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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

491ST MEETING

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THURSDAY, APRIL 11, 2002

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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., Dr. George E. Apostolakis, Chairman, presiding.

COMMITTEE MEMBERS PRESENT:

GEORGE E. APOSTOLAKIS	Chairman
MARIO V. BONACA	Vice Chairman
F. PETER FORD	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 Executive Director

SHER BAHADUR

SAM DURAISWAMY

I N D E X

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

(8:30 a.m.)

CHAIRMAN APOSTOLAKIS: The meeting will now come to order. This is the first day of the 491st meeting of the Advisory Committee on Reactor Safeguards. During today's meeting the Committee will consider the following: Final Review of the Turkey Point License Renewal Application; Advanced Reactor Research Plan; CRDM Penetration Cracking and Reactor Pressure Vessel Head Degradation; Westinghouse Owners Group (WOG) and Electric Power Research Institute (EPR) Initiatives Related to Risk-Informed Inservice Inspection of Piping; and Proposed ACRS Reports.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Mr. Howard Larson is the designed 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 sessions. A transcript of portions of the meeting is being kept and it is requested that the speakers use one of the microphones, identify themselves and speak with sufficient clarity and volume so that they can be

readily heard.

I will begin with some items of current interest. First of all, we are welcoming back Mr. Graham Leitch.

MEMBER LEITCH: Thank you. It's good to be back.

CHAIRMAN APOSTOLAKIS: That's good. I would like to inform the members that Chairman Meserve will be here tomorrow at 11 a.m. to welcome our newest member. And at 1 o'clock tomorrow afternoon we are all going as a group to have our picture taken individually because eventually we will get new budgets.

MEMBER SHACK: I'll need to dress up for that.

(Laughter.)

MEMBER SIEBER: Would that be possible?

(Laughter.)

MEMBER SHACK: That's the problem.

CHAIRMAN APOSTOLAKIS: You all have this handout, items of interest. There are five speeches by the Commissioners at the recent Regulatory Information Conference. Also, we have summary of the Reactor Oversight Process Inspecting Findings that should be of interest and also you will see on page 27

a news item that Westinghouse Electric Company has submitted an application for design certification of the AP-1000 design. And Dr. Kress has a tape perhaps we should all see?

MEMBER KRESS: Yes, I have here in my hot little hands a copy of a copy of a copy of a copy. Sandia at work, mostly, that I obtained by nefarious means and what this is is a tape showing a lot of the things they did to show the robustness of spent fuel casks, like running trains into them and dropping them off of buildings and etcetera. So if anybody is interested in seeing this and I have it and I guess Theron can set it up and show it at noon time some time.

CHAIRMAN APOSTOLAKIS: How long is it?

MEMBER KRESS: It's not very long.

CHAIRMAN APOSTOLAKIS: Okay, so maybe we can do that at 12:30 or so?

MEMBER POWERS: After members have watched it and convinced themselves that the casks are incredibly robust, I'll them what's wrong with the tests.

MEMBER KRESS: Okay, great.

CHAIRMAN APOSTOLAKIS: Okay, so I think we are now -- do the members have anything else to add by

way of introduction?

Okay, so the first item on the agenda is the final review of the Turkey Point License Renewal Application.

Dr. Bonaca is our lead member. Dr. Bonaca?

VICE CHAIR BONACA: Yes, good morning. On March 13, the Subcommittee on License Renewal traveled to Turkey Point and at that time we visited the site. We were able to observe on the simulators the ability of the plant to interconnect the emergency diesel generators from one unit to the other unit for station blackout concerns.

We also heard from the plant about the way that they addressed closure of the open items. There were only four open items in the SER for license renewal. We had an opportunity to observe the site and note the excellent physical conditions of the equipment on the site.

In the afternoon on the 13th we met in Town Hall of Florida City and there we had a public meeting and we heard from the staff how the open items had been addressed and closed.

During that meeting we also had some observation from a member of the public. We also had

in writing some concerns raised by another member of the public. The two concerns really echoed each other. One of the concerns that was raised had to do with voids in the concrete structure of the containment identified at Turkey Point, both units, in the early 1980s. We heard from the site personnel on how the issue had been addressed. We felt reasonably confident that they had been addressed properly. We asked questions regarding the generic implications, how they had been addressed and for those we have asked the staff to come today and tell us how they were handled for the other sites.

And so with that in mind, we have a presentation this morning both from the Turkey Point people and from the staff and at this point I turn the meeting to PK Kuo who is here to present us on that.

MR. KUO: Thank you, Dr. Bonaca. Good morning, members of the Committee. My name is PT Kuo, the Program Director for the License Renewal and Involved* Impacts Program. This is my first week on the job. Chris Grime has moved on to take on new challenges and we all wish him good luck. I also want to introduce Mr. Frank Gillespie on my right. Mr. Gillespie is the Deputy Director for the Division of Regulatory Improvements Program.

Today, after the Applicant's presentation, the staff will brief the Committee on the review results of the Turkey Point license renewal applications and specifically, the staff will address in detail the questions raised by Mr. Oncavage in their letter to the Committee on concrete voids and the hurricane damages.

We are going to have an assembled panel to brief the Commission. We also have a technical staff sitting in the audience ready to answer any of your questions.

With that I will ask whether Mr. Gillespie has any opening remarks?

MR. GILLESPIE: Yes. Let me just address the concrete void issue because we may not have done as much research on it as we would like relative to everything from the old Oyster Creek problem with spalling concrete on the outside to the voids that were identified in the 1980s and going back and saying did we consider this generically at that time?

The staff is going to be prepared to address it for Turkey Point where we think it's been plant specifically resolved and I'm going to tell you right now we might have an IOU to have to come back as we were kind of talking about this last night,

prepping for the meeting. We might not have done the generic research on the other aspects of it quite yet and we're kind of still in a process. The other thing is hopefully between the staff and the licensee's presentation, we will address things like Part 21 on analysis and decision points that are in Part 21 on is it significant, is it generic? And the lack of -- and it's a question of documentation for convenience. While the letter you got from this individual was, in fact, an open letter, the Agency did enter it and Region II is going to be on the phone to try to address this. They did enter it into the allegation system. Even though it was an open question it got put in the allegation system to make sure we followed up and got with the person and got back to them and got letters to them and did an inspection.

Unfortunately, that system gives the appearances because it, in general, was designed to protect people's identity of being kind of private and therefore the link to the plant-specific issue and what was done might not be obvious in public documentation because of that. So Region II is going to be on the phone to try to address that to the degree they can.

We put ourselves in a procedural box when

we put a public issue in a private system.

MR. BLANCHARD: Yes. I realize just for the benefit for those members who were not in the meeting, this is all because in their mind there was an expectation that since this was a potentially generic issue, maybe the licensee had initiated a Part 21 which speaks of a defect to a significant component. And Part 21's intent is the one of making the issue known, available to all plants so that people can look at their own plant and inform the NRC that there is an action to be taken on that. And that's why we raise these kind of issues and we will hear from Region II how it's handled.

MR. GILLESPIE: So we'll take our best shot at answering all of the questions, but we may have a little something. I talked to Goutam here and depending on how it all comes out when we get all the facts on the table, we might have an IOU still left.

VICE CHAIR BONACA: Yes, it's important, however, today that we also separate Turkey Point and how it was addressed at Turkey Point --

MR. GILLESPIE: Yes --

VICE CHAIR BONACA: From the generic issue because that may have to be handled actually -- they should be handled differently. We want to make sure

that there isn't any outstanding issue to the drafting of a letter of the report at Turkey Point.

MR. GILLESPIE: Yes. And PT told me last night, he said "I'm the license renewal guy." And he says, "this is an operating question." I said, "Yeah, but you're stuck leading the meeting." So --

(Laughter.)

Thank you.

MR. KUO: And if I may add, we also have a Region II representative who will be tied up in the telephone line and to here and to answer any questions you may have.

VICE CHAIR BONACA: Thank you.

MR. KUO: Thank you.

CHAIRMAN APOSTOLAKIS: Okay, the Applicant can go ahead.

MR. HALE: Can everybody hear me okay? Hi, my name is Steve Hale. I'm the Project Manager for License Renewal for Turkey Point in St. Lucie. I thank you for the opportunity to talk to you all today. I know I've met several of you when you came to the site, as well as the ACRS subcommittee meeting we had last September.

What I'd like to do today is give you an overview of the application and then talk specifically

about two of the open items which were a little more complicated to address than say some of the others and I'm going to talk about the closure of the nonsafety related which can affect safety related category of scoping and the license renewal rule, what we call Category 2. Then I'll talk about field-erected tanks and the program that we propose for field-erected tanks to close that open item.

When we began the license renewal application effort for Turkey Point, a lot of the guidance that's in place today was really in draft form, so we had to drawn on multiple sources. While we had Part 54, we have a draft standard review plan, but it was under major revision at the time. We had a draft GALL report. We tried to address and look at GALL as part of our overall process, but that was also in the developing stage for Turkey Point. We had a draft Reg. Guide, but we had 95-10 which was issued, I guess the final rev. was in the 1996 time frame which had undergone somewhat of a demonstration program, so we utilized the methodology that was in 95-10.

Additionally, we tried to use the lessons learned from previous applications, RAIs and RAI responses which were on-going with Calvert Cliffs and

Oconee at the time. And as generic issues were being resolved between NRC and NEI, we tried to factor those also in co-application as they were available and as they were applicable to Turkey Point.

One of the efforts NEI underwent in 1999 was working with the NRC staff and trying to come up with a format that we both could agree on so we could get used to the information being presented in the same places. This was, I believe, in the 1999 time frame and essentially, based on the draft SCs that were issued for Calvert Cliffs and Oconee, plus some lessons learned through those reviews, we structured, we came up with a format that both the staff and NEI agreed to and ANO was really the first to follow that standard format and then we followed Hatch because of where they were in the development of their application, attempted as best they could to address that format, but based on where they were, they really had a difficult time in trying to comply with it totally.

And then I think the subsequent applications that have come down the pike, Dominion's applications, Duke's other applications as well as Peach Bottom, followed the standard format. It's broken down into four chapters. The first chapter

addresses the administrative information requirements of Part 54. Chapter 2 goes through the methodology we utilize for scoping and screening and presents that results. Chapter 3 is where you do your aging management review and Chapter 4 addresses time-limited aging analyses.

Now I hadn't intended to go through scoping and screening methodology today. We went through that in great detail with the subcommittee on September 25th of last year.

Also, as part of that standard format there were several appendices. One was the UFSAR supplement. The second is Appendix B where we have summaries of our aging management programs presented in the ten element format addressing staff requirements on how they want aging management programs presented. We included an Appendix C and this was really to address some of the, what we call generic type RAIs, RAIs regarding positions, regarding aging effects and that sort of thing. It wasn't required by the standard format, but this was an intent on our part to address some of the RAIs we had seen in previous applications and we felt Appendix C did a good job of addressing some of those. Appendix D would include any of the technical specification

changes that would be identified by the overall process and then as an adjunct or really an attachment with the application comes the environmental report.

When you look at the scoping criteria in the rule there's a criteria of safety-related components that -- and there's three criteria stipulated for safety-related. Non-safety related which can affect safety-related, based on our review of this, we saw two types of non-safety which can affect safety. One is where the non-safety system has to function in order not to affect a safety-related component. And the other is one for potential of interactions, where the failure of the non-safety system could potentially affect the function of the safety-related system. And then category 3 is the five regulated events: fire protection, PTS, EQ, ATWS and station blackout.

In the application, you'll find in Section 2.2 a summary of all the systems at the plant and the ones we had identified as in the scope of license renewal and we do the same with structures. As you can see, about half the systems in the plant have at least some portions that fall within the scope of license renewal and a little less than or a little more than a third of the structures at the site.

I have to note that the structures at the site include anything in the protected area so you have a lot of the administration buildings and that sort of thing as why not essentially comes into play is the power block buildings.

For screening, this is where you really get down to the nuts and bolts of the components and structural components that support the functions that were identified in the system and structure level of scoping. And going through screening, the first step you do a component level scoping. Then you look at whether the component performs its function without moving parts or change configurations, essentially what we consider to be passive and/or they're not subject to replacement based on a qualified life. So you take each major system or structure in the plant that falls within the scope of license renewal. You break it down into its pieces, parts, you determine which ones support the functions and you establish which of those components are passive and which ones are not replaced regularly.

The results of screening are presented in the six column tables in Chapter 3. One of the lessons learned that we had with the Oconee and Calvert Cliffs applications was the fact that it

really makes it good to see the entire IPA on one set of tables, so you have the scoping and screening results essentially in the first two columns and then you have a balance of the aging management reviews, so rather than including duplicate tables in Chapter 2 and Chapter 3, we simply provide a summary in Chapter 2 and refer to Chapter 3 which lists the scoping and screening results and then you can see the rest of the IPA stacked up with each one of those components.

The mechanical sections, again, this is consistent with the standard format that was developed. You had a reactor coolant system, connected systems, emergency safety features, auxiliary systems and steam and power conversion.

In the structural area, we chose to break it up between the containment and other structures and in the electrical and I & C section, it essentially looks at all the electrical components of the site and it follows a slightly different process than the mechanical and civil sections.

We also submitted license renewal boundary drawings along with our application. Again, the staff has indicated that really facilitates their review in the mechanical area and lets them see what the boundaries were and what equipment was included in

scope based on the actual drawings generated from the PNIDs at the plant.

Aging Management Reviews are presented in Chapter 3 and Appendix B because really the Aging Management Review not only consists of identifying the aging effects, but demonstrating the aging effects are adequately managed for the extended period of operation.

To facilitate the review, we grouped the items in the Aging Management Review the same way they're grouped in the scoping and screening section so you had a one to one correlation through the application. Again, the results are presented in the six column tables including identifying the aging program that manages any aging effects that requirement management.

For nonclass 1 components, again in Appendix C, some of the technical positions we took regarding certain types of aging effects are presented there for non-Class 1 mechanical as well as civil structural. In the Class 1 area, we develop and discuss the aging effects specifically in Chapter 3.

One of the things that we felt was mandatory as part of our review for license renewal was doing an extensive review of both industry

experience as well as plant-specific experience at Turkey Point. We reviewed INPO and NRC generic communications and also our responses and any of those that really were related to aging we went back and relooked at those to see if we'd addressed them appropriately.

In terms of plant-specific history, we went back and looked at the nonconformance reports and condition reports, I think all the way back to the early 1980s. We looked at event response teams. These are teams we form when we have a significant event at Turkey Point like a plant trip, those sort of things. We form teams whose goal is not only to identify what needs to be done to get the plant started up, but also root cause and this type of thing.

One of the great source of information we have, we have a metallurgical lab and all of the nonconforming conditions or condition reports that require metallurgical analysis are submitted to the metallurgical lab for determination of root cause and the type of aging effects. We also drew on that population. Those were available, I think, at Turkey Point we had over 200 metallurgical lab reports so we used as another major source of information for

operating experience.

And as also part of our process, our procedures and the way we developed our Aging Management Review had us go and specifically talk to the system engineers and the component engineers. My team was located on the Turkey Point site, so we had quite a bit of interface with the engineers that deal with the systems on a day to day basis.

CHAIRMAN APOSTOLAKIS: Now from the metallurgical laboratory reports, I don't understand what benefit you had from those. Is it possible that you would decide to do something by looking at one of those reports that you had not already done?

MR. HALE: One of the issues that has been identified as the one -- hey, we don't think aging effects are occurring, but you need to go in and do one-time inspections to verify. Pitting is a good example. But if you go back and you look at metallurgical and you sort on things like stainless steel systems with chemistry control, you can look as whether you've ever had any specific failures related to pitting or stress corrosion cracking. We use metallurgical lab reports when they determined that we've had loss of material due to MIC and we folded those -- we developed tools for doing aging management

reviews on the non-Class 1 mechanical systems because those are the ones where you get the wide variety of materials and environments. And one of the things you use is hey, the tools the industry may develop may say that you have to address stress corrosion and cracking in the system, but if we can go back to the metallurgical lab reports and say we've never had stress corrosion cracking in this system and we can develop a technical basis for it, it provides a good source of information. Again, on the other hand, the tools the industry develops may say you don't get MIC in these kind of systems. Where we have experienced MIC and we discovered that through our interface with the metallurgical groups as well as the metallurgical lab reports. So we're not saying that we just use it carte blanche. What we're saying we use that information as additional research in some of the technical positions we may have taken with regards to aging effects.

CHAIRMAN APOSTOLAKIS: Okay.

MR. HALE: Any other questions related to that? Okay.

Time Limited Aging Analysis. These were the major TLAAs at Turkey Point: EQ, class and balance of plant fatigue, containment tendon

relaxation, reactor vessel irradiation embrittlement. We had a couple of cases wear/erosion where we had TLAAs associated with that. Containment liner fatigue, crane fatigue. Also as part of the rule we have to do a review of time bound exemptions whether we had any and our review determined we didn't.

With regard to the UFSAR supplement, we submitted a markup with the application. In addition to that we included a new chapter in the SAR which includes all the AMPs that are committed to for aging management, as well as a description of every one of the TLAAs that were identified. Also, in the FSAR supplements our commitments related to programs are included. Now additionally, one of the things we did with the staff, we've updated the SAR supplement to include all the commitments that were identified as part of our review of the application. In other words, with RAIs, responses to RAIs, we included any additional commitments that came out of that interchange into a revised SAR supplement that we issued late last year.

With regards to Appendix B where Aging Management Programs are located, for each aging effect requirement management an Aging Management Program is identified. We presented these programs in the 10

attributes following the guidance issued by the NRC.

We've got three categories of Aging Management Programs. We have those that are existing, those that need to be adjusted and those that are brand new. You see we have pretty equal distribution.

Again, I described Appendix C, non-Class 1 component, Aging Management Review Process,it's not required by the regulation, but we did submit it to address some of the previous RAIs we had seen and other applications. And Appendix D was technical specification changes. We did not have any for the Turkey Point license renewal application.

I just wanted to mention the environmental report because there is an environmental piece. Some of the unique things about the Turkey Point site, we have thousands of miles type of cooling canal system and you see it from satellite photos, in fact. We do not identify the need of any major refurbishment which is one of the issues that needs to be addressed in the environmental report.

We do not use wells at the site. We essentially, the only water we use from the local community is domestic water. And the evaluation we performed against the alternative show that license renewal is the lowest impact option under the

environmental review.

MEMBER LEITCH: Steve, I have a question. I'm not sure if this is the right time to bring it up or not, but the fossil units that are adjacent to the nuclear units --

MR. HALE: yes.

MEMBER LEITCH: It seemed to me that -- and I'm going on memory of quite a few years back, but it seemed to me that during Hurricane Andrew there was some missiles from the fossil unit that damaged a part of the nuclear unit. I think it was in the fire protection pump house or something like that.

MR. HALE: What happened was we had a high tower out in the water treatment plant area and the high tower fell over on one of our domestic water tanks. We have two tanks and the domestic water tanks are also what you credit for your Appendix R, I believe A-1, whatever, it's our fire protection water sources. So the tower actually fell over on one of the tanks and as a result we got into one of the start up issues we had related post-Hurricane Andrew was providing the water sources until we could reconstruct that tank.

MEMBER LEITCH: I guess my question is in the 20 years extension period for this license, what

assurance do we have that the fossil units wouldn't be retired and as many fossil units abandoned in place and that there might be missiles, if you will, created as a result of that that could in future storms damage the nuclear unit?

MR. HALE: Well, for one, the safety-related equipment is protected from missiles as part of our design basis. In fact, the safety-related portions of the plant and even some of the nonsafety-related portions of the plant survive very well. We were back on line within a month after Hurricane Andrew.

There were a lot of missiles during Hurricane Andrew, independent of whether the fossil unit was there or not. We had winds in the area of -- the eye passed over Turkey Point and we were in 150 to 160 miles per hour range. The South Florida building code is about 120 and so trees -- there was a missile that went through one of the oil tanks, what they call the day tanks that affected that particular tank.

The nuclear plant fared very well with the exception of that high tower falling on the fire water tank and a materials warehouse that was outside of the protected area. The plant did very well. I think it's a proof test on the plant so to speak, but one of

the things in terms of interactions that was identified some years ago and has been evaluated is the seismic capability of the smokestacks. And they have been evaluated. In fact, we've included them in the scope of license renewal for that very reason.

MEMBER LEITCH: Okay, the smokestacks at the adjacent fossil plant?

MR. HALE: Yes, yes. You'll find them discussed in the application, in fact.

MEMBER LEITCH: That's good. Thank you.

MEMBER SIEBER: Those stacks aren't very high though, right?

MR. HALE: About 400 feet. I wouldn't want to climb to the top of them. There are some folks who do who have to work on the lights, that sort of thing.

Okay now I'd like to go through the resolution of open items and Dr. Kress, I've tried to -- you had mentioned the criteria, so I've included some additional information there. I hope I address your question that you had.

This is a presentation I went through with the subcommittee when they were at the site. The open item is entitled scoping of seismic II over I piping systems. It really goes beyond that. This is really

interactions between nonsafety and safety-related system and the potential impact on safety-related.

One of the things I wanted to summarize was go through the components we included in the scope of license renewal to start with: (1) any pipe segment beyond the pressure boundary which is included in the seismic analysis, we included that pipe segment in the scope of license renewal because it fit in that first category which is it's performing a function in support of the safety system.

We included all piping component supports for nonsafety-related mechanical systems with the potential of seismic II over I interactions because Turkey Point is an older plant. We did this on an area basis. We basically went through each building of the plant and any room that contained both nonsafety and safety-related equipment all the nonsafety-related supports were in the scope of license renewal in that area, regardless of whether the stuff could follow effect or whatever, we just said this area contains both types, so as a result all the nonsafety-related supports associated with ductwork, cable trays, conduit and in addition to that we included the conduit itself, the cable trays and other structural components outside of the mechanical

area, in these areas where you had both safety and nonsafety equipment.

In addition to that, we had done a fairly extensive internal and external flooding analyses so anything related to that was included in the scope of license renewal and this basically included curbing. We have some sump pumps down in the RHR pump rooms and those sump rooms that were included in the scope of license renewal as well to accommodate flooding effects and in addition to that, we included all the pipe whip restraints, barriers, these type of things that we credit for jet impingement, effects of spray and pipe whip.

That's what we included in the scope of license renewal to start with. After a lot of dialogue between the staff and ourselves, the issue that was identified is that the effects of pipe whip, jet impingement, physical contact, pipes falling on pipes and leakage due to credible and that's an important word, credible nonsafety-related pipe failures, beyond the current assigned break locations because we've evaluated breaks in certain places, but we haven't evaluated them across the board, need to be considered based on the industry operating experience. In other words, if you'd had failures of

nonsafety-related piping, through operating experience, and you have a piece of a similar type piping routed above safety-related equipment, then that should be something that should be included in the scope of license renewal and managed from an aging standpoint.

As a result of this issue, there may be some additional pipe segments that need to be included in the scope of license renewal and thus an Aging Management Review needs to be performed. During our ACR Subcommittee walk down to the plant, I showed the ACR Subcommittee an example of the kind of pipe we were talking about.

What we did as a result of that and all these rooms where we had both nonsafety and safety-related equipment we did an evaluation assuming credible failures based on operating experience of nonsafety-related piping beyond what's currently in our current license basis. If there was an interaction with safety-related components as a result of this failure, we in turn included that pipe segment in the scope of license renewal.

To address the criteria --

CHAIRMAN APOSTOLAKIS: Let me understand this. Something is credible if it has happened?

MR. HALE: In operating experience in the industry.

CHAIRMAN APOSTOLAKIS: Oh, in the industry at large.

MR. HALE: In the industry at large. Not necessarily -- although a lot of this piping is not in the scope of license renewal and that sort of thing, we don't operate with leaks at the site and we manage that, but the real issue is when you're looking into the future, without doing specific aging management say on a piece of pipe, could it fail, such that it would affect safety-related equipment.

So we used a fairly conservative criteria in establishing the interaction. Basically, what we said if we had a nonsafety-related piece of pipe in a room with electrical equipment and that electrical equipment is not qualified for outdoor service, then we said that pipe is in the scope of license renewal. We didn't do a rigorous evaluation or analysis of spray and see if the component could accommodate it. We basically just concluded whether it would actually affect it or not through analysis, we said that pipe segment was in the scope of license renewal from a leakage standpoint.

From the pipe whip, jet impingement and

physical contact and this was basically the high energy piping out on the turbine building, it really took walk downs and actual physical observation of the piping and essentially we took the criteria that if we could see the pipe and the safety-related equipment, that piece of pipe was in the scope of license renewal. It wasn't based on a rigorous analysis, but we took a very conservative posture on this.

And in this case it was primarily conduit and cable tray routed out in the turbine building, so if we had to run a cable tray between two walls and there was high energy piping in the area, we said that high energy pipe is in the scope of license renewal.

I don't know if that addresses the criteria question that you have, but we basically just took a conservative position on it.

What was the results of all this? We included a number of pipe segments in five of the structures that contained safety and non-safety equipment. We identified the aging effects requiring management for those pipe segments and for those that require aging management, we included them in our chemistry control program, our systems and structures monitoring program and our Flow-Accelerated Corrosion Program. And we've already made al those changes in

the program documents. In most cases, they were already included in the program to start with. We just had not identified the piece of pipes in the scope of license renewal.

MEMBER ROSEN: What is the qualifier as applicable?

MR. HALE: Well, this is just a broad statement, you know, you don't use FAC on a non-FAC system. It was just a broad -- if you locate our open-item response, I don't know if you all have copies of that. We highlight specifically what systems and what programs apply to which pipe segments.

MEMBER ROSEN: But it's not an out -- all of the above is true except when we decide we don't want to.

MR. HALE: No, no, no, no. The intention here is not all these programs apply to all the pipe segments, that's all. FAC applies to only certain types of systems. Chemistry applies to certain systems as well as the system structures and monitoring program. It's in a lot of detail in our open item response and we've incorporated it on a component level basis where we identify the specific programs that are required.

Any more questions on II over I? Now this is one that I think the industry and the staff are working towards a resolution such that this will not become an open item on subsequent applications where the guidance gets clear, because a lot of it comes to communications and your ability to understand what the true issue is and I think once we understood, then it was easy for us to work through what it was we needed to do.

VICE CHAIR BONACA: Do you think the guidance now is clear enough?

MR. HALE: I think it's still going to be a challenge because for -- for older plants. I think newer plants, we've done an initial scoping review for St. Lucie. It's not going to be quite the same. The older plants have some unique design features --

VICE CHAIR BONACA: But the logic is pretty clear. Older, previous evaluation, II over I were based on concerns with high energy line break, so therefore you're looking for those kind of effects, not aging.

MR. HALE: Right.

VICE CHAIR BONACA: Whatever. Aging now introduces potentially some other locations for failures that are not already covered by previous, so

it seems to me the logic is clear. I mean --

MR. HALE: Right.

VICE CHAIR BONACA: The question is how is the guidance now because we're be looking for. We thought that the guidance provided in the SER for Hatch was quite clear.

MR. HALE: Yeah. Once you understand what the true issues are, I think that -- again, these guidance and these generic interchanges we're having with the staff are a real positive step, I feel, get some of these down on paper, you know, so we can -- we don't get into the point where it's an open item.

But the other item I was going to talk about was related to field-erected tanks. This was an item where the NRC had identified to us three times they wanted us to address regarding field-erected tanks. One, we had not supplied specific acceptance criteria in the application regarding inspection. They wanted us to include some additional provisions in our program that called for additional examinations if the one-time inspection we had proposed identified extensive loss of material. And also provide a little more information regarding why we felt we only needed to do one-time inspection on these tanks.

With regards to the acceptance criteria

and additional examinations, the acceptance criteria is any loss of material greater than the tanks corrosion allowance, okay, will require specific corrective action in our corrected action program and as part of that, we'll consider the use of any additional volumetric or service inspections and identify as well, whether we need to do follow-up inspections and that has been incorporated into the program requirements.

Our basis behind one-time inspection and I'd like to point out in any of these cases where we say a one-time inspection is because we're going into it with the thought that we don't expect to find an issue. In any of these one-time inspections, if we do find problems we would be required under our corrective action program to follow up and establish future inspections and that sort of thing. So when we say one-time inspections, we're saying that this is something where we don't expect to find anything, but our corrective action process would require us to follow-on if we had to.

VICE CHAIR BONACA: So if you find something when you do the one-time inspection, you'll convert that to a program?

MR. HALE: It depends on the aging effect

and what it may be, but if it's something that looks like it's going to be a continuing thing that we need to manage, then certainly we would institute follow-on inspections, but that would be part of our assessment and evaluation and what we saw.

Again, the first plan is under the one-time we don't expect to find significant aging. Our plant operating experience has revealed no incidents of degradation of CSTs, RWSTs and DWSTs, other than some repairs we had to do to the condensate storage tanks were attributed to one, we had some poor coatings to start with on the tank and secondly, the tank was being subjected due to an operational problem to hotter basically steam fluid was blown into the tank which was causing some degradation around the top that it was never really designed for. This is a field-erected atmospheric tank and it was being exposed to some higher temperatures.

Secondly, we went into the demineralized water storage tank recently to install a floating cover on it to help with oxygen control. We didn't find any degradation in that tank as part of that modification we performed.

On top of that, the RWSTs, the CSTs and the DWSTs, we inspect those. Those are part of our

on-going external inspection program so any problems with the tank, you would see corrosion that sort of thing on the outside of the tanks.

When the ACRS Subcommittee was at the site, we pointed out a couple of the tanks as part of our walk down we did.

Okay, that's all I had with regards to my formal presentation.

Do you have any other questions?

VICE CHAIR BONACA: Do you have anything to say about the statements from Mr. Oncavage or are they going to be at a later time?

MR. HALE: I went back and as part of Mr. Oncavage's statements I looked at what we did as a utility, with regards to the discovery, analyzing it, evaluating any corrective actions. With regards to the Part 21 issue, our procedures require us to address defects under Part 21. It's a mandated requirement. It's in our quality instructions.

One of the things that you have to do though is to do a significant safety hazards evaluation to establish whether it is reportable under Part 21. With regards to this particular event, the evaluation performed by Bechtel one, determined that the pressure integrity of the containment was never

compromised and this is documented in the Bechtel evaluation after discovery of the event --

VICE CHAIR BONACA: The design capability of the containment?

MR. HALE: Well, two things. One the pressure integrity, certainly the containment had undergone integrated leak rate tests as well as the structural integrity test previously and if you look where the void was, it was beyond the welded portion of the pressure battery.

Secondly, in that evaluation that Bechtel performed they also demonstrated that the structural integrity of the containment was not affected by the voids. So for it to be reportable, at least from our procedures, under Part 21, it would have to represent a significant safety hazard and based on the fact that the pressure integrity and the structural integrity were not affected by the voids, it would not represent a significant safety hazard.

VICE CHAIR BONACA: What I'm asking about is the design capability, I'm referring specifically to what you're committed to in your testing which is your testing the containment for your design capability which typically is lower, much lower than the overall structure -- ultimate capacity.

MR. HALE: Right.

VICE CHAIR BONACA: So the question I had, I guess, is that evaluation did not address the ultimate capacity. It addressed the --

MR. HALE: The design capacity.

VICE CHAIR BONACA: Design capacity. Okay. Just to make that clear. And so because of that, it is now reported under Part 21?

MR. HALE: Right.

MEMBER LEITCH: I have a question about your ability to inspect the head as per this recent NRC inspection, NRC request, I should say. There are different insulation configurations throughout the industry which make it more or less difficult for people to get a good look at the head. What's your status as far as that response is concerned?

MR. HALE: Turkey Point, we've completed bare metal inspections on both heads. Unfortunately Turkey Point was, if you recall back in 1987, we had a leak that we operated with --

MR. WILLIAMS: Excuse me, Steve?

MR. HALE: Yes.

MR. WILLIAMS: Is that the right slide? You've got station blackout up there?

MR. HALE: I'm sorry, I apologize.

(Laughter.)

I'm sorry, I had a slide for the Davis-Besse.

(Pause.)

Excuse me.

MEMBER ROSEN: It's going to be interesting to see you tie the two together.

(Laughter.)

MR. HALE: All right. As far as the -- as I was saying, Turkey Point had an event with some significant leakage in the reactor vessel head area. In fact, it's what prompted 8805. We had operated, I believe, about -- I believe it was about six months with a known leak in the reactor vessel. It was the conoseals.

As a result of corrective actions related to that, one our insulation configuration was changed somewhat to where we had inspection ports. Additionally, we installed a radiation detector that actually sniffs the head area and so we can get some intelligence, you know, when we get high radiation and containment and can help maybe locate whether --

MEMBER SHACK: N-16?

MR. HALE: Pardon?

MEMBER SHACK: N-16s?

MR. HALE: No, it's just radiation detector in the head region. It's in an enclosure, so we actually have a -- it's something we did to tell us. And we also instituted some very stringent leakage controls. We require specific evaluation if leakage reaches .5 GPM and if needed, we'll actually go in and do containment walk downs.

So the combination of those things, although it was a negative event, I believe has created a situation that we're finding and what we did is we did a bare metal inspection as a result of bulletin in 2001 related to Inconnel 600 on Unit 3 in October of 2001 and we also did it in March of 2002. I would also like to point out we were able to do this and accommodate it within a normal -- we're doing refueling outages in a 25-day type time frame and we were able to accomplish this with that. We used remote TV cameras. I actually went through the report evaluation and they addressed each individual nozzles. We've got videos and pictures, but it was clean. There was no evidence of leakage and there was no evidence of boric acid accumulations.

MEMBER SHACK: And you can literally do 100 percent inspection?

MR. HALE: One hundred percent visual.

With remote, television cameras and that sort of thing. I believe it was Framatone that's developed the -- but it's very detailed.

MEMBER ROSEN: This radiation monitor you talk about, is it sampling the environment, the air and taking it through a filter and putting it in front of a detector?

MR. HALE: Yeah.

MEMBER ROSEN: Now those filters, are those looked at?

MR. HALE: Yes. They're replaced periodically.

MEMBER ROSEN: What do you find on the filters?

MR. HALE: I'm not sure. You're asking a question that goes beyond --

MEMBER ROSEN: Well, I ask it because Davis- Besse found a lot of iron oxide on their filters and they had a similar system.

I think you ought to be finding that the filters are clean.

MR. HALE: They replace the paper periodically because they have to for the monitor itself.

MEMBER ROSEN: They take off the paper to

replace it because they analyze it.

MR. HALE: Yes.

MEMBER ROSEN: But not because it's plugged up or anything.

MR. HALE: Yeah.

MEMBER ROSEN: But you don't know?

MR. HALE: No.

MEMBER LEITCH: As a result of your operating with the leakage back in the 1980s whenever it was, did you find any wastage at that time?

MR. HALE: Not very much, but I think the number that was quoted, like I said, I'm reaching here was in the hundreds of pounds, had accumulated on three of the reactor vessel studs in that stud area, so there was some wastage on the studs. There was no real wastage on the head itself, but again, this was a conoseal leak.

MEMBER LEITCH: I understand.

MR. HALE: And it was, I believe in the -- it was within tech specs, but it was just spraying over about six months it accumulated boric acid.

MEMBER LEITCH: Okay, thank you.

VICE CHAIR BONACA: Going back a moment to the issue of the concrete, what did you do? How was it repaired? What I am trying to understand is what

is the condition of the containment right now for both units? I understand you repaired what you found. You did not open every part of the containment so you had the inspections to identify whether you had other void issues?

MR. HALE: Bechtel essentially did a root cause on the issue that was discovered. The root cause determined it was a combination of a difficult area to get concrete into plus where they had established a construction joint. The repairs that were implemented called for -- we were actually putting in a heavier steel bottom to the equipment hatch to remove the steam generators, so they removed that. They poured the appropriate concrete and they put a thicker piece of metal which was the intent all along when they had pulled it off and discovered the void. In terms of generic implications, based on the root causes that were identified, Bechtel established based on that root cause that they wouldn't find similar type of areas like that based on that -- and so that's documented.

VICE CHAIR BONACA: In other locations of your containment?

MR. HALE: Right, right. And that's documented in there. It was a fairly extensive

evaluation that they performed to demonstrate that.

VICE CHAIR BONACA: So you do have confidence that there are no voids in your containment?

MEMBER POWERS: It's an incredibly self-serving finding, isn't it, that everything is okay, we only made one mistake.

VICE CHAIR BONACA: That's why I'm interested in hearing about -- what is interesting is that it happened in the hatch of one of the units and then they looked at the other one and they found the same problem right in the location. That's why we would be raising questions about the generic implications for other units.

Now so there is a confidence that that was the only location in that containment that could have been affected by that and it was this position for the Turkey Point unit?

MR. HALE: Right.

VICE CHAIR BONACA: Containments.

MR. HALE: And it was also communicated with -- communicated and inspected by the region. There was an LER on it. They came in and looked at the Bechtel evaluation as well as the disposition of the repairs, so I have confidence. We've also

undergone, I think about seven integrated leak rate tests on both containments and I have full confidence in our containments.

MEMBER LEITCH: We had the same problem with Limerick during construction. I think it was Limerick I in about 1977 when the forms were removed from the containment pour and this was above one of the containment hatches, a large void was found. It's right above the containment hatch. There was a real configuration, complex configuration of rebar in that area, but it was a very significant hole. That was also a Bechtel job, by the way, and it was a very significant hole. Were it for the rebar you could easily put a Volkswagen and maybe a Cadillac into this hole.

CHAIRMAN APOSTOLAKIS: It saved a lot of concrete.

MEMBER LEITCH: It saved a lot of concrete. But of course that was self-evident and it was all chipped out and replaced.

VICE CHAIR BONACA: Because that was visible.

MEMBER LEITCH: Yes.

VICE CHAIR BONACA: I had another question regarding another point that Mr. Oncavage raised

regarding hurricane?

MR. HALE: Yes.

VICE CHAIR BONACA: Capability of the site and he presented the fact that he didn't feel that Hurricane Andrew was really a category 5 hurricane and the ability of the plant to withstand a category 5 and you addressed that issue.

MR. HALE: Yes, yes. In fact, the FSER highlights are design capability, the two aspects of a hurricane that you're concerned with is wind and tidal surge, but with regards to wind design, I think you'll find any FSER were designed for 225 miles an hour and all the way up to 300 some miles an hour without loss of structural integrity. So we are not concerned from -- wind design is not an issue.

VICE CHAIR BONACA: Tidal surge was the issue.

MR. HALE: When we look at tidal surge, we are designed -- the plant elevation is at 18 feet. We can -- we install stop logs as part of our hurricane preps up to 20 feet and all the safety-related equipment is located at 22.5 feet.

I had some friends that were affected by Hurricane Andrew's tidal surge and so I had some witness accounts of trucks at the top of their garage

as the thing came in and hit their house, but I think if you look at historical data and that sort of thing, 22.5 feet is plenty to accommodate any tidal surge that could be expected, even for a category 5 hurricane.

VICE CHAIR BONACA: Thank you.

MEMBER POWERS: Mario, in light of the Davis-Besse events, have inspections for these one-time inspections we do for license renewal, have they come under question?

VICE CHAIR BONACA: I don't think so. First of all, the components like such as a head are really under a different kind of inspection program that clearly is not one-time inspection.

MEMBER POWERS: I mean it's the mindset. If you go and inspect something expecting not to find it, you frequently don't find things. And there are an awful lot of inspections in license renewal with the predisposition not to find anything. And son of a gun, they don't.

VICE CHAIR BONACA: Yes, if you look at the issue or components which are related to the one-time inspection, I'm not sure that they are the type where your ability to detect would be so challenged. For example, it's erosion, certain components or

corrosion and so on and so forth. The presumption is that if you do the inspection close to the 40-years life and you do it once and you don't find anything, then you have -- and the first -- I think there is a good provision in the license renewal that says you can roll that inspection into your program until you find something and it then falls under corrective action. I think it's a good point you are raising. I think you have to be sensitive to that as we look at new license renewal applications in the future and see what kind of one-time inspection we have, if it is, in fact, an obvious thing that you would identify those kinds of degradations easily or if your ability to detect is being challenged.

MEMBER POWERS: Since we've been talking about Turkey Point concrete, I've got to tell the Committee at least one anecdote about the Turkey Point concrete, but Turkey Point doesn't know. In 1976, the NRC asked me to look at the effects of interactions with concrete and they said use prototypic concrete, so I said well, what's prototypic concrete? I decided the FSARs probably had prototypic concrete described in them, so I went to our library attendee and asked him for an FSAR and they handed me a box of microfiche, all jumbled together and they said these

are all the FSARs. So I went to sorting them out and the first one I sorted out so it was reasonably complete was Turkey Point and Turkey Point's FSAR has an excellent description of their concrete and I used that description of the concrete to create the concrete I was doing and since I wrote it down everybody else just used that as the specification and as far as I know every melt concrete experiment that's ever been sponsored by the NRC has used Turkey Point's concrete description.

(Laughter.)

Sand size. I believe your aggregate is oolite. I had to figure out what oolite was. And I know more about the Southeastern United States geology than I ever cared to learn trying to understand what oolite is.

MR. HALE: Any more questions for me?

VICE CHAIR BONACA: I don't think so. Thank you for the presentation. It was very informative. We'll hear from the Staff and the SER.

MR. KUO: Yes. I will call on Mr. Raj Auluck, the Project Manager for the Turkey Point license renewal application review and his panel.

MR. CHRISTIANSON: Nuclear Regulatory Commission, Chris Christianson speaking, may I help

you?

MR. AULUCK: Chris?

MR. CHRISTIANSON: Yes.

MR. AULUCK: Raj Auluck.

MR. CHRISTIANSON: Hi, Raj.

MR. AULUCK: Hi. We are just starting in a couple of places and I just wanted to make sure you are on the line.

MR. CHRISTIANSON: Okay.

(Pause.)

VICE CHAIR BONACA: Be aware we have about 45 minutes left for the meeting, including discussions, so I leave it up to you to be --

MR. AULUCK: Okay. Good morning. I am Raj Auluck, Project Manager for the Turkey Point license renewal application review. With me around the table is Jim Medoff. He's from Division of Engineering and helping us so he'll assist me on a couple of the slides. Then we have some people from the technical division, Jim Lazeunick from electrical. And they will discuss some of the issues which were especially asked by the Subcommittee during our meeting last week. Hans Ashar from Mechanical Engineering and Barry Elliott from Materials.

The purpose of today's meeting is to

present the staff's review -- Chris, are you there?

(Pause.)

Chris?

MR. CHRISTIANSON: I'm here.

MR. AULUCK: I forgot to introduce Chris Christianson. He's the Branch Chief, Region 2 and he'll be helping us respond to some of the questions you have on the inspections or the allegations.

I will describe the resolution of the open items and the basis upon which we'll move forward to make a recommendation to the Commission on this application.

The application was received 18 months back, 19 months today exactly. This was the firth application received by the NRC. Four have already been approved. This is the first Westinghouse. It is two-unit site. Each is designed for 2300 megawatt thermal. The site is shared by two oil and gas fired generating units in Florida City about 25 minutes from the Miami, south of Miami.

Unit 3 license expires on July 19, 2012 and for Unit 4, on April 4, 2013. The application is for two years' extension.

The review schedule originally issued with an acceptance letter. As you can see, the next --

that line is completing the SERS briefing and preparing the Commission paper with the recommendation on middle of next month.

The final SER was issued on February 27th and final environmental impact statement was issued on January 15th of this year.

MEMBER LEITCH: I have a question regarding the length of the extension. I read that the PTS value is very close to the allowable 300 degrees. It's 297.4. And it's stated that that would be okay because that was the value, I guess after 48 effective full-power years. Now we're extending this to 60 years. Is it mathematically impossible to get a number in excess of 48, full-power years, or is there some kind of a caveat that says 60, but no more than 48, effective full-power years?

MR. ELLIOTT: Well, you could get 48 effective full-power years corresponds to 60 years at 80 percent capacity factor. The plant could run higher than that and therefore it would exceed the -- before it reached 60 years it would exceed 48 effective full-power years. But it's not the 48 effective full-power years. It's the critical factor here. It's the neutron effluents received by the vessel and that's the critical factor and that's what

they have to monitor to determine whether or not they're going to exceed the PTS screening criteria. As long as they monitor the neutron effluents and they stay below their projections, they'll stay below the screening criteria. According to the PTS rule, if they start exceeding the effluents values they projected, they're required to do another projection of where they'll be with respect to the PTS rule. So it's within the PTS rule there is a flexibility.

MEMBER LEITCH: Okay, so there is no limitation then at 48 effective full-power --

MR. ELLIOTT: No, it isn't 48 effective full power. It's the neutron effluents.

MEMBER LEITCH: And even although they go above -- if they went above 48 effective full-power years, presumably they'd be crowding that 300 degree --

MR. ELLIOTT: They would have to tell us the impact on the neutron effluents for the vessel and then from that they would have to project the RPTS value to determine whether or not they're still below the screening criteria at end of license to extend the license.

MR. MEDOFF: Barry, may I add something?

MR. ELLIOTT: Sure.

MR. MEDOFF: I would like to add that in a reassignment they do exceed the screening criteria, the rule is written to require the licensee to take appropriate action including flux reductions and/or annealing of the reactor vessel. So the rule does incorporate corrective action should those screening criteria be exceeded.

MEMBER LEITCH: Okay, thank you.

MR. AULUCK: Continuing, we'll start with how we reviewed the application. There are two self-regulatory requirements that govern the review of any license renewal application. First is Part 54, the NRC staff conducts the technical review of the license renewal application to assure public health and safety requirements. A second is Part 51, then as the staff completes routine review of the license renewal application, focusing on the potential impacts of additional 20 years of plant operation. Now there are many programs which are routinely monitored and assessed plant operations, but the license renewal review focuses only on those which has the potential detrimental effects of aging and not addressed routinely by on-going programs.

Part 54 requires the Applicants who demonstrate how these programs will be effective in

managing the aging process during the extended period. Now staff's review consisted on reviewing of the Applicants' scoping and screening methodology, review of the aging management programs and review of the time limited aging analysis identified by the Applicant. These reviews are supplemented by the site audits and inspections by the NRC staff. There was one site audit done on this site and two inspections governing scoping, screening, aging and management reviews. Scoping and screening methodology review was done in two parts. And the first one is a desk top review which is basically initial review of the application supporting information and second is the on-site audit with a team of headquarters' staffs and regional participants in the review of the on-site documentation, review of the selected engineering reports, engineering procedures, design documentation and discussion with engineering staff.

Incidentally, it was during this audit first done early in the review process which was in this case November of 2000 when the staff raised the issue of interaction of nonsafety systems, structures and components with the safety systems, structures and components. And then later on this turned out to be one of the open items in the SER.

We had several discussions with the Applicant on this issue. Now this Part 54.29 describes the standards which must be met before the Committee issues a renewed license. We have talked a little bit already about the first two items on the slide. The last one relates to hearing and intervention on the license renewal application. There was no hearing on this application. There were two requests filed for -- filed to petition to intervene and request for hearing. On January 18, 2001, the Atomic Safety and Licensing Board Panel had a pre-hearing conference in Homestead, Florida to hear on the petitioner's standing and the admissability of their preferred contentions. In the order issued on February 26, the Board ruled that all -- both parties have standing to intervene. Neither petitioner proffered admissible contentions, so their intervention petitions therefore, must be denied.

The Board ruled that these contentions raise issues that fall beyond the scope of license renewal and renewal proceedings. And on March 19th, one of the petitioners -- he appealed the decision to the Commission. On July 19, 2001, the Commission issued an order affirming the Board's decision.

We have participated in several industry

groups on license renewal including Westinghouse Owners Group and for that developed series of generic reports intended to demonstrate that aging effects will be properly managed. At the Subcommittee, they asked us as a staff to make a specific presentation on these reports and how staff intends to use them.

Barry?

MR. ELLIOTT: Yes, Barry Elliott, Materials and Chemical Engineering. The staff has reviewed all these WCAPs. The first four, in particular, are license renewal documents in which the Westinghouse Owners Group has done an aging management review to determine the aging effects for the components that are listed in the titles there for the reports and they listed the aging effects for the components and the aging management programs that we used to manage those aging effects. The staff has written safety evaluations for each one of those and they've identified license renewal Applicant action items.

As far as Turkey Point is concerned, the staff was a little late in its safety evaluation, so they couldn't reference the actual staff evaluations in their report, so they wrote how their components fit the report and it was during the RAI process, the

Applicant addressed the license renewal action items and the staff reviewed those and found those satisfactory.

Those first four reports were discussed in detail at the Subcommittee meeting. The fifth item which is the WCAP-15338 deals with the time limit aging analysis for underclad cracks, specifically it has to do with reactor vessel forgings that were fabricated using a course screen, a head treatment and fabrication process and where the clad was applied with high heat input.

This is in BWR and in Westinghouse plants and we've had two topical reports on this. This is an extension of a review that the staff did in the 1970s on this issue and what they've basically done here, Westinghouse, is extended the review that they did in the 1970s using 1990's technology and information. They've updated the analysis for new technology, new information and also extended it for 60 years.

These are very small flaws on the order of 10 7-inch, the largest in-depth, the largest we've ever seen is like 3/10ths of an inch. The run in length from a tenth of an inch to like two inches. Very difficult to detect with ultrasonics. Therefore, we're relying on the analysis to assure vessel

integrity.

The amount of floor growth here from fatigue is very, very small. In sixty years, it's less than a tenth of an inch. We don't expect any growth from stress corrosion or a very small amount of growth from stress corrosion, cracking. This is borne out by the recent event this summer where the crack grew through the weld, reached the ferritic component and stopped. The allowable flaw size for this is much larger than the 3/10ths of an inch on the order of one in three tenths or one in four tenths of an inch. So there's a large margin here and for that reason there's no real concern about these cracks for license renewal.

VICE CHAIR BONACA: So this WCAP actually was used to address one of the open items, right, the underclad?

MR. ELLIOTT: They're required, licensees are required to identify time limit aging analysis. There's criteria in the rule. This would be one of them and this was used to address that requirement.

VICE CHAIR BONACA: The reason I'm asking is that the first four were reviewed, but they were not referenced into the application.

MR. ELLIOTT: Right.

VICE CHAIR BONACA: Although for the fifth one, the review was completed before the open item was addressed. So I think it was credited for.

MR. ELLIOTT: The fifth one was credited for.

MR. AULUCK: That's correct. The Commission appeal prepared many internal license renewal documents under the QA program for use in the preparation of the application and training of their staff members. The NRC staff reviewed selected portion of these documents during our site audit and scoping AMR instructions. According to the Applicant, they had several discussions with the previous applicants and reviewed previously issued RAIs and had other experts look at the application.

In summary, the staff generated about 215 requests for additional information on this application which was at that time substantially less than the previous ones of 300 to 400. And as I understand, the number is going down, which is expected as the experience, the quality and clarity of the application is improving.

As part of this review, the staff review issued four open items in the draft SER in August of 2001. The first one was seismic II over I interaction

of nonseismic safety-related piping because safety-related structures and components are known as seismic II over I. This was the same one that was identified early in the review process, but at that time the staff was in discussion with the Applicant to resolve the issue so we asked the FPL to just wait until the resolution is reached on the application and the staff position will be issued and then they can address that issue. So in the meantime the SER time came, so we issued the SER with open items.

And I think basically, the Applicant has gone over the criteria of selecting which portion of the piping was not included in the first time and then included later on. All I'd like to add here is since that time, the staff has issued two positions on this issue. First one is seismic II over I which was a narrow scope of nonsafety-related piping closely related to the safety-related piping. The second position which is broader in scope, it relates to all nonsafety-related piping and components. I think in the future, the staff intends to work with industry to make it an issue to combine the two positions into one.

The second open item is -- it relates to the field-erected tanks internal inspection. The

reason it was an open item during the SER stage was it was a new program and the Applicant had not addressed all the attributes identified in our process, so we asked the specific questions in the RAI and the Applicant said it's applicable to five tanks, two condensate storage tanks, two refueling water storage tanks and one shared demineralized water storage tank. The Applicant responded in late fall and the response was unacceptable. So this item was considered closed.

The next item relates to Reactor Vessel Head Alloy 600 penetration program and Jim Medoff, who was the lead reviewer for this issue when he was in Division of Engineering, he will speak.

MR. MEDOFF: Good morning, I'm Jim Medoff. I'm acting as a backup project manager for the Turkey Point license renewal application.

Prior to my rotation to the License Renewal Environmental Impacts Program I acted as a materials engineer for the Materials and Chemical Engineering Branch. Part of my responsibilities in that branch included the review of the Reactor Vessel Head Alloy 600 Penetration Inspection Program.

Basically what I need to say about the program is that the license renewal application was submitted prior to the issuance of NRC Bulletin

2001-01 which was the bulletin written on the Oconee circumferential cracking that they detected in a number of their penetration nozzles in a couple of their units. We issued an open item to address whether the inspection program for the penetration nozzles was current with bulletin and whether the -- and whether they were going to update the program to include the bulletin and FPL's responses to the bulletin and any changes to the inspection program that might needed to result from the program.

When the Applicant's response to the open item came in, we not only reviewed that, but we also, the Applicant referenced the bulletin and we looked at the bulletin response as well. Our review of the responses to both the open item and the bulletin indicate that FPL is committing to continue participation in the industry-wide program for inspection of vessel head penetration nozzles and to update this program as necessary based on industry experience and any further studies that the MRP or EPRI might conduct regarding vessel head integrity issues.

Their response to Bulletin 2001-01 provided revised rankings for the plants and indicated that they were going to do bare-head inspections of

both Unit 3 and Unit 4 vessel heads. FPL has completed both inspections and has not detected any visual signs of leakage or boric acids on the vessel heads for the units. I will say since Davis-Besse has been brought up that the NRC issued Bulletin 2002-01 to address the Davis-Besse issue and the impact on vessel head penetrations in pressurized water reactors in the industry and that FPL has provided its response to this bulletin. The response further indicates FPL's commitment to participate in the program and update the program as necessary based on inspection results.

The next open item deals with reactor pressure vessel underclad cracking. I'm not going to talk in depth on this because Barry has just addressed what the contents of the WCAP were and the technical details of the issue of underclad cracking.

What I will say is that when the NRC issued the safety evaluation on the topical report, they required two things. One was for three-loop plants of which the Turkey Point units are three-loop plants. They wanted the Applicants to indicate whether the number of design cycles for the transients assumed in the topical report bounds the number of cycles for 60 years of operation in terms of -- we're

talking in terms of fatigue analysis for growth of cracks.

The second item that the safety evaluation indicated was that Applicants referencing the topical reports as being applicable to their facilities would need to ensure that the TLAA for the valuation of the underclad cracks was summarily described in the FSAR supplement for their application.

FPL submitted responses to the RAIs relative to both of the action items so we decided that the FPL took appropriate action and closed the open item up.

MR. AULUCK: As you recall the Subcommittee meeting, one of the items discussed was station blackout and staff was asked how we are addressing that at Turkey Point. At that time we had stated that the issue is the position has not been finalized and when it is finalized it will be addressed like any other -- addressed by plants previously relicensed. Since then, the staff position has changed the final position on that station blackout was issued on April 1 and at that time they decided since the position has been issued, this must be addressed by the Applicant on this application prior to issuing the license, relicense. So we

communicated this issue to the Applicant the following day and since that time we are having meetings, we had a public meeting yesterday. We're trying to resolve the issue from the perspective that certain components from the off-site power to the plant should be included as part of the license renewal.

VICE CHAIR BONACA: This is a change from the discussion we had.

MR. AULUCK: This is a change from the discussion we had before and that -- so our intent here is to resolve the issue and still meet the schedule date of sending the recommendation to the Commission. What we are thinking is we'll issue -- the FSAR has been issued with all items addressed. It will go to the printers at the end of this month, but we are in parallel, we'll be preparing a supplement to the SER addressing, focusing on the station blackout issue and our intent is to complete that in the time frame.

VICE CHAIR BONACA: Okay, let me just for the benefit of the members who were not at the meeting at Turkey Point, the issue here is that there is a preferred station blackout recovery path and the guidance the NRC provided us before the meeting said essentially that that would include all the equipment

that collects to off-site power. That includes all the equipment that collects to off-site power. That includes, for example, the start-up transformers which the Applicant has not included in the scope of license renewal.

And the Applicant made the case that they did not rely on off-site power for recovery from station blackout and demonstrated to us that they can connect one unit to the diesel generators of the other units and one diesel generator out of four is capable of carrying all the loads for both units in case of a station blackout. They also pointed out that the experience from the Hurricane Andrew that that was, in fact, providing for them the most reliable source and they used it for that particular situation.

Our understanding up to now is that, in fact, that was the way of Turkey Point to address the license renewal commitments. Now so irrespective of that, the staff is asking that Turkey Point includes all the collection to the off-site power?

MR. AULUCK: Yes, that's why --

VICE CHAIR BONACA: This is a change to SER that we have in front of us?

MR. AULUCK: That's why we're going to issue a supplement to the SER and we hope to issue

that shortly, address this issue. Jim Lazevnick from Electrical will speak on this.

MR. LAZEVNICK: Yes, the Turkey Point has an alternate AC power source as a means of coping with the station blackout and essentially the point of disagreement is whether that source is capable of recovering from a station blackout. In order to recover from a station blackout, each plant has to develop a coping duration based on total loss of all AC power at the plant and the duration for Turkey Point was determined to be eight hours and they utilize an alternate AC source to demonstrate that the plant could cope for that period of eight hours. These sources may have capability beyond eight hours, but the staff has not reviewed them to see if they, in fact, have that capability and the original requirements of the station blackout rule, the definition of an alternate AC source did not address that capability. It spoke of the alternate AC source being a means to cope with station blackout for the period of the coping duration.

So based on other requirements in the station blackout rule, specifically Section 10 CFR 50.63(a)(1), the coping duration itself is based on four factors and one of those factors is the probable

time needed to recover off-site power at the site.

The four factors that licensees use to determine the specific required coping duration at their plant was developed into licensee guidance and this guidance was included in NRC Regulatory Guide 1.155 and an industry document that the NRC worked on the industry with which was NUMARC 87-00.

And all the licensees essentially utilizes a guidance to determine their coping duration, relative to license renewal and age-related failures, it's our view that unless we control a portion of that off-site power system in terms of age-related failures, the licensee potentially might need a longer required coping duration if those age-related failures were not properly controlled and addressed under the license renewal rule.

Our final position on this has been that the off-site power circuits between the switchyard and the safety buses should be included within the scope of license renewal. We recognize that the off-site power system actually is a source that the power source that extends all the way into the transmission system of the United States. We feel that this interface, this portion of the circuitry is an appropriate part to be included within license renewal

because it's the portion of the off-site power circuit that feeds the plant and essentially has requirements only in the plant. It has no transmission system type requirements associated with this portion of the circuit.

VICE CHAIR BONACA: So this says we have SER with one open item.

MR. AULUCK: Out of this stage, right, and we met with them and there is agreement, close to an agreement. We have looked at the draft response and the Applicant believes they can finalize their response in the next couple of days and we have agreed to work with the Applicant and issue the supplement as soon as possible.

VICE CHAIR BONACA: Well, we should hear from the Applicant what the Applicant thinks. They made a case for us and they made a demonstration of what they consider the ultimate power supply and as far as our review was concerned, we asked questions specifically about a standard for transformers in October and the answer was they are not in scope. And so I would like to hear what's happening there.

MR. HALE: We still do not agree with the staff position. We had long discussions with the staff yesterday. We understand what their position

is. We have nothing but confidence in the capability of our system and I think we demonstrated that for you at the simulator. But we understand what the staff position is. We have spent the last two weeks, I guess week and a half, based on being informed by the staff what their position was and that they had finalized it. So we have put together a response, draft response which they've highlighted the additional equipment. There's not a lot of equipment involved based on the boundaries that the staff is proposing. They're basically calling for the breakers and the switchyard that feeds the start-up transformer, the start-up transformer itself and the feed into the 4160 switchgear.

VICE CHAIR BONACA: Which I'm sure you consistently maintained?

MR. HALE: Yes, this equipment is maintained under the maintenance rule because the maintenance rule scoping criteria goes beyond our -- is different than license renewal. The maintenance rule considers things as trip hazards and that sort of thing. So this equipment is inspected under the maintenance rule, but base don our interpretation and our CLE documents which include our safety evaluation report, on-station blackout which we reviewed in

detail as well as our design basis documents and our FSAR, we cannot find where we've specifically credited restoration of off-site power, but we understand the staff position. We think we're somewhat unique in that we have fully capable diesels. In fact, we have over 400 KW, 300 to 400 KW of excess capacity of a single diesel, so it's their position. That's the way they've interpreted it. They've issued it formal and so we've issued a response to address the specific requirements --

VICE CHAIR BONACA: So you have already issued a response?

MR. HALE: A draft response. They are reviewing it. Once we factor in their comments, we will issue it formal probably within the next week.

VICE CHAIR BONACA: Any other questions for Steve?

Thank you.

MR. AULUCK: Continuing, in February of this year, a public citizen, Mr. Oncavage, sent a letter to the ACRS identifying four safety concerns. The first one relates to the effects of wires on aging, degradation rates and structural integrity of the containment structures at Turkey Point. At the Subcommittee, we discussed this issue and you asked

the staff to make a presentation as it may apply to some generic implications to the other plants.

Before Mr. Hans Ashar will speak on that, before he starts, I'd like to go a little bit of when the issue was first raised and what has happened since that time.

The issue was first raised by Mr. Oncavage at one of our exit meetings. We had gone for inspection there and at the exit we provided the results at a public meeting and Mr. Oncavage raised this issue that he understands there was some voids formed at Turkey Point containment during 1980s when during the steam generator replacement process. So at the meeting, the Region took this, considered this as an allegation and gave us a tracking number.

And then they asked the Applicant forward the concern to the Applicant to respond to the NRC. The Applicant responded with information to the NRC and on August 10, Region II sent a letter to Mr. Oncavage summarizing the results of the review.

But then in December 15th, he sent another letter to the Region stating that he's not satisfied with the results of the August 10 letter and NRC should ask FPL to start testing, looking for voids in the containment.

Region II informed Mr. Oncavage, acknowledging the December 15th letter and stating that they will respond to him after reviewing the material again. So on April 5th, last week, a formal response was issued to Mr. Oncavage, summarizing the review, independent review by the NRC staff and the inspection reports, other documents. Thus Region II considers this issue to be closed for Turkey Point.

Now Mr. Hans Ashar will speak on the general implications.

VICE CHAIR BONACA: Now I imagine that the issue was closed for Turkey Point because the two identified voids were filled and those inspections were filled in the containment or was it simply some statement that said we don't expect to find any more?

MR. AULUCK: I think it was review of other technical documents at the site and there was a technical member from Region II, went and spent a week there, earlier this year to review all the reports and results and discussions with them.

MR. ASHAR: I am Hans Ashar --

MR. GILLESPIE: Excuse me, Mario, if we could close this out because I know one of your concerns was documenting the stuff that was done. Since we have Region II on the phone, if a person went

to the site that means some place there's an inspection report which documents what he did. Is it possible to get that inspection report to the Committee?

VICE CHAIR BONACA: Chris? Chris, are you there?

MR. CHRISTIANSON: Hello, this is Chris Christianson, Deputy Director, Division of Reactor Safety.

VICE CHAIR BONACA: Did you hear the question?

MR. CHRISTIANSON: Is there a possibility to get a copy of the inspection report? We did not document this in an inspection report. We documented this as a memo to file in the allegation folder.

MR. GILLESPIE: Okay, it's still the same question. Is it possible to get a copy of that, Chris?

MR. CHRISTIANSON: Mr. Auluck can forward it on to the appropriate person.

MR. GILLESPIE: Okay, we'll contact you off-line, Chris, and we'll get a copy of it and get it to the right people on the Committee and that might provide some closure to the issue for Turkey Point and that might be beneficial.

VICE CHAIR BONACA: Yes, just to understand what was done to assure the issues of concerns with additional voids in the containment was properly addressed.

Thank you.

MR. DURAISWAMY: Mario. Raj, you sent another letter to Oncavage on April 5th?

MR. AULUCK: Yes.

MR. DURAISWAMY: From here? From the head office?

MR. AULUCK: No, from the Region.

MR. DURAISWAMY: From the Region.

MR. AULUCK: Because Region II considered the December 5th letter from Mr. Oncavage as the end of the follow-up allegation.

MR. DURAISWAMY: Yes.

MR. AULUCK: So they tracked it and they responded to that to him and just closing the loop. The letter is April 5th from Region II to Mr. Oncavage.

MR. DURAISWAMY: You guys don't have a copy of that thing?

MR. AULUCK: Those are allegations --

MR. DURAISWAMY: I know what the allegation is.

MR. LAZEVNICK: I think I have copies of it.

MR. AULUCK: They can be made available.

MR. GILLESPIE: This is why I say when you put stuff in the allegation system, it's a very closed system, even though this individual didn't ask to be treated that way and so we can deal with it and get you copies of it.

VICE CHAIR BONACA: But before the allegation issue, there was a finding, was an open finding. There was an evaluation being done. There was a response by Bechtel. There were people that came in with concrete and poured it to fill those -- I mean there were things that took place and in addition to that, if anybody had any question, they would have looked someone else to find are there other voids. That's -- I would expect there would be some documentation that says yes, we did the following steps and then the committee can review it and feel confident that something was done that we can state today those containments were taken care of and there are no voids in containments to the best of our knowledge within the limitation of detection and so on. It's not only the file on the allegation, it's just simply the paper trail that led to the

documentation of the actions taken to deal with the voids.

MR. GILLESPIE: And I'm hoping a memo to file actually references it reviewed this, reviewed that and then when you get those things, those things contain the subject matter and address these actions.

I'm just not sure having not seen the file how it strings it together, but that's -- the starting point, I hope would be the memo to file where they said okay, we reviewed all the existing information and existing actions taken to date and it appears to be satisfactory and I hope there's some reference to what those other documents were so we have a -- we should have the trail. It's just it's in a system no one has easy access to. So we'll take back the idea of working with Region II and copying the paper trail and trying to get it to you in the very near future here.

VICE CHAIR BONACA: We asked for those in Florida City. We asked for -- so that -- and Region II was there, present during the meeting and when we asked for this information.

MR. GILLESPIE: Yes, because if this was followed up in the 1980s and there was an inspection report from the 1980s, I'm hoping that research was

done that we can just pull it together in this one memo to file was kind of the cap on top of that review.

MR. HALE: Dr. Bonaca, this is Steve Hale, Florida Power and Light, we interfaced with the regional -- the fellow that came down to do the investigation. There were LERs on this event. There was initial LER plus supplements. There was also two inspection reports which documented the closure of those two LERs and the individual came to the site, looked at that information. So I think this memo to file or whatever should have all the specific documents, but I can tell you for sure because we were supporting him and he went in and actually was looking at the original pours, concrete pours documentation on the testing that was performed on that concrete, so he did a very exhaustive investigation, just based on the interfaced we had with the fellow when he was at the site.

VICE CHAIR BONACA: Okay, so we'll see for this.

MR. ASHAR: I am Hans Ashar from Mechanical, NRR. I had read your transcripts of my tech. team and concerns expressed by various members of the SEI subcommittee and based on that, I want to

address only the generic implication at this time as to what I think about it because we had a very short time to prepare for any in-depth research, but I'll try to tell you as much as I can gather from my own experience as well as other people's input into what I thought.

Now first thing, what I want to refer to is are the worse possible. First thing I want to emphasize is this, that having voids in concrete construction, in general, there is commercial application at nuclear power plant is not an acceptable way of constructing any structure. It is not an acceptable matter. People try very hard to make sure that the concrete that they pour is being consolidated very well through vibrators and the construction joints are being formed in such a way that this kind of voids can be avoided.

I also would like to let you know that it is possible, it is possible that some of the plants may have existing concrete voids. Now my own experience, when I was a specification engineer at Burns and Roe and I was at Three Mile Island, Unit 2, and at that time we heard about voids in ring guard at Three Mile Island, Unit 1 and the United Engineers Construction was the constructor on that one and their

engineer had found the voids and they took corrective action after that. So what I would like to emphasize here is that the way the quality control, quality assurance works in the industry and it worked at that time, at least, I know because ACRS had very strict quality assurance criteria. It had been in force because people wanted to keep their license and so there were attempts being made to award this kind of work being persistence in nuclear power plant structures.

Now somebody might say that that means that there are no voids in it. I wouldn't say so. I thin in spite of all the precautions there could be sometimes back down in some other thing, like a concrete venting plant, the pumping of the concrete, the vibratory spin work on the particular areas, voids might be there in some of the plants. Okay?

Now as I said before, core requirements require concrete voids -- impact of voids. What could happen to the containment if there are voids present? Now in a very narrow way I would say there will be a reduction in thickness of the thick part of the sections of concrete.

MEMBER POWERS: Before you go on to the impact, your slide says voids can occur where

vibrators can't reach.

MR. ASHAR: This is why I explain to you in much more depth is to what are the factors that can influence the existence of voids.

MEMBER POWERS: There are many other causes of voids.

MR. ASHAR: Please?

MEMBER POWERS: There are many other causes of voids in the concrete.

MR. ASHAR: Yes. Well, in order to avoid voids in concrete construction, in general, the first thing to make sure that the construction joints that they are going to put in are in the right place, so that you can ensure that the oldest areas, very older concrete are accessible from the formwork. And the vibrators can reach into those areas. These are the items being made all the time. As I told you in my experience, the voids were in the ring girder of the containment construction and the ring girder is a very thick area. It is a liner plate coming down and again the voids were in the area of the liner plate was touching the concrete area. But they took out all the concrete. They rehashed everything. They put new concrete in there to make sure there are no voids existing in that particular instance.

The other two you heard about were the Turkey Point and Limerick. So yeah, voids can occur in various places and due to various reasons.

MEMBER POWERS: I mean what I'm struggling with here is for this particular instance, you got an individual saying there are voids in the concrete. How do you know there are not voids elsewhere? The guy that placed -- the architect/engineer went in and said yeah, there were voids in this concrete and here's how we explain them. He said it's because the vibrators didn't get there. That seems very convenient to me.

MR. ASHAR: Well, it explained to you. I put one bullet, vibrators can't reach. It is not the only thing, okay? But the basic thing is to make sure that the old areas to be concreted out are filled up with concrete to make sure of that. And then to consolidate the vibrators to beat the -- now sometimes it can happen, the water may be a little higher or the weather might be such that the water can bleed. When it bleeds what happens the calcium hydroxide from concrete gets into that area instead of filling of with full concrete and integrate. Only the water part, calcium hydroxide stays in that area and it would look like you filled up the things. As the time

goes by that water starts evaporating and the void forms.

So those things are possibilities. I would not completely --

MEMBER POWERS: What I'm trying to understand is the firm went in and they came up with a hypothesis of why they had a void in Turkey Point. It was very convenient and it would not be something that would extend out of places in the containment. What did the staff do to look and see if there was alternate explanations for this?

MR. ASHAR: Well, I will ask open forum for other people to answer to this particular question. As I said, the construction practice during that time, the time this plant was being built were such and the quality assurance requirements were very stringent because I know from my own experience on this side of the fence I was not with NRC. I was with consultants and at that time, as a matter of fact, after I heard about that void and the cause for those voids, I wrote my specification for Three Mile Island, Unit 2 in such a way -- as a matter of fact, it is not very common for a specification writer to write about where the constructors would put their construction joints.

But in our case, we did write it. Okay, because we were concerned about the voids in construction of Three Mile Island, Unit 2. That's why -- so people --

MR. GILLESPIE: Dana, let me see if we can put our package of documentation together. I think this is getting to the point where it may deserve a different -- I'm going to suggest a separate meeting.

VICE CHAIR BONACA: The other point I would like to meet, we are here now, general considerations here. I think that is on the right track. The issue is you find a void under the hatch in concrete. So now you say well, let's see if this is just one of a chance and you go to the next containment and you find you have a void in the same spot.

And this seems to be almost like it's a design feature for this kind of containment, I guess. It's present in two, let's see how many you've got where you have a spot. I think you would want to go beyond. Now typically, you have mechanisms by which you raise an issue that could be, I thought, would be Part 21, but Bechtel says oh, it's okay, the containment is too capable, so it's under Part 21. I'm sure there was a paper trail by which the issue,

the potential impact of being a generic issue was evaluated. I mean normally the agency is very aggressive in pursuing these kind of issues. That's why we've been looking for how did we address, how do we get confidence that other containments of Bechtel design do not have the same voids in the same location and other containments in general do not have that. And that is really what we're looking for when we asked for that information in March down in Florida City. And we really haven't gotten the information.

MR. GILLESPIE: And I think that's exactly what we need to pull together. Because now we're all trying to project what happened in the mid-1980s.

VICE CHAIR BONACA: Yes.

MR. GILLESPIE: And I'm having a tough time myself remembering what I did last month and these people weren't there. How well were we documenting stuff in the mid-1980s? We need to pull the inspection reports, look at what the people looked at, look at what the fellow, the inspector from Region 2 that went in and re-reviewed the issue and then ask the question and look at other records and say now did we take that? What did we do with it generically? I just don't know.

I think we're talking about something in

1985 or something like that, maybe and it's 17 years old at this time. I like to assume the staff did the right thing. We did pursue things aggressively at that time. I just don't have the documentation in front of us. We need to pull it together.

Someone else from engineering --

MR. KUO: Goutam Bagchi, he's going to make a presentation on related issues.

MR. GILLESPIE: But I would suggest the opportunity to come back would be also fine with us.

VICE CHAIR BONACA: My proposal will be if we feel, first of all, this committee will decide whether or not we feel confident that the issues themselves for Turkey Point, so we can focus on the license renewal for that plant. If we feel it is dealt with properly, then we can say let's concentrate on that. That will result, probably with separate letters requesting that we look at the genetic implications, how they were handled for other units and that would open the path.

MR. GILLESPIE: Yes, and that would be fine. I think we can get the Region 2 records pretty quickly for you for Turkey Point to kind of close that documentation issue and I'll tell you the truth. I feel more comfortable coming back to talk about the

generic issue versus trying to do something where we're potentially kind of patching some things together.

VICE CHAIR BONACA: I agree with you one hundred percent.

MR. GILLESPIE: Goutam did have some thoughts of some basic engineering he covered with me earlier of about why this is a safety issue we can now look at in an orderly way and not necessarily assume we didn't look at it 17 years ago, but let's see what we decided then and what the basis was.

So I'd suggest coming back and let Goutam finish what he's going to go and we'd be happy to come back.

MR. ASHAR: If Goutam is going to speak, then I won't say anything --

VICE CHAIR BONACA: I would like to hear from the members, is it acceptable with you that we put this issue here, which is generic, separately and address it later or would you like through the presentation now?

MR. BAGCHI: It's a very quick presentation. I just wanted to share with you some idea of load sharing, what is it that is unique in the containment structure of design.

VICE CHAIR BONACA: Okay.

MR. BAGCHI: And I think there is something unique in the design itself that gives it the robustness and the ability to withstand the design basis.

And concrete, as you know, takes compression. It cracks and it doesn't take an tensile load and it maintains -- the effective purpose of the concrete is to maintain the reinforcing bars in the designed locations.

Reinforcement carries all the load. Post-tensioning tendons keep concrete in compression. And very high quality, .2 percent ultimate elongation, ductile liner plates are provided as the leak-tight barrier.

Design basis load is internal pressure, due to the postulated accident load. Containment structure goes into tension. Concrete cracks due to tension. Reinforcement bars take all tension loads and the liner plate maintains the leak tight integrity. If there is any local void, it deforms plasticly and then expands and bridges the gap, as we have experienced in the reactor vessel head at one plant.

At the shell-mat and shell-dome junctions

bending moment puts concrete into compression. But as you know, this was not the area where the concrete void was found. The concrete void appears where there is congestion of reinforcement and special provisions are sometimes lacking when putting in concrete. And this is the area of the ring girder near the equipment hatch.

So only in those two junctions the concrete is put into compression. By code requirement, concrete is under reinforced.

Crushing failure of concrete is prevented by code provision because the reinforcement has to yield first. Redistribution of load around any void provides the necessary strength. Structural Integrity Test would reveal locations of unacceptable voids by bulging, spalling or local failure. Every reinforced concrete structure passed the Structural Integrity Test satisfactorily the very first time.

There are requirements to make predictions of deformations and measurements are made, observations are made, examinations are made afterwards and they have all been within the predicted limits.

Post-tensioning puts the highest load during construction. Any weakness in concrete shows

up at this time as we found in the delamination of dome. It was a weakness in the design. Reinforcement bars were not provided and later on they learned their lesson.

Containment weakened by pervasive voids will not pass the SIT, the Structural Integrity test.

So my conclusion is that the unique design of the containment structure, the high quality of construction, no matter the fact that there were voids found and these are construction areas those are imbedded in the code related factors of conservatism and the allowable stresses and so on, there are going to be voids and in a very thick structure 4.5 to 5-foot thick walls, you're not going to easily find the voids. If they were found easily, they will be taken care of and if there are voids, as I tried to point out, the load path and the behavior of the concrete is such that the reliance is not on the concrete.

And this is -- the inside I just wanted to share with you and I feel that the containment structure is extremely robust as people have seen from the tests, although in the tests you wouldn't have expected any voids, but in a scaled condition, microvoids may well have been there in those third

scale, quarter scale test models. But it's the load and the design of the structure that provides us with the assurance that there will be good performance function, certainly, after the design basis load and way beyond that.

MEMBER SIEBER: I have a question. I recall during -- having witnessed a couple of Structural Integrity Tests of concrete containments that one of the steps was to find and map the cracks that appeared. Was that common practice for every containment?

MR. BAGCHI: Absolutely.

MEMBER SIEBER: That would reveal the presence of the voids because the cracks would appear around the area of the void as the loads redistribute themselves. Is that correct or not correct?

MR. BAGCHI: I would like to agree first and then take away some comfort that I've agreed with you. If it's 4.5 foot thick wall and if this void is adjacent to the liner plate, you're not going to see it..

MEMBER SIEBER: That's right, that's right.

MR. BAGCHI: This is a conservatism --

MEMBER SIEBER: You will see it on the

inside if it's adjacent to the liner because there will be a dimple there.

MR. BAGCHI: It has to be a very large void to do that.

MEMBER SIEBER: Yes, it does.

MR. BAGCHI: yes sir.

MEMBER ROSEN: So the conclusion is small voids you won't see, but they don't matter because the loads are being taken by the reinforcement steel and large voids, if they have occurred, you would see.

MR. BAGCHI: Yes, that's my contention.

MEMBER ROSEN: In the performance of the concrete.

MR. BAGCHI: If you allow me to characterize what kinds of voids, I would not consider as extremely critical is something in the order of a thickness.

MR. KUO: If I might add to it, the large void, if it is located in critical locations, in other words, it's a stressed location, void stress location, you will see during the test, as a result of the test.

MR. BAGCHI: That point about crack, map cracking, mapping the crack is really intended for that purpose.

MEMBER SIEBER: That's right.

VICE CHAIR BONACA: Thank you for informative presentation.

MR. GILLESPIE: Mario, now what I'm hoping is that we'll find that back in the 1980s someone as smart as Goutam wrote that down as a basis and I don't know if we will -- we need to look, but that's part of the reason I think some things didn't happen and how well did we document things in our actions, we need to do some investigation.

VICE CHAIR BONACA: Okay.

MEMBER RANSOM: A point of clarification, in Turkey Point, is it known that there are voids and do they know how big they are?

VICE CHAIR BONACA: Oh yes. They found voids, as you know.

MEMBER RANSOM: They have found them?

VICE CHAIR BONACA: Well, they found them, yeah, sure. That's how the whole issue came up. They found voids under the equipment hatch when they were replacing the steam generators. They had to take off the hatches because they were not large enough. As they removed them, they found these voids right under because of the complexity there and the amount of the rebar that --

MEMBER RANSOM: So those presumably were

remediated when they repaired them.

VICE CHAIR BONACA: Absolutely.

MEMBER RANSOM: This just led to suspicion that there may be other voids?

VICE CHAIR BONACA: The concern of Mr. Oncavage was are there other voids in the containments and so we expected to find that there would be some documented trail that said yeah, we looked at it or we tested or we performed some assessment of the type that we received right now that gives us confidence that probably there are no voids or there are some that are not significant to the strength of the containment. And we haven't found yet this paper trail. That's what we're looking for.

The other issue is the genetic implications. If you find this kind of issue in one location, in one containment and then you go to the next one and find the same thing as happened there, it tells us that very likely there is going to be something similar under the hatch in some other unit and so one will have to understand the significance of no remediation of that void and again, that may be some analysis done of this type that is sufficient, but we haven't seen any of that, so we're looking for how the generic implications of the issue were

handled.

MEMBER POWERS: I'll point out, Mario, that there were in construction of the McGuire plant that they found large voids in the concrete when they placed, had nothing to do with where they put vibrators. There are lots of reasons for voids.

VICE CHAIR BONACA: Yes, sure, the timing of pouring of the concrete, the density, the liquidity of it, how it flows.

Okay, so are there any more questions? Your considerations were still related to each other's presentation we had on the concrete, right?

MR. ASHAR: Pardon me? What's your question? I didn't get you.

VICE CHAIR BONACA: I'm saying what is the remaining portion of your presentation?

MR. ASHAR: Yes, I can finish up with a few lines. Now Goutam very well described this as to the robustness of containment and how the voids cannot be that much of a significance in integrity of the containment at least to resist the design basis pressures.

This is exactly what Goutam pointed out in the initial structural integrity testing, periodic leak rate testing being performed in the containment.

Containment -- they also conformed intended function of the structure. Now one other question that I'd seen being asked was what would be the impact on LERF. What I would say more succinctly is condition probably of containment failure. That would be affected if there is any point in it.

Now my judgment, it's my own judgment on this particular issue is that there are two model tests being performed at Sandia. One in 1995 or so on reinforced concrete model and one in 1999 on viscous concrete model which was being financed basically by NUPAC in coordination with the NRC.

On the first test, what I want to point out is the failure of the model at 137 psig or so, and at that time the concrete was quite a bit cracked and heavily cracked, but at that time they did not go all the way up to the failure of the complete structure. They stopped when they saw the leakage was too high, but there was some stiffness left still at that time and now in the later test in viscous concrete containment in 1999, they did go a little farther than just leaking criterion. It was considered the containment fate, but then they went a little bit more and they saw that there was few strength left, stiffness of the concrete to hold the liner in place

and I think they went about 10 psig, more than what would consider as a failure, not the ability to -- so that was my judgment that the effects of LERF of the voids, in general, would not be that significant.

CHAIRMAN APOSTOLAKIS: But the conditional containment failure probably in NUREG 1150 is extremely uncertain. I mean it's always between 0 and 1.

MR. ASHAR: Yes.

CHAIRMAN APOSTOLAKIS: I wonder, does it include the possible presence of voids?

MR. ASHAR: Yes, this is what happens. Okay, that if the structure were intact completely, okay, the ideal structure, you find out one fragility curve occurred for containment probably so there is an FSAR and ordinate probably to a failure, FSAR used as pressure as a parameter. Okay, that will give you the medium design pressure. Point 5 failure could occur. That was taken in the LERF calculation later on for structural containment. Now if there is a degradation, a main degradation is not concrete, but the liner. In the case of concrete containments, liner would be the prime candidate for reducing the effectiveness of containment because it would leak. So if there is liner degradation of high level, then

you can shift your facility curve in such a way that it meets with the damage assessment that has been performed.

CHAIRMAN APOSTOLAKIS: My question is if I look at the -- not the fragility curve, but the final results of the NUREG-1150, they have very nice figures with various sequences and then the conditional containment is computed.

MR. ASHAR: Right.

CHAIRMAN APOSTOLAKIS: And this is a very uncertain quantity. It goes from 10 to the minus something, all the way to .9 sometimes or even 5.

MR. ASHAR: Right.

CHAIRMAN APOSTOLAKIS: So that's extremely uncertain. So I don't know what it means.

MR. ASHAR: But normally the IPEs are performed with little more preciseness than those -- excuse me?

CHAIRMAN APOSTOLAKIS: You mean the IPE is no better than your NUREG 1150? I doubt it.

MR. ASHAR: Oh no, no, no. What I'm saying that the uncertainties which are being in NUREG 1150 considers number of uncertainties. When you start in plant specific IPE, that means they have precisely characterizing the sequences and then

putting the -- they also have uncertainties, but not as much as what we see --

CHAIRMAN APOSTOLAKIS: Yes, but the IPEs also did not spend as much effort on the level.

MR. ASHAR: I'm not saying I would put a lot of --

CHAIRMAN APOSTOLAKIS: My question is in the original 1150 studies, was the possible presence of voids included? You don't know?

MR. ASHAR: I know that it was not.

CHAIRMAN APOSTOLAKIS: Oh, it was not.

MR. ASHAR: It was not. None of the damage condition or anything was considered in the 1150.

VICE CHAIR BONACA: That's why I made a distinction between the design pressure that I believe, this condition is still allowed to meet as a requirement of the tech specs versus the ultimate containment. So we don't know and typically we are looking at penetrations as the weak link or something of that kind and here you have an unknown.

CHAIRMAN APOSTOLAKIS: Is the effect not significant because we are so uncertain to begin with what can happen?

MR. ASHAR: Well, only from the existing

condition. It's not related to the insignificance.

MEMBER FORD: Mario, you also managed to go about how we felt about this particular issue for Turkey Point as opposed to generic issues. I feel really uncomfortable. In all of the rest of the license renewal examinations we've been asked to comment upon, we've had detailed documents, ANPs that we can make good scientific judgments, our own independent judgments. Here we're hearing engineering judgment, anecdotes. We've got nothing to go on. So I don't see how we can make any advice or judgment on this as an issue.

CHAIRMAN APOSTOLAKIS: Yes, I think this kind of discussion will take place in the afternoon part--

VICE CHAIR BONACA: But I would like to -- I know, we know pretty much what we heard already. My sense is that we should not write a report now. There are two issues here that need some closure. One is the station blackout issue. Although we know that the plant is taking a position, a direction of fulfilling the requirements, it is important for us as a committee for us to understand is it a capricious requirement in addition to what already they are doing at Turkey Point? Is it essential? I think we need to

reflect on that and review it. Second, we also now need to look at this paper that will be provided to us and so my suggestion would be that schedule one hour meeting at the May meeting and we look at those two issues and then resolve them at that time. That will give us at least time next three weeks --

CHAIRMAN APOSTOLAKIS: Well, we have time this afternoon to discuss the letter. We have already agreed that there will be some additional information provided to us with a possible presentation.

VICE CHAIR BONACA: Yes.

CHAIRMAN APOSTOLAKIS: We're already behind schedule.

VICE CHAIR BONACA: I was attempting to say in a way that you're right and a means of probably doing some closure, but I think that for us to jump to something today is going to make it enough.

CHAIRMAN APOSTOLAKIS: Okay. So I'm wondering now is there anything else we need to discuss right now?

VICE CHAIR BONACA: Any other questions that members would raise?

MEMBER LEITCH: Not related to concrete, but I have a question about there's a figure in the environmental report. It depicts a 6-mile radius and

usually when you see these figures they have a 10-mile radius. I don't know that this relates to emergency planning, but I'm just wondering --

CHAIRMAN APOSTOLAKIS: Which figure is this?

MEMBER LEITCH: Page 2.1-3 in the environmental report.

I'm just wondering is there any implication? Does Turkey Point have a 10-mile EPZ like everybody else?

MR. HALE: Yes, we do. Steve Hale, Florida Power and Light. Yes, we do. That's not intended for emergency planning.

MEMBER LEITCH: Okay and my other question is can someone tell me what's the CDF and LERF for these units and are they different from one another?

MR. AULUCK: We'll have to get back to you.

MEMBER LEITCH: Okay, I'm just looking for the CDF and LERF and are units, Unit 3 and 4 different from one another.

MR. HALE: Unit -- I can't cite the specific numbers, but we're not an outlier or anything like that. We have reasonable CDF numbers. I can't speak to the specific numbers.

MEMBER SHACK: Well, actually, your numbers reported int eh IPE are highest of anybody, but the discussion at Florida was that, in fact, that your updated PRA has numbers that are much lower. So I think it's close to four times 10^{-4} in the IPE and the reported number was like 1 times 10^{-5}, some PRA person gave this in Florida, but that hasn't been documented.

CHAIRMAN APOSTOLAKIS: So how did it go from four times 10^{-4} to 1 times 10^{-5}?

MEMBER SHACK: Divide by 40.

(Laughter.)

MEMBER ROSEN: This is fairly typically actually --

MEMBER SHACK: The discussion was that he was making some very conservative assumptions when they did the IPE.

MEMBER ROSEN: That's the reason. This is fairly typical, you see it in most PRAs that the very first ones are quite a bit higher than the more sophisticated ones that are done over time.

CHAIRMAN APOSTOLAKIS: So that's something that we have to discuss.

VICE CHAIR BONACA: Any other questions?

MEMBER POWERS: But George, I'll remind

you the number is totally meaningless because it only considers operational events.

MEMBER ROSEN: Because of what, Dana?

MEMBER POWERS: It only considers operational events. It doesn't consider shutdown.

MEMBER ROSEN: Plants generally have a shutdown assessment that considers the risk during shutdown which is additive to the internal events. It's not meaningless, it's just part of the question.

CHAIRMAN APOSTOLAKIS: Okay, any other questions for the presenters?

MR. AULUCK: Do you want us to go over the other concerns of Mr. Oncavage?

CHAIRMAN APOSTOLAKIS: Well, it's too late now.

VICE CHAIR BONACA: Let's just cover those.

MR. MEDOFF: This is Jim Medoff again, Backup Project Manager for Turkey Point. Basically, when Mr. Oncavage sent his letter in to you, we did an independent review of its concerns and basically we categorized them into voids which we just discussed. The effect of hurricane windspeeds in storm surges, unsafe operation of the units. He also went into concerns about the effect of terrorist attacks on the

safety of the plants and he had a concern about spent fuel capacity.

Basically, what we did is we called up the National Oceanographic and Atmospheric Administration to discuss the hurricanes. Hurricane Andrew basically was one of the most severe hurricanes ever to hit the Atlantic coast. It had wind speeds of 149 to 150 miles per hour which puts it in Category 4, but with gusts above that which put the gusts into Category 5. The storm surges for the Hurricane Andrew were of the order of 17 feet maximum. As Steve Hale has indicated, the Florida Power Light units, the Turkey Point units, vital equipment are designed to withstand storm surges above 22 feet and all of the vital equipment such as emergency diesel generators, the reactor vessel, etcetera are put in design category 1 structures and they're designed to withstand differential pressures created by the hurricane of the order of 225 psi without any deformation of the --

MEMBER ROSEN: Now you said above 22 feet. I don't think that's what he said. I thought they said it was up to 22 feet.

MR. MEDOFF: No, the location of the vital equipment is at 22 feet or higher.

MEMBER ROSEN: Right.

MR. MEDOFF: The maximum hurricane -- in our discussions with NOAA, the maximum surge ever recorded for the Atlantic Coast was 20 feet and that was for, I think, it was Hurricane Hugo on the North Atlantic coast.

The maximum storm search for Hurricane Andrew was 17, so the vital equipment at Turkey Point are designed at levels currently to withstand the current storm surges for Category 5 hurricanes.

That's not to say that you might get a really, really severe hurricane to create a storm surge above 22 feet, but I think the probability, my educated guess on that would be the probability would be low given the data that NOAA had given me in our discussions with them.

The next one is the effective terrorist attacks on --

VICE CHAIR BONACA: We know that that's being handled.

MR. MEDOFF: And the last concern was the -- Mr. Oncavage was concerned that they were going to expand the spent fuel capacity in the spent fuel building. Typically, they're covered by tech specs if they even come close. FPL will submit action to address it.

MEMBER POWERS: It strikes me that the way you have approached storm surges is a bit different than we usually approach natural phenomena, especially when you're prognosticating for another 30 years or so.

Don't we usually say what's the probability of storm surges of various elevations over that period?

MR. MEDOFF: Not being the expert in that area, I'm not going to say yes or not, but I would expect that to be the case.

MEMBER POWERS: Taking particular incidents since it got to 17 feet, it could get to 20 feet within the last 100 years we've had as high as 20 feet and this is at 23 feet strikes me that you're very close and I certainly listen to people, not too intently, that tell me that the weather is such that hurricanes are going to become more vigorous in the future. I know that despite the prognostications last year was a particularly hurricane deficit year, so maybe their predictions are not too good. But it strikes me that you need a little more quantified treatment of this.

MR. AULUCK: I think the design of Turkey Point can handle Category 5 hurricanes. Steve, do you

want to add?

MR. HALE: Well, one, I think this is beyond Turkey Point, I mean if the issue is that historically in establishing your natural phenomenon and what you address in your SAR, you go back, I believe 100 years or something like that and then you establish some conservatism on top of that in the design of your structures.

We are fully confident in the design of our structures of accommodating our design basis hurricanes which had margin well above 100 year storm that was identified. So I believe that in considering storms in the future, would be more in the generic arena than I would a specific Turkey Point issue.

MR. AULUCK: So, in conclusion, we have completed our review. As I understand we owe you information on the documentation, how Region 2 closed the issue on voids. It's available. It's just a question of getting it to you. The staff recommendation will include the resolution of the SBO issue and applicant has met all the requirements required by 54.29.

VICE CHAIR BONACA: So mean the second bullet is not correct, of course, at this stage. I mean there's one open item and we will --

MR. AULUCK: All open items identified in the SER were resolved. This is a new emerging issue.

VICE CHAIR BONACA: You're right.

MR. AULUCK: It just came last week and that's why I made a separate bullet in the staff recommendation.

VICE CHAIR BONACA: Thank you. Any further questions?

MR. KUO: And this concludes the staff's presentation on Turkey Point license renewal application review and we will take two actions back. The first one is try to put together the paper trail on the concrete voids inspection from Region 2. We will try to get as many copies as we can.

The second action is to check the CDF and LERF values for the containment.

VICE CHAIR BONACA: There's a third one which is the station blackout.

MR. KUO: Station blackout. We issue the staff position on April 2nd on station blackout and the issue has been there for quite a few months. We have issued the first station blackout proposed position back in November of last year. Since then we have met with NEI and the industry three times and this position was supported by the NEI and the

industry.

VICE CHAIR BONACA: On the other hand, the staff was present during the walkdown of Turkey Point and the demonstration of the alternate path and there was no mention that this requirement would come up, so I think it's important for us to review it to understand if the requirement is appropriate.

MR. KUO: Sure, sure.

VICE CHAIR BONACA: Because I was very convinced by what I saw there and that it was adequate, so I would like to just --

MR. KUO: I understand.

CHAIRMAN APOSTOLAKIS: All right, thank you all.

MR. HALE: Just for my own benefit, so I understand these issues. I guess right now the current schedule for the Turkey Point license shows a letter from ACRS by -- what is it, April 19th?

MR. AULUCK: The 19th.

MR. HALE: And so what I understand that's not going to occur?

CHAIRMAN APOSTOLAKIS: It looks like it will not.

MEMBER POWERS: Let's make very clear that that's somebody else's schedule. That's not our

schedule.

MR. HALE: Oh, I'm not -- I'm not -- don't -- just for my own benefit in terms of where we stand with our license review.

CHAIRMAN APOSTOLAKIS: There is a probability that it would get it, it went down by a factor of 40 as a result of today's --

(Laughter.)

MR. HALE: Is there anything that we can do? Certainly, we can get our hands on the information ourselves with regards to the concrete containment. In fact, I brought quite a bit of information with me today. If there's some way with regard to the concrete void issue, we can resolve it by inspection of the information I have with me.

The second item was with regards to station blackout. We met for an extended period of time yesterday with the staff and have come in general agreement to the approach. We also have that information available. And certainly, the CDFs for the plant can be obtained very quickly.

MEMBER KRESS: I propose that the Subcommittee Chairman sit down with him and go over that information and see if it's enough to satisfy the Subcommittee Chairman and then he can report back to

the full Committee.

VICE CHAIR BONACA: There are Subcommittee member concerns, however, raised right here and I want to make sure that we satisfy those. I'll be certainly willing to sit down and review what you have and still there are a number of issues here, it seems to me that put the Committee under pressure to come to a determination when these issues are raised in Florida City, with the exception of the session blackout. And so it concerns me in the months, the elapse of time we haven't been able to find --

CHAIRMAN APOSTOLAKIS: Okay, why don't you then interact with the licensee and report to us maybe at 5:30 where we have some time to discuss this?

VICE CHAIR BONACA: I'll do that.

CHAIRMAN APOSTOLAKIS: And see how the Committee members feel then about writing a letter. Okay?

MR. HALE: I would like for Dr. Ford, too, because he's the one that's voiced concerns with regards to -- if possible --

CHAIRMAN APOSTOLAKIS: Yes. We can do these things. But you have to remember, the letter is from the full Committee.

MR. HALE: I understand. I understand

fully. I just want to make sure that I have brought information today and anything I can do to facilitate your review I would like to do that.

CHAIRMAN APOSTOLAKIS: Certainly. Okay, thank you all very much. We'll recess until 11:30.

(Off the record.)

CHAIRMAN APOSTOLAKIS: We're back in session. The next topic is Advanced Reactor Research Plan.

Dr. Kress is the cognizant member.

MEMBER KRESS: Thank you, Mr. Chairman. The staff is diligently working on a comprehensive research plan for advanced reactors. We have a draft, a proposed draft, copy of it which is incomplete. So I guess we could consider this kind of an interim briefing and I guess we're looking for any early feedback from us that we might be able to give them either orally now or perhaps in a letter. So with that minor introduction, I'll turn it over to Farouk.

MR. ELTAWILA: Thank you, Tom. You are exactly right that this plan right now is in a very early stage, and as a matter of fact, we have not received the input from the user office like NRR and NMSS, so it's a work in progress and we'll continue to update this plan and we envision that we will be

coming to the ACRS at Subcommittee level in the different areas of this program. But for the time being, the staff developed that plan to identify the issues that will be needed to develop the safety criteria against which this advanced reactor design will be judged.

The plan is extremely comprehensive and includes a lot of information. Some of this information might already exist through international research that's conducted somewhere else. it is also available through the vendors and the old history of gas-cooled reactors, for example.

So the plan should not be construed as research activities that the Office of Research is going to be conducting. As a matter of fact, a lot of the information that describes in the plant would be the responsibility of the Applicant of the new reactor design to try to make the safety case. So we will be receiving a lot of information from the industry on that.

But regardless of where the source of information is going to come from, whether it's coming from NRC, from international cooperation or from the vendor or the Applicant himself, NRC will have the best information available to make its regulatory

decision.

MEMBER LEITCH: If it's not intended to identify research, would it be intended to influence research by the NRC? Maybe identify is not the right word. "Would influence" be the right word?

MR. ELTAWILA: Influence research. I really consider it now as a gap analysis to try to identify the weakness or the lack of information at the NRC because we saw it in this advanced reactor, particularly gas-cooled reactor very recently. So we might identify an issue that there have been a lot of research being done somewhere else, so if I call it research or try to make it to influence research, it might be the wrong way of characterizing it.

So it's really gap analysis right now and once we collect more information we are going to refine that and find out which part of the research would be provided by the industry, which part will be provided by NRC.

Having said that, one more issue that the Office of Research, even though if the utility or if the vendor provide information research data to support their safety case, the Office of Research will be conducting confirmatory research to try to go beyond the information that's usually traditionally

provided by Applicants like poking into the area of severe accident source term and the issue that not traditionally being addressed by Applicant and licensee.

MEMBER LEITCH: So the operative word is "by the NRC"? In other words, you're identifying research that needs to be done by someone.

MR. ELTAWILA: By someone. And eventually we'll try to narrow down to the research that will be done by the NRC.

MR. ELTAWILA: Okay.

MEMBER FORD: Can you put a quantitational thing on "eventually"? When are these decisions going to be made?

MR. ELTAWILA: I think this decision -- we are supposed to go to the Commission in the fall of this year so we are planning to form inter-office task groups to look at the information in the research plan, identify which part of this information would be provided. The NRC is going to ask the vendor and Applicant to provide and then decide after that the balance of that will be performed by NRC and finalized that in the fall and send it to the Commission, of course, after coming to you here.

MEMBER FORD: So there will be several

meetings with the ACRS to comment on the various points along that time line?

MR. ELTAWILA: That's correct, yes.

CHAIRMAN APOSTOLAKIS: By fall?

MEMBER KRESS: Oh yes, we will several by fall, yes.

MR. FLACK: I think what's envisioned is that we would come back at least once to the Full Committee before we go to the Commission with the plan. And then Subcommittees as we feel are necessary or as the Committee feels necessary.

CHAIRMAN APOSTOLAKIS: Maybe you need a better title though. When you issue a report that says "Research Plan" it seems to me most people would think research to be done by the NRC. Usually, these are technical issues. They need resolution before you license them.

MR. ELTAWILA: George, I agree with you, but we are -- are embarking on an area here that we really don't have too much experience, especially in the.

gas-cooled reactor. We don't have much experience and we have, for example, we are having a hard time getting information from the international community. So the information might be out there, but we might

still have to do the research because we are unable to get this information.

CHAIRMAN APOSTOLAKIS: No, I understand, but I think the title of your report should be advanced reactor technical issues.

MR. ELTAWILA: Information needs.

CHAIRMAN APOSTOLAKIS: Yes, information needs, something like that.

MR. ELTAWILA: We can change that.

CHAIRMAN APOSTOLAKIS: Instead of Research Plan.

MR. FLACK: Well, the reason why it's a plan is we're trying to build an infrastructure.

CHAIRMAN APOSTOLAKIS: But you cannot plan for other people, John.

MR. FLACK: No, no. I understand. That's when we exercise the plan. The plan is to build the infrastructure and then part 2 is well, we're getting a license application that at some later date we're prepared to support the licensing office in that area. So we have a plan to try to establish the infrastructure that will support the plan.

CHAIRMAN APOSTOLAKIS: If you change the title you will not need a separate color for that bullet over there.

MR. ELTAWILA: We'll change the title, how about that? Really, it's not a big issue right now.

CHAIRMAN APOSTOLAKIS: The second bullet there, you know, why do you feel that you have to say that? Isn't that sort of understood that the Applicants are responsible for data?

MR. ELTAWILA: It is -- well, traditionally, the NRC have been generating the data for all plans, you know, before the 1990s and things like that. The NRC generated all the thermal hydraulic database, all the severe accident and the fuel. So right now we are entering our strategic plan, put the burden on the industry for providing the data that's needed to justify the technical basis for the licensing of the plant.

So it is important to identify that so people when they read the plan, they don't think that we are -- whatever we're going to call it, they are not going to reach the conclusion that NRC is going to do this work and then they will sit and not do any of the work themselves.

MEMBER KRESS: I think that's worth saying.

CHAIRMAN APOSTOLAKIS: But you also have a sentence in the actual report. I don't know if you

want to come back to it, but where you say it is also recognized that an Applicant of a new reactor design has a primary responsibility to demonstrate the safety case of the proposed design.

MR. ELTAWILA: That's correct.

CHAIRMAN APOSTOLAKIS: And later on, you use a variation of this as well. It wasn't clear, I mean somehow it sent a message that we are really not part of this. We are setting the standards, aren't we, the criteria and the objectives. It's their responsibility to demonstrate they comply with the criteria, but not -- what does it mean to demonstrate the safety case? Are they going to also set the criteria?

MR. ELTAWILA: No, no. I think it's very difficult to put everything in the first bullets, but if you go a little bit further in our discussion you will see that one of our responsibilities is to develop the data to set the safety limits for this plan.

CHAIRMAN APOSTOLAKIS: Sure.

MR. ELTAWILA: So that will be our responsibility. It's not going to be Applicant responsibility or anybody else.

CHAIRMAN APOSTOLAKIS: Okay, but I think

in the report it should be made clearer, because that was something that struck me when I read it.

MEMBER KRESS: But when it comes to deciding what data and research that the Applicant needs to provide to you, do you have some sort of firm criteria for how to pick out of this comprehensive document so these are your guys and these are confirmatory and they're ours. Do you have a way to decide that or is that just going to be judgment?

MR. ELTAWILA: I think it will be a lot of things: experience, judgment and our interaction with the user office about what are the information that they want independent capability from the staff to be able to do their job. And our own initiative in the Office of Research about how to build that additional infrastructure to be able to ask more intelligent questions from this Applicant and licensees. So it will be a combination of the three and the way we have developed this information and the past will play a major role in deciding which part will be ours and which part will be the Applicant's. But in the past, Applicant tends to focus on the operation of the plant. They have a safety envelope that they work within the safety envelope and they will provide the information to satisfy that need only.

NRC wants to go beyond that and to try to challenge the system in a different way and we will generate the information for that.

Although the plan itself is for AP-1000, IRS and GT-MHR and PBMR, you will see that most of our discussion will be on high temperature gas-cooled reactor because that's the area we don't have much information about.

CHAIRMAN APOSTOLAKIS: Do you have sufficient information on IRIS?

MR. ELTAWILA: Okay, IRIS, let me -- IRIS, we have very limited interaction with Westinghouse so it's not really a major part of our activities right now.

The other points that I want to make is that we -- Jim Lyons from NRR and I attended a meeting with Framatome and Framatome is proposing to submit SWR application. So -- SWR -- honestly, I tried to look in the vu-graphs to find what -- simplified water reactor or something like that.

MR. LYONS: This is Jim Lyons from NRR. It's the SWR 1000. It was designed by Siemens from Framatome and Siemens are now together. It's a plant that's being considered to be built in Finland. They're also looking at coming in. That would be a

BWR design that they're thinking about. They're also exploring whether or not they'd want to come in with the EPR which is European Pressurized Water Reactor. That's another one that they're thinking, they're considering coming in with for design certification.

CHAIRMAN APOSTOLAKIS: Now the SWR is not the same as the SBWR?

MR. LYONS: No, it's not. It is a boiling water reactor. It was --

MR. ELTAWILA: It's almost the same principle, but it's different. So again, we're going to change our plant as Jim indicated. They are coming. They want certification. Next year, they submit application.

They are serious about submitting application.

We're having a meeting with them.

MR. LYONS: We're meeting with them on -- they're going to present these two basic designs and they're trying to understand the design certification process and to make a business decision on whether or not they want to come forward.

MEMBER ROSEN: This raises the whole question in my mind of how you pick the things that you need to get researched, however you get them

researched. Because I was astonished in reading your report that the Generation IV program of the Department of Energy isn't mentioned until the 111th page which is the last page.

CHAIRMAN APOSTOLAKIS: Because they couldn't do it after that.

MEMBER ROSEN: Because they could not do it after that and still mention it.

And in that program which is a very vital program with lots of effort going into it, hundreds of people working on it, many of the concepts that were just mentioned and lots beyond that are being considered seriously to be down-selected for development of a roadmap and some research, significant amounts of research from the Department of Energy. I know John Flack who's with you. He's aware of these things and has attended many of the meetings.

So I would ask you why don't you even reference Generation IV in this report?

MR. ELTAWILA: That's a good question. We are keeping informed with what's going on in Generation IV, but it's a Commission direction. The Commission directed the staff to work with this applicant at this time, and that's why we defined the work that will be needed for these four applications

that we have, even though IRIS is at the very early stage.

So we get guidance from the Commission about what to work on and what not to work on, and for advanced -- for the Generation IV to continue to interact with DOE, we're keeping abreast of what's going on, and we keep the Commission informed with what's going on. And once the Commission feels that the staff should be engaged in this process, I think the Commission will direct us to be working in this area.

MEMBER ROSEN: I think perhaps the committee -- our committee ought to discuss this point.

CHAIRMAN APOSTOLAKIS: It wouldn't make any difference, though, Steve. I mean, they are trying to be as general as they can. I mean, look at the very -- the penultimate arrow there. The regulations will be technology neutral. I mean, if they mention Generation IV on the second page, would it make any difference to what they're proposing?

MEMBER ROSEN: Well, I think it would make a great deal of difference.

CHAIRMAN APOSTOLAKIS: Really?

MEMBER ROSEN: Oh, yes.

CHAIRMAN APOSTOLAKIS: They are trying to be technology neutral.

MEMBER ROSEN: Well, but I do think you have --

CHAIRMAN APOSTOLAKIS: Yes. Well --

MEMBER ROSEN: -- ever do that.

CHAIRMAN APOSTOLAKIS: Then, they will have, they say, Regulatory Guides.

MEMBER ROSEN: No.

CHAIRMAN APOSTOLAKIS: So they will not have --

MEMBER ROSEN: For example, this report includes -- a third of the report is on the research to support nuclear materials, NMSS activities. The Generation IV program will be -- if it continues to evolve the way it currently is, will include a major research track on sodium-cooled reactors, but the fuel cycle of it mostly.

CHAIRMAN APOSTOLAKIS: Yes.

MEMBER ROSEN: With an emphasis on fuel cycle research. And that's not mentioned at all in this third -- last third of this 111-page report. And it would seem to me that it would be a major thrust of the nation's going-forward activity.

MEMBER KRESS: Well, I think Farouk --

MEMBER ROSEN: So my basic --

MEMBER KRESS: -- I think Farouk appropriately answered, though. They've got constraints on what this report is supposed to look at, and it doesn't include that.

MEMBER ROSEN: Right. And I'd say if those are the constraints that they were asked -- that they were working within, because the Commission directed that, then, well, that's certainly what they have to do.

MEMBER KRESS: Sure.

MEMBER ROSEN: But we can advise the Commission that maybe they ought to be thinking about some broader issues.

MEMBER KRESS: Well, that's -- I think that would be another issue, another thought.

MEMBER ROSEN: I'm not faulting them. I'm just --

MR. ELTAWILA: No. I think we encourage the committee to think about the reality of the budget situation, and things like that. We have to -- even that we are encouraging NEI and the industry to come with identification of what's really their priority.

You know, if it is going to be AP-1000, PBMR, GT-MHR, we really need to get clear guidance

from the industry about what's important, what's definitely going to be submitted for certification, and has a chance of continuing with the application here for review, because, as you can see from the report itself, the amount of information that needs to be gathered is tremendous.

And given the staff limitation and even contractor availability and test facilities, and things like that, we need to plan in a much better structured way than trying to address everything at the same time.

MEMBER ROSEN: I think there are major strategic issues that need to be addressed, and that one of them comes out of what you just said, which is wait for the applicant to come and then we'll get ready. I'm not sure that's the only way that research should get defined, and we can discuss that more in the committee.

MEMBER KRESS: Yes. But surely you want to give priority to things you know are going to come in for certification, or at least you suspect very soon. So, you know, you can't -- if you've got a lot of stuff to do, you're going to focus on the ones that you need first. And I think that's what they've done.

MEMBER ROSEN: Well, they've done what

they were told to do, which is a good thing to do --

MEMBER KRESS: Yes.

MEMBER ROSEN: -- when you work here.

(Laughter.)

MR. ELTAWILA: Okay. With the -- I think George alluded about to the new regulatory structure that we should be looking at. For example, some feature of the PBMR is not really covered by current regulation because -- which is developed for light water reactor.

So Exelon has proposed a risk-informed approach towards defining the license basing event to supplement the current regulatory structure. And we are planning to build on Option 3, and that's why Mary is here, build on Option 3, try to provide -- maybe we need to develop additional supplemental risk metrics for the other type of reactor, and at a very high level for what criteria this design should mean that we can be technology or reactor design neutral.

And then, in the specific Regulatory Guide, we'll try to see how well they should be measuring against meeting the acceptance criteria, and we'll provide that for each type of reactor, a Reg Guide or a set of Reg Guides to address these acceptance criteria.

The overall objective of the research plan is to, as I mentioned earlier, to determine the critical information that is needed to establish the safety standard new reactor design is going to meeting. That's NRC responsibility. Although that we might get some data from the licensee -- from applicants, we have the major responsibility of developing this data.

Again, another issue -- the issue of uncertainty, we are planning to explore uncertainties in this design and this information, and that's the responsibility of NRC.

And, finally, is the issue of developing independent analysis tool and give the data to assess this tool.

CHAIRMAN APOSTOLAKIS: Now, the uncertainties. You have in mind something, NUREG-1150? That's the only place where I've seen large uncertainties handled.

MR. ELTAWILA: I think we will be looking at something like NUREG-1150.

CHAIRMAN APOSTOLAKIS: With expert opinion elicitation and doing something about it and --

MR. ELTAWILA: For some of this new design which we're going to have, much of the experience or

much of the data, that we will have to look into expert opinion. And you can -- maybe when John discusses the issues of fuel you'll find some of this in his discussion. I don't know if you were planning to discuss it.

Again, because of the -- we are going to rely a lot on cooperative agreement, although we have been having difficulty entering into some of these agreements, but there is work in China and Japan, European community, and we are looking for cooperation of the Department of Energy to do some testing in the fuel area.

I want to conclude my brief presentation here by saying that we looked at Dr. Powers' trip report. I think Dana identified very important technical and policy issues that the Commission needs to resolve before we can say this type of PBMR in particular is -- can be certified or not.

CHAIRMAN APOSTOLAKIS: Did you find that report --

MR. ELTAWILA: So the issues are very important.

CHAIRMAN APOSTOLAKIS: Did you find that report clearly written?

(Laughter.)

MR. ELTAWILA: If you heard Commissioner McGaffigan say, it's plain language, you know, and he was looking for something from us to say the same thing. But, unfortunately, he also admitted that our concurrence process will not allow me to write something like Dana Powers writes. So --

(Laughter.)

CHAIRMAN APOSTOLAKIS: Well, it's not that -- I'm not sure this committee would think about --

(Laughter.)

Yes, he certainly speaks with sufficient clarity and volume.

(Laughter.)

And volume.

MR. ELTAWILA: Well, they are very important issues. We identified these issues and sent them to Exelon, and we are in the process of gathering information about it, and we actually use this information in the development in our research plan. In addition to Dr. Powers, we received other comments from Dr. Murley, for example, and all of this information is factored into our plan.

CHAIRMAN APOSTOLAKIS: Now, why did -- I sense that you have some problems with international -- not problems perhaps, but you are not -- it's also

clear how you're going to get information from the international efforts. Why do you need to understand the status? I mean, you send somebody there, you understand it. What's the problem? They are reluctant to give you information?

MR. ELTAWILA: When you -- there is reluctance -- I think, for example, the European community is -- their system of working the everybody do -- does research, and the shared information -- there is no exchange of money.

So for us to try to get information from the European community, we'll try to get consensus from all of the members of the community. And you know that that's extremely difficult, to enter into an ongoing program right now to try to get information. So each country has said yes or no to sharing information with NRC.

When it comes to China, it is just -- we have limitations through the State Department and things like that about what level of interaction we're going to have with them. Japanese, again, the organization -- so it's just -- in a nutshell, it's not that easy.

Yes, we're sending people to go and meet with them. We've been exchanging e-mail. We meet

with them. And it sounds very promising, and it looks like we are on the right track, and we are going to get the information. But, unfortunately, nothing has materialized up to now. We have not signed a single agreement with any of these countries. You know, that's one of the most frustrating parts of this activity right now.

MEMBER FORD: And do you have a backup plan should those agreements not take place?

MR. ELTAWILA: Our backup plan is to go to the Commission and say, "We will have to develop this data, all of it, ourselves." And which I think that will be -- will put some of this, like the PBMR schedule, in jeopardy because some of these data are very crucial for --

CHAIRMAN APOSTOLAKIS: Do they have any incentive to cooperate with you? Is there any benefit to them?

MR. ELTAWILA: The benefit is that we definitely -- we are going to be doing research, and we'll try to exchange the information. It's just government-to-government communication and the exchange of information is not that easy as a lot of people think it is, you know, including our Commissioner.

Our Commissioner believes that we should have had all of these agreements signed by now, but it's just not happening that fast, you know.

CHAIRMAN APOSTOLAKIS: It's still not very clear to me, but, anyway, let's go on.

MR. ELTAWILA: Okay. With that, I will ask John to complete the presentation.

MR. FLACK: Okay. My name is John Flack. I'm the Branch Chief of the Regulatory Effectiveness and Human Factors Branch, which also has the advanced reactor group.

I know we're time limited, and Farouk covered a number of things, so I will briefly -- I will go quickly through the viewgraphs. And please slow me down if you need more information.

CHAIRMAN APOSTOLAKIS: Don't worry.

MR. FLACK: The plan was actually created with a number of --

CHAIRMAN APOSTOLAKIS: Does this committee have a reputation that it does not ask enough questions? Because every speaker who comes here encourages us not to hesitate to interrupt them.

(Laughter.)

Do we have a record of not interrupting?

MR. ELTAWILA: For the record, I did not

ask you to --

CHAIRMAN APOSTOLAKIS: Is our image so terrible that --

(Laughter.)

MEMBER POWERS: We're very shy.

(Laughter.)

We're tiring.

CHAIRMAN APOSTOLAKIS: Okay. John, we appreciate your --

MR. FLACK: Okay.

CHAIRMAN APOSTOLAKIS: I know it was well meaning.

MR. FLACK: Thank you. The plan itself had been created by -- over 20 authors actually wrote parts of the plan. Many of them you'll find in the room today, so what I'm -- I'm offering you an opportunity, if there's anything technical that you want -- you've seen in the plan or you hear here today, we have the people here that --

CHAIRMAN APOSTOLAKIS: Would you please introduce your colleagues?

MR. FLACK: Oh, I'm sorry. Mr. Rubin to my left. Stu has been the -- in addition to work in the fuels issue on the HTTR, he is also the project manager on the pebble bed reactor.

CHAIRMAN APOSTOLAKIS: Okay.

MR. FLACK: And Joe Muscara to my right prepared most of the material and the plan on materials, primarily high temperature materials and graphite. Don Carlson also works in our group and has prepared most of the material on the nuclear analysis part of that, for both material and reactor safety.

CHAIRMAN APOSTOLAKIS: Very good.

MEMBER KRESS: When I read the plan -- by the way, I like the way it's organized.

MR. FLACK: Oh, good.

MEMBER KRESS: Yes. It makes it very, very well put together to know what the issue is and what it -- but when I read it, most of it sounds like it was written by one person, except when you get to the materials part that sounds like -- a little different. But did one person write most of that?

MR. FLACK: No. Actually, well --

MEMBER KRESS: It was put together by a bunch of people, huh?

MR. FLACK: We tried to establish a certain format I'll cover in a minute, but I'm trying to get that information out. But what was important about the development of the plan is we didn't want it to be issue driven; in other words, try to figure an

issue and then what research you need to resolve the issue.

What we were really focusing on is the infrastructure, the ability to ask the right questions. And so we started -- well, I'll get to it, but we started from that perspective, what are the tools, what is the expertise that we're going to need, rather than try to identify issues.

But, in the end, I do have viewgraphs on some of the issues we see already -- technical issues that could bubble up to be safety issues, that could bubble up to be policy issues -- and we'll go through that towards the end.

Farouk went over many of the objectives of the -- the reason why we put together the plan. Some of these I've just summarized on this viewgraph, trying to identify the areas, the expertise, having the plan as a communication tool, so people understand what we're trying to achieve.

MEMBER ROSEN: But wait a minute. Now, it's not to build an advanced reactor research infrastructure. It's really to build an advanced reactor research infrastructure for three or four selected concepts.

MR. FLACK: That's right. The scope is

there, it's only limited -- the scope of the plan right now is limited to the four concepts that we have on the table.

MEMBER KRESS: You should read advanced reactor as these four concepts.

MR. FLACK: That's right. That's right.

CHAIRMAN APOSTOLAKIS: And also --

MEMBER ROSEN: Which may change tomorrow if somebody else brings another concept in with an application.

MR. FLACK: Well, the idea is to see what we'd need to do. We have an infrastructure in place. It's what additional work or additional tools above and beyond what we have already. So with these four concepts coming in, we already see that we're going to need new data, additional tools, and at that -- we're looking at it from that perspective.

If another concept came in, we'll have to see what tools can be applied to that concept. And if there needs to be something new developed, then we would take it from there.

MEMBER ROSEN: But, as you know, there were something like 19 concept sets in the DOE Generation IV program, which really meant that there were something like 75 or 80 concepts that were looked

at overall. So there's lot of concepts out there.

MR. FLACK: Right, right.

MEMBER ROSEN: Some day -- so you need a program that -- a thinking process that sets you up to be ready to respond to whoever comes in with whatever concept.

MR. FLACK: Well, you have to have that --

MEMBER KRESS: You can't do that for all of them. I mean, you just don't have the resources.

MEMBER ROSEN: What I think is the list of the four has some of the things that we might have to work on in the next decade, but it certainly doesn't have all of them.

MEMBER KRESS: Well, it probably encompasses a good many of them.

MEMBER ROSEN: But it would be clearly a mistake to believe that because the Commission has picked those four that that's all that will ever be brought to the table here and --

CHAIRMAN APOSTOLAKIS: From 4 to 80 is a factor.

MEMBER KRESS: Yes, but I don't think -- to think in terms of which ones of these others might make it to NRC, and then try to prepare --

MEMBER ROSEN: No, but you don't have to

think about it. You can just simply ask -- go out and see what people are doing.

MEMBER KRESS: Well, I think their comment that they try to -- try to make the -- at least the acceptance criteria in the regulations reactor type neutral is a good way -- is a good thing to do to anticipate that.

MEMBER ROSEN: It is. I agree with that.

CHAIRMAN APOSTOLAKIS: Now, the overall objective, is it really to build an advanced reactor research infrastructure, or is it to build the infrastructure that would allow you to license advanced reactors?

MR. FLACK: Now, there's a distinction between the infrastructure, one being called regulatory infrastructure and one called research infrastructure. What we're talking about, at least aside from the framework, we're really talking about research infrastructure.

CHAIRMAN APOSTOLAKIS: But the objective ultimately is to support licensing.

MR. FLACK: That's right. Which will get us through the next phase of this plan that --

CHAIRMAN APOSTOLAKIS: So that's what you should say, actually, right? I mean, to build an

advanced reactor research infrastructure, why? This is a regulatory agency here.

MR. FLACK: Well --

CHAIRMAN APOSTOLAKIS: Only to the extent that it's required for licensing. We've been told by the Commissioners many times, they have said it in public, this is a regulatory agency.

MR. FLACK: That's right.

CHAIRMAN APOSTOLAKIS: It's not the National Science Foundation.

MR. FLACK: That's right.

CHAIRMAN APOSTOLAKIS: So the overall objective probably needs to be reworded.

MR. FLACK: Yes. And it's driven a lot by regulatory needs.

CHAIRMAN APOSTOLAKIS: Of course.

MR. FLACK: In fact, that was my next viewgraph was to say, where are we going on the second phase of this plan? If I can jump to that, we can --

CHAIRMAN APOSTOLAKIS: Of course you can.

MR. FLACK: -- talk to that issue a little bit more.

The first phase of the plan was really to get out everything on the table as -- that we know it today, with no constraints to resources, and so on.

And so we held workshops, we had the preapplication review to capitalize on, we had talked -- we went around the world looking at what was out there.

So we're coming to the end of this first phase, and, actually, with this meeting, which will be the second phase of this research plan. And the second phase of this research plan is really what focuses on that particular issue that you just brought up, George. It's to set up working groups with the user offices now that we've seen -- and we gave everything -- put everything out on the table. What is it that we really need to do now?

CHAIRMAN APOSTOLAKIS: Yes.

MR. FLACK: Okay? And that's going to be the next phase, and we see this phase coming to completion. The next time we come to the committee we would be more focused on that particular issue of supporting the process, the regulatory process in the global sense, and then going to the Commission with that plan at that time.

And then, the third phase is really to maintain it a living plan, to pick up new designs as they come in, see what delta needs to be done, what new tools we need to develop, and to state engaged in that Generation IV activity, to see if these things

are materializing to the point where we need to start getting serious about something.

MEMBER FORD: Now, how does the prioritization judgment come about? Given the fact that your resources are undecided, management resources like collaborative agreements, people, dollars. That's not a fixed amount right now. So your prioritization is going to presumably change with time, isn't that correct?

MR. FLACK: Well, I think Farouk might want to --

MR. ELTAWILA: No. I think the -- our budget and resources has been established for the next three years, you know, that at least to -- our 2003 budget is fixed, and 2004 and 2005 is proposed to the Commission. And we will try to prioritize within these budget constraints.

And if we're going to be using the same PPM process, and we'll be competing with other operating events that depends on the priority, we'll be .funding this research based on the available budget.

MEMBER FORD: No, I recognize that. That's how you're going to spend your money on your people and subcontractors. But what happens if one of

the priorities that -- technical priorities -- work on graphite, for instance.

MR. ELTAWILA: Okay.

MEMBER FORD: That work has been done in Britain, for instance. And what happens if the Brits decide that they don't have to give you that data for whatever reason? What happens?

MR. ELTAWILA: The first point, that we are going to be asking the applicants to provide us for the data to support their case, and then based on the information we're provided we'll see what additional information we will be -- we need to develop ourselves.

MEMBER FORD: Okay.

MR. ELTAWILA: It is not very easy for a regulatory agency to try to develop a research program. It has to be issue-driven, as George indicated, that we -- everything has to be related to the licensing process that we are working on.

CHAIRMAN APOSTOLAKIS: I think the overall objective should be reworded to reflect that. I mean, I appreciate the phases, but you said overall objective.

MR. ELTAWILA: Okay.

CHAIRMAN APOSTOLAKIS: Ultimately, that's

what you're going to do.

MEMBER KRESS: I think it's implicit in everything already anyway.

CHAIRMAN APOSTOLAKIS: Another thing I noticed when I read the report is that you list everybody's workshops except the ACRS. Was there any reason? Did you find it useless?

MR. FLACK: No. There's no reason why we missed that. That was an important oversight. Thank you.

CHAIRMAN APOSTOLAKIS: Maybe it was not very useful to you.

MEMBER POWERS: Maybe they just didn't like our --

CHAIRMAN APOSTOLAKIS: That's I thought, too.

MEMBER POWERS: Nothing useful emerged from it.

(Laughter.)

CHAIRMAN APOSTOLAKIS: You list everybody's workshops, the dates and this and that. Of course, it will never bias our views, but --

MEMBER ROSEN: You're too sensitive, George.

CHAIRMAN APOSTOLAKIS: I am not too

sensitive. I'm just sensitive.

(Laughter.)

MEMBER LEITCH: The second bullet is --

CHAIRMAN APOSTOLAKIS: Commissioner Diaz was there. He gave the keynote speech. Maybe the staff doesn't think much of what the Commissioner said.

MR. FLACK: I think if -- you'll find -- I'm sure I've seen it in there somewhere.

CHAIRMAN APOSTOLAKIS: It is not here. John, it is not here.

MR. FLACK: It might have got scratched the last time. I don't know.

(Laughter.)

MEMBER LEITCH: The second bullet there, Johns, is there some reason the AP-1000 is not on that list or --

MR. FLACK: No, that should really be on there. It was for examples, and I was --

MEMBER LEITCH: It says "for example," and I was just wondering if it --

MR. FLACK: Yes, they're all HTTRs. I should have put a light -- yes, a light water reactor on there. Yes.

MEMBER ROSEN: There's an astonishingly

pervasive gas reactor focus on this, because of the --

MEMBER KRESS: Well, you're almost through with the AP-1000 preapplication review anyway.

MR. FLACK: Yes. The preapplication is done, in fact. I think the --

MEMBER KRESS: Is that correct?

MR. FLACK: But most of the gap that we see is in the high-temperature gas-cooled area, so, you know -- but we have an infrastructure in place pretty good for a light water reactor.

Okay. I think we pretty much touched upon this. The meaning on infrastructure, again, is the staff expertise, the tools, the facilities, contractor support, and the scope being the four reactors as we see it today. And the structure -- and, again, we built the structure around not the issues themselves but on the technical areas, which you'll see in a moment.

MEMBER POWERS: John, before you take that down, let me ask you a question about technical approach on this. The second item on your list there is called analytic tools and analysis methods. And one of the challenges that we repeatedly come up with when we look at things connected with current reactors and modest changes to those current reactors, like the

AP-1000, is that many, many, many of our analytic tools going from simple neutronics through thermal hydraulics to fission product release had their origin in an era when the computing capabilities that people had were widely different than what it is now, and probably we'll see in the next 10 years even more dramatic changes.

Yet your plan doesn't seem to act upon those things. I mean, it doesn't seem to take that into account. There is lots of things like, well, we can take TRACM and put another patch on it, we can take MELCOR and gerry-rig it to handle something else, rather than saying, "Hold it. We really have undergone a computer revolution here." The way we do computing, the way people do coding now, it's just very, very different than what it was when our codes had their origin.

Maybe it's an opportunity for us to bring our codes up and to recognize that the hardware has just changed, and what not. But your plan didn't seem to delve into that kind of an approach.

MR. FLACK: You know, it's an excellent subject for a subcommittee, I think, to revisit this particular issue. You're right. We're really building on things that already have been developed

and seeing where we're going to -- how can we extend them rather than go back to -- you know, and look and see is there a better way of doing this. And I think it's an excellent question. We just -- just built on what we have.

I know TRACM is improving, of course, has come quite a way from -- just in the Fortran part of that. But as far as starting with something new -- and this may be an opportunity to do that for these gas-cooled reactors, where you may have one code, because of the nature of the beast, that you don't have the core melt and the accident progression and that -- you have a fission product release over time and temperature and using one code to deal with the whole spectrum, right out into the environment, might be a way to go.

MEMBER POWERS: One of the things that it seems to me that -- you know, in trying to think about the future, and you put it right up front in your plan, you say, gee, you know, we're going to move to a probabilistic risk assessment kind of framework. And whereas I -- I know for a fact that a lot of our probabilistic risk assessment tools are kind of patchwork things.

They work pretty well until you get to the

questions of, gee, let's do some of these deterministic analyses for a bunch of scenarios. And then we run into a problem that our codes are fairly archaic. And if somebody wants to run 150 MELCOR sequences, for instance, you know, you're -- and that's an enormous number for a probabilistic risk assessment; 150 is actually a fairly modest number.

You really are buying yourself a pretty big chore here. So if you -- you know, if you were looking to say I want to make bigger use of probabilistic techniques in my licensing process, I want to have more assessments of them, I want to take that probabilistic technique deeper into the accident sequences, rather than just looking at Level 1 I actually want to go deeper into Level 2, and things like that, then my phenomenological tools, both thermal hydraulic and structural techniques and things like that, have to be better.

You might really come to the conclusion that you need to invest some in your tools, and that's regardless of what goes on in DOE land or in the vendor's land, that you really do need to encourage the Commission to get you the resources to develop your thing.

I mean, I guess my thinking on this is

that, for instance, the thermal hydraulic area you have some people that are pretty qualified getting TRACM as a consolidation. And that's going to be awfully useful for existing reactors, but I bet you they don't find it very satisfactory for looking at very innovative kinds of thermal hydraulics things where the analyses go, I think as you say in the document, instead of working on time scales of a few hours you're starting to work on time scales of days and things like that.

MR. ELTAWILA: John, can I try to address this issue?

Dana, you are raising a very good issue. But I just -- actually, our problem is not really the speed of the computer, because you continue to enhance that, and the machine speed itself will make up for the difference.

But the biggest problem is trying to develop a code. You have to have a target that this code is going to be better than what we have right now. And we really don't have the data to support development of models that we'll be able to put in this code.

So going -- embarking on a code development program, without having the supporting

experimental data, will be just a waste of resources. And we face that issue early, you know, when we are thinking about either developing a new thermal hydraulic code versus consolidating the existing code into a single code.

And we'll get a group of experts, and they all advise us against developing a code from scratch, because we're going to end up -- the code is going to be slow because of the limitation of the model, not because of the machine.

So unless somebody is willing to invest a few hundred million dollars in developing the data to support this fast running code with accurate, better models, I think going into the development of faster code is not going to be the best way we put our money to work.

MEMBER ROSEN: I'd like to add that, although it's probably true, that many of the codes that we'd be looking at using in licensing reviews are built on older, previously developed codes. There may be some pockets where there are new codes being developed in the current computing environment.

And I would give as an example in the fuel performance area, the European Commission has a high temperature reactor fuels task group in place. And

one of the areas that they are doing work in is to develop fuel performance models today. And those fuel performance codes will be developed, obviously, in the current computing environment.

Also, INEEL, working with MIT, I believe, is developing fuel performance models and codes to predict fuel failure, etcetera. So there are a few examples at least where codes are being developed in this environment.

MEMBER POWERS: Well, I, of course, have come to learn that fuel research is irrelevant, so --

(Laughter.)

MR. ELTAWILA: That's the subject of another meeting.

(Laughter.)

MEMBER POWERS: I couldn't resist.

MR. FLACK: We'll move right along on that.

Basically, to your comment, Tom, on how we structured the report was around three questions -- why we -- why is it important for us to do this research, what it is we would actually do, and then how would we use the results. And we tried to keep each of the people focused.

MEMBER KRESS: And I thought that was very

good. It was very helpful in reading it.

MR. FLACK: And the research plan structure, which is -- has been developed, and this was developed to sort of try to get the completeness of the work that we're doing. We actually started, again, not from an issue perspective but from the top down, and we began -- well, we started by looking at the arenas that we would be working in as far as research is concerned. Well, as you can see, most of it is reactor safety.

We're looking and pressing into these other arenas to see what work can be done, since most of the work that we do involves reactor. So there is some of it discussed as far as nuclear waste and materials safety, and then, of course, safeguards. Again, we're pressing that area.

But within the reactor safety arena, we laid out the work more or less along the lines of the cornerstones of safety. And bringing that down further, going from accident -- starting from right to left, accident progression to initiating events, which dictates the sort of scenarios we need to look at as an office on a particular plant design, and then from there -- which actually sets the stage for the rest, coming down to look at accident analysis and what area

or what technical work needs to be done in that area.

It's primarily driven by the PRA and those things that -- that influence the PRA, like human factors and I&C. And so in these areas PRA was generally that part of the research under Mark Cunningham, as you know, Mary Drouin, and Alan Rubin, and John Ridgely. And on the plant analysis it's primarily the human factors and I&C, which is Steve Arndt for I&C and Jay Persinski for human factors.

Moving across from there, from left to right, the next large area is the reactor systems analysis, which is primarily in Jack Rosenthal's branch. And under that being the thermal hydraulics, the nuclear analysis, and the fission product transport work.

MEMBER POWERS: You felt that it was -- that the computational tools you have available to you for doing probabilistic risk assessment -- the actual analysis itself, you know, calculating out the probabilities, that those were in such fine shape that they deserve no improvement at all?

MR. FLACK: Well, no, I don't think that would be the case. There's really -- I don't know if Mary wants to respond to that, but there's really three areas there in PRA that we see as being --

pushing our needs, and that is initiating event frequency for the high-temperature gas-cooled reactors.

MEMBER POWERS: Yes, but those are data things. I'm talking about the actual computational tools.

MR. FLACK: Oh, the computational tools? Do you want to comment on that, Mary?

MEMBER POWERS: The way you go about doing the analyses.

MS. DROUIN: I agree that there is going to need to be some research in the development of some of these tools, particularly in the computational area. And that's --

CHAIRMAN APOSTOLAKIS: But the report I think says that SAPHIRE will be used for the PRA. Isn't that so? That's what the report says.

MR. FLACK: Yes, that's right.

MS. DROUIN: SAPHIRE is a starting base, absolutely. I mean, I would not like to think we would just start with a clean piece of paper and not take a tool that we already have and see where we can use it, modify it appropriately.

MEMBER POWERS: At least through the classical Level 1 for normal operating events, the

computational pathway is fairly straightforward, I think, Mary.

MS. DROUIN: Yes.

MEMBER POWERS: And adequately -- the blocks that you need are adequately there in SAPHIRE, maybe the computational way it's done.

The issue, it seems to me, that's been raised so clearly by the eminent Dr. Kress is that that computational framework may not be adequate if we were to extend the way we do PRA from an operational events to include all plant operational states.

I think that's a conclusion that has come from your own studies in looking at the other operational events, that the tool you have may not have all of the computational elements you need to do all operational states.

MS. DROUIN: I don't disagree.

MEMBER POWERS: And as we know, we trust you implicitly, because you're one of my heroes, right?

MS. DROUIN: Absolutely.

(Laughter.)

MEMBER POWERS: I told you I'd get it on the record.

(Laughter.)

MS. DROUIN: But, you know, when you get into -- there's a lot of technical issues, particularly in the Level 2 when you start looking at the advanced reactors, and this will have a direct impact, then, on the calculational tools we use and where we'll be needing to do some work.

And right now we are in the midst of trying to -- when you look at the RES plan, you know, that plan there, when it gets into the PRA part, is very high level. We are in the midst of trying to put together a very detailed plan of what we mean by that three-page plan in the RES-1.

MEMBER POWERS: I'd like to see that. That would be interesting.

CHAIRMAN APOSTOLAKIS: If I look at this --

MS. DROUIN: We do plan to come to the ACRS with it.

CHAIRMAN APOSTOLAKIS: If I look at this figure, I see the acronym -- actually, it's initialism, right? PRA? It's an initialism. Down there on the left.

But it seems to me that, you know, again, your report shows that the thinking is really that -- if you look at the out within the four boxes, and so

on, you will be looking at the accident sequences all the way from the initiating event all the way to offsite protection or somewhere in between, and use that information in your decision-making processes. And that's PRA, is it not? So it is a little bit misleading the way it's shown there.

MR. FLACK: Under "accident analysis," do you mean?

CHAIRMAN APOSTOLAKIS: Yes. I mean, it's pervasive. It's --

MR. FLACK: Yes, that's true, very much so. There was another figure in the report that shows these loops of information, how it flows between the groups, which I don't have with me. But you're right, there is always this feedback mechanism, both within the groups and background PRA. In fact, that's the way the office does work. PTS is an example where you bring in, you know, the PRA people with the materials people with the thermal hydraulic folks and --

CHAIRMAN APOSTOLAKIS: Well, the biggest question, really, here would be, how are you going to use the PRA? I mean, right now, in the most important decisions the agency is making PRA is very peripheral. It doesn't really play any role.

MR. FLACK: In your regulatory decision-

making or the use --

CHAIRMAN APOSTOLAKIS: Yes.

MR. FLACK: -- in the --

CHAIRMAN APOSTOLAKIS: Regulatory, like license renewal, power uprates, PRA really doesn't do much there. I mean, it's just, oh, by the way, this is the number we got from the CDF.

MEMBER KRESS: And even in direct licensing.

CHAIRMAN APOSTOLAKIS: And in what?

MEMBER KRESS: Just licensing a plant doesn't seem to play a role.

CHAIRMAN APOSTOLAKIS: Well, we're not licensing anybody. That's what --

MEMBER KRESS: Well, we will be.

CHAIRMAN APOSTOLAKIS: Yes, that's what I'm saying, that this will be --

MEMBER KRESS: Same thing is the license.

CHAIRMAN APOSTOLAKIS: I mean, so that will be a major challenge, I think, how to use that, how to actually use it.

MR. FLACK: Yes, we're moving towards the framework box there, I think.

CHAIRMAN APOSTOLAKIS: You're going to talk about it separately?

MR. FLACK: If you'd like. Do you want to talk about it --

CHAIRMAN APOSTOLAKIS: Do you plan to talk about it? Are you planning --

MR. FLACK: Well, we can talk about it to a certain extent.

CHAIRMAN APOSTOLAKIS: Well, that, it seems to me, would be a major challenge.

MR. FLACK: Yes.

CHAIRMAN APOSTOLAKIS: Because the Regulatory Guide 1.174 doesn't apply here. I mean, that's for changes in the licensing process.

MR. FLACK: Right. That's right.

CHAIRMAN APOSTOLAKIS: And you don't have a licensing basis here. So it's really using this as part of your integrated decision-making process.

MR. FLACK: That's right. It is --

VICE CHAIR BONACA: They show Option 3 as a foundation for this. Option 3 has a very specific apportionment of certain goals --

CHAIRMAN APOSTOLAKIS: I understand that. I understand that.

VICE CHAIR BONACA: -- which are really measurement for PRA. So there is some structure that you can put inside here already.

MR. FLACK: Yes. But the point I think is that we're dealing with plants already built, and we're applying PRA concepts to those plants in the sense of changes. And now we're thinking, well, what are we going to do with respect to regulatory decision-making on future plants that haven't been built?

CHAIRMAN APOSTOLAKIS: Right.

MR. FLACK: And that gets us -- I think pushes us into this framework, what do we need? And there's really two pieces going on there. One is this blank sheet of paper starting from a clean approach, which is -- there is going to be work initiated next year, and there's work going on in NRR is -- how do we transition to that?

And Mary can talk about the part about the research plan, and Jim Lyons could talk about the NRR approach that's now taking place, from that perspective. So they're coming together in some form.

Mary, did you want to --

CHAIRMAN APOSTOLAKIS: Well, you are basing it on Option 3, right?

MS. DROUIN: Well, if you remember, the Option 3 framework has, you know, three parts to it. It has -- started with, you know, what we call that

hierarchical structure.

CHAIRMAN APOSTOLAKIS: Right.

MS. DROUIN: You know, a top-down approach. And then, because it is risk-informed, it brings in how you bring in defense-in-depth both at the hierarchical, from the top down and the bottoms up, and then brings in, how do you bring in your quantitative guidelines? And ultimately that is producing the criteria and guidelines that you would be using to help you in your decision-making process throughout your licensing.

In terms of your earlier question, you know, the PRA and the framework and -- it's like they're all very intricately tied, and one of the ways that you do use your PRA, you know, would help in your decision-making also in terms of how much research, using that word loosely here, that you would need, because you certainly don't want to pursue an area that, from your PRA perspective, you don't need it to support the PRA, and you don't need it for -- it's not going to help you, and it's not going to contribute significantly to your risk is what I'm saying.

CHAIRMAN APOSTOLAKIS: Well, the point, though, is -- I understand what you're saying, Mary. But this is really something that is an ideal

situation. I can't imagine, for example, the guys who will be working on the reactor plant analysis and fuel analysis will be willing to take their criteria and objectives from the PRA guys. They will just --

MS. DROUIN: As an input.

CHAIRMAN APOSTOLAKIS: That would be one of the angles to their integrated decision-making process which would have, I think, other major, major inputs.

MS. DROUIN: Yes.

CHAIRMAN APOSTOLAKIS: So the question will be, you know, to what extent will there be -- will the PRA inputs influence that, or they will say, no, you know, defense-in-depth and safety margins is really the name of the game.

MS. DROUIN: But that's where you're -- I mean, what we're calling it, the framework or the decision-making criteria comes in and provides you guidelines on that and how you bring in your defense-in-depth, your uncertainties, your safety margins, and your risk insights, and how you blend all of those together in your decision-making process.

CHAIRMAN APOSTOLAKIS: Which we don't have right now. We don't have those guidelines right now.

MS. DROUIN: That is what we're going to

be developing.

CHAIRMAN APOSTOLAKIS: Right.

MS. DROUIN: Where we're starting with Option 3. Now, you can't just adopt Option 3, because Option 3 is, how do you make current changes?

CHAIRMAN APOSTOLAKIS: Right.

MS. DROUIN: And so there -- you'd have other questions that you're going to have to answer, because we're not just making current changes, you know, in cases you're starting new.

CHAIRMAN APOSTOLAKIS: Right.

MS. DROUIN: So when you're starting new, you've got to --

CHAIRMAN APOSTOLAKIS: Well, frankly, I don't know how you can use PRA in light of Davis-Besse. That was, I thought, a major blow to the whole risk cause. I mean, unless we recognize that. I mean, 10^{-4} means nothing to me now.

MEMBER ROSEN: In the case of PBMR, and we believe GT-MHR, they have proposed a licensing approach, which the staff has reviewed. And I think we have briefed the committee on the licensing approach, and it is very much PRA-based, in the sense that licensing basis events are randomized for probability and consequences.

And they are put into the framework or approach that they utilize for operational events, design basis events, and beyond design basis events. And I think it would be useful to have a PRA -- the staff to have its own PRA to kind of review those applicant placement of those events within that framework.

CHAIRMAN APOSTOLAKIS: But, you know, about I think three years ago or so, or maybe longer, there was a major issue that was raised. I think it was before 1.174 was published. People, especially from the industry, were complaining that PRA was just another burden, that we had to do everything, you know, the regulations said, plus a PRA, to get those additional insights.

So if we are to use it now, somehow those other requirements will have to be effective, and maybe some of them should be eliminated. And I -- this is where I think will be a major problem, how to do that, because we're going to have, again, the same philosophical conflict. Okay? And I think the Davis-Besse incident gives arguments to the structuralist defense-in-depth.

MEMBER ROSEN: If you're correct, George, that --

CHAIRMAN APOSTOLAKIS: They're about to win me over.

(Laughter.)

MEMBER ROSEN: I think you would be correct if all 100 plants had that problem.

CHAIRMAN APOSTOLAKIS: Hmm?

MEMBER ROSEN: If all 100 plants had that problem. We're talking about a plant.

CHAIRMAN APOSTOLAKIS: Yes.

MEMBER ROSEN: One of 100 or so. So --

CHAIRMAN APOSTOLAKIS: I missed that.

MEMBER ROSEN: Well, I'm just responding to your point that the event -- that Davis-Besse invalidates all of the probabilistic thinking.

CHAIRMAN APOSTOLAKIS: I didn't say it invalidates, but it creates serious questions in my mind.

MEMBER POWERS: George, I --

VICE CHAIR BONACA: It goes back to the proposal. It has a means of filling the gap in the Code of Federal Regulations. I mean, in that sense, PRA has been extremely successful. Here we've attempted to see -- it could play a primary role, in and of itself, rather than defense-in-depth, and that's really where concern comes. Okay? Can it be

the first, you know --

CHAIRMAN APOSTOLAKIS: Dana?

MEMBER POWERS: Well, I guess I had two points. One, just to respond to Steve, all individual plants have individual peculiarities that can be problems.

To your point, George, as one of the more ardent of the structuralists on the committee, I'll tell you that, no, I still think PRA has a -- despite Davis-Besse, and what not, has a really admirable place to play within any kind of reactor system. It's just that it doesn't play in the defense-in-depth argument from a structural point of view. It plays very much in the redundancy, and what not, within systems.

I still think it has a strong place to play there, and I think it will be an even stronger place to play in the advanced reactors where we can relieve much more of the ad hoc determinism yet again.

CHAIRMAN APOSTOLAKIS: I think unless the PRA guys do a better job on model uncertainty it will not play such a significant role in the process.

MEMBER KRESS: I think you're right, George. That'll be a key.

CHAIRMAN APOSTOLAKIS: I think the lambda

stuff, the log normal stuff, is nothing. It's the model uncertainty that drives the decisions.

VICE CHAIR BONACA: I think one thing that, you know, impresses me more and more as we go forth is the -- some of the wisdom in 1.174. You know, the whole concept of integrated decision-making, etcetera, that comes --

CHAIRMAN APOSTOLAKIS: It's an ideal document. But show me one case where it was applied.

(Laughter.)

There isn't a single case where this beautiful discussion on uncertainty was actually applied.

VICE CHAIR BONACA: That's true. You're right.

CHAIRMAN APOSTOLAKIS: It's model uncertainty. That's the name of the game. The distributions in lambda don't mean anything, and I don't think we're doing a good job there. I understand, you know, some of the tradeoffs that Dana mentioned, sure, they are meaningful, and so on. But it's really model uncertainty that does the trick.

MEMBER POWERS: Well, I bet we see -- I certainly hope we see good uses of it in the PTS stuff.

MEMBER ROSEN: In the PTS stuff?

MEMBER KRESS: Pressurized thermal shock stuff, yes.

CHAIRMAN APOSTOLAKIS: Even there I think there was more promise than actually done.

MEMBER POWERS: Well, we haven't seen the final story there. But, I mean, that's -- well, certainly, you can't criticize a program because there's more promise than was actually done. I can't think of any program that that's not the case, so --

CHAIRMAN APOSTOLAKIS: There's no question about it, that it's a pioneering study.

MEMBER KRESS: Well, Option 3, though, is still highly focused on light water reactors. It talks about CDFs and LERFs and sequence frequencies that are endemic to light water reactors, and it tends to -- to allocate risk among CDF and LERF and allocate it among sequences, actually.

And you won't run into a difficulty when you get to the -- trying to apply Option 3 in that sense to the gas-cooled reactors, because you don't have the equivalent number of sequences, you don't have the same ones, you have a different set of frequencies that are important, and you don't have a well-defined CDF or even a well-defined LERF.

And so I think one of the things that you're going to buck up against is you'll need more precision in your definition of defense-in-depth for these reactors. You just can't say anymore that it means a balance between containment and CDF. You're going to have to be more precise, and it's going to have to tie in the uncertainty some way, even though you could still keep the structuralist view. You're going to have to tie in to uncertainties in some way.

CHAIRMAN APOSTOLAKIS: Well, that uncertainty has to be a realistic assessment of uncertainties, not just the stuff that's easy to do.

MEMBER KRESS: Yes.

MS. DROUIN: If you go back to Farouk's slide, one of the things that we have identified in developing, you know, this -- taking the Option 3 framework and, you know, modifying it for advanced reactors, the primary thing was to look at the surrogates of CDF and LERF.

CHAIRMAN APOSTOLAKIS: Yes. Yes.

MS. DROUIN: And that's one of the critical items there, that those may not be sufficient, and we may need to come up with different, you know, figures of merit here than just those surrogates, and come up with some others. So that's

And so I think one of the things that you're going to buck up against is you'll need more precision in your definition of defense-in-depth for these reactors. You just can't say anymore that it means a balance between containment and CDF. You're going to have to be more precise, and it's going to have to tie in the uncertainty some way, even though you could still keep the structuralist view. You're going to have to tie in to uncertainties in some way.

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MS. DROUIN: And that's one of the critical items there, that those may not be sufficient, and we may need to come up with different, you know, figures of merit here than just those surrogates, and come up with some others. So that's

one of the big items that we have ticketed to look at.

CHAIRMAN APOSTOLAKIS: Now, coming back to this figure -- oh, I'm sorry. I can understand, and I agree, that this thing, you know, by and large is an effective -- contributing to an effective regulatory process. I just don't know that it's efficient. You say effective and efficient. How do you know it's efficient?

MR. FLACK: Well, it's something you strive for.

CHAIRMAN APOSTOLAKIS: But how? I mean, if you ask the guys who were developing all of these rules in the late '60s/early '70s, I'm sure what they wanted to do was also be efficient. And here we come 20 years later and say they are not.

VICE CHAIR BONACA: I think if you compare it to the existing system, I mean, probably the inclusion of the PRA considerations, the risk considerations, are making it more effective and --

CHAIRMAN APOSTOLAKIS: I'd like to see that happen.

VICE CHAIR BONACA: Well, no, because I think in some cases you will limit the -- the necessary burden, okay, that's the only -- I mean, to the extent --

CHAIRMAN APOSTOLAKIS: Mario, you will be told it's defense-in-depth, period. Do it. Okay? It's a new system, we don't know, we don't want to be surprised again. And I think there's a lot to that argument.

VICE CHAIR BONACA: Well, we have seen some, you know --

CHAIRMAN APOSTOLAKIS: If in a mature technology we get things like Davis-Besse --

VICE CHAIR BONACA: Yes, I know.

CHAIRMAN APOSTOLAKIS: You know, I'm just putting myself in a situation of the poor PRA guy who says, "Your inspections will fail with probability .2 over a number of years." He's going to be crucified. My inspectors never fail. Are you kidding? My inspectors will go there and find it in a minute. Okay? That's exactly what you're going to get. It's the same thing you were getting before 1978.

My operators know what to do, and it's always my -- I don't know why they put that "my" in front.

(Laughter.)

I remember. I was in a PRA, and we said, you know, how about if the operators don't know how to --

VICE CHAIR BONACA: See, but let me just say this.

CHAIRMAN APOSTOLAKIS: Are you kidding? They will not know?

VICE CHAIR BONACA: Yes. But I don't think we can make too much -- in a Davis-Besse event, we have to learn more. There were a lot of indications for a long time that something was wrong. Now, at some point --

CHAIRMAN APOSTOLAKIS: And where is that in the PRA?

VICE CHAIR BONACA: Well, I'm only saying that there is a burden on operations to, in fact, respond to the indications that you have. And in this case, we may have a case where they did not respond for years to this indication, that they had plenty of those. And so I'm saying that you cannot address everything in your PRA.

CHAIRMAN APOSTOLAKIS: It seems to me that you will never make progress unless you punish people for the mistakes they make.

(Laughter.)

The PRA should be penalized now for that.

MEMBER ROSEN: The PRA should be penalized?

CHAIRMAN APOSTOLAKIS: Well, or the PRA practitioners on the use of the PRA.

MEMBER KRESS: You're just going to change -- you're going to change the frequency of medium break LOCAs. That's all you're going to do.

CHAIRMAN APOSTOLAKIS: How about the efficient, though? How are you going to make sure it's efficient?

MR. FLACK: Well, that was the -- the question is using these risk insights, which you think or believe at this point aren't doing what they should be doing, to utilize those and focusing your resources on the right things and being efficient by doing that. I mean, without that, I don't know, it's just judgment. I mean, I --

CHAIRMAN APOSTOLAKIS: Well, one way to do that is to really put a lot of meat to what Mary just said. I mean, if you start from the top and with a PRA structure you go down and you put objectives, then you know why you are putting them there. But the moment you start saying, "No, I'll do it because of defense-in-depth, then you are deviating from efficiency."

MR. FLACK: Yes, it could be.

CHAIRMAN APOSTOLAKIS: It may be for a

good reason, but --

VICE CHAIR BONACA: I still believe that the use of PRA in many areas where you don't have this kind of grayness is going to really yield much more efficiency.

CHAIRMAN APOSTOLAKIS: How do you decide when you have grayness?

VICE CHAIR BONACA: Well, I mean, you know, an area, you know -- I mean, certainly you have some indications where you have balance with information and mitigation that you do not want to compromise, and you're going to be very committed to defense-in-depth. There are a lot of decisions, however, in the design of a plant where, you know, the inclusion of consideration of probabilities will help you be more effective and have less of a burden.

MR. FLACK: I think in that role of knowing what's not important, I mean, we are always focusing on the PRAs, trying to point out what is important, which is a good thing. But it also points out things that are not important, and for certain reasons, then, justify that.

I mean, you have to have a technical basis for it. But, I mean, it's a thinking process that allows you to do that. So, you know, I don't think we

should throw the baby out with the bath water, I mean, on this.

CHAIRMAN APOSTOLAKIS: You're more optimistic than I am.

(Laughter.)

VICE CHAIR BONACA: But there was really practical terms. And in the 15 years or 20 years of use of PRA in this approach, it has paid off tremendously for the utilities that use it in those kinds of decisions where you are not only affecting defense-in-depth, but you are making intelligent decisions on imposition of your requirements or elimination of those.

And we have seen some proposals that have been approved, and 1.174 -- they were really acceptable, have not been, you know, undermined by the experience with Davis-Besse.

VICE CHAIR BONACA: I think there's got to be some efficiency brought in by that.

MR. FLACK: Moving right along --

MEMBER KRESS: Please continue.

VICE CHAIR BONACA: I'm trying to convince you that PRA is --

(Laughter.)

MEMBER KRESS: I can't believe we're

having this discussion. Continue, please.

MR. FLACK: Okay. So this is the process we use. It's clearly -- it's a matrix approach. We use the entire office resources as input to the plant.

Now, the next few viewgraphs I go through and identify the different technical areas. I don't know if we need to spend much time on that. It's in the plan. Those are the areas that are being hit. And that kind of leads us on to what the technical issues are that we're seeing now. Maybe we can, for the sake of time, jump to that viewgraph.

MEMBER KRESS: Well, let me ask you a couple of questions about the technical areas first.

MR. FLACK: Okay.

MEMBER KRESS: You know, you're asking us for -- whether you think you have the right scope or you're missing anything or something. I thought it was very comprehensive. In fact, there's so much in there I don't know how it could ever get done.

But there were a couple of areas I was going to ask you about that I really didn't see in there. And one of them was the issue of licensing by test.

MR. FLACK: Licensing by?

MEMBER KRESS: Test.

MR. FLACK: Test.

MEMBER KRESS: For PBMR. I didn't see that discussed in there anywhere, and I was thinking there might be a section talking about the -- where would that fit into the regulatory structure at all, if at all, and is it part of the thinking, or is there any research need? Like, you know, research in the sense of how that would affect your decision-making process, or what licensing by test actually means. I didn't see anything on that.

MR. FLACK: Well, we have been thinking about it. I don't know if --

MR. LYONS: This is Jim Lyons from NRR again. This is one of the areas that we've looked at. There is certainly the ability within Part 52 to license a prototype reactor, and then you would -- you know, and then you would perform tests on that prototype reactor, and then you could continue on with using that reactor as a way of developing your I guess licensing by test.

I don't know if we've really completely looked at how we would do that. One of the things that may happen if we do a license by test or a prototype reactor is that we may put extra features or have -- you know, request extra features be placed on

that plant to provide us any, you know, assurance that there wouldn't be any real problems.

But it's part of our process. It's something that could be done, but I don't think that we saw any real need in the research area to address that.

MR. FLACK: Yes, it's a difficult question to deal with until we actually get a plant in as well.

MEMBER KRESS: Well, along this same line, one of the issues that is sure to arise with PBMR and GT-MHR, GA, just in general, is how do you know that you actually have the fuel quality that's required when you -- after you load it into the reactor.

And one way to do that is what you do with light water reactors -- you look at the level of activity in the primary system, and you infer the quality of the cladding or the quality of the fuel from that. And the question I would have is: isn't there some concept like that being thought of for the pebble bed modular reactor and the others?

So that during start-up of the operational phases you can say, "All right. Based on what we see now, you don't have the fuel quality you said you were going to have in your licensing basis, so you've got to do something." Is that part of the plan? Is that

in there?

MEMBER ROSEN: It's not in there as explicitly as you just described it, but it is in there implicitly. The way I like to refer to it is a defense-in-depth on fuel performance during operation and postulated events. And you can think of that defense-in-depth as building in quality absolutely correctly every time, and that focuses you on the manufacturing part of the process, to look at the process and the product specification, make sure you're doing it right every time.

MEMBER KRESS: You would look at process versus product.

MEMBER ROSEN: And that's in our plan.

MEMBER KRESS: Now we're wanting to look at product, too.

MEMBER ROSEN: Okay. Then, look at the products. But before it ever gets put into a reactor and starts operating, then you get to the next defense-in-depth place, which is monitoring operations, and looking at activity and monitoring conditions.

The question comes up, though, is that method qualified? Is that method reliable?

MEMBER KRESS: Yes.

MEMBER ROSEN: Is there data that shows that --

MEMBER KRESS: That's exactly my question, yes. Is there something in the plan that will answer that question?

MEMBER ROSEN: Yes. Yes.

MEMBER ROSEN: Well, I think you have some advantages here, if you're thinking about pebble bed, that you don't have in light water reactor. You could do destructive examination on the fuel.

MEMBER ROSEN: That brings me to the third --

MEMBER ROSEN: And you could afford it.

MEMBER ROSEN: Yes, that's right.

MEMBER ROSEN: But you couldn't do that in the light water reactor, say, I'm going to destroy this assembly and say, therefore, the other 80 are okay. You know, that wouldn't be -- it wouldn't make any sense. But if you're talking about thousands of pebbles, you can statistically sample them and do destructive evaluation and gain some real confidence as to the quality of the pebbles.

MEMBER ROSEN: Right. And that's --

MEMBER KRESS: You can't, because they have to be irradiated. And you're not going -- that's

the problem. You've got to run through the irradiation first.

MEMBER ROSEN: That's the research issue is how do you identify, from looking at the destructive evaluation of a non-irradiated pebble, how an irradiated pebble is going to work.

MEMBER KRESS: Yes. You can't make that judgment. You have to irradiate them, and that's where your statistical problem shows up. You just can't irradiate enough of them to get the right statistics to qualify the level of failure or pebbles that you think you have to have.

MEMBER ROSEN: So that's the answer to the research program, Dr. Kress? I mean, I was suggesting that there ought to be a research program to get to that answer. But if you already know it --

MEMBER KRESS: Well, you have to -- you just can't irradiate enough pellets over the timeframe to do that. You can't do it.

MEMBER ROSEN: Well, the approach that's taken when you have billions, literally billions, of fuel particles in the reactor is to test hundreds of thousands in a materials test reactor to qualify them, and then, even if you --

MEMBER KRESS: Yes, to the right

irradiation level.

MEMBER ROSEN: To the right conditions, temperature, fluents, burnup, whatever it is, and even if you have zero particle failures you don't extrapolate if you have zero in the billions. There's a statistic that you can use to project what the number would be.

MEMBER KRESS: But it's an extremely difficult task.

MEMBER ROSEN: But the question comes up, are the test statistics going to hold true in the fuel that you make later?

MEMBER KRESS: That's right, because you're only testing one batch.

MEMBER ROSEN: In a sense, that's true. So you need to show that that's going to continue over the life of the fuel supply and the life of the plant. And so you're stuck with, well, how do I then monitor later on fuel that's coming off the assembly line and put in the reactor?

MEMBER ROSEN: Well, these are good questions.

MEMBER KRESS: But you're saying that's implicit in --

MEMBER ROSEN: Yes. And if you look at

the plan, and you look under the fuel performance piece, you see something called fuel manufacture. And our plan is to try to understand as best we can what are the really critical aspects of fuel manufacture to get quality in the product and also performance in reactor and in accidents. And there is work going on internationally to try to understand what it is that in the process and the product specifications that will do just that. So we're following that.

And the question comes up, should there be a regulatory footprint in some sense on that piece as a way of assuring defense-in-depth? I think there's a general belief that we ought not to regulate the product but the performance, which puts you into the next step, which is looking at operating performance. If you're going to have --

MEMBER ROSEN: It would be preferable to -- in my view, to regulate the performance. But in the case we're talking about, because of the importance of the product protocols, it seems to me that the regulatory footprint in the processing of the fuel is crucial.

MEMBER ROSEN: Yes. And part --

MEMBER KRESS: And I think it's analogous to digital I&C for controls and --

MEMBER ROSEN: And part of the preapplication review, a big part of the fuel performance review, is to look at the tradeoffs of, where do you put your regulatory imprint. Do you put it in the manufacturing piece and/or also in operation and/or testing fuel after it has come out? I mean, you can put it anywhere you want.

The data I have seen on monitoring operation and looking at some examples going back to the German testing program, there are failure modes that will not be caught by monitoring coolant activity. They don't --

MEMBER ROSEN: Stu, why do you think it is only one answer? Why do you think that?

MEMBER ROSEN: I'm not saying there's one.

MEMBER ROSEN: Whatever answer you come up with now is the answer forever. I don't think so.

MEMBER ROSEN: I'm not saying one. I'm not --

MEMBER ROSEN: I think the answer is something you -- in the beginning you do almost all of what you've talked about, until you begin to get confidence that you don't need to -- that you do not need to do pieces of it and can begin subtracting away pieces.

MEMBER ROSEN: And we very much believe that this whole area will be a Commission policy decision. And what we plan to do in our SECY paper at the end of this -- not so much the advanced reactor research plan development process, but the end of the preapplication review, is to lay out those defense-in-depth opportunities for catching fuel that may not perform well in an accident, and talk about the advantages and the disadvantages in each one, and lay out our -- those options and lay out our recommendation, and then the Commission will have to make a decision.

But I'm not going to say what that final answer is, but it is, we believe, very much a Commission policy decision on where that imprint or multiple imprints need to be.

MEMBER KRESS: Well, while I'm on a roll here, I want to have one complaint. There's a statement in the document -- now I don't have mine with me, so I don't know what page it's on, but it's to -- the statement says that the -- I won't be able to find it, because I've got it dog-eared -- that the evolution of severe accidents and source terms will be similar to current operating plants.

Now, I just think that's flat-out wrong

for IRIS, and it may be wrong -- I mean, you can't even relate it to PBMRs. But for IRIS I think it's flat-out wrong, and I think there's contrary evidence, especially for high burnup fuel, and IRIS, of course, is going to go to really high burnups. And I just don't think you can make that statement.

And I didn't see in the plan, Dana, anything on research for core degradation and fission product releases for high burnup fuel of the LWR type.

MEMBER POWERS: It's totally irrelevant, Tom.

MEMBER KRESS: I know it is. Yes. So that's a complaint. That's the one major complaint I have.

CHAIRMAN APOSTOLAKIS: You have commented on the whole report now, because I want to do that, too. You are not just commenting on the --

MEMBER KRESS: Yes, that's right.

CHAIRMAN APOSTOLAKIS: Okay.

MR. ELTAWILA: I agree with you on IRIS. And as I indicated earlier, we have very limited interaction with Westinghouse on the design of IRIS. So we really -- this plan does not really address IRIS in any extent. So your points are well taken. And once we -- we are going to keep that plan as a living

document. Once we get information about IRIS, we will modify to address this plant design.

MEMBER KRESS: Yes, okay. Well, another question I have is you had a section in there discussing -- I don't even remember where it was either -- discussing underground siting.

CHAIRMAN APOSTOLAKIS: Yes, I remember that.

MEMBER KRESS: It's a good idea, but I don't think anyone is seriously considering that, are they? I mean, is that -- that wouldn't be a priority in my research.

MR. FLACK: Underground is pretty much the GA design, the GT-MHR --

MEMBER KRESS: Well, that's partly underground.

MR. FLACK: Yes.

MEMBER KRESS: Okay. One other thought. You talked about, for the PBMR and the pebble -- the gas-cooled reactors that severe accident issues include water ingression and air ingression. I'm not so sure water ingression is a severe accident issue. I think it's a long-term degradation issue and not a severe accident issue, so you might want to rethink that one a little bit.

I guess that's my list of items, George.

CHAIRMAN APOSTOLAKIS: Well, I have a -- I mean, if we are talking about broader issues now, it looks like -- first of all, you mentioned PIRT some place. I can't find it now, but I remember. I know it's a major deficiency on somebody's part not to know what it is. But I've been on this committee for five years, and people use the word "PIRT" as if everybody knew what it was from birth. Is there any place where I can go and find out what it is? I don't know what PIRT is.

MEMBER KRESS: There's a document called CSAU that --

CHAIRMAN APOSTOLAKIS: Oh, is that part of CSAU?

MEMBER KRESS: Yes.

CHAIRMAN APOSTOLAKIS: Can you -- I know what it is, but I'd like to know how it's done.

MEMBER KRESS: Well, I don't want --

CHAIRMAN APOSTOLAKIS: And I know that the thermal hydraulicists are ecstatic about it.

(Laughter.)

MEMBER KRESS: I don't know what the NUREG number is.

CHAIRMAN APOSTOLAKIS: So I'm very

suspicious.

(Laughter.)

Now, that brings me to another point, which is related to my question about efficiency and the use of risk information. It's a matter of style, of tone, how to write this rather than really substance. I know what you mean, although the substance is effective.

I'm willing to bet that what's going to happen is you're going to have the PRA at the high level, and then you're going to use a hell of a lot of defense-in-depth arguments to really preserve most of the criteria you have now.

And here is the sentence that justifies that. I'm editing now as I go. However, until appropriate models can be accurately developed for these new designs to define and prioritize these issues, conventional methods will -- may need to be applied." So this is dismissing now PRA. This gives you a way out.

I would say -- I would change the tone of this and say the following. Yes, we've had all sorts of -- I'm reading from the human factors, but I don't want to single them out, because I don't think it's unique to them. Yes, you've been looking at task

analysis, at procedure development, training program development. Please tell us how important these things are in the risk environment.

I agree -- you see, now they are putting the burden on the reliability analysts. Until the HRA models are accurate, we will continue doing what we're doing. I'll reverse that. Show me why what you're doing is important to risk, and then you put a hell of a lot of pressure on a lot of people to actually quantify, because if that pressure is not there they will never quantify, and I say that with a license -- I mean, the power uprates.

The answer was, we have an engineer who looks at the -- who looks at it. You know, the available time was 42 minutes, now it's 39, and he says it's okay. Now, where is the incentive of quantifying if that's the easy solution? An engineer looks at it and decides it's okay.

So it seems to me it's a matter of tone rather than really substance. Ask all these people to tell you why all these requirements are important from the risk perspective.

Now, they may come back and say, well, gee, not everything is important, you know, from -- with respect to CDF, but there are other criteria.

Well, that would be progress in itself, because I do know there are other criteria that are not specifically stated.

MR. ELTAWILA: If we sound quiet on this side, it's because Mary keeps saying, "I agree with you," so I -- we are really --

CHAIRMAN APOSTOLAKIS: She agrees with me or you?

MR. ELTAWILA: No, with you. So we are agreeing with you, and I think that's a good point.

CHAIRMAN APOSTOLAKIS: I think that if you say that clearly here, then I think you are well on your way of having an efficient -- I'm not saying that it will always work, but at least you are shifting the emphasis now.

MR. ELTAWILA: Okay.

CHAIRMAN APOSTOLAKIS: You have to tell me why this particular requirement is important from the risk perspective, whatever "risk" means in this context. You know, it's not -- nothing is important with respect to CDF, by the way, unless you demolish the reactor. There may be other intermediate objectives that are effective, and at least we will have them on paper.

Ah, come on, Steve. You know you have to

do big things to see a big change in the CDF.

MEMBER ROSEN: Abolish the reactor?

MEMBER KRESS: Almost.

CHAIRMAN APOSTOLAKIS: Almost.

MR. FLACK: Well, there are sensitive issues like, for example -- that would be difficult to quantify. And since you brought up human factors, it would be like a question of whether an operator is qualified, what would be the risk from an unqualified operator? I mean, these are --

CHAIRMAN APOSTOLAKIS: All I'm doing is I'm shifting the emphasis.

MR. FLACK: No, I understand. I understand.

CHAIRMAN APOSTOLAKIS: See, as long as you say it's the problem of the HRA analyst, they will never get anywhere. If you say, "No, it's your problem, you tell me whether what you're doing here is risk-significant," then you will see a very different attitude. I repeat, I don't want to single out the human factors. I mean, it applies to I&C, and I am sure it will apply to other things with the new reactor.

I&C, too -- I mean, you look at it, there is a lot of work, and this is -- at the end it says,

"Oh, by the way, we really ought to quantify it, too." Well, yes, sure.

MEMBER POWERS: John, let me ask you a question. Since, obviously, we've blown your presentation completely to hell, we might as well just continue this trend. Teach you to make viewgraphs, by God.

(Laughter.)

We have just had the IPEEE insights document given to us, and with arguable exceptions we find two things. One is the estimates of risk that the licensee has submitted for fire were surprisingly high comparable to operational risks. And the techniques that they used to derive those were relatively crude.

And, okay, so you can argue that maybe the risks are not as high; they were just very conservative when they went through and did it. On the other hand, you can take them at face value and say, "Hey, one of the features of our current crop of reactors is there are very susceptible to fire and is an accident initiator." And maybe we don't want that for advanced reactors.

I mean, it does seem kind of a crude thing to have a sophisticated, high-technology device like

a nuclear reactor susceptible to fire as an accident initiator. Why, then, wouldn't you want to put priority on having good technologies for evaluating fire and advanced reactors?

MR. FLACK: I guess you looked through the report for that piece and didn't quite find it there. Fire is a difficult issue. It's a spatial interaction type of issue that you need to deal with almost on a plant-specific level. So it's difficult to understand what that risk would be until a plant actually comes in and says, "Here is what I got, and here is where things are," and then you can study it from that perspective.

But I guess, again, this comes back to the code issue, whether or not our codes --

MEMBER POWERS: I'm looking at -- I mean, I'm taking your lead in saying you're trying to create an infrastructure here, a capability --

MR. FLACK: Right. Exactly.

MEMBER POWERS: -- and so I'm asking, isn't this a capability that you want to have?

MR. FLACK: I would -- the answer is, of course. I mean, it's certainly an important risk contributor we see in these plants. How they play out in advanced plants, passive designs, is yet to be seen

in what we'll have -- how we'll approach that problem.

Again, it's a difficult issue to deal with without seeing a plant. But no, it's certainly external events. Seismic and fire are two that's part of that.

MR. RUBIN: Can I just -- John? This is Alan Rubin from the PRA Branch and also the IPEEE External Event Program. As part of the advanced reactor research plan, we do include external events in the PRA -- different operational states as well as external events, fire, and seismic. So we --

MEMBER POWERS: We don't doubt that you include them. I'm really asking a question on the quality of tool that you have available to include them. For instance, a noted member of this panel, an exemplary member of this panel, devised a code some time in the past, and he recount for you the details of it, called COMBURN, and we universally find COMBURN gets used beyond its stated limits of applicability, because there's nothing else available.

And the problem I see that you have is just what John outlined for you. If you're going to analyze fire, you're going to have to do it on a plant-specific basis. If you wait for a plant to come along in order to do a fire analysis, then there isn't

time to develop a better tool, because you're under the gun and people are yelling at you to do it faster, better, cheaper, and things like that.

And so COMBURN lives forever. And though I know the author of COMBURN is an exemplary individual, a noted phenomenologist in this world, I don't think even he thinks that it deserves to live forever.

MS. DROUIN: Dana, let me just also interject something. We have a huge research initiative going on in the area of fire that would support this effort. I mean, that's looking into things -- you know, the models. I think they've been in front of the ACRS.

MEMBER POWERS: I get confused, Mary, over the strategy in preparing the report. It's all well and good that you have a research effort going on there, but shouldn't you lay it down here to say, "And we need that research effort"? I mean, this wasn't a litany of things that you're supposed to do. It's the things that are supposed to be done.

MR. FLACK: No, that's a good comment.

MS. DROUIN: I mean, the whole intent was to take advantage of what was going on in that program, and, yes, we probably shouldn't have been so

silent on it.

MEMBER KRESS: I think we have reached the end of the allotted time for this subcommittee meeting. I would like to, you know -- lest you go away thinking we were too negative, I think -- I think you're on the right track with this thing, and you did a magnificent job of identifying the -- what the needs are and the gaps that might exist. And it's a comprehensive, well-written document.

So I think you're on the right track, and, you know, we got some specific comments. I don't know if those were sufficient for feedback or should we have a letter or not. Probably --

MR. FLACK: No, we weren't looking for a letter at this point.

MEMBER KRESS: Okay. Well, the other question I wanted to ask is: when should we think about having you back again on this same issue? July meeting, is that too soon, or is that too late, or what do you think?

MR. FLACK: Are we talking about subcommittee or full committee?

MEMBER KRESS: Well, probably need a subcommittee and a full committee, too.

MR. FLACK: On this subject.

MEMBER KRESS: Yes. When do you think it would be worth thinking about another meeting? That's my question, I guess.

MR. ELTAWILA: We are ready any time you want, Tom, so just set the schedule according to your -- the availability of you and other members of the committee.

CHAIRMAN APOSTOLAKIS: There has to be some evolution.

MR. ELTAWILA: So I think we will have to start scheduling all of these meetings between now and to end by August, to be able to finalize the plan to go to the Commission. So if --

MEMBER KRESS: That's why I was thinking if it was in July we --

MR. ELTAWILA: -- every month you want a meeting, we will be supporting that.

MEMBER KRESS: Well, thanks. I guess we're going to talk about -- yes, go ahead. One more thing.

MEMBER ROSEN: I want to say one thing. I associate myself with all of the comments of the eminent Dr. Kress, but I am still concerned about the scope. So take that away.

MR. FLACK: We gotcha.

CHAIRMAN APOSTOLAKIS: And next time, John, just come with two viewgraphs. It doesn't matter.

(Laughter.)

It just doesn't matter.

Okay. Thank you, gentlemen.

MEMBER KRESS: Thank you very much.

CHAIRMAN APOSTOLAKIS: This was a useful discussion, and we will recess now. How much time do you guys want? Do you want a full hour? Okay. Shall we be back at 1:50? 45 minutes? 1:50, okay.

(Whereupon, at 1:08 p.m., the proceedings in the foregoing matter went off the record for a lunch break.)