think that's the question, actually.

MS. COOPER: We're trying to work with the state of the art as it is and use it to the best that we can to try to make an informed decision about how to make good choices about focusing resources on reviewing licensee requests.

MEMBER APOSTOLAKIS: But there is huge model uncertainty, Susan, in human reliability. So even if you don't concern yourself with changes in risk, you use importance measures, I mean, those will have to use the probability that was calculated using

some model for the human action.

MS. COOPER: Well, we are -- I mean, we are using the inputs from Reg. Guide 1.174, which is a change in risk.

MEMBER APOSTOLAKIS: 1.174 tells you what to do after you calculate the change. The question is, in calculating the change, what model do you use? 1.174 doesn't tell you that. 1.174 says use, you know, a good PRA. So --

MS. COOPER: And this guidance does not address that. That's not part of our job -- to try to look into those particular issues.

Now, with respect --

VICE CHAIRMAN WALLIS: It seems to me a scale of the whole thing, though. If you can't calculate the model -- if you don't have a good way of modeling this --

MEMBER APOSTOLAKIS: Right.

VICE CHAIRMAN WALLIS: -- then you're just playing games with --

MS. COOPER: Well, I don't know that I would -- I would agree with the fact that you -- we don't have a good way of modeling human reliability. There are some methods that may be better than others, and when you compare it to other aspects of PRA it may

not measure up.

But, I mean, you know, compare HRA to, you know, seismic risk analysis or some of the other areas where we have large uncertainties. And then, you know, you can get a better basis. But I don't even --

MEMBER APOSTOLAKIS: But I think the difference between seismic and HRA is that the seismic fellows have recognized that the uncertainties are due to models, and they are handling them explicitly. In HRA, different groups develop their own model, and they don't compare to what other people are doing.

MS. COOPER: Well, all I can --

MEMBER APOSTOLAKIS: One last point. There is a paper by Andre Pousse in the PSA conference of 1989 that shows a table of different people using the same method, and the same people using different methods, the results that they get for HRA. And they are scattered all over the place.

Now, this committee has seen a variety of models being used. In some of the power upgrades people say -- some licensees say, "Well, and we use the EPRI methodology." And then we find out that the NRC never really reviewed the EPRI methodology. Nobody knows, unless you are a member of the EPRI alliance, what it is.

So it's these, really, issues that concern us. It's not -- I mean, the overall approach you are describing is fine.

MS. COOPER: Well, all I can say is that I think the approach does address the basic concerns about, let's say, maturity in HRA on uncertainties in the following ways. First of all, Reg. Guide 1.174 and SRP Chapter 19 already talk about quality of PRA and quality of HRA and uncertainty. And that doesn't change so far as how the input from Reg. Guide 1.174 in step one is done. So that's already there.

Then, we have this importance measure calculation, which, you know, we can argue about its robustness. But then we have a third step yet, and that's where we bring -- can bring in qualitative information to ingest further what we think is the appropriate level.

And then, as we can see when we get to the very end of the presentation, we have a table out of Reg. Guide -- I'm sorry -- NUREG-1764 that shows how we put all of these three inputs together and make decisions. And you can see, again, from the table that there are places where you can make adjustments.

And in the end, the worst thing that can happen, the worst consequence is that perhaps at the

end of this process you should have gone to a higher level of review. And I guess I would argue that that's probably still not the last line of defense, because at the same time that the human factors people may be looking at a human action, the SPSB folks over in NRR are looking at the PRA side, and they still may find a concern and come back to the human factors people and say, "Look, we think that maybe you ought to spend -- you know, look at this pretty closely because of our concern."

So I still don't think this is the last line of defense.

MEMBER APOSTOLAKIS: You will talk about the --

MS. COOPER: And I think we have -- I think there are a number of levels here that we've built in.

MEMBER ROSEN: Yes. George, I think we could stipulate that there is a lot of uncertainty about the human reliability models and modeling, and let them go on with that, and then come back to that at the end and see how they use it.

MEMBER APOSTOLAKIS: Okay.

MS. COOPER: Okay. I think I'm still on slide 18, talking about step number two where the

input there is the evaluation of risk significance of the human action not being performed correctly.

Step three, the third input then is qualitative information, qualitative evaluation of human action. And then step four is the integration of those three inputs. And I'll go through each of the steps with a little more detail.

Next slide.

In step one, as I said, the input here is from calculations done with Reg. Guide 1.174 where the delta CDF is calculated, and then an assignment is made into one of three regions.

For the purpose of this particular screening process, if -- okay, we're on the next slide. If the license change request involves --

MEMBER ROSEN: The "HA" means human action.

MS. COOPER: Human action. Only involves a human action, and the assignment from Reg. Guide 1.174 is in Region I, we recommend that the most detailed level of human factors engineering review be done. If that's not the case, then we go -- proceed to step two, develop additional inputs to the overall screening process.

MEMBER APOSTOLAKIS: So let me understand

this. The first one says --

MEMBER ROSEN: Go back a slide.

MEMBER APOSTOLAKIS: -- what?

MS. COOPER: I'm sorry?

MEMBER APOSTOLAKIS: That you will do a detailed analysis?

MS. COOPER: Yes.

MEMBER APOSTOLAKIS: Region I is which one? Remind me.

MEMBER ROSEN: It's the high one.

MS. COOPER: Okay. Region I is the highest one in Reg. Guide 1.174. It is -- when Paul gets into his discussion, you'll find that there are also three levels of human factors engineering review where the Level 1 is the most detailed --

MEMBER ROSEN: This one basically says if it's a human action, and it's clearly risk significant --

MS. COOPER: Right.

MEMBER ROSEN: -- we're going to do a full review.

MS. COOPER: That's correct.

MEMBER APOSTOLAKIS: And delta CDF is in Region I.

MEMBER ROSEN: Right.

MS. COOPER: Right.

MEMBER APOSTOLAKIS: All right. Now, Region I is the rejection region?

MS. COOPER: That's not exactly the way Reg. Guide 1.174 states it. It's implied that there aren't going to be very many of those, but it does not say that it's an absolute rejection. So we -- this -- for that reason, this NUREG must address the fact that that's a possibility.

MEMBER APOSTOLAKIS: But the human factors evaluation -- let's say, you know, you're doing it and you say it, "Well, we're happy with the way they did it," you are still in Region I. So who is going to decide now whether --

MS. COOPER: Well, I -- that sort of speaks to a process that's over in NRR, and I don't know that I could speak to that. But all I'm saying is that because Reg. Guide 1.174 allows for the fact that there can be a Region I assignment that's not rejected out of hand, we must also consider that. Otherwise, we've got a gap.

MEMBER ROSEN: I mean, a licensee can come in and propose a change. That has a very significant human action delta CDF. I mean, they can do it. It's not likely, but they --

MEMBER APOSTOLAKIS: They can do it. The question is: what do we do?

MEMBER ROSEN: Well, you're about to hear that.

MR. PARRY: Can I add -- this is Gareth Parry, NRR.

MEMBER ROSEN: If you'll listen long enough, you'll hear that.

MR. PARRY: I think, really, the way to look at it is that if -- remember, the setting it in regions according to Reg. Guide 1.174 is really the use of a calculation using PRAs. I think the only reason that you would have for not rejecting it is to say that there was something about that calculation that was extremely conservative.

So I think that's the direction it would go, but it would be conservative enough to -- to make you realize that that's probably not the right reason.

MEMBER APOSTOLAKIS: So we have here a reversal of roles. The licensee comes with an extremely conservative analysis, and the staff says, "No, you are too conservative. You really deserve the change."

MR. PARRY: No. I think they'd have to make that -- they'd have to make that argument.

MEMBER APOSTOLAKIS: That's kind of unusual, though.

MR. PARRY: They'd have to make that argument.

MEMBER ROSEN: It will be very unusual.

MEMBER APOSTOLAKIS: Very unusual.

MEMBER ROSEN: No, no. Let's get through this and get to the more usual cases of --

MR. PARRY: The Reg. Guide is for the licensee, remember, not for the staff. So that they would have to make the argument that the analysis --

MEMBER APOSTOLAKIS: I think Susan put it in the right way, that the guide doesn't say that you are rejected outright, but there is a hell of a strong implication --

MEMBER ROSEN: There's a burden -- there's a burden to be --

MEMBER APOSTOLAKIS: -- you'd better not come.

MS. COOPER: Right. Why don't we go on to the next slide and go to step number two, the second input in the process. Here the risk significance of the human action not being performed correctly is evaluated. The way this is evaluated is using two different types of importance measures -- the RAW and

Fussell-Vesely importance measures.

And the results of this process in determining the importance measures then makes a preliminary determination of the level of review which is going to be combined with the other inputs.

VICE CHAIRMAN WALLIS: This seems to be easy when nothing is -- it's a yes/no. I mean, either she has flipped the switch or she didn't. I mean, that's, yes, they did, yes, they didn't -- but when not correctly means something much more complicated, like they misunderstood the whole situation, they did something completely incorrect that no one anticipated, or, you know, there are all kinds of ways of being incorrect.

MEMBER APOSTOLAKIS: As has been found out many times, correct is --

VICE CHAIRMAN WALLIS: Yes. So I'm not quite sure how you do this. But maybe --

MS. COOPER: Well, it has to be based on whatever event is modeled in the PRA, and that will be defined --

VICE CHAIRMAN WALLIS: It's a yes/no thing. You go this way or you go that way.

MS. COOPER: The failure modes and the failure states are defined. You know, that -- so

that's more or less a good --

VICE CHAIRMAN WALLIS: It doesn't take into account the human -- completely misunderstand the situation and doing something very inappropriate.

MS. COOPER: That rather depends on what they've modeled. I mean, it's possible that they could have modeled that.

VICE CHAIRMAN WALLIS: Sure.

MS. COOPER: I mean, it doesn't say that.

MEMBER ROSEN: It's the classic cognitive area you're talking about, where the human does the right thing for the wrong accident.

VICE CHAIRMAN WALLIS: When I get into trouble driving a car is not when I turn left instead of right; it's when I completely misunderstand the situation about what is going to do with his sports car. And, therefore, I do completely the wrong thing. And it's -- you know, anyway --

MS. COOPER: That's true. But this stuff does not get into any of the underlying layers of how the modeling was done. It's simply a mechanical test here at this point in time. The event, the basic event, is what it is in the PRA model, and this is a mathematical exercise to try to see how important this particular event is. The qualitative evaluation done

in the next step could possibly, you know, get into that.

VICE CHAIRMAN WALLIS: Okay.

MS. COOPER: All right? The next slide then goes into a little more detail about how the RAW importance measure is calculated. And the equation is shown here. I don't know that we need to go into -- unless someone has a question, I don't know if we need to go into any more detail there.

MEMBER APOSTOLAKIS: You select the ratio method.

MS. COOPER: I'm sorry?

MEMBER APOSTOLAKIS: You say, "We select the ratio method." That's what the second bullet says.

MEMBER ROSEN: Right.

MS. COOPER: Yes.

MEMBER APOSTOLAKIS: What other method is there?

MS. COOPER: There is more than one way to express some of these importance measures.

MEMBER APOSTOLAKIS: I thought that was a definition of RAW.

MS. COOPER: Jim Higgins, please, will you --

MR. HIGGINS: Jim Higgins, Brookhaven Lab. There is also the interval method, where you do calculate the delta expressed that way. And if you go back to the original 1983 Bill Vesely NUREG/CR, he articles both an interval method and the ratio method of RAW calculation.

And I guess when we first started developing the methodology here, we were using the ratios because we were trying to correlate the delta CDF to the Commission's safety goal of delta CDF. And so we were using the interval method.

But because of just what you raised, there was a number -- a bit of confusion among people because it hasn't been used recently, and so we just shifted back to this.

MEMBER APOSTOLAKIS: Yes. This is the standard of --

MR. HIGGINS: Which is the standard, and so that's --

MEMBER ROSEN: That's why we use it, you know, when you're doing --

MEMBER APOSTOLAKIS: Yes. The goal is to use this, you know.

MEMBER ROSEN: It's the new CDF over the old CDF.

MR. HIGGINS: That's correct. Yes. And we actually expressed it in this format a little bit differently, because we're -- as Susan will get to, we're calculating the differences in the regions based on the change in delta -- on the delta CDF.

VICE CHAIRMAN WALLIS: So the best thing you can do is have a big baseline CDF. Then your RAW is smaller?

MEMBER ROSEN: Unfortunately, that's true.

MR. HIGGINS: Well, that's -- in fact, you'll see here that's why the curves are -- look like they do. We reduce it to account for that.

Go ahead, Susan.

MS. COOPER: Okay. We're here at the next slide. This is showing the -- how the different level assignments then can be made using the RAW importance level. This slide does not show -- actually print out the levels, but everything above is Level 1, between the two lines is Level 2, and Level 3 is then below the second line.

MEMBER APOSTOLAKIS: I don't understand this. For what delta CDF is this calculated? It's a function --

MS. COOPER: I'm sorry?

MEMBER APOSTOLAKIS: It's a function of

the baseline CDF.

MS. COOPER: It's a function of the baseline --

MEMBER APOSTOLAKIS: For a given delta CDF?

MS. COOPER: No.

MEMBER ROSEN: I didn't see this chart before. This is --

MEMBER APOSTOLAKIS: It has to be for a given delta CDF.

MEMBER ROSEN: This is Duane Arnold, Perry, Nine Mile Point, Salem, and what else? Some other -- Point Beach or what?

MS. COOPER: The data points I'm going to have to let Brookhaven speak to. But the purpose -- the reason why this slide is here is to address a question that came out of the subcommittee meeting asking, you know, where did the level assignments come from from the importance measure calculations?

And actually, the next slide discusses the relationship, how this --

MEMBER ROSEN: Point of order. I don't get it.

MS. COOPER: -- was developed.

MEMBER ROSEN: Go back to that previous

slide. Why are you showing us data from these five plants?

MR. PERSENSKY: Ignore that. At this point, ignore the data. This was a convenient slide in order to respond to your comments.

VICE CHAIRMAN WALLIS: This is the only place where you present us data. Now, come on. Don't --

(Laughter.)

MR. PERSENSKY: And the data was part of the development of this in the first place. We were trying to just demonstrate that this is where the lines are and how we got -- and how the different levels would be affected.

The data was part of the testing that we had done at various times during the development of this process. It came from IPE data that --

MEMBER ROSEN: IPE data.

MR. PERSENSKY: Yes.

MEMBER APOSTOLAKIS: The question is: what does the curve, for example, that starts at 100 on the left and goes down --

MS. COOPER: Actually, let's go back a slide.

MR. PARRY: I think that's delta CDF of

10^{-4} is the top one.

MS. COOPER: If we could go back to --

MEMBER APOSTOLAKIS: So for a fixed delta CDF --

MR. PARRY: For a fixed delta CDF, it's the RAW -- it's the variation of RAW as you --

MEMBER APOSTOLAKIS: Which confirms what Graham said, that you are luckier if you have a higher CDF. right? Or a fixed delta CDF.

MS. COOPER: Right.

MEMBER APOSTOLAKIS: You increase the --

VICE CHAIRMAN WALLIS: That doesn't make sense. That doesn't make sense.

MR. PERSENSKY: No, because the absolute change is the same. The delta CDF is always 10^{-4} on that line.

MEMBER APOSTOLAKIS: Yes. So if you take the --

MR. PARRY: Yes. But all that's telling you is that the higher you have, the smaller your RAW is to get the delta CDF --

VICE CHAIRMAN WALLIS: Right.

MR. PARRY: -- which doesn't actually make you better. In fact, if you -- I think it puts you on a level playing field.

MEMBER APOSTOLAKIS: I don't think that curve really is very informative. Plotting it as a function of CDF doesn't really mean much.

MEMBER ROSEN: I don't know what that curve means either.

MEMBER APOSTOLAKIS: It's not a crime, but --

MEMBER KRESS: It means if you calculate a RAW for a given change in your human error action, or whatever, and your baseline CDF happens to be one times 10^{-4}, then if that RAW you calculate is like -- on this thing it looks like two or three, then it's -- it's two, then it's not permitted, or you would question it.

MS. COOPER: Well, it --

MEMBER KRESS: Because it's too big of a change.

MS. COOPER: But it's supposed to function the same way the curves or the tables that are in Reg. Guide 1.174, except to use the information of importance measures. As a matter of fact, it's based on some on that material.

I think Jim Higgins has a burning question here or a comment.

MR. HIGGINS: Yes. Maybe just to -- it

gets back a little bit to I think the confusion here is the reason we initially set up the acceptance criteria to be based on a delta CDF. It was incurred by failing the human action, and it was set up such that if you failed the human action that delta CDF would increase by no more than 10^{-4}. And that was our cut between Region I and Region II for this. And then, 10^{-5} was the cut between Region II and Region III.

But then there was a desire to convert it over to a RAW that people were more familiar with, namely the ratio method. So what we did is we used the same criteria -- namely, when you fail the human action, you don't want the calculated increase in risk to be more than 10^{-4} for Region I.

So in order to compute what the RAW would then be, it has to vary depending on delta CDF to address the comment that was made over here. And so the curve -- what we did was we just used the equation and we presumed a delta CDF of 10^{-4}. And then, for each of the CDF -- the baseline CDF values, we computed what the acceptance criteria were and generated that line.

MEMBER KRESS: What bothers me about it is, why does the curve convex instead of concave?

MR. HIGGINS: Because it's a log scale.

MEMBER KRESS: I know. But I would have thought that if you stick to the 10^{-4}, it would be a straight line and not curve or turn up. This says you're still allowing a change in RAW if the CDF is 10^{-3}.

MS. COOPER: Actually, it's not saying that yet. It's just simply saying that --

MEMBER APOSTOLAKIS: This is just mathematics.

MS. COOPER: -- this is just mathematics to try to determine which -- which actions deserve the most attention. And we still haven't even gotten to that answer yet. That's simply the recommendation based on this particular calculation, and there's yet another one to be done here in step two. So --

MEMBER APOSTOLAKIS: So this is really the figure in 1.174 converted to a RAW.

MR. PARRY: No, not really. This is a "how bad could it get" if the human action fails on --

MEMBER APOSTOLAKIS: Yes. It's the boundary of 10^{-4} in a --

MS. COOPER: Roughly, yes.

MR. PARRY: At 10^{-4}, if you look at Reg. Guide 1.174, that top boundary is 10^{-5}.

MS. COOPER: This sort of takes --

MEMBER APOSTOLAKIS: For CDF is 10^{-5}, you're right.

MR. PARRY: The delta CDF. So this actually more -- corresponds more to the bands of the reactor oversight process.

MEMBER ROSEN: That's what it says on that slide.

MEMBER APOSTOLAKIS: Maybe the green line is a 10^{-5}?

MS. COOPER: Yes.

MR. PARRY: It is.

MEMBER APOSTOLAKIS: The green line is that figure in 1.174 converted to RAW.

MS. COOPER: Right.

MEMBER APOSTOLAKIS: As a function of CDF.

MR. PARRY: That's correct.

MS. COOPER: That's correct.

MEMBER APOSTOLAKIS: Instead of delta CDF, it's now RAW.

MEMBER ROSEN: And the dark line is where -- if you're above that dark line, you've got a red finding in the RLP.

MS. COOPER: That's right. And that's actually all stated on slide number 24, which is the

next slide.

VICE CHAIRMAN WALLIS: But this slide doesn't help and makes it worse. When you've got a basic thing, which is 10^{-4} delta CDF, that's understandable. When you put it into RAW and draw these curves, you're obfuscating something very simple.

MS. COOPER: Well, so far as understanding perhaps, maybe so. But the purpose is to have a tool for someone -- you know, in other words, NRR gets a submittal and there is PRA information that's provided, including maybe importance measures.

And NRR staff can take that information, plot that on this curve, and get their input reasonably quickly, because, really, all we're doing right now is we're not -- we're not even yet to the review yet. We're just trying to decide how much time am I going to put in the review. So --

MEMBER APOSTOLAKIS: These points are actually submitted?

MS. COOPER: No. I believe the comment earlier was made that these are IPE --

MR. PERSENSKY: No, this is part of a test of developing the -- where these things would fall. We took some information from existing IPEs. These

were not submittals in terms of submittals for changes. This is just stuff that we took in a hypothetical situation to apply, so we could see how it would fit within these ranges, so that we could see would it really discriminate.

MEMBER POWERS: Does it matter in your kind of qualitative description of that that the IPEs maybe aren't very reliable in this area?

MR. PERSENSKY: Again, this was -- these were probably generated almost two years ago when we were doing some -- this is not IPE. I'm sorry. Maybe I've got the wrong data.

MR. HIGGINS: Right, yes. Jim Higgins again. As part of the verification of the acceptability of the method and the usability of the method, we conducted a number of incremental tests along the process, some of which we did where we evaluated past submittals for changes to human actions.

Secondly, we evaluated some IPE data. And then, when we got up to this point, the most recent point, we actually used the current PRA data, current as of about a year or two ago, from plant PRAs that we actually gathered as part of the ROP SDP notebook development process when we went on the benchmarking

trips to the sites.

And for most of the plants we had available to us RAW and Fussell-Vesely information for all of the components in the PRA, particularly the human action. So we collected that, and for those -- we selected five plants, and that gave us -- that data is actually 127 human actions that were plotted, so we could see the distributions for the human actions that were modeled in those PRAs, how they would fall out on the curves to help us evaluate if those acceptance criteria for the splits were reasonable.

MEMBER POWERS: I'm enthusiastic about this, because this is a step toward quantifying the question that we've asked -- maybe I've asked on this committee several times is, how good is human performance? And how good do you want it? I mean, I can see you moving in that direction here with this sort of approach.

MEMBER KRESS: It seems to me like also a benefit of using RAW and Fussell-Vesely versus actual CDF is that you to some extent incorporate the uncertainty in the model, because they tend to be a little more bounding than the actual calculated delta.

MR. HIGGINS: Right. In fact, that was -- when we first did it, we were just using RAW, and one

of the reasons was because you don't -- a little bit of -- if you're concerned about what the HEP value is, this gets rid of that.

Now, you still have the modeling issues.

MEMBER KRESS: It doesn't get it out altogether.

MR. HIGGINS: Right. You still have some modeling issues, but it does -- and then, Gareth was one of the people that had suggested that we go a little bit further and also look at Fussell-Vesely, which is just --

MEMBER KRESS: Which is more bounding than RAW.

MR. HIGGINS: -- a different aspect of the risk. And we actually, when we got into developing the acceptance criteria, we initially tried -- it was suggested that we look at the NRC SERs that had been done for the risk submittals for South Texas and Comanche Peak.

And we utilized their -- tried to utilize the similar RAW and Fussell-Vesely combinations to incorporate into here, and then there were a number of issues that came up which we could get into if we want to, but we found that the -- empirically, by looking at a number of IPEs, then, that the raw Fussell-Vesely

were not correlated, and you really were getting different information from the two of those.

So we ended up to -- we ended up making them two separate criteria -- RAW and Fussell-Vesely -- and the way we evaluate it is we take the more conservative of the two. It's an or.

MEMBER APOSTOLAKIS: So what is the result of this?

MS. COOPER: I was going to say let's move on forward and --

MEMBER APOSTOLAKIS: No, I'm mean --

MEMBER ROSEN: You'll get a fine graph of --

MEMBER APOSTOLAKIS: No, no, no. But, I mean, these are criteria for deciding what?

MS. COOPER: Deciding the level of human factors engineering review. Okay?

MR. PERSENSKY: This is how much review we're going to do from a human factors standpoint.

MEMBER POWERS: George, this is right on what we've been asking for.

MEMBER APOSTOLAKIS: Yes, I know.

MEMBER POWERS: We're saying, how bad is human performance? How good do you want it? Except they're casting it in terms of review.

MEMBER APOSTOLAKIS: Yes.

MEMBER POWERS: And I think that's what they should be doing. I mean, I think this is great.

MR. PERSENSKY: And we're trying to make use of existing agency's documents and existing procedures. We weren't trying to develop brand-new procedures here, and that's why we were --

MS. COOPER: We haven't gotten to the review until --

MEMBER POWERS: But, J, this is new to you guys. I mean, this is new to you guys.

MR. PERSENSKY: This is the way we apply our work.

MEMBER POWERS: I mean, it's -- and it's giving you a -- I mean, if you're looking for three-decimal precision, you're in the wrong field. Okay? But it's giving you a qualitative feel for, should I do a lot or should I do a little bit? I mean, I think it's great.

MEMBER APOSTOLAKIS: I'm trying to understand slide 24. Let's go back.

VICE CHAIRMAN WALLIS: We should move on I think. Really, the --

MEMBER APOSTOLAKIS: The Commission -- the goal of 10^{-4} is for -- from all contributors. But now

you seem to be applying it to human error only. Is that the correct perception here what's happening? I mean, shouldn't there be some reduction in this, because you are dealing with a specific item?

The Commission goal of 10^{-4} is for all contributors -- seismic, fire, human error.

MS. COOPER: This is a delta CDF.

MEMBER APOSTOLAKIS: Well, that's even worse, because now you are adding it to the existing CDF. So if the existing CDF is --

MS. COOPER: Okay. I'm going to let Gareth field these questions. He thinks he's got this one.

MR. PARRY: I think all we're trying to do with this measure is to see how significant is that action to maintaining a safe level of risk. Okay? And if that were -- actually were to fail completely, then what we're saying is that there is a high risk significance.

And I take slight exception to what Dana said. I don't think this is a measure of human performance as such. It's more of a measure of where you want to put your effort to make damn sure that this thing doesn't fail.

MEMBER POWERS: But that's --

MR. PARRY: In the sense of RAW.

MEMBER POWERS: That is exactly what we've been asking for is some sort of an idea of where to put the -- how much and where to put the effort.

MR. PARRY: Right.

MEMBER POWERS: And, I mean, I -- to my mind, this is a breakthrough. I mean, it may not -- like I say, if you're looking for three decimal point precision, it's not going to ever be here. But if you want something that says, do I work a lot, or do I work a little bit, do I worry a lot, do I worry a little bit, I mean, what more --

MEMBER APOSTOLAKIS: But I would worry --

MEMBER POWERS: -- can you ask for here?

MEMBER APOSTOLAKIS: I disagree with Gareth. I agree with the intent, but the "criterion" are -- in quotes -- of when I should worry should be lower than delta CDF 10^{-4}.

MR. PARRY: I think the criteria to some extent are arbitrary, but I think maybe when they --

MEMBER APOSTOLAKIS: No, it's not arbitrary. Why is it arbitrary?

MR. PARRY: Let me finish. When they get to talking about the level of review, maybe that's when it makes sense to worry whether these are the

right levels, because I think when you're talking about the highest level of review that's a very detailed review.

The 10^{-5} is somewhat less, but it's sort of equivalent to what you do now is what I understand. And the third one is less than that.

MEMBER ROSEN: Yes. I've been pleading with you, George, to let her get through the whole story, and then I think you'll have an answer to your question, which is what it's being used for is really --

MEMBER APOSTOLAKIS: Okay.

MEMBER ROSEN: -- what makes it okay to do what it seems like it's not okay to do up front.

MS. COOPER: What I'd like to do is skip over the next few slides. I will simply say that the same calculations -- type of calculation is also performed with the Fussell-Vesely importance measure. A similar curve or a curve with levels is also generated.

And then, as Jim Higgins mentioned a few minutes back, and as noted on page -- slide 28, the most conservative of the two calculations, then, is supposed to be the output of this particular step, and then is the input to the overall process.

So now we're on slide 29, which is the third step in the process. And in this particular step we're -- the intent is to do a qualitative evaluation of the human action, which allows, then, the reviewer to reduce or elevate the level of review or the recommendation for the review.

There are three different basic areas in which the evaluation is made -- personnel functions and task, design support for task performance, and performance shaping factors.

Then, the next slide --

MEMBER APOSTOLAKIS: Go back, back, back.

MS. COOPER: I'm sorry?

MEMBER APOSTOLAKIS: Now, this is where there should be a good discussion of model uncertainty.

MS. COOPER: No.

MEMBER APOSTOLAKIS: No. Why not?

MS. COOPER: Because it's not -- what we're looking for is human factors input and general performance information. The PRA is already going to be looking at that. That's their job.

This is for the purposes of the human factors folks to try to decide whether or not there are important issues that they need to look at that

increases their need to look at this particular action. Now, they may get input from the PRA people, saying, hey, we're looking at this from the HRA side. We ought to be looking a little harder at this.

MEMBER APOSTOLAKIS: No, because you say the screener reduces or elevates. So if the screener is not familiar with the fact that --

MS. COOPER: Well, not overall.

MEMBER APOSTOLAKIS: Well, let me --

MS. COOPER: There is an integration of --

MEMBER APOSTOLAKIS: -- tell you what bothers me. We talk about -- you are not involved in that. Power upgrades -- I raise the issue of model uncertainty and human reliability, but somehow we all recognize it but we do nothing.

Then, in other regulatory matters, the same thing. And I'm afraid we're going to do the same thing here. Yes, we all agree there is -- there are large uncertainties, but --

MS. COOPER: You could say --

MEMBER APOSTOLAKIS: -- somebody else would worry about it.

MS. COOPER: -- to a certain extent that this qualitative evaluation is to address that. It's trying to address things that are not explicitly

modeled.

MEMBER APOSTOLAKIS: But that's my point, that -- does anybody understand why EDF, for example, has chosen to follow one route, and we are choosing to follow another one? And whether what they consider important should play a role here? Because that's human factors. They are not doing it as PRA analysts. They are saying, no, no, no, we think that the operator will develop a strategy what to do, right?

MS. COOPER: I think the answer is yes, but I don't think that's the point of this project. I don't think that's --

MEMBER ROSEN: Let me recognize Gareth.

MS. COOPER: Yes, Gareth has a comment.

MR. PARRY: It's Gareth Parry again. I think there is somewhat of a disconnect between human factors and human reliability analysis, as you know. The human reliability analysis models are one thing. They don't -- there's no direct relationship between the human factors.

The way I think that we should look at this is that what this -- what we're talking about here is what level of human factors review do you need to support a risk-informed application. Now, one of the inputs is the PRA, and one of the inputs to that

is the HRA. And you're right, the uncertainties in that have to be addressed in the evaluation of which region you're in.

But what we're looking at here, the human factors review, I think is part of the supplementary information that goes into the integrated decision-making. It doesn't -- I mean, it could have an influence on the HRA, but it may not have. It may be additional information.

MEMBER APOSTOLAKIS: So there is another --

MR. PARRY: It's another input.

MEMBER APOSTOLAKIS: Is there another review of the HRA model? By whom?

MR. PARRY: That would be done by the HRA -- by the people reviewing the PRA --

MEMBER APOSTOLAKIS: Right. But I'm not talking about the quantification itself. I mean, the reason why there are different HRA models is because the human factors inputs are different. Different groups consider different things as being important.

MS. COOPER: In a broad sense, perhaps that's so.

MEMBER APOSTOLAKIS: Yes.

MR. PERSENSKY: I think if we go back,

again, to the purpose of why we even have this screening process, right now we are getting in fairly routinely changes to licensing basis because of changes in operator action. Without this screening process, the decision is made on the amount of review that we do on a very subjective human -- or engineering judgment basis.

What we've tried to do by adding this screening process in here and using existing NRC documents and approaches was to give our reviewers a little bit of help from a risk standpoint, a risk-informed standpoint, as to whether we -- you know, what level of review.

As part of this, we, I think, are -- we're interacting more with the risk people. This gives us an opportunity to get back into that integrated review as the part of Reg. Guide 1.174 with some more specific information. But, you know, to date, without this system, it's purely a subjective way of deciding what level to do.

A lot of the questions you're asking have to do with, how do we improve Reg. Guide 1.174, and that's not the purpose of this document. And how do we approve HRA? Those are things that we agree need to be done, but for this purpose right now all we're

trying to do is say, can we use this as a way of reducing resource towards the amount of review that has to be done, or the amount of whatever is in the submittal? I think we're getting way off board on what the purpose of this document is.

MEMBER ROSEN: You're using it to try to be more effective in your --

MR. PERSENSKY: We're just trying to be more effective in how we do our work.

MEMBER ROSEN: That doesn't do away with your concerns about human reliability. It doesn't do away with our concerns about CDF and where you enter it and whether you have full -- modeling that's full, and whether you --

CHAIRMAN BONACA: Just one way --

MEMBER ROSEN: -- whether the PRA that defines the CDF has got all modes and seismic and fire in it.

This is something we argued yesterday -- Gareth and I -- about. He thinks 1.174 is fine. I have a problem with 1.174. It may lead to non-conservative answers, if you're not dealing with full scope PRAs as we enter this process. So --

MEMBER APOSTOLAKIS: If I take a concrete example that came before this committee, in one power

upgrade request they concluded that the time available to the operators would be reduced for action from 42 minutes to 39 minutes. And they used a non-reviewed human reliability model, and they calculated the change as being negligible.

Who in this process would catch -- not catch -- raise the issue of model uncertainty here? Your guys will not --

MS. COOPER: No.

MEMBER APOSTOLAKIS: -- because they will follow this.

MS. COOPER: The PRA folks would -- NRR. That's their responsibility.

MR. PERSENSKY: But what we would do is we would ask them, gee, if you're reducing the amount of time, what is the time necessary -- what is -- you know, what would be a reasonable time to accomplish that action based on the system's response?

And if it's well below 39 minutes, then we probably -- we wouldn't be so concerned about the risk, because if the operators in some simulator experiments, which we may have asked them to do, can do it all in -- in fact --

MEMBER APOSTOLAKIS: I agree. But the problem is that --

MR. PERSENSKY: -- what's the point of going that next step?

MEMBER POWERS: In fact, J, for the specific example, when asked they indicated they had run 50 tests over the years, and the operator experience was all less than 30 seconds.

MR. PERSENSKY: Right. So the difference 42 minutes and 39 minutes is not a meaningful difference in that situation.

MEMBER APOSTOLAKIS: There was another case where it was seven minutes, went down to four. And that was not so obvious.

But, again, based on factors such as -- how would you know? How would you know what they took into account unless you dug into the HRA model?

MS. COOPER: This is not to dig into how the HRA was modeled. This is simply to understand the action, the changes that the requests introduced, for the human factors --

MEMBER ROSEN: I need to take control of this session. We've got 15 minutes left, and I really do want to get done on time.

MS. COOPER: Okay.

MEMBER ROSEN: So let's -- we can't solve it here. We can express the concerns.

MS. COOPER: Let's move on to step four, slide number 30, and this is the integration of the three inputs in the risk screening process.

It takes the results from steps one, two, and three, and on the next slide it shows the table from the Reg. Guide -- the NUREG that illustrates how the decision-making process goes. From the -- probably you can't read from your slides. I can't either, so I'm going to read from --

(Laughter.)

I'll try.

(Laughter.)

MEMBER POWERS: This is an example of a human factors --

MS. COOPER: It is a --

MEMBER ROSEN: Let's go on, please.

MS. COOPER: -- human factors problem here, yes. In any case, it shows you the inputs from step one, step two, and step three, and then shows -- gives a recommendation on the far right column, then, as to what the level of review would be.

MEMBER ROSEN: Of human factors staff review of --

MS. COOPER: Of human factors staff review of that particular human action, taking those three

sets of inputs.

MEMBER ROSEN: Next slide. Now, we're finally to it.

MR. LEWIS: Now, after the risk screening process, the product of the risk screening process, is advice to the human factors people. What level of review do you do? A Level 1 is a detailed review, Level 2 is a moderately detailed review, and Level 3 is a brief review. And what these -- how these are defined is expressed in the NUREG-1764.

The criteria from --

MEMBER ROSEN: Don't leave it at that. Just say, for example, what a Level 1 review contains.

MR. LEWIS: Well, it's basically all of the -- well, it's tailored from NUREG -- it's right down here, tailored from NUREG-0711. The 12 elements are selected from those.

MEMBER ROSEN: Yes. Throw them out. What are they? You are about to do a detailed review. What are the 12 element? Give me six.

MR. PERSENSKY: Procedures, staffing, HMI -- these are all the things -- and the question here is they're all the things that were back on the slide when we were talking about 0711. But each of them, depending on whether or not that element is affected

in some way -- if there was no change in the HMI, you wouldn't do an HMI review.

If there's a change in staffing or a change in procedures, then you would review their procedures in staffing at the levels indicated by the --

MEMBER ROSEN: Okay. So Level 1 you're going to look at most of the performance shaping factors.

MR. PERSENSKY: Most of the information, yes.

MEMBER ROSEN: Okay. That's what I was trying to get -- he's not listening, but I was --

MR. PERSENSKY: Whereas in Level 2 you would pick up fewer of them, and you would not necessarily go into as much depth in that review. And then, the Level 3 we talked about as being something that you make sure that everything is in place, and you do it -- it's not that there's no review, but there is a limited review because it is, in fact, the lowest risk category from both region -- the 1.174 and --

MEMBER ROSEN: It's important that my colleague Dr. Apostolakis understands what these levels are, because that's what you're really

complaining about.

The Level 1 review is they're going to look at all of the performance shaping factors, you know, basically for that thing. Level 2, only some of them. And Level 3, hardly at all. And now when you get to saying that and you say, "Well, you've got all of the different modeling," I mean, surely the different models use the same performance shaping factors but ascribe different levels -- importance to each of the performance shaping factors.

But the point is that knowledgeable human factors professionals are going to look at all of them in trying -- in a Level 1 case in trying to decide whether this human action is likely to succeed.

MEMBER APOSTOLAKIS: But the point of model uncertainties are there are other people who don't even use performance shaping factors. We are doing this within THERP. See, that's my point. That other questions that other people have raised will never come up. People don't even want to touch the words.

So I want the reviewer to be sensitized to that. I don't want them to become experts on HRA. But why are other groups, reputable groups, doing it in a different way? What are the human factor

settlements that are different? And sensitize the reviewer. That's all I'm saying. I'm not asking you to develop an HRA model. That's somebody else's job.

MR. PERSENSKY: That's actually a response to one of your -- the questions that came up in the ACRS September 24th letter also.

MEMBER ROSEN: We're going to through that if we have enough time, but we're running out of a chance to do that.

MR. PERSENSKY: We'll get to that in a minute.

MEMBER APOSTOLAKIS: September 24th?

MR. PERSENSKY: Last year's letter.

MEMBER APOSTOLAKIS: Oh, last year.

MEMBER ROSEN: We're going to go back to last year's letter and try and see what's -- what their response is.

MEMBER APOSTOLAKIS: For a moment I thought we were having a meeting on --

MEMBER ROSEN: No. No, no, no. I would have let you know. I would have invited you, and you would have told me you couldn't come.

MR. LEWIS: Okay. Just to remind you, this --

MEMBER APOSTOLAKIS: I was waiting for

that kind of comment.

MR. LEWIS: This slide is --

MEMBER ROSEN: Go ahead.

MR. LEWIS: This review is performed by human factors people, not HRA people. And so it's a standard human factors review as opposed to an HRA type of review. And the whole list of --

MEMBER APOSTOLAKIS: Until when are we going to make that distinction?

MEMBER ROSEN: Which distinction?

MEMBER APOSTOLAKIS: Between the HRA people and the human factors people. Shouldn't there be -- the cowman and the farmer should be friends?

MR. LEWIS: Yes. But at the present time, the human factors people can look at a lot more things than human reliability people can quantify. And so the issues that we're looking at, just to answer your question, Mr. Rosen, in more detail, is back on slide 10. Those are the -- the entire list is there.

MEMBER APOSTOLAKIS: Let's not go back.

MR. LEWIS: Okay. No, let's go forward.

MR. PERSENSKY: But they are considered -- in many cases are considered performance shaping factors, but not all of it.

MR. LEWIS: Yes, it's a laundry list.

Okay. So if we can go to slide 33, which we are at. So after the human factors review, then the human factors people make their decision, and that decision is submitted to the integrated decision-making process. This is the same sort of integrated decision process that's described in Reg. Guide 1.174, since this is a -- for a risk-informed submittal and to the human factors safety evaluation report.

Now I'll turn it over to J.

MR. PERSENSKY: One of the other things the subcommittee asked us to look at was the letter from September 24, 2002. That particular meeting actually was a meeting on the human factors and the human reliability program plan. If you recall, Erasmia and Bruce Hallbert came and talked a lot about some of the work that had been done at Halden, and how he used the staffing data to do some HRA.

MEMBER APOSTOLAKIS: That was one of our better meetings, wasn't it?

MR. PERSENSKY: Right. Next to this one, of course.

(Laughter.)

That letter had -- and what I've done is I've just put all of the remarks -- those things that are starred here were the things that came out as

formal recommendations. The others were really more remarks that were in the back.

Basically, at the time that these documents -- the question was: how have we used the input from the ACRS in the development of these documents? The first answer is: well, most of these documents -- these documents were pretty well done a year ago. They've just been going through the review process, so we couldn't have used a whole lot of it.

MEMBER APOSTOLAKIS: How long did it take to do them?

MR. PERSENSKY: To do what?

MEMBER APOSTOLAKIS: To produce the documents.

MR. PERSENSKY: Well, the total production time in terms of all of the technical basis and stuff was probably seven years, seven or eight years. But, you know, again, a lot of research went into it, a lot of other things, as far as putting it together in a final document. I mean, the review process takes over a year.

MEMBER APOSTOLAKIS: Yes, that's why I asked.

MR. PERSENSKY: And the review process internally, as well as we went to public comment with

it, things like that. So, but the answer is most of this was done before we got this letter.

However, and the other thing is we were talking about where we were going in the future as opposed to what we had. At that point, a lot of where we were going in the future aimed at more the monitoring aspect of what the NRC does as opposed to the licensing aspect.

The licensing aspect guidelines development is what we're addressing here today, not that monitoring, like looking at latent errors. And these are projects, some of which we have in fact ongoing or will be starting based on whenever Congress decides to give us a budget. But this was, again, long term.

Now, the first remark, though, was talking about generating guidance for use in inspection and review, and that's exactly what this is. The issue of team and individual performance was brought up. What we have used in this, for instance, is the fact that when we talked about -- one of the guidelines has to do with -- sets of guidelines has to do with review of displays.

But we did use research from team performance versus individual performance to look at

the whole concept of how people work together when they have a single display to work from.

MEMBER APOSTOLAKIS: But the probabilities you will get from the PRA most likely did not consider these things.

MR. PERSENSKY: Most likely they did not. And if you get down to the last couple of bullets on this slide, I sort of separated those things that I consider to be human factors from human reliability. And where there's an overlap, they're in the middle. But I think your -- that last issue you were bringing up is the last bullet is to perform a critical review of HRA models. That was one of the things that you --

MEMBER APOSTOLAKIS: Has anybody done that?

MR. PERSENSKY: That has not been done. It is something that, again, it was -- it's been put into the budget process. As far as how far along it is, I can't really tell you.

MEMBER APOSTOLAKIS: About seven years, J?

MR. PERSENSKY: Well, I think there's a difference between doing that and coming up with a consolidated guidelines document. But basically, we haven't addressed a lot of these, but we are beginning to address them as part of our program.

MEMBER ROSEN: So what does the asterisk mean again?

MR. PERSENSKY: The asterisk was -- those were the formal recommendations. For instance, the one on simulators. We are, in fact, as part of one of our projects in the advanced reactor area looking at various simulators that are out there including the Halden simulator.

And tomorrow, as a matter of fact, Mr. Thadani will be visiting EDF to look at what's called a fitness simulator, which was a new simulator that they've developed and that our staff has already looked at and suggested that it was worth him going down to visit to see what it's like.

So, and we know --

MEMBER APOSTOLAKIS: And what is it?

MR. PERSENSKY: It's FITNESS -- pardon?

MEMBER APOSTOLAKIS: Where is it?

MR. PERSENSKY: It's Lyon.

MEMBER APOSTOLAKIS: Lyon.

MR. PERSENSKY: And we have -- in fact, Halden has used it in some of their work as well. So in any event, we have --

MEMBER APOSTOLAKIS: So the other statements there were in a discussion of the letter,

is that what you mean?

MR. PERSENSKY: These were all in the discussion of the letter, yes.

MEMBER APOSTOLAKIS: So the starred --

MR. PERSENSKY: The starred ones were formal recommendations, and we did send back a formal letter responding to that dated December 9th. But as far as -- the subcommittee asked us to address how we used it in this document and --

MEMBER ROSEN: And the answer is --

MR. PERSENSKY: The answer is not much.

MEMBER ROSEN: Okay. It's a question and answer. Thank you very much.

MR. PERSENSKY: But we are doing some of these things or beginning to do some of these things.

MEMBER ROSEN: Well, what about the other letter? We didn't talk about that one.

MEMBER APOSTOLAKIS: What letter is that?

MR. PERSENSKY: Oh, the '95 letter?

MEMBER ROSEN: Yes.

MR. PERSENSKY: Paul is going to be addressing that in the --

MEMBER ROSEN: Well, I'd rather skip to that, and come back to Robert Fuld in a minute.

MR. PERSENSKY: To what?

MEMBER ROSEN: To the '95 -- our own letter first, and then we'll talk about the public comment.

MR. LEWIS: Okay. This is --

MEMBER ROSEN: I have a priority. First, I'll --

(Laughter.)

MEMBER ROSEN: -- we've got you here on slide 40.

MR. LEWIS: Okay. This is a comment in a letter by ACRS on its review of NUREG-0700. This is not 0711.

MEMBER ROSEN: From 1995, right.

MR. LEWIS: 1995, yes. And the comment in the letter was that NUREG-0700 might be overly prescriptive and may discourage the approval of equally qualified, acceptable alternatives. And kind of as a corollary to that, it might result in de facto regulation.

And so our response to that was that NUREG-0700 is used as a part of the NUREG-0711 process, and NUREG-0711 encourages the use of vendor and licensee-specific style guide used in 0700. And the 0700 -- or 0711 process is flexible. They are guidelines, and so there is a certain amount of --

there is flexibility in it, and licensees can come with alternative proposals with a justification.

And the guidelines in 0700 do reflect the best practices, and the human error discrepancy evaluation process uses guideline discrepancies only as a flag and -- for looking in more detail. And at the end of an evaluation, they'll look at the whole picture. Some of them will have human evaluation -- human error discrepancies, and some won't. And some will pass.

So it is recognized that I&C and human factors engineering technology are rapidly changing, more so than other aspects of the plant. And so there's a need to address new technologies, and that's built into 0711, again.

Then, the items in 0700 are used to evaluate what technology is employed by the vendor. And the document does not suggest that the guidance areas included are expected to be included in the design. So this -- the document is a review document as opposed to a design document.

So, for example, the guidance for the review of computerized procedures is provided and used -- used only if a system is provided. So that's -- the guidelines in 0700 are used only if applicable to

this particular case.

MEMBER ROSEN: Okay. Well, we were concerned about -- that that weighty tone, which has gotten even weightier since 1995, being a de facto standard and you keep saying -- shaking your head no, no, no, and I know what it says on the front of the Reg. Guide, and that was what the discussion was about is when you put a book like 0700 -- do you happen to have a copy there --

MR. LEWIS: Yes.

MEMBER ROSEN: -- you could just show the committee? The rest of the committee who may not have seen it? You hit somebody over the head with that, they stay hit. So it's -- it's hard to argue with Mother Nature, so that was what the comment is about.

MR. PERSENSKY: One of the things about the weightiness of that particular document is, remember, we're -- this document includes the entire set of -- can be used for all of the plants that are out there. So it includes both analog information, digital information, things that would affect hybrid control rooms.

So 0700 was a fairly weighty document back in 1981 when it first came out. But what we've done is we've actually added to it as opposed to

necessarily replacing it, because the plants haven't all changed yet. So we can't take out the stuff --

MEMBER ROSEN: Right. So it can be used to anchor even a larger boat than --

MR. PERSENSKY: -- later on, or we could separate it into 14 different volumes. But we tried to put it into one.

MEMBER KRESS: Somehow, a panel --

MEMBER ROSEN: All right. Now let's talk about Fuld. Dr. Robert Fuld came to talk to the subcommittee. He's a human factors professional from the public, and he had some comments that you -- I thought you --

MEMBER APOSTOLAKIS: Does he represent anybody?

MEMBER ROSEN: He represents himself.

MEMBER SIEBER: He's a public citizen.

MR. PERSENSKY: He doesn't represent the group Public Citizen. He is --

MEMBER APOSTOLAKIS: I understand that.

MEMBER ROSEN: He is a member of the public who has credentials in this area, and he had some views that I thought the committee might like to understand what they were.

MR. LEWIS: So the human factors

subcommittee asked us to address the comments by Robert Fuld, and that's what we've done beginning on slide 36.

So his first comment is that NUREG-0711 -- his comments now are on 0711. The committee's comments were on 0700.

VICE CHAIRMAN WALLIS: This looks like some of our comments earlier. You're just describing qualitatively a process. You're not saying what method is acceptable.

MR. LEWIS: I didn't hear the comment.

VICE CHAIRMAN WALLIS: It sounds like what we said earlier on. I mean, just -- his comments look like some of ours. You have a process --

MR. LEWIS: Oh, yes.

VICE CHAIRMAN WALLIS: -- but then everybody has a different way of doing it, and they're all different. So how do you evaluate them?

MEMBER ROSEN: There's quite a bit of commonality between what he said and what this committee said in 1995. I don't know what --

MR. PERSENSKY: In 1995, you only reviewed 0700. You did not review 0711.

MEMBER ROSEN: I see.

MR. PERSENSKY: And his comments are only

on 0711, not on 0700.

MEMBER APOSTOLAKIS: Do you remember when in 1995 the letter was issued?

MR. PERSENSKY: We have a copy of it.

MR. LEWIS: November 13.

MEMBER APOSTOLAKIS: Oh, so I was a member.

MR. PERSENSKY: Yes, you were there.

MR. LEWIS: November 13, 1995.

MEMBER ROSEN: Go ahead.

MR. LEWIS: Okay. So, yes, his comments were similar to your comments. His first comment is that NUREG-0711 is overly prescriptive, and our response is, again, we have to make very clear when we are making comments on 0711 that 0711 describes -- does not describe a design process. It provides guidelines for the review of a design process.

So it's prescriptive in that sense. These are review guidelines, not guidelines for designing a nuclear powerplant.

MEMBER KRESS: The word "prescriptive" usually applies to rules instead of review documents or guides.

MR. LEWIS: I didn't -- I'm sorry?

MEMBER KRESS: When I think of the word

"prescriptive," I'm thinking it usually applies to a rule.

MR. LEWIS: A rule, oh, yes.

MEMBER KRESS: And not guidance or review documents or standards or --

MR. LEWIS: Yes, that's a good segue into my next slide. I'll get to that.

MEMBER APOSTOLAKIS: You're already there.

MR. LEWIS: Okay. Okay. We're there.

There's a hierarchy of NRC documents, and the Code of Federal Regulations is the most prescriptive. And by design, the standard review plan is less prescriptive, and the NUREGs are even less prescriptive, although the level of detail goes in the other direction.

So the NUREGs are very detailed, but they're not prescriptive. They are simply guidelines.

MEMBER ROSEN: Right. In the sense that you -- 10 CFR 50, you go to jail -- directly to jail, do not pass go, if you don't comply. Whereas NUREGs, you could just say, "I want to do it differently" and argue about it.

MEMBER APOSTOLAKIS: You go to exile.

MEMBER SIEBER: Well, the perfect example in 700 is it tells you --

MEMBER ROSEN: It's a figure of speech, George.

MEMBER SIEBER: -- you can paint it green, paint it red, paint it white. And if you paint it red, people will look at it. It doesn't tell you to paint it red.

MR. PERSENSKY: Exactly. Exactly. But it does tell you to be consistent in the way you're --

MEMBER SIEBER: You can either be the Navy or the coal fire guys, because they're backwards.

MR. LEWIS: Okay. There is a point on the previous slide, slide 36, that I think is very telling. And that is NUREG-0711 has already been used for the review of three advanced reactor designs, and those three advanced reactors are very different. The hardware is different, the control room is different, and what's more -- what's more, the process that they used in developing it is very different.

And NUREG 0711 was used for all of those and --

MEMBER APOSTOLAKIS: Which design were these?

MR. PERSENSKY: There were the evolutionary designs -- AP600, APWR.

MR. LEWIS: So given the fact that we are

close to out of time, let's go to slide 38.

MR. PERSENSKY: I did want to just go back on the one slide 37. I think the first bullet there is also -- I mean, we've been talking about it from the standpoint of human performance, but this concept of prescriptiveness is an agency-wide problem. As an implementation, it's not what the document says, but it's the way it's implemented.

MEMBER APOSTOLAKIS: So you agree, then, that the detail, you wouldn't call it prescriptive.

MR. PERSENSKY: Right.

MEMBER APOSTOLAKIS: You disagree with his comments, and you say his comment is an agency-wide problem.

MR. PERSENSKY: I agree that the problem of interpreting things as being prescriptive when they are not is an agency-wide problem.

MEMBER ROSEN: People interpreting it as prescriptive.

MR. PERSENSKY: It's the way it's interpreted as opposed to the way it's actually written. I mean, we can only deal with how it's written at this point.

MR. LEWIS: Yes. So there is an important distinction between detail and prescriptiveness. 0700

is very detailed, is not prescriptive. You can -- if you have a good reason for doing it, otherwise you can --

MEMBER SIEBER: Then you don't have to.

MR. LEWIS: Okay. Now, are we ready for 38?

MEMBER ROSEN: Yes.

MEMBER APOSTOLAKIS: You're going to define systems engineering, Paul?

MR. LEWIS: No.

MEMBER APOSTOLAKIS: Are you that brave?

MR. LEWIS: No. I wanted to avoid the definition of -- the purpose of the slide was to avoid getting entangled in a definition of systems engineering. We're saying how it is -- how we are using that in this particular document, so that we can ignore the particular term.

So what the commenter is referring to is our use of -- how we use 0711. And when I describe how we use 0711, I think you will agree that it's a reasonable approach.

How we are using 0711 is we consider those 12 elements that are on slide 10, we decide which of those elements is applicable to the current application at hand, which is a reasonable thing to

do, and then we use those elements to review.

So we think that that's a justifiable way of approaching it. And one of the reasons is the approach is quite general, as indicated by the fact that we've reviewed three types of advanced plant.

And, furthermore, this is the most widely used approach in the industry. This is the one that's taught in all of the schools. If we were to use something else, we'd really have to justify that. This is the standard approach.

MEMBER APOSTOLAKIS: Doesn't he have to justify his statement, though? What does it mean the use of systems engineering is not justifiable?

MR. LEWIS: That is a critique that Robert Fuld made at the --

MEMBER APOSTOLAKIS: Right, to justify his statement.

MR. LEWIS: No, that's my last point there. Not only did he not justify it, he did not really specify it. So it's kind of hard to respond to the comment.

MEMBER ROSEN: And he doesn't suggest an alternative is what --

MR. LEWIS: That's correct. Yes.

MEMBER ROSEN: All right. I think we've

given enough here on --

MR. LEWIS: Okay.

MEMBER ROSEN: If anybody wants to study this, the committee has the slides. We did have a responsible member of the public who feels strongly about his point of view. He was given a chance to address the subcommittee, and we would -- we made -- I made the decision that the full committee should at least be made aware of his point of view.

With that, Mr. Chairman, I will thank the members of the staff who have done a great job getting us up to speed in this area. I think you, as Dana has suggested, have made some important strides forward. And we look forward to further discussion with you.

Mr. Chairman.

CHAIRMAN BONACA: Are there any further questions? If not --

MEMBER APOSTOLAKIS: Will there be a letter on this? Are we writing a letter on --

MR. PERSENSKY: Yes. One point in one of the slides we didn't finish up is that, in fact, we are asking for a letter, since we are asking for endorsement of these documents.

MEMBER ROSEN: This is a draft --

MEMBER POWERS: I guess I'm looking for a

little qualitative feel. You're moving into a more quantitative approach on how to apportion your efforts, or helping other people apportion their efforts is what you're really doing.

How do you feel about that? It's a good idea? Bad idea? Going to work? Not going to work? Do you want to optimize it? Work on it?

MR. PERSENSKY: From the standpoint of how do we feel about it, I think it has some value to us. It will help us to prioritize our resources. However, as we saw from today's meeting, the uncertainty associated with some aspects of using those techniques sometimes takes up more time than actually doing the prescriptive approach.

But, in fact, if we use the existing tools, I think it is more valuable for us. I mean, it's going to help us out, and that's -- what we said in the September 2002 meeting is that there is an interaction between HRA and human factors. And part of that is them helping us to prioritize, but us helping to provide them data to do that.

So it's an iterative process, and we have been working more and more towards that over the last few years. And, in fact, I believe there is probably some suggestion that the two groups be merged.

MR. LEWIS: I believe, Hussein, did you want to be recognized? No? Okay.

MR. BONGARRA: I'd like to voice my opinion if I may for just a second, as a user. I feel very comfortable about the idea of trying to work within a more risk-informed framework here.

I think that what we've collectively attempted to develop here, as I mentioned earlier, is really kind of a first-of-a-kind effort. And I think I said it earlier in the subcommittee meeting, and I won't -- well, the bottom line is I see this really as a challenge not only to us to follow through with implementing it, but I also see it as a challenge to the industry to take a look -- and they have -- public comment has been made on it, and we did see the fact that there weren't a tremendous number of public comments that were critical of the process.

So that gives me, as a reviewer, further encouragement that this is something we should follow through on. So bottom line is I look at this in a positive light.

MEMBER POWERS: Let me ask you -- I mean, it seems to me my perception is -- and maybe I'm wrong about this -- that you go through and you say, what level should I be doing the review at? And what

you're doing in the past is all kind of Level 2, and now you allow yourself to go more detailed or less detailed or be the same thing. Is that a correct perception here?

MR. BONGARRA: I think that is indeed correct. What we're --

MEMBER POWERS: I think that's fantastic. I mean, I think that's what the Commission was looking for when they said, "Let's go with risk information" is they didn't know whether what they were doing right now was too much or not enough. And what you -- you're allowing yourself is to go either direction. I think that's a great --

MEMBER ROSEN: And the answer is that it was both. It was --

MEMBER POWERS: Yes. I mean, I --

MEMBER ROSEN: In some cases it was too much, and in some cases it was not enough.

MEMBER POWERS: And I think they knew that, and a lot of people said, well, the risk-informed reduction is -- risk-informed regulation is for burden reduction. But, no, it wasn't. It was for burden focus, and I think you've done that here. I think that's terrific.

MR. BONGARRA: I'd just like to make one

quick mention as well because of the types of comments that were made earlier in questions with regard to the technical process itself. We do have a companion document that we're in the process of completing. Essentially, it's a technical basis document.

So some of the very detailed questions that were asked with regard to how the curves were generated, that information will be forthcoming in a technical basis document.

MEMBER ROSEN: I think the committee, and the subcommittee for sure, would be interested in looking at that.

MEMBER POWERS: Well, Dr. Rosen, I think this is one of the success stories we've got to highlight. I mean, I think this is something that comes across as a fallout in the move toward risk-informed regulation that a lot of people don't appreciate as -- wouldn't even imagine it could occur.

MEMBER ROSEN: All right. We'll take that -- we'll have some more discussions of that when we get to the research requirements. I think that's an interesting suggestion.

MEMBER POWERS: Yes.

CHAIRMAN BONACA: Okay. Any further questions for anybody? If not, thank you very much

for a very informative presentation.

We will recess until 20 after 1:00 for lunch.

(Whereupon, at 12:25 p.m., the proceedings in the foregoing matter went off the record for a lunch break.)

CHAIRMAN BONACA: The next item on the agenda is final revision to 10 CFR 50.48 to endorse NFPA 805 fire protection standard. And again, Mr. Rosen is leading us in the presentation.

MR. ROSEN: Well, I'm not going to do much leading. I'm just going to turn it right over to the fire protection guys from the staff.

DR. POWERS: Aren't you supposed to provide us prospective and context?

MR. ROSEN: You already have it.

DR. KRESS: Tell us what to listen for.

MR. ROSEN: Oh, I will if you insist.

(Laughter.)

You all understand that the fire protection rules of this Agency are deterministic and as such they place undue burden in some areas on licensees and the staff. Do more work than may be required.

To resolve this issue, the National Fire

Protection Association and the staff have worked together to develop a new standard called NFPA 805. And the staff has proposed and the Commission appears willing to undertake a study of rewriting 10 CFR 50.48 to allow NFPA 805 to be used as a voluntary alternative to the prescriptive rules in 10 CFR 50.

With that context, the gentlemen from the staff will brief us on where they stand on moving this issue forward to rulemaking.

MR. BIRMINGHAM: Thank you. I'm Joe Birmingham in the Office of NRR. I'm the project manager to help in the rulemaking. We believe we are now ready to move forward into the final rulemaking stage for NFPA 805.

Also presenting today will be Paul Lain from the Plant Systems Branch of the Fire Protection Group. Paul will be handling some of the technical structure of the rule and I'll be handling more of the programmatic.

First, I'd just like to note that we did meet with the Fire Protection Subcommittee in September. We had a chance to make a similar presentation at that time and we answered their questions that they had for us. Not very much has changed since then. We had a little bit of wording

differences that we worked out with OGC as far as the technical bases, but the substance of the rule hasn't changed.

The areas that we're going to cover today will be the background of the rule, how it originated, what the Commission direction was, some of the advantages of NFPA 805 over existing Appendix R and licensing conditions. As Mr. Rosen has said, our deterministic structure of NFPA 805, how we expect it to be implemented, some very basics on the rule structures and then we'll get into the status of the rulemaking and the schedule.

Paul, do you want to take over?

MR. LAIN: I'm Paul Lain from the Plant Systems Branch. I see you're familiar with this time line. I think Browns Ferry in 1975 woke a lot of people up. The staff developed Appendix R after that and put it into effect using 10 CFR 1048. There was a lot of lower tier documents that followed to try to soothe * (1:22:13) the implementation such as Generic Letter 86-10 which instructed sites to sort of change their license condition to allow changes to the fire protection program as virtually affects a shutdown. But also it was considered very deterministic and quite a burden.

So in the 1990s, the development of PRAs, PSAs and advancements in fire modeling gave us confidence that we could quantify the fire risk and reduce the deterministic departments. It was in 1998 the Commission gave the go ahead to go ahead and develop NFPA 805, the national consensus standard with industry.

And sort of the later documents kind of show what Dr. Rosen kind of put in the subcommittee meeting that the glacial speed of this rulemaking --

MR. ROSEN: We knew which way it was going.

MR. LAIN: Yes. Okay.

MR. ROSEN: But you had to watch it for a while to see it move.

MR. LAIN: Yes, okay. The advantages of going with 805. During this whole process, the staff, industry and other interested parties worked together to develop the NFPA standard which has an agreed upon set of fire protection performance goals and criteria. I think that's one of the major parts of the 805. Therefore, I think the rule has a greater chance of acceptance instead of the staff just sort of developing it in isolation. And it's sort of goes along with the Agency's policies of working along with

industry.

So some of these other advantages, some of it's voluntary. It's an alternative to Appendix R. Facilities are happy with their fire protection program right now. They don't necessarily have to change to 805 which is -- uses performance-based methods. If licensees find that it's advantageous, then it's another way of handling issues.

That's sort of let's the licensees focus on or allocate resources for the more significant issues while fine tuning their fire protection programs away from spending a lot of time on the lower risk issues.

That's more of the meat of the new requirement.

There's a core program of minimum design requirements and fundamental design elements or program elements and we'll go more into that on the next slide. It's Chapter 3 of the standard. I'm not sure how many -- I think it was handed out previously in some of the pre-materials.

MR. ROSEN: I think when you're talking about the advantages of 805, I think you left out a key one. You get to it later on, but it's the analysis that goes to cold shutdown, right? Whereas current analyses only go to hot shutdown.

MR. LAIN: Yes.

MR. ROSEN: So in that sense the scope is broader. It establishes requirements more broadly.

MS. BLACK: And it covers shutdown as well.

MR. ROSEN: Shutdown.

MR. LAIN: Shutdown and low power also.

MR. ROSEN: Right. So it takes you all the way out in the modes whereas the current requirements are for power. So in that sense it's more regulatory comprehensive.

MR. LAIN: More comprehensive. So for transition purposes, 805 was developed sort of in a parallel structure. One side of it, 805, has a lot of the Appendix R deterministic requirements within it and the other side is sort of the performance-based requirements, so a facility may be able to transition using the deterministic side and then as they want to change their program or as issues arise, they'll be able to use performance-based methods to resolve those issues.

So it doesn't necessarily require a facility to go in and re-analyze from a performance-base their whole system. It does have a lot of the deterministic type requirements in it.

So that is I think another -- a good part of how it's structured is it's structured for existing plants to be able to transition without having to really start from ground zero and build a program up from that.

I'll talk a little bit about the core program fundamental elements and minimum design requirements. Ed Connell who was part of the staff worked hard as the NRC member on the Committee and he wanted to make sure that there was sort of a core fire protection program minimum program that the facilities will maintain.

As you can see, some of these items like fire suppression systems like a sprinkler system or a fire alarm system, Chapter 3 doesn't necessarily tell you where it has the system, it just kind of tells you sort of the design and installation requirements, whereas Chapter 4 where you go through your nuclear safety analysis, that kind of decides where you're going to need to protect these areas where you don't need to protect and that's the performance-based side --

MR. ROSEN: From a nuclear safety perspective.

MR. LAIN: Yes.

MR. ROSEN: Now you may choose and most licensees did choose to have much broader coverage than just the nuclear safety because they want to protect the asset as well for property damage reasons.

MR. LAIN: Yes. There are deterministic requirements within Chapter 3. Five-person brigade member is one of them that comes to mind. And it's something that the NRC sort of has had since the 1970s that is a minimum requirement of fire brigade members. But it also does put sort of a quality stamp on that that follows a different NFPA type standard.

Joe will talk a little bit later about how the rulemaking handles deviations or changes to Chapter 3 and how they'll be able to handle those.

Any questions?

Differences from Appendix R. Dr. Rosen talked a little bit about the cold shutdown. Appendix R sort of requires facilities to sort of design all the way to cold shutdown within 72 hours with recovery actions. NFPA 805 talks about bringing the fuel that needs to be brought to a safe and stable condition which is sort of hot standby. That's sort of makes the evaluation a little bit shorter, shorter within the first 24 hours, but also it sort of looks at all modes of operation also. So it's sort of -- it's not

a requirement to go all the way to cold shutdown, it's the more -- the performance criteria is to keep the fuel into a safe and stable condition.

Other ones are emergency lighting is now sort of in the guidance section of NFPA and basically you have to within your analysis you have to prove that sufficient lighting is available to perform the intended function and it's not necessarily a set requirement.

Alternate --

DR. APOSTOLAKIS: How is that determined, sufficient lighting?

MR. LAIN: I think when you go through your nuclear safety analysis and you have certain things you have to do for shutdown, you're going to have to prove that you have sufficient lighting. You mean what is sufficient?

DR. APOSTOLAKIS: So if it is small, for example, you will have to evaluate how much that --

MR. LAIN: That whole topic is also -- it's being handled by a new rulemaking that's coming down the pike on the manual actions. It's sort of defining how are they going to be able to go about doing manual actions. I think that's going to give more of the guidance on where we're at. But within

805, I think it's still kind of left at a level of subjectivity and it's not necessarily a quantitative requirement. But it is though -- it's not necessarily they will have to have 8 hours of emergency lighting. If they have something that they need to do within the first hour, they need to prove that they have emergency lighting for that first hour and so they're not necessarily going to require to have 8-hour lighting throughout the plant.

MR. BIRMINGHAM: As Paul said, the Agency is looking at what are the feasibility criteria for things like recovery actions and emergency lighting under recovery actions, what's the effect of smoke and heat and so on on the people performing those emergency actions. But 805 does have criteria in it that talks about that you have to be able to demonstrate that the recovery action can be performed and in the environment that it's going to be performed in. It does have that criteria built into it, although it is built into an appendices which is not part of this rule per se, but it's a good point.

MR. LAIN: Alternate and dedicated shutdown are not necessarily defined as they are in Appendix R. The analysis document basically says that you need to have a safe shutdown path or method.

Recovery actions outside the control room are allowed within 805 within the performance based method where in Appendix R it was one success path had to be free of fire damage. So the analysis allows using the recovery actions.

805 does have some additional sort of radiation release criterias for fires like in maybe the rad waste areas which is a little bit more complete standpoint and also 805 covers the fire protection plan, sort of covers all modes of operation such as low power and refueling which Appendix R doesn't.

DR. APOSTOLAKIS: What happened to the 20-foot separation criteria in Appendix R?

MR. LAIN: That is within the deterministic requirement within 805. But if a facility does not necessarily meet that, they can use their performance-based method and determine whether it's --

DR. APOSTOLAKIS: Why do you call it performance-based? Is it risk-informed?

MR. LAIN: Yes, it has -- it uses risk-informed information along with fire modeling to be able to calculate the consequences of certain fires along with the risk information.

DR. APOSTOLAKIS: So is it possible then for a licensee who has complied with Appendix R 90 percent, to use that and say now here we really don't have the 20-foot separation, but we will use 805 to prove to you that it's not necessary. So 90 percent of the time they use Appendix R and in other words are they allowed to pick and choose?

MR. LAIN: No. They're not necessarily allowed to pick and choose on their own. I think what's going to happen is they'll be able to use this methodology to send in for exemptions or license amendments.

MR. BIRMINGHAM: I was going to say it's probably helpful to look at the 805 approach. Licensees will need to do a self-assessment of the plan, determine what are the nuclear safety systems that have to be protected, how far -- if you have a redundant system and they're both in a fire area, and if for some reason they're not foot separated, first you look at can I meet it by a deterministic -- do I have the 20 feet?

If you can't meet the deterministic, you do have the option of looking at it from a performance based. Is there a reason to believe that in this room is it credible to believe that there's a possibility

of a fire that can affect both systems? And from a performance-based standard, you can apply the risk insights as well as the performance-based approach and if it turns out that you can -- to know if there's a credible fire you can have in that room that's going to last for 15 or 20 minutes, you don't need a 3-hour barrier, for example. You could get a lesser barrier.

MR. LAIN: And that's if they can do that on their own, if they're an 805 plant. If they find that they're becoming an 805 plant, then basically they can keep that evaluation on record and the inspectors will come through and question them on that and they'll be able to show them the evaluation there versus if they're an Appendix R plant, they would need to come in for an exemption.

DR. APOSTOLAKIS: But when they come for an exemption, can use 805?

MR. LAIN: Yes. We would expect to see some performance-based type exemptions coming through.

MR. BIRMINGHAM: Well, we currently have had some licensees come in and presented information, showed us that while they may not meet the Appendix R criteria at their plant for some reason or another, that something less than 20 foot is acceptable at their plant. And there are exemptions on the record.

MR. LAIN: On the record, plenty. A lot of those did not use as much risk information as they used more fire modeling and other types of approach there.

DR. APOSTOLAKIS: I thought that was one of reasons that the Agency supported the development of NFPA 805. There were too many exemptions to Appendix R using deterministic --

MR. LAIN: That there are 800 or over 800 exemptions on the books now and they saw that the Appendix R deterministic criteria, if we have another issue like thermal lag or something of that sort, you end up with a lot of exemptions coming in. So this is one way a facility can figure out those exemptions on their own.

DR. APOSTOLAKIS: So if I take two plants that meet Appendix R criteria, and I do a risk assessment, will I find roughly the same contribution to CDF from fires?

MR. LAIN: I would think that's --

DR. APOSTOLAKIS: I'm not so sure.

MR. LAIN: You would think there's going to be a --

DR. APOSTOLAKIS: There would be a --

DR. POWERS: I would be sponged, George.

MR. LAIN: It would take an hour.

DR. APOSTOLAKIS: Does it bother anybody in the Agency that the risks are different, even though the appendix is met?

MR. LAIN: I'll have to talk with my manager.

MS. BLACK: I didn't quite understand the question. What were the two plants you were comparing?

DR. APOSTOLAKIS: Well, two plants that meet Appendix R and then I do a risk assessment and I calculate the contribution to CDF from fires. Now most likely these will differ.

MS. BLACK: Right.

DR. APOSTOLAKIS: Is that a cause for concern?

MS. BLACK: No.

DR. APOSTOLAKIS: Why not?

MR. SIEBER: I don't think it is because you can have two entirely different plants, a PWR and BWR, that are going to have different risk profiles and the contribution to the risk from fire will be different because of plant layout, plant vulnerabilities are different.

So it wouldn't bother me.

CHAIRMAN BONACA: Plus, I mean if they're both low --

DR. SHACK: If they are both acceptably low.

MR. LAIN: Right.

DR. SHACK: They can be different but --

DR. APOSTOLAKIS: But will they be acceptably low?

CHAIRMAN BONACA: Some of the earlier design, I don't know how you define acceptably low.

MR. ROSEN: Right.

CHAIRMAN BONACA: That's a big contribution for a fire, so on the latest designs fire is much less because they were designed with fire in mind.

MR. ROSEN: Right. But the Agency doesn't go in and set individual criteria for what portions of risk -- you can only have 10 percent to human actions. You only have 20 percent for fire.

DR. KRESS: Wait until you see the Option 3 Framework.

MR. ROSEN: Well, maybe that's being considered in the future, but as of today, we do have requirements that plants meet the regulations and then there's an implied understanding that that means

typically a low enough CDF over all. But we don't go in and try to parse that CDF into pieces and then say -- and each piece must be less than a certain amount.

DR. APOSTOLAKIS: I agree with that, but first of all, J.S. wants to say something.

MR. HYSLOP: This is J.S. Hyslop from --

MR. ROSEN: You do have to introduce a lot of facts here.

MR. HYSLOP: I was just sitting here, but from my perspective it seems like you can fly with Appendix R in a couple of ways. There are several 3(g)(2) criteria. You can -- some plays rely more than other plants on manual actions, so you would expect different risk contributions from plant to plant, at least from my perspective.

MR. SIEBER: That's another reason.

DR. APOSTOLAKIS: Would you then lead to CDF greater than 10^{-4}?

MR. SIEBER: Who knows?

MR. ROSEN: I don't think so. If you find one of those, then you go after that.

DR. APOSTOLAKIS: But you're not even looking there because you have satisfied Appendix R, so you don't --

MR. ROSEN: No, if someone suddenly has a

revelation that they haven't properly assessed the safety of their plant and find themselves in 2 times 10^{-4}, 3 times 10^{-4}, then they're obviously going to be doing something about it, especially if it's --

DR. APOSTOLAKIS: Did Quad Cities satisfy Appendix R?

MR. ROSEN: Yes. There was a Quad Cities data transient, I'll call it, where for a while they thought their fire risk was quite a bit higher than it ultimately turned out to be when they did the analysis.

DR. APOSTOLAKIS: It was not as high as they originally thought, but it was not negligible either.

MR. ROSEN: It wasn't negligible, when they got done doing it right, but originally they thought it was higher than that.

MR. BIRMINGHAM: One of the advantages of NFPA 805 is that it does require this assessment where the licensees do go through fire area by fire area and do determination, what their risk in that area, and by doing this additional look they will be better protected in some areas than they would have been otherwise. And by protecting themselves in relationship to the risk, the concern to nuclear

safety, their contribution to CDF could drop as opposed to what -- there's no reason for it to go up that I see, but it could drop.

DR. POWERS: Do we still --

MR. BIRMINGHAM: Fire area plants aren't required to even take that look.

DR. POWERS: Do we assume that each fire area is isolated from other fire area?

MR. BIRMINGHAM: Yes.

DR. POWERS: There is no probability that any of the barriers between fire areas would be breached by the fire itself?

MR. ROSEN: From a deterministic point of view, is that what you're asking?

DR. POWERS: Well, I'm really asking a probabilistic question, I'll have to admit.

MR. LAIN: I think in the Appendix R world, yes.

DR. POWERS: In an Appendix R world, yes, I agree. Do we still do that in a non-Appendix R world?

MR. LAIN: I think, yes. The evaluation is going from a fire area to a fire area.

DR. POWERS: We've got absolutely 100 percent perfectly reliable fire barriers?

MR. LAIN: No, no. I think they're going to be evaluating fire barriers also.

MR. BIRMINGHAM: But we apply it consistently against the Appendix R plants and against the NFPA 805 plants that we assume that a single fire starts and the language in there is from a single fire. You're correct.

But that seems reasonable. A fire initiates and it can propagate unless it's taken care of quickly.

MR. ROSEN: Well, I think we have some operating experience that says that one fire can cause another fire in a remote area. I think that's what probably Dana is thinking about, but I hesitate to guess, but I think -- I know for sure that has been seen in the field but it's highly unlikely. Most fires that have occurred have not had that constant. It can happen, but it's like everything else. It's got a probability with it.

DR. POWERS: Let's see now, the Browns Ferry fire didn't propagate from fire area to another?

MR. ROSEN: No, I'm not talking about propagation. I'm not talking about propagation. I'm talking about a fire which has an effect which causes something else remotely to malfunction and that thing

can catch on fire. That has happened, but it's not typical of fires.

Now propagation is another matter. If you have a huge fire someplace, it can overwhelm a fire barrier, sure.

MR. LAIN: Implementation. NEI has been working hard. We've been working with NEI on implementation guide. I think Rev. D was handed out. They've had two pilots. One at Farley, Farley Station which reviewed the change control process and the other was at McGuire which covered the transition process. The staff has participation in both of those pilots and our detailed staff comments on those, on the Rev. D are presently in concurrence.

MR. ROSEN: Do you have a plan to endorse the implementation guide by Reg. Guide?

MR. LAIN: Yes. I missed that first sentence.

MR. ROSEN: It's not going to stand out there alone, the implementation guide?

MR. LAIN: No, our plan is to have a performance-based fire protection Reg. Guide and the first thing we're looking at putting in that is this implementation guide from NEI and we would like to endorse the implementation guide, so we are trying to

work with NEI in getting a quality product that we can endorse.

MR. ROSEN: How close are you to that? You said you were in Rev. D. Is that right? Did you say that?

MR. LAIN: Right. And hopefully --

MR. ROSEN: There four revisions already, to me, right?

MR. LAIN: Right.

MR. HANNON: Let me try to respond to that. We anticipate -- I'm John Hannon, Plant Systems Branch Chief.

We anticipate that our comments will be in the latest revision, will be available to NEI by the end of the year and we anticipate that they should be able to wrap everything up in one additional revision after this.

So we're looking at one more revision to reach final.

MR. ROSEN: Will that guide be available, assuming the Commission acts, I think the Commission is going to be acting in the early part of 2004, assuming the Committee recommends this going up? We're going to need to have both the guide and the rule at the same time, right, in order to move

forward?

MS. BLACK: I'm Suzanne Black, Director of DSSA. Back several years ago, before I was even in DSSA, I think the decision was made to go ahead with this rule ahead of the guidance, although we've been slow writing the rule and we've been pushing the guidance, so they're probably going to come together, but we didn't want to hold the rule up or the guidance. And I think the paper -- what the proposed rule is due in March, I believe, to the Commission now? Is that the new schedule?

MR. LAIN: I think we'll go over that later. Right now, I think we've got a new date.

MR. ROSEN: But the rule is not much use without the guide and the guide is not much use without the rule.

MS. BLACK: Right.

MR. ROSEN: Fred Emerson?

MR. EMERSON: This is Fred Emerson with NEI. Let me add a little clarification.

We anticipate at least two more revisions. One to address the comments that we are going to be getting and the other is because we're not going to be seeing the final rule language until the March time frame, despite our requests otherwise, we're going to

have to issue another revision after the rule is final, just to make sure that we pick up all the language of any changes that are being made to the rule language between the last time we saw it and the next time we see it.

So the final one will be issued at some point after the rule is final and that will be, I'm guessing, May-June next year.

MR. BIRMINGHAM: Fred, isn't it somewhat true that licensees, I mean -- they will have the rule available to them. We expect early sometime shortly after March when the Commission does approve it, but they will have the rule, the standard will be available to them and they will be able to begin to also have the draft of the implementing guidance and they'll be able to begin to look at their plants as far as that economic decision that they need to make to decide whether it benefits them to become an 805 plant or to stay as they are as an Appendix R plant.

MR. EMERSON: Yes, what you say is true. They will have substantial information available to allow them to begin the decision making process, but because this is a pretty significant change in their licensing basis that they're contemplating, they're not going to make a final decision until after they

see the final rule and the final implementing guidance.

DR. POWERS: So we have the potential of having Appendix R plants, 805 plants, Branch Technical Position plants and Licensing Condition plants. Is this right?

MR. LAIN: Yes sir.

DR. POWERS: And we're going to have inspectors trained to do all four types, right?

MR. LAIN: Yes sir.

DR. POWERS: Challenging. This is burden reduction on the inspection force.

CHAIRMAN BONACA: Or permutations thereof.

DR. POWERS: Plus 803 exceptions. This sounds pretty easy to me.

MR. BIRMINGHAM: Well, we have the advantage of the rather experienced inspection force as far as looking at the Appendix R plan.

DR. POWERS: And they'll never retire, so you'll have --

(Laughter.)

MR. BIRMINGHAM: Yes, they will. You're right.

MR. LAIN: Something we've agreed to with NEI is to do comprehensive reviews of the initial

setups. I think our long term plan is to sort of have an administrative license amendment transitioned with the review of the transition with the efficiency and inspection staff, but initially the headquarters staff will be reviewing the first couple of transitions and we are hoping to sort of provide a template for others to follow and so that's something we've agreed to do with NEI.

The staff, with enforcement discretion, the staff wants to encourage the licensees to conduct these self-evaluations in transition to 805 so we're working with OE, the Office of Enforcement to develop an enforcement policy and also with ROP, the Reactor Oversight Process, to develop some incentives, I think, that NEI's been looking forward to.

We don't necessarily punish the licensees for finding old design issues. That's been an NRC policy, I think, in the past with OE. And so in the future the regions are going to continue to conduct regular inspections during the transition period, but they may focus their inspection, sort of concentrate on the transition and the progress of the self-evaluations.

DR. POWERS: Now the regions' fire inspection capabilities --

MR. LAIN: I didn't catch that first couple of words.

DR. POWERS: There wasn't a couple, first couple of words. I began with a prepositional phrase. What I'm interested in is your last bullet here. It says the Reactor Oversight Process will monitor future changes and what not.

And what I'm interested in is this -- the capability of the regions to inspect the diversity of plants that we'll now have under this fire protection scheme.

MR. LAIN: I think the plan now is to sort of in next summer time period is to develop the inspection criteria. Right now we're looking at audit guidance on how to audit the first couple of initial submittals. I think there's going to be a few years before they've actually -- a few of them have actually transitioned. So I think during that time period we're going to be looking at ways to come out with the inspection criteria.

MR. BIRMINGHAM: Were there plans to have a temporary -- not a temporary, but a GI * (1:54:37)

MR. LAIN: No, that's still to be determined.

DR. POWERS: Well, you've discussed the

mechanics and I'm more concerned about the manpower right now.

In at least a few of our visits to the regions, they've complained to us about their being relatively at sea in the area of inspecting for fire protection, lacking the trained manpower, having to rely heavily on headquarters to provide that in specialized inspections. Is it your intention that these will be specialized inspections coming out on fire protection or are you just going to rely on the regions to do it in their normal inspection procedure?

MR. LAIN: My indication is we're going to rely on their normal inspection, inspection schedule and inspection process.

MR. HANNON: Dr. Powers, this is John Hannon. It's been some -- at least a year or more since we've had any requests from the regions to support their fire protection inspections from headquarters.

It's my current understanding is that all of our regions are staffed up and are capable of self-assessing --

DR. POWERS: I know you've been working in that direction and I just basically am asking is it successful and now you're going to rattle the drum

again with another change.

MR. LAIN: From there I'm going to let Joe talk about the rule.

MR. BIRMINGHAM: Okay, I'd like to talk about the rule's structure itself a little bit. What we intend to do is to add a paragraph 50.48(c) that will incorporate NFPA 805 directly into 10 CFR 50. That way NFPA 805 actually becomes part of 10 CFR 50 if it is the rule. 10 CFR 50.48(a) will continue to apply.

DR. POWERS: Let me ask you a question about this strategy. You're going to incorporate this specific guidance by addition into the rule which means every time it gets updated you're going to have to go through a rule changing. Is that correct?

MR. BIRMINGHAM: Our intention is not to generally not to go through an update to the rule. If licensees see a specific advantage to a later edition, we would prefer or expect or plan for them to actually have to come in and request, take advantage of it, rather than actually pursue rulemaking.

MR. ROSEN: So this is not going to be like the ASME code 50.55(a)?

MR. BIRMINGHAM: No, it will not.

MR. ROSEN: That's not going to -- that's

not the model to be thinking about here.

MR. BIRMINGHAM: Correct. it is not. It will not automatically update as new versions of NFPA 805 come out in the future.

MR. LAIN: It's sort of my understanding with OGC is that basically that would be allowing NPFA to do rulemaking and the NFPA Committee could --

MR. ROSEN: But that's not the way it works for the ASME code either. The ASME Code Committee Committees can change the code, but then the NRC staff adopts approves the new provision. So it's a three-step process, with exceptions it's necessary.

When you're saying we don't intend, you don't intend to do that with 5048(c)?

MR. BIRMINGHAM: That's correct.

MS. BLACK: This is Suzanne Black again and I think if the Code Committee changed it to the point where it looked like it was worthwhile going through rulemaking, yes, we would, but once again, this decision to adopt this into the rule versus use something simpler in the rule was made years ago, but in hindsight, it might have been an incorrect decision, but it was made back when -- I don't know. I don't know if I even want to get into the history of why we decided to go this way versus that way, but it

was modeled on the ASME code --

DR. POWERS: Process.

MS. BLACK: -- process back then and I think with hindsight now we probably -- I would have recommended another path, but I think it's too late to change courses.

DR. POWERS: Well, I would think about this horse a little bit. You've gotten a brand new rule, a brand new fire protection process here. You've run it through three plants, didn't exactly go the smoothest of any pilots that I've ever seen in my life. Those three plants are represented -- or two plants are representative of two plants. And now you're going to try it on some others. You might find a kink or two here and you're going to ossify yourself.

MS. BLACK: Well, I don't think the kinks are with the standards so much as like interpreting how to implement it and with a simpler rule you'd even have more of that.

We run into the struggle of how much detail to put into the rule with our legal staff because you need to have detail and criteria that anyone can look at and judge whether or not a licensee is meeting the rules or any informed person is what

OGC's standard is. And I think trying to come up with some general criteria to put in the rule would be very difficult and so at this point I think this is the best way to go.

MR. ROSEN: I think Dana's point is well taken. I think it's a big difference between the ASME PP&V code and NFPA 805 in terms of experience and broad scale implementation and use.

MS. BLACK: I think the code cases -- those are constantly making changes, required changes that different code cases can be picked up.

MR. ROSEN: In the boiler and pressure --

MS. BLACK: Right, but in this, I don't envision that many changes because even though it's very long and detailed, it's pretty general. I think most of the changes we'd want to make, you could make through the guidance document at this point.

MR. ROSEN: Those are good arguments, we'll see what it turns out to happen actually.

MS. BLACK: Twenty-twenty hindsight in the future, right?

MR. ROSEN: We'll find out, if we're still around.

DR. POWERS: There's a saving Grace. It costs a fortune to change over to this so how many

people are actually going to do it?

MR. ROSEN: Well, that's a whole other question. I did read and I think it was the regulatory analysis that now the staff things that maybe 20 or 25 plants, I think it said, and I don't know whether that means units or plants, will ultimately adopt 805.

We had a representative from Duke here who said they had already made the decision at the subcommittee meeting. They had already made the decision for McGuire and I think he said Catawba, but they would make the transition. And he thought, as I recall what he said then, there are probably another dozen plants that their little working group had decided would likely benefit a great deal from moving. So one of the concerns of ACRS all along has been is that we'll give this party and nobody will come. And we would caution the staff to not make the barriers to entry so high that the benefits of this move couldn't accrue to the public's health and safety and to the industry and the Agency's resources, all of which we anticipate.

So now I'm still worried that as Dana suggested that they'll give this party and nobody will come, except the Duke guys who say they will.

Can you say anything about that? What do you know? What's recently being heard?

MR. HANNON: This is John Hannon. In the last NEI fire protection forum we asked that question and there was one hand in the audience. I turned out it was a plant in Region 1 who said they had already budgeted to make the transition to 805. They plan to do it in FY 05. That was the only response we got at that time.

MS. BLACK: But back in 2001 when we almost didn't go forward with this rulemaking, we had a letter from NEI that said that they supported going forward with this because they thought it would be beneficial use of our resources and that people would adopt this rule.

MR. ROSEN: Maybe the NEI representative, if he's still here, would be willing to give us a late update on that.

MR. EMERSON: This is Fred Emerson with NEI. I think most plants are still adopting a wait and see attitude because we still haven't seen the final rule and we haven't seen the final guidance.

I think over the last couple of years there has been a major shift from total skepticism to cautious optimism that this might actually be

beneficial. But even if you completely optimize its benefits, there will still be some plants who don't see a cost benefit and moving forward with it and that's going to be a plant specific decision.

What we've been doing is working with the staff to try to remove as many unnecessary barriers to implementation as possible to improve the likelihood that plants who can benefit from it will see the benefits of going ahead and make that decision. And we're going to be putting out guidance that -- and have put out guidance that allows a plant to make some early decisions as to whether this is going to be beneficial or not when they do see the final paperwork coming out of the staff and out of the NEI.

DR. POWERS: Fred, so do you remember when were doing the fire protection functional inspection and people had to get their fire protection licensing basis in order? They were complaining vigorously because that was costing like a million dollars. How do they avoid that million dollars a plant?

MR. EMERSON: Well, the estimates that we've seen coming out for making a transition like this is on the order of one to two man-years, depending on how well the current licensing basis is documented and how good their PRAs.

DR. POWERS: See, it's the codicil, depending on how well the current licensing basis is documented and we know from the fire protection functional inspections that a lot of them have it scattered, shall we say?

MR. EMERSON: True, but I don't think it's in the area of a million dollars. I think it's more in the area of half a million or less.

DR. POWERS: I'm quoting the numbers that came out of the fire protection --

MR. EMERSON: I understand and I'm quoting numbers that came out of our pilots.

MR. ROSEN: Well, I don't know if we're going to get very much further with this line of questioning, but what we have is a lot of unknowns, I can see that and not a lot more clarify of the issue of just how many plants are going to actually make the transition. The only way to find out unfortunately is to go ahead.

If we don't go ahead, then we'll never know. If we go ahead, we might know.

MR. BIRMINGHAM: Sort of just following on to that, an observation is that those plants that are likely to be in operation for a longer period of time are more likely to benefit from the NFPA 805 --

MR. ROSEN: That's getting to be almost all of the plants now in terms of license renewal.

MR. BIRMINGHAM: License renewal. Yes, I think that's a good point.

The other thing is that NFPA 805, we are amending paragraph (f) of 50.48 to state that a plant that complies with NFPA 805 will be complying with the requirements of paragraph (f) for decommissioning.

Within the rule itself we're identifying seven exceptions. They were exceptions that we felt that the standard had written into it statements that the staff either wanted to clarify or that we just felt we weren't going to quite go along with as written. An example might be that the standard, for example, required flame-retardant coating on cables. I'm sorry, it required flame-retardant cables per se and our practice has been that you have flame-retardant cables or that you have applied flame-retardant coating or that you have a suppression system in place. We took an exception to that, for example.

I could relate some of the other exceptions --

MR. ROSEN: Well, I think you should make it clear that some of the exceptions were because

they're beyond the scope of NRC regulation, for example, the life safety goal.

MR. BIRMINGHAM: That's a good point. The two that we felt were the life safety goal, in general, and the plant damage goal were also -- those are the two that -- they're not within the scope of NRC regulatory structure, therefore we took exception to them, not because they're not good goals, not because we aren't glad to see them in NFPA 805, but we felt they're outside our regulatory structure.

We expect licensees to document their -- there's a bullet missing.

(Pause.)

The last slide, the last bullet, the rule structure requires licensees to complete a plant-wide evaluation before changing any of their fire protection program.

Once they complete that, the licensees document that evaluation and will retain those records on site. They will be maintained, available for our inspectors to use as a basis for conducting their inspections.

We are going to require in the rule structure that alternatives to NFPA 805 and also any changes, deviations to the Chapter 3 elements and

minimum design requirements will require license amendment. The NRC considers the Chapter 3 elements and design requirements to be of sufficient importance that we thought that was necessary and of course, we require that alternatives to NFPA 805 which we don't know what those alternatives are would be adopted by a license amendment.

In working with the rule and the rulemaking process, we determined that it's not necessary for NRC to pre-approve the use of methods such as fire modeling and fire PSAs. Licensees have, in the past, been allowed to use models somewhat at risk and that we believe licensees can do this. Because NFPA 805 contains within it a regulatory structure for the use of fire models, fire PSAs.

We provided for a decommissioning plants to comply with NFPA 805. There's -- although paragraph (f) describes the general qualities of a fire protection program, it doesn't have specifics built into it. Appendix R would be less applicable to a decommissioning plant because the nuclear safety aspects tend to diminish and you fall into the radiation release aspects concerns and we felt that well, NFPA 805 has an entire chapter devoted to how to move your plant towards a decommissioning mode.

The reactor oversight process monitoring future changes, as we said, before you can make changes to your plant, you need to complete the plant-wide evaluation. Once you complete that, then you can begin to make these changes. Those are the types of changes that as they're made we expect the reactor oversight process will be able to, over time, be able to monitor. We don't expect 25 plants to come in all at once. This will be maybe four plants a year to come in and over time we will see up to maybe 20, 25 plants. And it will give a chance for the triennial inspections to come in and look at the different plants and gain that inspection experience.

Also, the NRC may approve such things as risk-informed performance-based methods in the future which maybe used under NFPA 805 structure.

MR. ROSEN: But because you have to approve the transfer to 805 status, correct?

MR. BIRMINGHAM: Yes.

MR. ROSEN: You can control the rate at which licensees are allowed to make that transition. In other words, let's just assume for some reason everybody wanted to do it all at once. Well, you just say no. You'd set up a priority scale and do it consistent with your resources, right?

MR. BIRMINGHAM: Yes, not unlike what we're doing in license renewal. We're having to limit how many plants can come in for license renewal at one time. Which plants are a priority, which plants can identify the greatest need.

Plants are in their compliance for Appendix R. They don't need to make a change, so where it's not a penalty to them, it's going to delay --

MR. ROSEN: In a sense, it's less necessary than license renewal because at least in license renewal plants may be rerunning up against a hard stop in terms of the license * (2:12:30). But here, that's not true at all. I mean they can continue in Appendix R forever, or for as long as their plant is licensed.

MR. BIRMINGHAM: Correct. Thank you. Current status of the rulemaking, the proposed rule was issued in November of 2002. The comment period ended in January of 2003. We've been working with OGC and with the Plant Systems Branch to resolve those comments, to work on reducing the need for license amendment requests for methods. We made some good progress in those areas and we think we're ready to go forward with the final rule now.

The Federal Register notice for the final review has been reviewed by OGC and they told us that they had no legal objection to the Federal Register notice. The Rev. E of the implementing guidance is expected the first quarter of 2004.

Our current schedule is to brief the ACRS in December. We're here. This is on the final rule and we don't expect to see significant changes. OGC has given us their no legal objection. Staff doesn't plan any changes.

And the Commission is quite familiar with it. And in the January-February time frame, we will go through the office concurrence process. We'll see CRGR. CRGR will be an information brief. This is a voluntary alternative. It's not a requirement, so they should not have any problem with the -- there are no generic requirements.

MR. ROSEN: No backfit requirements. This is typically what they focus on.

MR. BIRMINGHAM: Correct. In March, the final rule will go to the EDO and then up to the Commission.

We expect the final rule to be published one month after the Staff Requirements Memorandum comes out and we don't know how long the Commission

will deliberate, but we really don't expect a lengthy deliberation. It hasn't changed that significantly from the proposed rules stage.

MR. ROSEN: Okay.

MS. BLACK: Steve, I'd like to clarify one thing and this is Suzanne Black again. I wanted to clarify the thing about the license amendment review because remember, this was supposed to be more or less self-implementing and the first few were going to audit to make sure that the implementation guidance is clear enough that everybody understands how licensees are going to transition into this new regulatory scheme. But we weren't going to review and approve these new fire protection programs. We were going to allow licensees to do it and then through the inspection program, eventually, we would review its implementation through the triennials.

MR. ROSEN: Okay, that's very helpful. I forgot that. So actually what will really happen once the rule is published is licensees that make a decision to do this will just send you a letter telling you they're doing it.

MS. BLACK: Right.

MR. ROSEN: And then you schedule your review activities in the field as you choose to.

MS. BLACK: Correct.

MR. ROSEN: Okay, I don't think this will happen, but in principle, you could get 50 letters one day. It's highly unlikely.

MR. BIRMINGHAM: Questions from the rest of the Committee? Comments?

MR. ROSEN: Well, if there are no other comments from any of the members, or members of the public, I want to thank you all very much and turn it back to you, Mr. Chairman.

CHAIRMAN BONACA: Thank you for the presentation. It was informative.

MR. ROSEN: I notice we're on schedule.

CHAIRMAN BONACA: You are absolutely right, so you are commended for that.

MR. ROSEN: I was fishing for that compliment.

CHAIRMAN BONACA: We're now moving and having a presentation from one of our members regarding recent operating events. That's a quite interesting presentation.

We can stay off the record at this point.

(Whereupon, at 2:16 p.m., the meeting was concluded.)

CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Advisory Committee on Reactor Safeguards 508th Meeting

Docket Number: n/a

Location: Rockville, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Rebecca Davis
Official Reporter
Neal R. Gross & Co., Inc.

Construction Inspection Program

Mary Ann M. Ashley
CIP Team Leader

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- Jerome Blake, RII
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- Ron Gardner, RIII
- Charles Paulk, RIV
- Tom Foley, NRR
- Joseph Sebrosky, NRR
- Edmund Kleeh, NRR
- Carl Konzman, NRR

Steering Committee

- Charles Casto
- Stuart Richards
- James Lyons

Development of the CIP

- Uses a team approach
  - Regional representatives
  - Steering committee
- Builds on work from 1996
  - Lessons learned

Program Overview

- Framework Document
- Inspection Manual Chapters
- Inspection Procedures

CIP Framework Document

Reflects that inspection program is focused on reaching conclusions

- IMC-2501 for Early Site Permits
- IMC-2502 Combined License
- IMC-2503 ITAAC
- IMC-2504 Preparation for Operation

Challenge: IMC-2503, ITAAC

- Majority of the inspection work
- Modular Construction Techniques
  - Aggressive construction schedules
  - Location of construction activities
  - Timing of inspections to support ITAAC conclusion

People

Inspection skills

Strategic Workforce Planning

On-going construction

- MOX fuel fabrication facility
- Enrichment facility construction
- Browns Ferry Unit 1 restart

Formal training

Programs and Processes

Construction Inspection Program Information Management System (CIPMS)

- Collect, organize, manage and generate reports
- Tie information to NRC ITAAC verifications
  - Detailed construction schedules as early in the process as possible regardless of location
  - Coding scheme

Procedures

Detailed Inspection Procedures

- Design-specific inspection procedures
- Estimate in SECY-01-188, "Future Licensing and Inspection Readiness Assessment (FLIRA)"
- Lead time for development varies by design

Public Comments

- Applicability of Part 21 to applicants
- More specifics:
  - public communications
  - engineering design verification
- Clarify expectations regarding Appendix B
- Clarify role of SAYGO

What's next for CIP?

- Finalize the framework document
- Test CIPIMS
- Observe construction in progress (particularly modular construction)
- Complete Manual Chapters
- Complete change summaries for Inspection Procedures

United States Nuclear Regulatory Commission

Standard Review Plan (SRP) Chapter 18, Human Factors Engineering and Associated Documents

ACRS
December 4, 2003

1

Agenda

- Introduction
- Overview of SRP and related documents
- NUREG - 1764
  - Risk-informed screening method
  - Human factors engineering review criteria
- ACRS Letter of Sept. 24, 2002
- Public comments and ACRS letter of Nov. 13, 1995
- Closing statements
- ACRS discussion

2

Meeting Purpose

- Request ACRS Endorsement of:
  - Revision to SRP Chapter 18, "Human Factors Engineering"
  - NUREG-0711, "Human Factors Engineering Program Review Model;"
  - NUREG-0700, "Human System-Interface Design Review Guidelines;"
  - NUREG-1764, "Guidance for the Review of Changes to Human Actions."

3

Presenters

- J. Persensky, RES/DSARE/REAHFB
- James Bongarra, NRR/DIPM/IROB
- Susan Cooper, RES/DRAA/PRAB
- Paul Lewis, RES/DSARE/REAHFB

4

SRP Chapter 18 and Related NUREGs Overview

- SRP Chapter 18 provides a high level framework for all HFE reviews

Applications:

Review aspects of →

- o New Plants
- o Control room modifications
- o Modifications affecting human actions

5

SRP Chapter 18 Revisions

- Modified review elements and acceptance criteria to agree with NURE-0711, Rev.2
- Added review of plant modifications and credited human actions
- Added a graded approach to HF review based on risk insights

6

SRP Chapter 18
Technical Basis for Revision

- Address feedback from applications
  - ALWR reviews
  - Plant modernization reviews performed in other countries
  - Feedback from staff and international users
- Incorporate NRC research on human factors engineering

7

SRP Chapter 18
Summary

- SRP Chapter 18:
  - Existence Since Early 1980's
  - Last Revised – 1996
  - Principal NRC HF Guidance
  - Refers to Several HF Related Guidance Documents
  - Latest Revision Upgraded, Partially Risk-informed

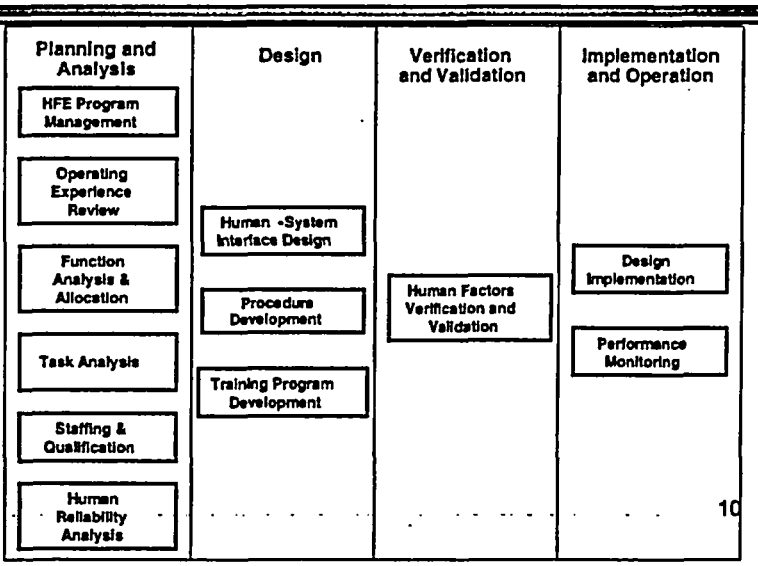
8

NUREG-0711
"Human Factors Engineering Program Review Model"

- Complete set of HF review elements.
  - All HF reviews.
  - Complete life cycle.
  - Includes reviews of the design process and the design product.
- Elements from NUREG-0711 are adapted in other documents for specific types of review.

9

NUREG-0711
Review Elements



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NUREG-0711
Changes From Prior Revision

- Applies to all HF reviews, not only advanced reactors.
- Two elements added :
  - Design Implementation.
  - Performance Monitoring.
- Changes made to the following elements
  - Function Analysis and Allocation.
  - Human Reliability Analysis.
  - Human-System Interface.
  - Verification and Validation.

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NUREG-0700
"Human System-Interface Design Review Guidelines"

- HSI Elements
  - Information Display
  - Interaction and Interface Management
  - Basic Controls
- HSI Systems
  - Alarm Systems
  - Group-View Display System
  - Soft-Control System
  - Computer-Based Procedure Systems
  - Computerized Operator Support Systems
  - Communication Systems
- Workstations and Workplaces
- HSI Support
  - Maintainability of Digital Systems

12

NUREG-0700
Changes From Prior Revision

- Adds review guidance for digital systems
  - General computer-based information system interfaces
  - Soft controls
  - Computer-based procedures and alarm systems
  - Interface management and navigation
  - Maintainability of digital systems

13

NUREG-1764
"Guidance for the Review of Changes to Human Actions"

- Guidance addresses:
  - New actions (e.g., substitution of a human action for an automated action, when the automated equipment fails.)
  - Modified actions (e.g., due to new or modified system components.)
  - Modified task demands (e.g., change in amount of time available, or in environment.)
- Risk-informed review guidance
  - The risk screening method determines the level (detailed, medium, brief) of human factors review.

14

NUREG-1764 Review Approach

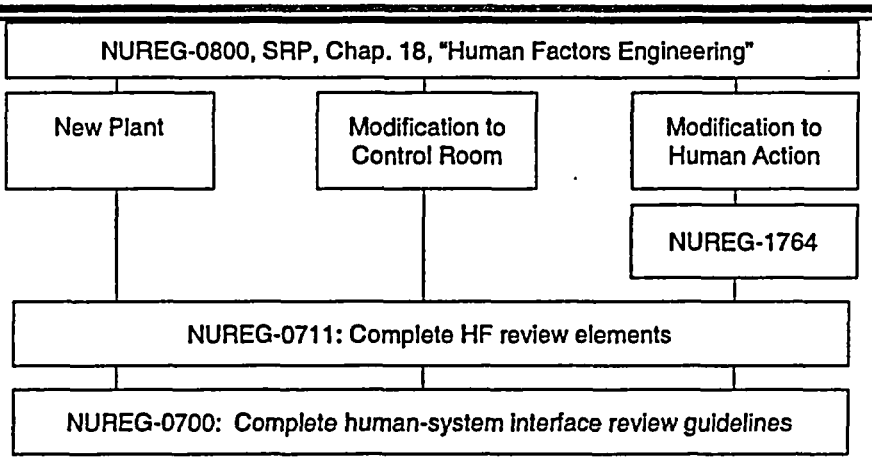
+ Risk-screening
  - Risk-informed submittal
  - Non-risk informed submittal

+ Human factors review criteria

+ Integrated Decision-Making (See RG1.174, Section 2.2.6) and Input to Safety Evaluation Report

15

SRP, Chapter 18, "Human Factors Engineering" Hierarchy



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NUREG-1764
Phase 1
Risk Screening Method

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NUREG-1764, Risk Screening Method
Four Steps

- Step 1: Change in risk due to modification per RG 1.174.
- Step 2: Evaluation of risk-significance of human action not being performed correctly.
- Step 3: Qualitative evaluation.
- Step 4: Integrated assessment.

18

NUREG-1764, Risk Screening Method Step 1

- Step 1 - change in risk due to modification per RG 1.174
- Δ CDF_{mod} = [new CDF (with modification in-place) - current baseline CDF]

19

NUREG-1764, Risk Screening, Step 1 (cont.)

- If HA only and Region I – Do a Level I HFE review.
- Otherwise - go to Step 2 to evaluate risk-significance of human-action not being performed correctly

20

NUREG-1764, Risk Screening Step 2

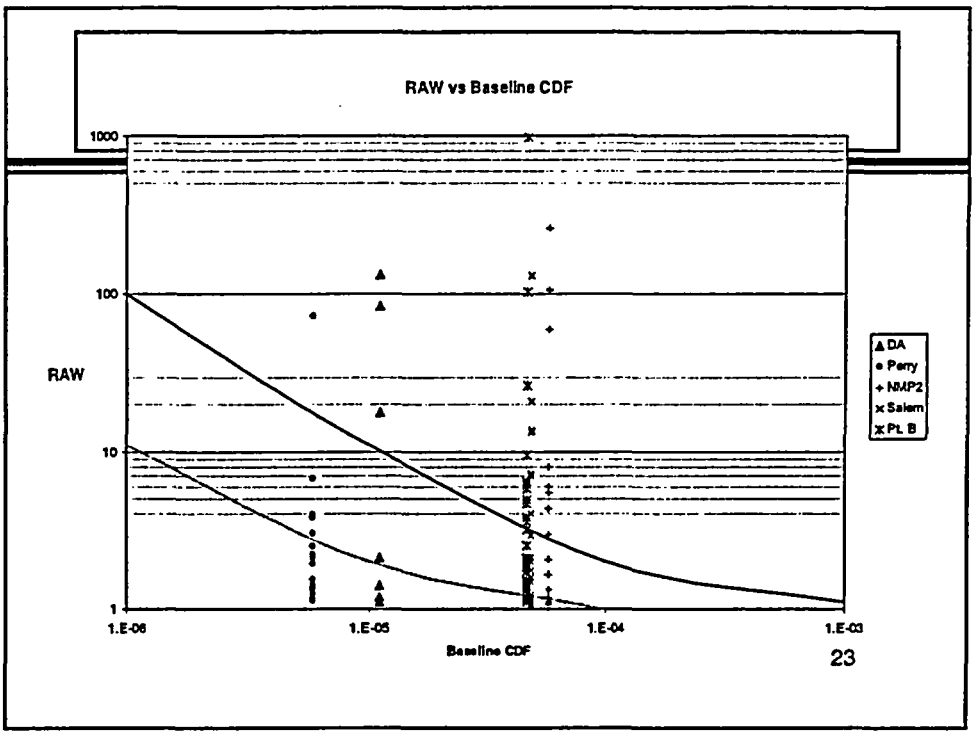
- Step 2 - evaluation of risk-significance of human action not being performed correctly
- Evaluates risk importance of HA based on both RAW and FV importance measures.
- *Preliminary determination of Review level for HA as Level I, II, or III.*

21

NUREG-1764, Risk Screening, Step 2 RAW versus CDF_{BL}

- RAW measures importance by computing the increase in CDF when the HA fails
- We select the ratio method of RAW since it is most commonly used and understood and PSA programs already calculate it
- $RAW_x = (CDF_{BL} + \Delta CDF_x) / CDF_{BL}$

22



NUREG-1764, Risk Screening, Step 2
RAW versus CDF_{BL}

- Level I versus Level II split line:
  - **The line is based on a combination of CDF_{BL} and Δ CDF of 1 E-4**
  - **Related to the Commission Safety Goal of not exceeding a CDF of 1E-4 core damage events per reactor-year**
  - **Relates to a red finding in the new NRC SDP program**

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NUREG-1764, Risk Screening, Step 2
RAW versus CDF_{BL}

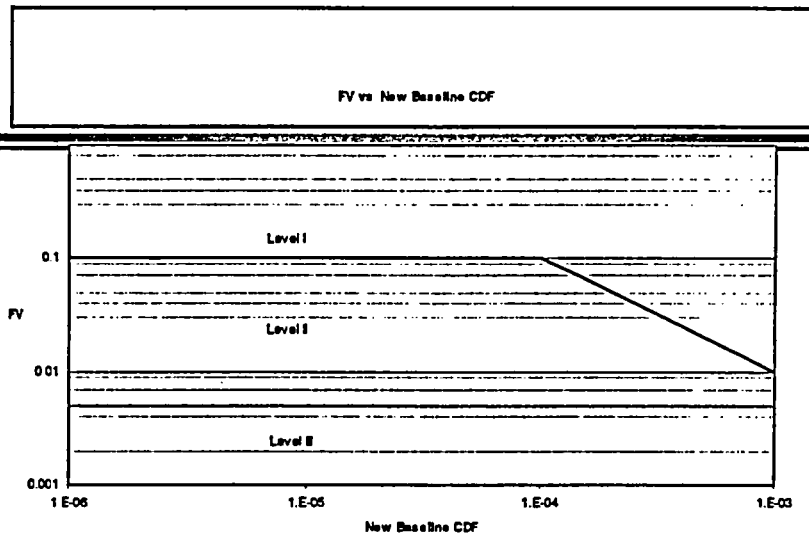
- Level II versus Level III split line
  - Similar to RG 1.174, this is placed is one order of magnitude below the Level I line
  - Equates the lower Level II curve to a ΔCDF of 1 E-5
  - Thus Level II relates to a Yellow SDP finding and Level III to a White or Green finding

25

NUREG-1764, Risk Screening, Step 2
FV versus CDF_{BL}

- FV represents a different aspect of risk than RAW
- FV is the fraction of total core damage cutsets (or sequences) that contain the action in question
- FV Split Criteria on next VG.

26



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NUREG-1764, Risk Screening, Step 2
Combining RAW and FV

- Take the most conservative Region as determined by RAW and FV

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NUREG-1764, Risk Screening Step 3

- Step 3 - Qualitative Evaluation
  - Allows the screener to reduce or elevate the Level of HFE Review
  - Based on factors such as:
    - Personnel functions and tasks.
    - Design support for task performance.
    - Performance shaping factors.

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NUREG-1764, Risk Screening Step 4

- Step 4 Integrated Assessment
  - Integrates the results generated in Steps 1 through 3
  - Provides a Table that gives the Level of HFE review based on screening.
  - Conclusion of Risk Screening: The level (I, II, or III) of human factors review.

30

NUREG-1764, TABLE 2.2 (p. 22), "Integrated Assessment with RI Screening"

Results of Step 1 RI/PSA (see Note 1)	Results of Step 2 Importance Measures	Results of Step 3 Qualitative Assessment	Results of Step 4 Recommended Level of HF Review
Region I (HA only)	-	-	Level I
Region I (Expansion & HA)	Level I	No change or elevate	Level I
		Reduce	Level II
	Level II	Elevate	Level I
		No change	Level II
		Reduce	Level III
	Level III	Elevate	Level II (see Note 2)
		No change or Reduce	Level III
Region II	Level I	No change or Elevate	Level I
		Reduce	Level II
	Level II	Elevate	Level I
		No change	Level II
		Reduce	Level III
	Level III	Elevate	Level II
		No change or Reduce	Level III
Region III	Level I	No change or Elevate	Level I (see Note 3)
		Reduce	Level II
	Level II	Elevate	Level I (see Note 3)
		No change	Level II
		Reduce	Level III
	Level III	Elevate	Level II
		No change Or Reduce	Level III

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NUREG-1764, HF Review
Three Levels of HF Review

- Levels
  - Level I is the most detailed review
  - Level II is a moderately detailed review
  - Level III is a brief review
- Criteria are from NUREG-0711
  - Graded
  - Tailored

32

NUREG-1764, Phase 3 HF Review Decision

- Result of human factors review is submitted to Integrated Decision-Making (See RG1.174, Section 2.2.6) and to Safety Evaluation Report

33

ACRS Letter of Sept. 24, 2002 Remarks

- **Generate guidance for the use of inspection and review tools**
- **Study team and individual performance in the context of plant organization***
- **Consider need for simulator devoted to research***
- **Study human performance during severe accidents**
- **Evaluate if the ROP detects human performance degradation**
- **Search for leading indicators of human performance degradation***
- **Investigate latent errors and how to treat in PRA***
- **Articulate HRA program vision***
- **Use of simulators for quantifying HRA**
- **Perform critical review of HRA models.**

34

Comments on NUREGs -0800, Chapter 18, -0711, and -0700

35

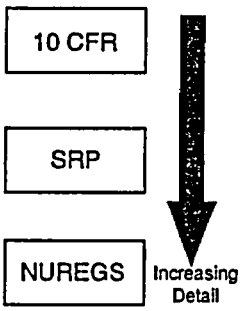
Comment by Robert Fuld (1): NUREG-0711 is overly prescriptive.

- **Response**
  - NUREG-0711 does not prescribe a *process*; it provides *guidelines* for the *review* of design process.
  - The review elements are used to review how important topics are addressed in the applicant's process.
  - To illustrate
    - NUREG-0711 provides guidance on the review of task analysis, but does not specify that one task analysis method must be used.
    - Three advanced reactor reviews were conducted using NUREG-0711, yet *each* vendor had *its own design approach*, and *each design is very different*.
  - NUREG-0711 is detailed, but the detail is needed
    - Increase the standardization across reviews
    - Reduce uncertainty in its application

36

Comment by Robert Fuld (2): NUREG-0711 may be considered de facto regulation

- **Response**
  - This is an agency-wide issue
  - HFE review information is provided in increasing detail to provide flexibility in application
  - The HFE review guidance documents clearly state that the contents are guidance and that alternative approaches can be acceptable with justification
  - NUREG-0711 explicitly provides guidance on how to evaluate the acceptability of alternative approaches



37

Critiques by Robert Fuld (3): The use of a systems engineering approach is not justified.

- **Response**
  - What NUREG-0711 means by "systems engineering approach" is:
    - To consider the 12 elements,
    - To decide which of the 12 elements applies to this review,
    - To use those elements in the review.
  - This approach is quite general.
  - This approach is widely used and accepted
    - Systems engineering is a fundamental approach to human factors taught in most human factors courses
    - It is used by nearly all design organizations of large, complex systems
  - *The critique does not suggest an alternative approach*

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Comment by Robert Fuld (4): NUREG-0711 is too costly.

- **Response**
  - **The basis for this comments is unknown**
    - **Compared with what alternative?**
  - **Industry currently recognizes the need for HFE and addresses it; NUREG-0711 is used to review what processes are used**
  - **NRC guidance is forward looking and has smoothed the road for the introduction of new technologies for advanced control room technologies by providing clear guidance**
  - **All NUREG-0711 elements are not used for all reviews.**
    - **A graded and tailored approach is used based on the type of review being performed.**

39

Comment by ACRS (1995): NUREG-0700 Overly prescriptive and may discourage the approval of other equally acceptable alternatives (de facto regulation).

- **Response**
  - **NUREG-0700 is used with the NUREG-0711 process**
    - NUREG-0711 encourages the use of a vendor/licensee specific style guide in place of 0700
  - **Guidelines reflect best practices**
    - HED evaluation process uses guideline discrepancies only as flags for looking in more detail
    - It is recognized that I&C and HFE technology are rapidly changing (more so than other aspects of the plant) and the need to address new technology is built into 0711
  - **The items are used to evaluated what technology is employed by the vendor**
    - The document does not suggest that the guidance areas included are expected to be included in the design, e.g., guidance for the review of computerized procedures is provided and used only IF such a system is provided

40

Summary of Positive Feedback

- NEI Public Comment Letter
  - "It should be noted that there are few comments, indicating the draft sections provide adequate information to successfully develop and implement the targeted programs and plans."
- ACRS Letter of January 14, 1994
  - "We commend the staff for the development of this document (HFE Program Review Model). It provides much needed guidance to applicants on the staff expectations with regard to HFE for evolutionary reactors."
- Results of extensive peer review by industry groups and its use by many organizations both within and outside of the nuclear industry reflect the positive light in which this guidance is viewed.

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SRP Chapter 18 and Related NUREGs Summary

- SRP Chapter 18 now has three applications
- NUREG-0711
  - Scope of application expanded
  - New and revised review guidance
- NUREG-0700 added guidance for specific HSI topics
  - Computer-based procedures
  - Soft controls
- NUREG-1764
  - New document.
  - It contains (1) a risk screening method and (2) graded HF review criteria.

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SRP Chapter 18 and Related NUREGs Conclusion

- **Supports NRC Performance Goals**
  - **Reduce unnecessary burden**
    - NUREG-1764 has a risk screening method
    - No new requirements
  - **Improve regulatory efficiency**
    - Clear, detailed review guidance
    - Standardized format
    - Users have expressed need for detail
  - **Maintain safety**
    - Risk screen provides detailed review for risk important human actions.
    - Reduces regulatory uncertainty, which can cause licensees to delay safety improvements
    - Contains review guidance for new technologies
- **Supports NRC policy on risk-informed regulation**
- **Asking for ACRS letter**

43

Technical Reports Related to the Development of Human Factors Engineering Review Guidelines

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NFPA 805 RULEMAKING

ACRS Full Committee
Briefing On Fire Protection
December 4, 2003

Paul Lain, Plant Systems, NRR
Joe Birmingham, Rulemaking, NRR

NFPA 805 - Performance-Based Standard for Fire Protection for LWRs

- Background
- Advantages
- NFPA 805 Structure
- Implementation
- Rule Structure
- Status of Rulemaking
- Schedule

NFPA 805 - Background

- 1975 - Browns Ferry Fire
- 1980 - 50.48 and Appendix R
- 1998 - Reg. Guide 1.174, PRA
- 1998 - SECY 98-058, RI/PB FP Std
- 2000 - SECY 00-009, Rulemaking Plan
- 2001 - NFPA 805 Published
- 2002 - Proposed Rule Published

NFPA 805 - Advantages

- Uses stakeholder involvement
- Voluntary alternative
- Sets performance goals and criteria
- Focus on risk significant issues
- Endorses a National Consensus Standard
- Reduces unnecessary regulatory burden

NFPA 805 Structure

- Maintains a core FP program
- Requires an analysis to establish a fundamental fire protection program
- Allows transition of existing licensing basis including exemptions and GL 86-10 evaluations
- Guidance on performing nuclear safety analysis, fire modeling, and fire PSAs

NFPA 805 Structure (Continued)

- NFPA 805 Chapter 3 "Fundamental Fire Protection Elements"
  - Fire Protection Plan
  - Fire Prevention (e.g. control of combustibles)
  - Fire Brigade
  - Water Supply
  - Standpipes and Hose Stations
  - Fire Extinguishers
  - Fire Alarm and Detection Systems
  - Water-Based Fire Suppression Systems
  - Gaseous Fire Suppression Systems
  - Passive Fire Suppression (e.g. building separation, fire barriers, penetrations)

NFPA 805 Structure

- Differences From App. R
  - Cold shutdown
  - Emergency lighting
  - Alternate/dedicated shutdown
  - Analyzed shutdown method
  - Recovery actions
  - Adds radiation release criteria

Implementation

- NEI pilots held at Farley and McGuire
- NEI Implementation Guide
- Comprehensive review of initial submittals
- Enforcement discretion during transition
- ROP monitors future changes

Rule Structure

- Incorporates NFPA 805, 2001 Edition into 10 CFR 50.48(c)
- Identifies 7 exceptions to the standard
- Requires license amendment to adopt NFPA 805 including identifying any license revisions
- Requires licensee to complete a plant wide evaluation before changing fire protection program

Rule Structure

- Licensees document evaluation and retain records on site
- Alternatives to NFPA 805 and changes to Chapter 3 elements require license amendment
- NRC approval of methods not required licensee may use these at "risk"
- Decommissioning plants may comply with NFPA 805
- ROP monitors future changes
- NRC may approve new RI/PB methods in the future

Current Status

- Proposed rule issued November 2002
- Comment period ended January 2003,
- Federal Register Notice reviewed by OGC, November 2003
- Rev E of implementing guidance expected first Quarter of 2004

Schedule

- Dec – Brief ACRS on Final Rule
- Jan/Feb – Office Concurrences/CRGR
- Mar - Final Rule to EDO/Commission
- Final Rule published 1 month after Staff Requirements Memorandum