ACRST-2006

ORIGINAL

OFFICIAL TRANSCRIPT OF PROCEEDINGS

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TR04 (ACRS)
RETURN ORIGINAL TO
B.J.WHITE, ACRS-P-315

THANKS! BARBARA JO
#27288

Agency: Nuclear Regulatory Commission
Advisory Committee on Reactor Safeguards

Title: 410th ACRS Meeting

Docket No.

LOCATION: Bethesda, Maryland

DATE: Thursday, June 9, 1994 PAGES: 1 - 132

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PUBLIC NOTICE BY THE

UNITED STATES NUCLEAR REGULATORY COMMISSION

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

DATE: June 9, 1994

The contents of this transcript of the proceedings of the United States Nuclear Regulatory Commission's Advisory Committee on Reactor Safeguards, (date) June 9, 1994, as Reported herein, are a record of the discussions recorded at the meeting held on the above date.

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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410th ACRS Meeting

U.S. Nuclear Regulatory Commission
Conference Room P-110
7920 Norfolk Avenue
Bethesda, Maryland

Thursday, June 9, 1994

The above-entitled proceedings commenced at 8:30 a.m., pursuant to notice, T. Kress, Chairman, presiding.

PRESENT FOR THE ACRS:

T. Kress, Chairman
W. Lindblad, Vice Chairman
J. Carroll
C. Michelson
C. Wylie
I. Catton
R. Seale
P. Davis
W. Shack
D. Powers, Prospective Member
J. Larkins, Executive Director
S. Schofer, Technical Secretary

PRESENT FOR NRC/NRR:

F. Kantor
J. Lee
F. Congel
J. Wilson
J. O'Brien
M. Virgilio
C. McCracken
S. West
W. Travers
S. Reynolds
S. Newberry
P.T. Kuo
S. Lee

ALSO PRESENT:

A. Mohseni, NRC/AEOD
A. Marion, NEI
G. Wu, NEI

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

[8:30 a.m.]

MR. KRESS: The meeting will now come to order, please.

This the first day of the 410th meeting of the Advisory Committee on Reactor Safeguards. During today's meeting, the committee will discuss or hear reports on the following:

(1) Protective action guidelines;

(2) fire protection-related matters;

(3) proposed revisions to the license renewal rule;

(4) report of the planning and procedures subcommittee;

(5) proposed ACRS reports.

Portions of today's meeting may be closed to discuss organizational and personnel matters that relate solely to the internal personnel rules and practices of the Advisory Committee and matters the release of which would represent a clearly unwarranted invasion of personal privacy.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act.

Dr. John T. Larkins is the Designated Federal Official for the initial portion of the meeting.

We have received no written statements or requests for time to make oral statements from members of the public regarding today's sessions. A transcript of portions of the meeting is being kept an it is requested that each speaker use one of the microphones, identify himself and speak with sufficient clarity and volume so that he can be readily heard.

I will begin with some items of current interest.

First, I would like to introduce to the Committee and others present our summer interns and co-op students. We have Heather Richmond is our summer technical intern from Carnegie Mellon University. She will be a senior there in chemical and biomedical engineering this fall. And during this first rotation, she will be assisting in the development of the ZY Index system. Even I don't know what that is. Maybe she can tell us. And the development of instructions for the use of the Internet and the Mosaic interface.

Heather.

MS. RICHMOND: This is only my first day and I am still learning myself. But it is a retrieval and storage package so we can cut down on the paperwork.

MR. KRESS: Wonderful. Thank you.

Amy Blandford is a junior in nuclear engineering at Purdue and she has been here before. During her previous

rotation, she completed an informational high-level waste canister design report.

For her fourth co-op rotation, she will be working on a project dealing with the Thermo-Lag issues.

MR. CATTON: I need all the help I can get.

MR. KRESS: We know.

MR. CARROLL: I was going to say she's a lucky lady.

[Laughter.]

MR. KRESS: Chad Little is a senior in electrical engineering at the University of Pittsburgh. During his previous rotation, Chad completed a study on the reliability of microprocessors. For his fourth rotation, he will be helping to further refine the computing needs of the Committee through the use of Mosaic and video teleconferencing.

Chad, we're glad to have you with us.

[Applause.]

MR. KRESS: I would like to also welcome back Dana Powers. My understanding is you are very close but not quite.

Yes, John?

MR. LARKINS: I think it is my understanding that as of this -- yesterday afternoon, he has a Q clearance so he can now officially vote as a member.

MR. KRESS: The most surprising thing about that is that they could actually get him a Q clearance.

MR. SHACK: Put him to work.

MR. KRESS: I guess you can now vote, Dana, officially vote.

There is a yellow thing I would like to call your attention to. This is a farewell reception for Commissioner Remick. It is on June 27, so if you are going to be in town and wish to attend this at the Crowne Plaza, you will need reservations. I just wanted to point that out for you.

We do plan on, if you recall, taking Commissioner Remick to dinner tonight. So if you haven't signed up for that and wish to go, please do so.

I also --

MR. CARROLL: How do I know if I signed up. I sent something back to Barbara --

MR. KRESS: Just show up. You don't have to sign up. We're going to O'Donnell's

[Discussion off the record.]

MR. KRESS: There is also a SECY somewhere at your place which is SECY-94-117 which lays out some revised Staff schedules for the design certification applications. I'll just -- it shows some slippage in the schedules. You will be interested in looking at those.

There are some of the Commissioners that have

differing views on the subject. You have a letter from Commissioner Remick and I invite you to read it.

With that, I will ask if there are any other members who wish to bring up anything before we start with the technical portions?

[No response.]

MR. KRESS: Seeing none, I'll introduce the first topic of the day, which is -- Oh, yes, thank you, Sam. I forgot --

MR. CARROLL: He has fallen into bad habits immediately.

MR. KRESS: It's easy to forget these.

This is our list of letters we have to get out this time. You will notice there are six of these with four of them priority A, one priority B and one priority C. If you don't agree with those priorities, please let us no.

MR. MICHELSON: I would suggest that item 1 be A-plus. If we wait until July, we have no choice.

MR. KRESS: You are absolutely right. We did plan on meeting in July, by the way. I will talk about that in the planning and procedure spec. Still, this is an A-plus. We are more or less obligated to get that out this time. So we want to get it before Ivan --

MR. CATTON: I have to leave.

MR. KRESS: You have to leave at 2:00 o'clock.

MR. CATTON: actually, 2:30.

MR. KRESS: You have some draft of this?

MR. CATTON: The second draft is in typing right now.

MR. CARROLL: It's 2:00 o'clock today you leave, right?

MR. CATTON: I am leaving at 2:30 today.

MR. KRESS: Okay. So we would like to have that pretty far along.

MR. CATTON: I would hope so. And I have rewritten it to meet with the subcommittee's views.

MR. CARROLL: Whatever they are.

MR. CATTON: There are lots of options in them and I have already written my added remarks.

MR. KRESS: In case you need them.

MR. CATTON: In case I need them.

MR. KRESS: Are we to call you and ask you about those when you come up with a final version?

MR. DAVIS: Mr. Chairman? I'm sorry. While we're on the subject of letters, you may recall we received a letter addressed to you from Commissioner Rogers on May 16 commenting on our letter of May 11 relative to PRA, use of PRA in regulatory activities.

The letter -- the last paragraph of the letter sort of indicates that Commissioner Rogers would like to

hear from us regarding PRA research needs. It doesn't exactly say that as such, but it does indicate he's interested in our suggestion that PRA research needs be pursued further by NRC and he also states that he would find our conclusions on this very helpful in considering the agenda, research agenda for the future.

I am just wondering if we wish to put together something in response to this, indicating what our thoughts are regarding PRA research needs.

MR. KRESS: I think it is an opportunity that we certainly would not want to let pass is my opinion.

MR. DAVIS: I agree with that.

MR. CARROLL: Sounds like you even have volunteer for that.

MR. KRESS: That is what I was hoping.

MR. CATTON: Don't you need to have a subcommittee meeting or do you know what they are doing in research, or is that what you are suggesting?

MR. DAVIS: I think a subcommittee meeting may be very helpful.

MR. CATTON: I think it is kind of necessary.

MR. KRESS: Unless you already know what research they are doing.

MR. DAVIS: I generally know what they are doing, but I don't know what they're planning to do.

MR. LINDBLAD: As I recall, we heard a presentation on the PRA policy, and there was a reference to an implementation plan that was not yet ready for us to see. It would seem to me that the implementation plan would include the NRR needs that were being communicated to research.

MR. DAVIS: I agree.

MR. LINDBLAD: So I think the Chairman is going to refer to Bill Russell being with us next month, and things that we might raise with Bill Russell at the time. And some of us thought that maybe we ought to ask him about the status of the implementation plan.

MR. DAVIS: I agree.

MR. LINDBLAD: That would be an appropriate --

MR. CATTON: Pete, the Option 4 of this Thermo-Lag business, which is a performance-based fire regulation is really PRA. It is the mix. I think if we are going to have subcommittee meeting, that ought to be a part of it because that looks like the first heavy duty application.

MR. DAVIS: I'm beginning to feel sorry I brought this up.

[Laughter.]

MR. CATTON: Why? Why are you sorry you brought it up? I think it is an important issue. I think we should find out what they are doing.

MR. SEALE: Are you taking notes, Dana.

MR. KRESS: Okay. Why don't we talk about that during our planning meeting then. I think you ought to seriously plan on having such a meeting.

MR. MICHELSON: Mr. Chairman, on the question of the fire protection letter which I feel has a high degree of urgency, it has been suggested that perhaps we could discuss this during lunch hour by having lunch around the table. I wonder how other members feel about that?

MR. SEALE: Willing.

MR. MICHELSON: Depending on how well it goes this morning.

MR. CARROLL: When we talked yesterday -- or at least my impression of what we concluded was we would have only about an hour presentation and then devote the rest of the time to looking at Ivan's letter.

MR. MICHELSON: Yes. If it goes well enough we don't need to.

MR. CARROLL: But I have no problem with lunch around the table.

MR. MICHELSON: We do have that contingency.

MR. KRESS: Ivan, I think we ought to seriously consider that.

MR. MICHELSON: See how it goes.

MR. KRESS: We will see how it goes after the

presentation.

MR. MICHELSON: I would like to have Ivan here for as much of it, if not all of it.

MR. CARROLL: He's got kind of a flimsy excuse for leaving at 2:30.

MR. KRESS: I know it, but why don't we seriously consider that and keep it as an option.

Were there other discussion?

MR. LINDBLAD: Yes. Mr. Chairman, in the list of letters scheduled for consideration, I am responsible for letters number 4 and 5. And I would suggest -- my personal preference is to reverse the priority of those two and make letter number 5 an A priority and letter number 4 a B priority.

We may see -- we may want to do this or consider this after we have heard the presentation on license renewal rule. We have delayed in getting out letter number 5 for a couple of weeks.

M.. KRESS: I certainly would be agreeable to that.

Was there any reason why Letter 4 had a priority A? Do you recall, Sam?

MR. LINDBLAD: I believe the reason is that it will now be going out for public comment. We will hear from them and there will be opportunities later. But if there is

something we want to say before it goes out for public comment, this will be the time to hear it.

MR. KRESS: Should we leave it as an A or drop it to a D and just raise the other one to an A.

MR. LINDBLAD: Okay.

MR. KRESS: I think looking at this set of letters and the status of most of them, there is a very good chance we will finish up Friday night. Just for the information of the members.

MR. CARROLL: I would have said the opposite.

MR. KRESS: We will see. You know, it could go one way or the other.

MR. CARROLL: I guess the key is how well we do on the fire letter.

MR. KRESS: Yes, that will probably be the key. With Ivan gone, it will probably go a lot faster.

If there is no more discussion on that subject, I will turn now to the first topic of the meeting. This looks like my subject, Protective Action Guidelines.

You recall in our review of System 80+ that when they used the new source terms, it turned out that they were able to meet Protective Action Guidelines.

The question was what does that mean. Some of us felt like it would be useful to us if the Staff could come in and perhaps give us a discussion and tutorial on

Protective Action Guidelines, their perspective on it and maybe some historical perspective. This is for our benefit, for the Staff. We appreciate them coming in and doing this.

With that, I will turn it over.

MR. CONGEL: Thank you, Dr. Kress. This morning we have an outline to hopefully accomplish exactly what you just said. Falk Kantor from my Emergency Preparedness Branch has a series of slides to accompany his presentation and hopefully answer basic issue.

We talked the last couple of weeks about the content of this. I believe that it should give an overview of not only the Protective Action Guidelines but how they fit in with our emergency planning current, our emergency planning future plans and issues, and what meaning, if anything, the CE 80+ analysis had when it referred to the PAGs.

With that, I will have Falk begin his presentation.

[Slide.]

MR. KANTOR: Good morning, ladies and gentlemen. As Frank said, my name is Falk Kantor. I am a member of the NRR Staff, the Emergency Preparedness Branch. As Frank has indicated, I am here to provide an overview of emergency planning and how it fits into our licensing process, in particular for the advanced reactors, and perhaps to address

some questions which have arisen as a result of the review of the CE System 80, in particular the accident analysis section.

[Slide.]

MR. KANTOR: The topics I am going to be talking about are the EPA Protective Action Guides themselves, what they are and how they are used. The relationships of the PAGs to emergency planning, and then a short discussion of emergency planning under 10 CFR Part 52, how emergency planning fits in the various phases of that regulation, and then discuss a little bit about the -- reiterate the licensing review that was done for CE System 80-plus, in particular Chapter 15, and then talk a little bit about our current ongoing examination of emergency planning for passive reactors.

[Slide.]

MR. KANTOR: The Protective Action Guide itself is defined as the projected dose from an unplanned release of radioactive material at which a specific protective action is recommended.

The PAGs have been developed and established by the U.S. Environmental Protection Agency, and are found in the Manual Protective Action Guides referred to as DPA-400.

[Slide.]

MR. KANTOR: The PAGs are pretty well established

by EPA and they are used in the emergency planning process. There is no controversy or question about the PAGs themselves. This is a table right from the EPA PAG Manual. It shows the basic PAGs for the plume exposure pathway for the early phase of an accident, the first couple of hours and the first couple of days of an accident, and the basic PAG is projected dose of 1 to 5 rem. At the lower level, you begin taking protective actions, could be evacuation if feasible, or sheltering and, as the projected dose increases up to 5 rem, you try to take the most appropriate protective action which we believe would be evacuation.

[Slide.]

MR. KANTOR: The way PAGs are included in the emergency planning scheme of things is, we have a regulation, 10 CFR 50.47(b)(10), this is one of the basic 16 emergency standards, and it states that emergency plans must contain guidelines for the choice of protective actions that are consistent with Federal guidance.

The primary guidance document we use for emergency planning is NUREG-0654, and NUREG-0654 in one of its criterion states the protective actions be in accord with the recommendations of the EPA PAG Manual. So that is the linkage between emergency planning regulations and guidance and the EPA PAGs. All plans rely upon an incorporate the EPA PAGs as the basis for taking protective actions.

EPA PAGs are also used in the development of the ten-mile emergency planning zone which is described in NUREG-0396.

MR. KRESS: Excuse me. Is it the role of the States to have in place emergency procedures?

MR. KANTOR: Yes. We require an on-site plan provided by an application or licensee and supporting off-site plans usually provided by State and local governments. Those are the required plans for licensing and approval. As I indicated, both the on-site and off-site plans would incorporate these protective action guides as the basis for recommending protective actions.

MR. KRESS: Whose role is it to enforce those? Is it NRC's role or is it --

MR. KANTOR: Well, the NRC reviews the on-site plan. The off-site plans are reviewed by the Federal Emergency Management Agency who provide their findings to the NRC, and the NRC then makes the overall licensing decision. Yes, the plans are reviewed to see that they do incorporate these guidelines and exercises are then conducted to demonstrate the use of the plans including the guidelines.

MR. KRESS: Thank you.

MR. DAVIS: Excuse me. I have a question on the previous slide. I am sorry I am a little behind. This

administration of stable iodine has been an issue that has been around for a long time. I presume you are talking about potassium iodine pills?

MR. KANTOR: It could be potassium iodine pills. This is a guideline which would apply if the plans included the use of stable icdine as a protective measure. Most plans do not include that for members of the public. They do include it for emergency workers and institutionalized persons.

MR. DAVIS: That was going to be my question. You say it requires approval of State medical officials. Is this approval obtained at the time the license is granted for the plant?

MR. KANTOR: Well, it is a recommendation by the EPA primarily to States that might be using iodine in their plans. They would have to incorporate in some way a medical viewpoint or agreement to use this as a protective measure. Right now, in the United States, there are only three States that make use of stable iodine.

MR. KRESS: Thank you. That has helped.

MR. CARROLL: Who are those three States out of curiosity?

MR. KANTOR: There is Tennessee which is the only State who have attempted to predistribute it, and Alabama and Arizona I believe are the other two States that

stockpiled in the vicinity of a site.

MR. CARROLL: Now the Commission recently took some action on this subject I remember reading. What was that about?

MR. KANTOR: Well, the Commission had an issue before it concerning whether to recommend a change in the Federal policy. The Federal policy was published in 1985, which, in essence, recommends KI for emergency workers, and institutionalized persons, but does not recommend or encourage stockpiling for the public. So the Commission had this issue before it, whether it should encourage the stockpiling of the KI. As you know, the Commission decided to not go forward with that and to stay with the current Federal recommendation.

MR. CARROLL: Out of curiosity, why wasn't that matter brought before the ACRS?

MR. KANTOR: I am not sure I could answer that question, why it was not brought before the ACRS. It was in the form of some staff Commission papers --

MR. CARROLL: Which I never saw.

MR. KANTOR: -- which are publicly available now. I cannot answer why that was not brought before the ACRS. It has been a long ongoing issue.

MR. CARROLL: I happen to have some views on it, that is why I was interested to learn that it was a fait

accompli.

MR. KRESS: Did they administer KI during the Chernobyl incident?

MR. KANTOR: Afterwards, yes. KI, I think, was used extensively, and it has been studied extensively.

MR. KRESS: I wondered if we had looked at that.

MR. KANTOR: We have reviewed, as part of the Chernobyl accident, the use of KI and whether and how it might apply to the United States. We feel that the Chernobyl situation is not applicable to NRC and U.S.-type situations.

MR. CONGEL: Let me add a little bit to that, if I could, please, because there are several aspects to the Chernobyl experience and how they relate to the development of our ultimate KI policy. There were KI tablets and maybe even the solution form administered in a wide range around Chernobyl immediately following the accident. Just recently, within the past several weeks, our EDO had entered into a formal agreement with the Russians and Ukraines and, I guess, Byelorussia to follow up with a very detailed study on the results and effectiveness of the KI administration primarily on the children that were administered the drug during that time.

There are a whole series of facts and, of course, this could be a subject of a separate presentation itself,

but let me just hit a couple of high points. Falk just mentioned it wasn't directly applicable to us. One of the facts that has to be pointed out was, the principal reason that the material was used, especially with children, was the fact that they had to continue eating foods that were grown in the area as well as drinking the milk that was produced in the area and we know that it had iodine in it. There were no choices involved in terms of disposing or destroying that milk and getting a fresh supply.

Secondly, the population that was exposed in this manner already had a history of potential problems and, in fact, the sections of the exposed area were called the goiter belt in the former Soviet Union. So the studies that will be conducted are going to have to be lengthy and detailed and, of course, they will be, I am sure, very difficult.

So the applicability over the longer term to our experience is not direct, but the information that can be gathered is of useful purpose medically as well as for any future decisionmaking. But the decision to embark on this program was just made, just formally, I think, within the past, I will say, a month, because that is what Jim Taylor had mentioned to me just a week or so ago.

MR. KRESS: Thank you.

[Slide.]

MR. KANTOR: As I mentioned, PAGS can also be found in the rationale for the 10-mile emergency planning zone. In particular, one of the rationales is that the projected doses from design basis accidents should not exceed PAGS outside the emergency planning zone and the projected doses for most core melt sequences would not exceed PAGS outside the emergency planning zone, so that is another way PAGS were used in the development of emergency planning requirements.

[Slide.]

MR. KANTOR: About a year ago the Staff provided a presentation to the ACRS on emergency planning under 10 CFR, Part 52, and I thought I would just go over the high points of that in order provide some perspective of where we are in the review of CE System 80.

[Slide.]

MR. KANTOR: Under sub-part (a), early site permits, an application must identify physical impediments to emergency plans and describe contacts and arrangements with offsite authorities.

The application may also propose major features of emergency plans or complete integrated plans and the NRC in consultation with FEMA would review the emergency plans that are submitted as part of an early site permit.

Under sub-part (b) of Part 52, the standard design

certification, there really is not much in this area for emergency planning. The application must contain information on the design of the plant, of course, and it has to demonstrate a compliance with TMI requirements in 50.34(f).

Two of those requirements refer to the technical support center and the operational support center.

There is also some requirements for support facilities, labs, and decon facilities so that is where emergency planning comes into the standard design certification review which we have done for both ABWR and CE System 80. The applicants have developed ITAAC for these facilities and we have reviewed and approved the ITAACs during the course of our review.

[Slide.]

MR. KANTOR: It is in the combined license phase that emergency planning has to -- the combination of emergency planning. An application for combined license must contain the emergency plans, the overall plans, the onsite and offsite plans that we referred to.

The Applicant must propose ITAAC including those applicable to emergency planning and prior to operation the NRC in consultation with FEMA I might add must find that the acceptance criteria are met.

I want to point out also the application in Part

52 states that the application will be reviewed according to the standards in Part 50 and others.

The point I want to make is that there is no change in emergency planning requirements for review done under Part 52. The change really is when and how you go about submitting the plans and the NRC reviews and approves the plans, but the bottom line is that all our current emergency planning requirements are still required to be met by an Applicant under 10 CFR, Part 52.

[Slide.]

MR. KANTOR: Taking a look at CE System 80+ in particular, I'd reiterate what I just said. We are reviewing 80+ under Part 52. Emergency plans are not required for issuance of a design certification and there were no emergency plans submitted.

They were required to demonstrate compliance with the requirements for 50.34(f), in particular the TSC and OSC I mentioned.

The dose calculation that was done in Chapter 15, the PAG dose calculation, Chapter 15 of the SER, does not signal any change in the requirements of EP for advanced reactors.

MR. KRESS: Are you going to expand on that statement?

MR. KANTOR: Yes.

[Slide.]

MR. KANTOR: Under Chapter 15 the standard design basis accidents were evaluated and the results were compared to Part 100 guidelines.

There was a so-called EPA PAG dose calculation done and it was done and perhaps some of the Staff can provide some background on it. It was done at the request of the Applicant and they provided an analysis. The Staff evaluated that analysis and agreed that the approach and models used were reasonable and acceptable but there was no licensing finding made as a result of that calculation.

As I indicated, there is no change in our emergency planning requirements, and certainly under design certification there is no requirement that an EPA PAG dose calculation be done but the Applicant felt it was to their advantage or necessary for them to submit that calculation. We reviewed it.

We caveated it, I think, in the SCR to indicate that just this one sequence would not be sufficient for an overall evaluation of emergency planning. Emergency planning would take in much more than this PAG dose calculation.

Now there is an initiative, an effort going on in the Staff to review emergency requirements for passive reactors and perhaps the Applicant felt that this was to

their advantage to make their case now upfront in advance of the Staff reaching any decision on any change in emergency planning requirements.

I'll talk a little bit more about that.

If you have any more questions on details about the calculation itself or perhaps other questions on where it fits into the scheme of things, there are some other members here of the NRR staff that perhaps could --

MR. LINDBLAD: Yes. Was the calculation or the modeling done more or less as boundary conditions, enveloping conditions or just typical conditions?

MR. KANTOR: I will have to maybe defer to the Staff. I think it was a conservative-based or a realistic based calculation.

Aby, do you have any --

MR. MOHSENI: I am Aby Mohseni and I was involved in the analysis of the Applicant's calculations.

We did not conclude that the Applicant's calculations resulted in identifying the bounding of conditions and therefore --

MR. LINDBLAD: And so you still don't today?

MR. MOHSENI: That is correct.

MR. LINDBLAD: All right, thank you.

MR. MOHSENI: We were not requested to do that by the Applicant. We were requested to review if indeed that

sequence of accidents reflected an acceptable method of calculating the offsite doses and compare them to the PAGs and we did just that.

MR. LINDBLAD: Did the Applicant represent that he thought it was a bounding condition?

MR. MOHSENI: Not to the extent that we would be comfortable making that kind of a determination. While the Applicant in an oral presentation said that it does appear that indeed the sequence we have selected does represent most of the severe core damage consequences, they did not go far enough to indeed state that this is an envelope calculation.

MR. LINDBLAD: Thank you.

MR. KRESS: Did they use the hypothetical site that is in the Utilities Requirement document for that calculation?

[Slide.]

MR. KANTOR: Well, here's some of the assumptions up here that went into the calculation of that particular sequence. We have the typical design basis accident assumptions, and these were the assumptions that were used in the PAG dose calculation.

And I believe it was a standard type of meteorology that was used. Certainly, I don't think it was site-specific in any way.

MR. KRESS: You wouldn't accept that in an actual calculation. You'd want the 95 percentile, Chi over q.

MR. KANTOR: Right. For emergency planning, it takes in a spectrum of accidents. The planning basis has already been established for a spectrum of accidents.

MR. CONGEL: And, secondly, let's be a little careful here because the requirements for meeting the emergency preparedness regulations are not based on just a PAG type of calculation.

There was a slide that Falk put up earlier that indicated the overall considerations. But, the ultimate decision and finding of an LPZ of 10 miles was based on a number of considerations, this just one of them, and a very heavy dose of judgment, as well.

MR. KANTOR: In fact, for review of emergency planning, we do not really review accident dose calculations. We review whether the application has met the 16 planning standards that are in the regulations.

The accident analysis has already gone into establishing the 10-mile emergency planning zone. That's where the accident analysis went in, and that took in what I say was a spectrum of accidents, including design basis accidents and severe accidents, or accidents beyond the design basis.

But, we don't do individual dose calculations in

the review of emergency planning for a particular application.

MR. KRESS: If a combined license holder were to come in and propose a site and buy a System 80+ for it, and they repeated the calculations, including the other design basis accidents that you talk about, and they still met PAGs, then what considerations do you use to decide?

Who decides then, at that point, whether they actually didn't have to have an emergency plan, and what consideration goes into that decision?

MR. KANTOR: Well, there's no question they'll have to have an emergency plan under combined license. And as I indicated earlier, all the current emergency planning requirements would have to be met. Those are the regulations 50.47 and appendix E, the Part 50.

MR. KRESS: Well, why do we have PAGs then?

MR. KANTOR: PAGs go into development of emergency plans. They're the basis for taking protective actions. If you get into an accident situation and you project that you're going to exceed these PAGs, that's the basis for recommending protective actions to the public.

It's go into the plans. But, like we don't --

MR. KRESS: But they're not a decision criteria then?

MR. KANTOR: They are a decision criteria at the

time of event. They're not really a decision criteria as to whether --

MR. KRESS: -- as to whether or not to have an emergency action plan.

MR. KANTOR: Right, because they're already established. They're already built into the plans. I mean, during the course of the review, we would determine that the plans do have the EPA PAGs in there as the guidelines for taking protective actions. That would be where our review would come in.

But we would not do a review of a dose calculation against those PAGs under the current scheme of things to determine whether plans are required or not required.

They are required. Plans are required under our current regulations.

MR. CONGEL: Maybe, I can add a little bit. Could we go back to slide 6, which was headed the Planning Basis for the Current Requirements for Size.

[Slide.]

And I know that when we went over this slide, it was rather quick. So I had anticipated more questions. But I think that the questions that were asked and the discussion that we're having, it may be put into a better frame if we look back at this slide again.

As I mentioned earlier, the choice up to 10 miles

was not based on strictly a quantitative evaluation. Some analysis that, after it was completed, popped out with a number 9.88, or something of that sort, that we rounded off to 10.

There were judgments made. Among them were valuations that looked at a spectrum, a series of accidents, and the off-site doses associated with those accidents.

And, in fact, the NUREG 3906 contains families of curves that give dose versus distances for -- and the probability of their occurrence.

And when one looks at those families of curves just as one of the inputs for this decision-making process, you'll see that the probability of exceeding a protective action guideline dose at about 10 miles gets very small. It doesn't go to zero, but at that point there is a judgment made that distances of about 10 miles should provide a sufficient protective boundary such that detailed planning within that distance could be the basis for our reasonable assurance finding.

MR. POWERS: What's very small, Frank?

MR. CONGEL: I picked very small because I don't remember the number exactly. But it was something on the order of 10 to the minus 6 or less.

And if you go down the bullets on this slide, you'll also notice that even from this choice of 10 miles

that beyond this 10 mile EPZ, you don't exceed the PAGs.

And we also looked at very -- you know, borderline incredible sequences. And you find that you don't exceed doses that would result in prompt health effects beyond 10 miles.

Again, the probability, as we all know, doesn't go to zero. The other statement that was made with a distance as large as 10 miles and the detailed planning within that distance, that you have a basis for if a need ever arose to plan for actions beyond the 10 miles.

But I have to emphasize very heavily there are judgment factors here. It was a policy matter that ultimately decided it. And the fact that the newer designs are claiming that they could possibly meet PAGs at the 10-mile distance with a variable probability of that occurring may be something that we would look at for an overall potential policy change, but that's not in the works right now.

And, in fact, Falk will get to in his later slides just where we are on the Commission directive as to reevaluate the 10-mile EPZ and, in fact, our overall planning basis for emergencies for future reactors.

We'll discuss that in a few minutes. But, for right now, any reactor that comes in for design certification review is subject to the exact, same

regulations that we have for our operating plants.

MR. DAVIS: I had a question. How do you decide what "most" is? Is this a probability cut-off? What is the criteria for that?

MR. CONGEL: Yes. It is qualitative, but it is a probability cut-off, and I refer back to those families of curves that I mentioned a moment ago in 0396.

MR. KANTOR: There is a complete discussion of all this in NUREG-0396 which is a joint NRC/EPA document on development of the planning basis for nuclear power plants that would have the details of all the information that went into the development of the ten-mile emergency planning zone.

As Frank indicated, the final selection of Ten Miles as a policy decision.

MR. DAVIS: Thank you.

[Slide.]

MR. KANTOR: Now I am going to move on to what you might say are some current activities that are going on in reviewing emergency planning for advanced reactors.

There were a couple of Commission papers provided back, I believe, in April of last year, one of which was SECY-93-087. As you see, "Policy Technical and Licensing Issues Pertaining to Evolutionary and Advanced Light Water Reactor Designs."

And in that paper, the Staff made the following points. Certain modification to EP requirements may be appropriate for the passive designs; there is a need to consider a plant's ability to prevent a release or to provide very long delayed times for all but the most unlikely events; more information is needed, particularly concerning a source term and risk.

And then it was noted that EP requirements following a TMI-2 accident were not based on strictly technical factors, as you know. There were some policy and public perception-type factors that went into emergency planning requirements.

And it states as a policy matter, it may be that even very low calculated probabilities may not be considered a sufficient basis for changes to EP requirements.

[Slide.]

MR. KANTOR: The second Staff paper was SECY-93-092, "Issues Pertaining to the Advanced Reactor and CANDU3 Designs and their Relationship to Current Regulatory Requirements."

There was an issues list in that paper including one on should advanced reactors with passive design safety features be able to reduce emergency planning zones and requirements.

The Staff indicated that -- proposed no change to

the existing regulations at this time. Information obtained from ongoing evaluations will be factored into EP requirements for advanced designs. Based in part on these accident evaluations, the Staff will consider whether some relaxation from the current requirements may be appropriate.

And then in response to the SECY papers, the Commission routed a Staff requirements memorandum on July 30th, 93. The Commission agreed that it was premature at this time to reach a conclusion at this time to reach a conclusion for advanced reactors.

For ongoing review purposes, Staff should use existing regulatory requirements. However, the Staff should remain open to suggestions to simplify the EP requirements for reactors that are designed with greater safety margins.

And Staff is requested to submit recommendations for proposed technical criteria and methods to use to justify simplifications of EP requirements, and that the work on EP for advanced reactors should be correlated with the work on accident evaluation and source term.

MR. KRESS: Is there anything ongoing on that second from the bottom bullet?

MR. KANTOR: Yes. Next slide.

[Slide.]

MR. KANTOR: In response to the SRM in December of '93, the Staff provided a response where it laid out a

preliminary program or method for advancing in response.

It proposed three technical factors as a possible basis for simplifying EP requirements. It would have to involve some reduction in source term, a reduction in probability of release, and an increase in the delay time preceding release. Some combination of factors involving those would probably be necessary before Staff could recommend any relaxation in current EP requirements.

MR. KRESS: This source term you are talking about here is the release from containment source term?

MR. KANTOR: Yes. It would be the new -- what we call the new source term.

MR. KRESS: But that is what it going into containment.

MR. CONGEL: No, it is correct. His answer yes -- simple answer was correct. What you are saying is correct, Dr. Kress. It is what gets out.

MR. KRESS: Okay.

MR. KANTOR: Staff noted that in addition to the technical criteria EP must consider other policy and public perception factors also.

There have been several meetings by the Staff, different branches of NRR that are involved in risk and containment, also with our Office of Research to develop a plan, a schedule, for reviewing the EP requirements for

passive reactors.

First of all, a decision was made to focus on passive reactors because we had more information there on design and risk assessment information, the level of licensing interest is greater there than the advanced reactors, and any insights we gain from review of the EP for passive reactors could be factored into EP for advanced reactors.

In addition, research has been initiated or shortly will be initiating a contract to review the planning basis for emergency planning using the new source term and insights from NUREG-1150. In other words, we are going to take a look in a fashion similar to what was done in NUREG-0396 to establish the 10-mile current emergency planning zone using new information that is available now to relook at the planning basis for passive reactor designs.

The industry also has an effort in this regard. EPRI has provided a technical report on simplification of EP. NEI now has the lead in developing policy and other issues in addition to the technical issues that would go into a possible reduction of emergency planning requirements.

We have met with NEI and we are going to be meeting with them and coordinating with them as we proceed in our review effort.

MR. CARROLL: In general, what is industry proposing in terms of simplification?

MR. KANTOR: Industry proposes a range all the way from emergency planning zone at the site boundary to -- which is almost tantamount to no emergency planning.

In effect, the industry would like to reduce either the scope, the area of the emergency planning zone or the requirements that go into the emergency planning zone, such as sirens, prompt notification, advanced planning, the need for off-site plans, those type of things the industry, based on their studies, would like to provide a basis for, either reducing or eliminating.

MR. CARROLL: I guess sirens would be at the top of their list of things they would like to see.

MR. KANTOR: Certainly, I think they would like to see -- if we can establish that the need for prompt measures is much reduced, then of course you don't need the sirens or maybe you don't need sirens out to 10 miles, maybe only two miles or something like that. And also the requirement for prompt notification of the public and quite sophisticated and complicated off-site plans might be lessened or reduced.

MR. LINDBLAD: Sirens will be anachronistic in the information highway age, won't it?

MR. CARROLL: I suppose that's right, Bill. As long as you are --

MR. KANTOR: There are other factors involved, too. As we indicate, on a technical basis you can establish that you could reduce emergency planning. There are other factors involved in emergency planning, public perception is one of them.

MR. LINDBLAD: I was hoping you were going to expand on that and an earlier --

MR. KANTOR: The public is not as familiar and comfortable with emergency planning zones.

MR. LINDBLAD: Which public are we talking about here? The local site-oriented public or the general population of the United States?

MR. KANTOR: I'm referring to the general public, I guess. But certainly the local population is certainly much more familiar and aware of emergency plans if they are in the vicinity of a site because of the exercises we conduct once every two years. There is a full demonstration of the off-site plans.

MR. CARROLL: And the sirens they drive by every day that remind them of it.

MR. KANTOR: And those are periodically tested. It might be monthly, it might be semi-annually. And there is a warning given. There is a lot of interaction now between licensees and the public on emergency planning and, like I mentioned, there is a feeling like the public is

comfortable with emergency planning that's out there now.

MR. LINDBLAD: How do you measure that and how do you gauge whether they are comfortable or not?

MR. KANTOR: Well, it's difficult. It's a judgment, just by going out to various exercises and meeting, you know, members of the public and the fact that we don't have large numbers of intervenors coming in or 2.206 requests to eliminate emergency planning, that sort of thing.

MR. LINDBLAD: So you count intervenors?

MR. KANTOR: No, I am just making some general, overall statements.

MR. DAVIS: There was a case -- excuse me. Are you finished?

MR. KANTOR: Yes.

MR. DAVIS: -- on the East Coast where the 10-mile zone extended across a state boundary and the state adjacent to the plant refused to participate in the emergency planning exercise.

MR. KANTOR: Right.

MR. DAVIS: And that disturbed the licensing process for the plant.

What do you do in that case, if the state refuses to participate?

MR. KANTOR: As a result of that case, which is

the Seabrook case, I believe you're referring to, and there was also the Shoreham case before that. And I happened to be personally involved in both of those and it was a long and difficult, torturous couple of years in emergency planning.

As a result of those cases, the regulations were changed. The so-called Realism Rule was put in place that if state and locals refused to participate, a utility can develop off-site plans and submit those.

After the rule was passed, there was also an executive order from the presidential branch that established a mechanism for the Federal Government, in particular FEMA, to assist utilities if the utility makes a declaration that the state and locals decline to participate in emergency planning, they request assistance from the federal government. That's never been done, but that is an avenue open.

So there are options if state and locals don't participate. But, from experience, a utility would be very hesitant to get involved in any situation like that. And I think the basis of emergency planning is really cooperation between licensees, applicants and state and local authorities.

That's one of the purposes of the early site permit process would be to flush out any kind of potential

opposition to emergency planning on the part of those state and locals. We would like to see these agreements up front before we go far down the emergency planning course.

MR. CARROLL: Since the time that Pete was referring to, Massachusetts has changed its position.

MR. KANTOR: That's correct. They have fully joined into the emergency planning process and they have provided a plan in support of the Seabrook plant.

Seabrook was licensed with a utility plan that was developed for Massachusetts. But since it was licensed, Massachusetts has come back into the planning process and their plan has now replaced the utility plan.

MR. CARROLL: What did they ever do with their siren trucks?

MR. KANTOR: The vans?

MR. CARROLL: Yes.

MR. KANTOR: They were used in some fashion. There were about 100 of those vans or something with crews that were on call for 24 hours a day. The trucks have been, you know, used someplace else. The sirens were taken off the trucks and have been used other places.

MR. CONGEL: Excuse me. I would like to make a couple of points at this point and then continue the discussion. But, first of all, the interactions that we have had with industry, primarily EPRI and NEI, have

resulted in a lot of meaningful discussion. It is clearly not a discussion where industry says, here are our proposals and we would like the Staff to consider it. In fact, industry itself had difficulty wrestling with this question and in coming with a proposal for the Staff to consider.

I say this from several bases. We can focus in on earlier problems like at Seabrook and Shoreham and even Pilgrim. But the reality of the matter is that those are success stories now and, in fact, EP has reached a level where we get very, very few problems associated with existing and emergency plans right now, very few.

There is a perception on the part of the locals in particular, but it is a bigger picture than that. But the locals in particular where they feel part of the system contribute and overwhelming majority of science have as many volunteers as they want to participate and help along.

So as Falk already mentioned, this part of the overall operations of a power plant has an ingredient that goes far beyond, I think, the safety perspective.

So before you make any requests or a utility would make any requests to reduce it or even possibly eliminate it, you have to consider the goodwill and things that are the result of these programs.

Secondly, in terms of potential blocking of plants to operate a plant at the last minute, Falk already pointed

out that this early site permit process is intended to flush out any serious, very fundamental problems associated with siting a plant in a particular area before large amounts of funds are spent. But in terms of having a situation arise where the utility itself has to come up with substitute plans, that surely represents a major problem, regardless of how successful it works out.

So looking toward the future, we certainly want to minimize not eliminate such a thing like that happening again. So we are going to go with lessons learned from our earlier experiences.

Again, though, before you do anything with the overall emergency planning programs, you have to see what it is accomplishing not only from a perspective of safety, but also from the perspective of community involvement. That part, I think, has resulted in a lot of discussion, the staff within ourselves, industry within itself, and cross purposes, you know, just discussions of what we should do. There appears to be a consensus on development where perhaps we can relook at some of the details, the infrastructure that is required now within the ten miles.

Then you mentioned sirens, we haven't even gotten to a discussion at that level of detail with industry yet. We are still wrestling with a bigger picture with them as to what we should even do. The program that is being put

together by Research in response to the SRM is going to focus on these kinds of questions, should you reconsider the ten miles, should you make it smaller, or should you look at potential changes within the ten miles, or what. We are going to look at the whole spectrum of things. Overlying this is the fact that we have a success story out there right now and there is reluctance on anybody's part to rock that boat.

MR. LINDBLAD: I believe there was an earlier episode that we called Below Regulatory Concern in which the Commission tried to be realistic on some risk and recognized after a while that the Federal government wasn't the only potential regulator in the world. If we decided on a Federal basis that certain health requirements were not necessary, other government agencies would move in and impose them themselves as they have a right to. So the experience on BRC might be a lesson to us as well.

MR. CONGEL: I think that is an excellent example. You could surely undermine your own credibility if you come up with a package that says that reactors are now so safe we don't need anything like that, just as a hypothetical situation. It just doesn't work that way. We have also marketed and expressed in many, many public forums what role we feel EP has, and it is like Level 4 of our defense in-depth perspective and criteria that we apply to the safety

of every operating plant.

MR. CARROLL: I found it amusing that in the aftermath of the Oleum release in Richmond, California, a year ago or so that --

MR. LINDBLAD: Oleum is a small community in --

MR. CARROLL: No. Oleum is --

MR. LINDBLAD: Fuming sulfuric acid, yes.

MR. CARROLL: That there was a demand for sirens downstream of the chemical plant, and they were pointing to the fact, well, if nuclear plants, which everybody knows are safe, need sirens, why doesn't something as unsafe as this need them.

MR. LINDBLAD: The presence of chlorine, gaseous chlorine on a site can also generate emergency requirements.

MR. CONGEL: There are many success stories for it. Another one is in Louisiana, in that part of the country there are a lot of chemical plants, and I have talked with emergency planners in that area, and they are thankful because the infrastructure that is provided by the nuclear plants down there is used in the emergencies associated with the chemical plants. In fact, thankfully and fortunately, they only time they have had to exercise that plan in order to assist the public is for accidents at the chemical plant. So the point of the matter is, there is a usefulness associated with this program.

MR. SEALE: It is an emergency utility and it has a constituency, and I think we would have a real hard time reducing that presence.

MR. CONGEL: Yes, sir. Like I said, I think it would be worthwhile to reevaluate just some of the level of detail within the ten miles, and where we have learned and where you need 15 minutes, and where you don't need 15 minutes, but even that you don't do without a lot of consideration and thought and having everything all fit together.

MR. LINDBLAD: The other observation about the new executive order which permits a utility to move forward in the absence of off-site regulatory or governmental collaboration, I don't think that only applies to siting new plants, but it could also arise with the change of administration in States or counties as time goes on, and it could be that it will keep some operating plants continuing to operate safely with a change of political atmosphere.

MR. CONGEL: That's correct. It applies, actually, across the board, new and old.

MR. KRESS: I would like to get back to the minor point on your slide there. At the top you have one of the reasons for simplifying emergency planning requirements is an increase in the delay time preceding the release.

Do you mind if I ask how that would -- what

simplifications would result from that?

MR. KANTOR: Well, that factor reverts to, if it could be established that instead of release occurring on the order of a half-hour, which is possible you might say with current plants, that the release might be held up for something on the order of 12 hours or 24 hours. If that was the case, then it might be possible to factor that into your emergency planning which would certainly reduce some of the urgency from our current plan arrangements.

MR. KRESS: But you would still need an emergency plan, and you may still have to evacuate and all those things.

MR. KANTOR: That could be.

MR. KRESS: It would just give you more time to think about it.

MR. KANTOR: It would give you more time and, as Frank indicated, you could perhaps reduce some of your infrastructure requirements. The prompt urgency aspect of emergency planning would be somewhat lessened, but it could be that emergency plans would still be required to some extent, maybe not quite to the extent we now require.

MR. KRESS: Are there any more?

MR. DAVIS: I had one. Is sheltering an option under this initiative as part of the emergency planning?

MR. KANTOR: Right. Sheltering is a protective

action recommendation. Depending on the situation that you are in, you may recommend sheltering. The staff philosophy is for severe accidents, severe core damage type accidents, we believe evacuation, at least of the close-in population, is the preferred protective action. However, there might be situations such as severe weather where it might not be possible to evacuate. You might then want to shelter, or you might evacuate out to two miles and recommend sheltering out to ten miles, and then do further evaluation and decide you might want to expand your evacuation area. But sheltering certainly is a principal protective action.

MR. DAVIS: I know of a plant that has a prison within ten miles and the warden was very reluctant to consider evacuating the prison population.

MR. KANTOR: That's true.

MR. DAVIS: Of course, he had a good shielding situation there.

MR. KANTOR: That's true, but plans have been developed for prisons to evacuate them if necessary, and not just for nuclear power, but I am familiar with one prison in the ten mile emergency planning zone that does have extensive plans for evacuation. It might not be at the same time scale as the public evacuation, but there are plans and resources identified to evacuate the prison.

MR. KRESS: If there are no more questions, I

would like to thank the staff for the very nice presentation. It has been very useful to us, and we certainly appreciate it.

MR. KANTOR: Thank you.

MR. KANTOR: The next, Ivan, we need Ivan here. We could let Carl Michelson introduce this next topic, which is Fire Protection Related Matters. We did have a subcommittee meeting yesterday. Do you feel comfortable introducing this, Carl, in Ivan's absence.

MR. LARKINS: I will get him. I think he is in the hall.

MR. MICHELSON: We need a change of the guard anyway.

MR. DAVIS: Mr. Chairman, while we are waiting, I am trying to determine what we have just heard and how it relates to the letter that we have on this issue. Do you have one --

MR. KRESS: I have a very much revised draft of what you saw last time which I wrote in the absence of this presentation, and I think it may still be pretty good. We may not have to look at it in light of what we have heard, but, in fact, I need to give that draft to get it typed up. I am glad you reminded me.

Ivan, we have come to an early start of the fire protection thing.

MR. CATTON: Five minutes ahead.

MR. KRESS: Yes. We're trying to get to your letter is the reason and I am turning the introduction over to you at this point.

MR. CATTON: Okay. I thought it was just harassment.

MR. KRESS: Yes, but it is a little of both.

MR. DAVIS: It's coming.

MR. CATTON: I am going to get that after these people are finished. Is there an agenda?

MR. COE: Item 3.

MR. CATTON: I will keep my introduction brief and then I hope that the others can keep their presentations brief and maybe we can finish the formal part of this in an hour or so and we can address the letter, the draft of which should be available pretty quick.

The question that we have to address is what to recommend to the Commission as far as a method to resolve the Thermo-Lag issue.

What we are going to hear about is four options.

One is business as usual.

Two is a permutation that probably would exist through the exemption process anyway.

Three is actually somewhat different in that more probabilistic viewpoints will be brought to bear.

Four is a full-blown performance-based fire regulation process.

At present the Staff is recommending that Option 1 be followed, but I have just read through their presentation to the Commission and it seems to me that Option 1 with exemptions could be any one of the others, depending on how the exemptions are treated.

MR. DAVIS: Except 4.

MR. CATTON: Except 4, except 4. That's correct.

So with that, let's get started. I believe the first speaker is going to be --

MR. VIRGILIO: Steven West will be speaking for the Staff this morning.

THE REPORTER: Can you identify yourself?

MR. VIRGILIO: Marty Virgilio, NRR staff.

MR. CATTON: There is Steve.

[Pause.]

MR. CATTON: And it looks like his package is thin.

MR. WEST: The package is thin; the issues are weighty.

[Pause.]

[Slide.]

MR. WEST: My name is Steven West. I am a Section Chief in the Plant Systems Branch of the Office of Nuclear

Reactor Regulation.

My section is responsible for fire protection at the operating reactors and we have been tasked with the Staff effort to resolve the Thermo-Lag issues.

There are some collateral issues that other divisions and branches are working on and we do the coordination -- for example, the rating and seismic issues and that kind of thing.

There were questions yesterday about Thermo-Lag and some questions about what it was. I brought a piece and I won't spend a lot of time on it but I'll pass it around.

This is a nominal, half-inch panel which comes in a sheet like gypsum board and it is cut up to form boxes around cable trays. That's the principal application and this is the Thermo-Lag itself, the white, and the back is the stress skin and we had a discussion yesterday about why is the colors different in photographs and that kind of thing and this will help, I think, explain that.

A three-hour barrier is thicker and it has a screen on both sides. That is the only difference.

MR. MICHELSON: That screen is made of what material?

MR. WEST: It is just a carbon steel, mild steel, I believe.

[Slide.]

MR. WEST: Dr. Catton described the four options. I am just going to move into our discussion, detailed discussion of each of the four options.

[Slide.]

MR. WEST: This is basically the same presentation that we gave to the Commission on May 20th.

We worked for probably two months on the options. It was a concentrated, concerted effort by the Staff and our management up through Jim Taylor, the Executive Director for Operations.

There was an awful lot of debate and discussion.

Option 1 of the four was to continue with our original plan of returning the plants to compliance with Appendix R or whatever fire protection commitments they had made which would require them to rely on these Thermo-Lag fire barriers.

We felt that a couple of things were driving us towards this option and recommending this as the preferred Staff approach for the resolution of the issues.

One is when you look back at Appendix R there has been a tremendous amount of industry and Staff effort over the past 13 or 14 years to bring the plants into compliance with Appendix R. We felt that until the Thermo-Lag issue surfaced that plants were in nominal compliance with Appendix R.

You find the odd problem occasionally. Usually they are self-identified by the individual licensee and they implement a fix and bring themselves back into full compliance.

We haven't seen any significant, at least in the past five years, any real significant problems in general with Appendix R implementation so you have that and as a result of that you have a lot of satisfaction by industry and the Staff and the public that the plants are fire-safe.

Then Thermo-Lag came along and we had to deal with that problem.

We have been working on it for about three years internally and with industry and over those three years we have gained an awful lot of information about Thermo-Lag and Thermo-Lag fire barriers. We have re-looked at fire safety in the plants.

We wanted to continue with this option because we want to take advantage of all of that effort, a tremendous amount of effort both in the original compliance with Appendix R and with what we have learned about Thermo-Lag fire barriers.

Now at least 22 units as of a month or so ago have written us and told us that they have either already fixed the problem in their plant by removing the barriers and replacing them with something else or re-locating

components or doing an analysis that shows that it wasn't really necessary, or they have made a commitment to do something that will return them to compliance.

So we started out, I think when we first started counting plants, to have 83 or 82 plants or units with Thermo-Lag. Twenty-two have said everything is okay. A couple have shut down and for other reasons we are down to about 59 or 60 that have a problem yet to deal with.

Now what have we learned about Thermo-Lag?

We have done a lot of tests, full-scale fire endurance tests and small scale fire tests, to understand the thermal performance of the system. We have done combustibility tests.

Industry has done an awful lot of tests. I am talking about NUMARC or NEI now, TVA -- one of the licensees that kind of took the lead for this issue.

MR. CARROLL: Their incentive now is because Watts Bar licensing is coming up, is that right?

MR. WEST: Watts Bar has a -- Comanche Peak, Texas Utilities had an incentive to license Comanche Peak Unit II because they had a commitment to Thermo-Lag. TVA now has an incentive to license Watts Bar and they have a certain commitment to Thermo-Lag, so those two licensees have done a lot of work, particularly with the one-hour barriers, which is what they used.

What we have learned about the one-hour barriers is the one-hour barriers that are installed in the plants today won't last one hour, they will last maybe 20 or 30 minutes. However they can be updated, we believe, using additional Thermo-Lag materials.

The failures have principally been at seams and joints where the material has been put together. Under fire exposure, the seams and joints weaken. Where they burn through, you have an opening in the barrier, the fire gets into the cables and you have a problem. It won't last for one hour. In 20 minutes that may happen.

But by reinforcing the seams and joints with additional stress skin and Thermo-Lag, you c get the one-hour barrier to last one hour.

MR. CATTON: Is this material the stress skin?

MR. WEST: Yes. And you can buy that just as screen without the Thermo-Lag attached and you can wrap it around joints and put some trowel-grade material over it and reinforce the joint, for example.

MR. CATTON: What is it, fiberglass?

MR. WEST: Steel, just mild carbon steel.

MR. MICHELSON: Clarification. Are there any one-hour barriers made of Thermo-Lag that do last one hour?

MR. WEST: Based on testing that TU Electric did, I would say there are some barriers in the mid-sizes of

conduits, maybe three, four inches.

MR. MICHELSON: So it's not all one-hour barriers, but it's fairly a large number.

MR. WEST: Most.

MR. MICHELSON: Same statement for three hours. Are there any that will last three hours?

MR. WEST: The tests that NEI did, it looks like there were very -- maybe one or two of the three hour barriers that last close to three hours.

MR. MICHELSON: One can't say that none of the three-hour barriers last three hours?

MR. WEST: No. You can't say that.

But we have found that three-hour barriers are a challenge. They still continue to be a challenge. They'll last, in the base line, in other words non-upgraded, for about one hour.

The NRC -- I didn't mention this to the subcommittee yesterday -- when you are meeting with NEI talking about criteria in December, I was at UL, Underwriters Laboratories in Chicago running some tests for the Staff. We did some three-hour fire endurance tests. We tested three assemblies and we found that they'll last about an hour. NEI did some tests and tried to upgrade it using additional Thermo-Lag materials and they found that in general the upgrade is so substantive, the amount of work

and material and effort that would be involved to upgrade a three-hour barrier to really last three hours, it is so significant that it really does not appear to be practical to do that in a plant.

I think one of the examples they mentioned yesterday is you could take a 3/4-inch conduit and before you could get it to last three hours, the thing would be eight inches in diameter with Thermo-Lag material and that's just not practical.

You introduce a lot of problems if you try to go with that fix and the costs would be significant. You can get into problems with clearances in the plant and that kind of thing.

However, we feel there are a number of alternatives that still exist for three-hour barriers. You can do some of the things that are already being done, continue to look for areas where you could relocate components, reroute cables to come back into compliance, you could reclassify the three-hour barriers as a one-hour barrier and then maybe install a suppression system. Ther you would meet the rule. No exemption would be required or Staff review for that matter. You could replace the barriers with other materials. There are vendors out there that tell us they have materials that will work. But then you get into those costs of replacement.

I think in the SECY paper, 94-128, we had five or six or eight options.

MR. CARROLL: That's a point that probably ought to be amplified on for people that weren't here yesterday. You said there are vendors who claim they can provide a three-hour fire barrier. But, as I understood you yesterday in response to questions, you have not conducted any extensive testing to demonstrate that claim; is that right?

MR. WEST: This is an are, this area of upgrading a Thermo-Lag barrier with another material or using another material to replace Thermo-Lag, that has not really, in my view, been fleshed out. There could be a lot more work done in that area.

NEI had planned to do some work which they deferred in that area. We are working with licensees. We are working with Commonwealth Edison Company. They have proposed to use another material to upgrade Thermo-Lag. It's a material that is not currently used. But we are working with them. There are licensees pursuing this course of action.

MR. MICHELSON: Maybe I need a clarification. I thought you told us yesterday that three-hour barriers made out of other material have passed the three-hour test. Did I misunderstand that?

This is not a new problem and the testing has been

going on for many years. Did I misunderstand that the three-hour barriers not made out of Thermo-Lag have been verified to be three-hour --

MR. WEST: I think what I said yesterday is that there are vendors, a number of vendors who have submitted to the NRC test reports and in those reports they claim that their barriers would last one and three hours.

MR. MICHELSON: These barriers have been used for 15 years or 10 years at least. What did you look at for test verification 10 years ago when they came in and said this is how they are going to do it?

MR. WEST: Well, we looked at the -- we did a similar review for those barriers that we did for Thermo-Lag.

MR. MICHELSON: And you had --

MR. WEST: And we concluded 10 years ago or whenever we got those submittals that we looked at, that those barrier systems were adequate to meet our requirements.

MR. MICHELSON: That was based on test results, including Thermo-Lag?

MR. WEST: Including Thermo-Lag.

MR. MICHELSON: Thermo-Lag was found later to have a problem. But the other barriers, at least in the past, were thought not to have a problem. And until they're

reevaluated, they don't have a problem.

MR. WEST: If I gave you the test that we looked at for Thermo-Lag 10 years ago today and you looked at those tests, you may conclude that those barriers are acceptable. There are circumstances surrounding the Thermo-Lag barriers that, you know, we can't discuss, allegations that led us to go back and look at those.

MR. CATTON: I don't think you're addressing the question that has been put before you.

If you reevaluate the other materials, will they pass?

MR. WEST: As I said yesterday, we are in the process of reevaluating all those other barrier systems. We have asked the vendors for materials to resubstantiate their claims --

MR. CATTON: That's enough.

MR. WEST: I can't answer your question today. We are doing the review.

MR. CATTON: You did. You said we're reevaluating. That's fine.

MR. WEST: We have not completed that evaluation.

MR. CATTON: We have a time problem, so could you continue.

MR. WEST: We will be happy to report to the Committee the results of that review when it's done. We

have done small-scale testing at NIST. That testing has not produced any show-stoppers. We believe the materials, at least their thermal performance, is adequate to meet our requirements. Until we complete the review, I don't think anyone on the Staff is going to say this is an adequate barrier.

MR. CARROLL: We are happy with your answer.

MR. WEST: I'm unhappy.

MR. MICHELSON: One clarification on your question and statement, though. For the NIST test, did the Thermo-Lag pass the NIST test?

MR. WEST: No, the Thermo-Lag did not pass the NIST test.

MR. MICHELSON: It showed in -- but the other materials did?

MR. WEST: Right.

MR. MICHELSON: Right.

MR. WEST: Yes, the NIST test we did with Thermo-Lag, that was one of the first things we did and we said, we have a problem here.

MR. MICHELSON: That was the statement I was looking for and we got it.

MR. WEST: Is that resolved?

MR. DAVIS: Excuse me. I think it's worth emphasizing that under the fourth item, the alternatives,

that's not a complete list.

MR. WEST: No, that's not a complete list. To fit everything on a slide, we identified a couple. I believe in the SECY paper, we may have identified seven or eight.

MR. DAVIS: Is one of them posting fire watches, because I understood that was being used?

MR. WEST: The posting of fire watches is an acceptable compensatory measure until a permanent corrective action can be taken to bring whatever the degraded condition is back into compliance with the regulations.

MR. DAVIS: Is there a time limit on how long that can be used?

MR. WEST: There is no time limit. It's --

MR. DAVIS: For the life of the plant?

MR. WEST: Well, it's a Staff expectation that they are temporary, whatever temporary means. And we are expecting licensees with problems to take a corrective action.

MR. DAVIS: But there is not a definitive requirement for that?

MR. WEST: No. In our 50.54(f) letter that we sent out in December, we did state our expectation and I think it was that things would be fixed by '96 or something like that. So we are not looking for these things to be in place for the life of the plant.

MR. CARROLL: I would also comment for the benefit of those who weren't here yesterday that we did see some colored slides of some of these tests.

And a three-hour fire barrier is a pretty remarkable device, something that will keep the cables cool enough for three hours in a 2,000 degree furnace is a pretty good trick, believe me.

Those things come out looking pretty warm to me.

MR. WEST: You're right.

And these barriers, just as an aside, present a real fire protection challenge because any other barrier, like a wall or a floor or a ceiling, generally, you have one side is exposed to ambient air in the laboratory. And these are not. It's an enclosed system.

And you're measuring temperatures inside a fairly small and closed system. And, once the temperatures start rising, it's a real challenge for the barrier.

Okay. So, in closing, I just want to emphasize it. As you know, this was a staff-recommended approach. We felt that we should stay the course on trying to return plants to compliance. It was the action plan we had laid out and had been working towards with industry.

And we wanted to -- we haven't come up with a real good, or any reason, really, to alter our course at this point.

MR. WYLIE: Let me ask on your limited exemptions. Does that include elements of the other options?

MR. CATTON: It doesn't preclude them.

MR. WEST: A licensee could, if they were so inclined, pursue option 2 or 3 on its own and submit it to the staff as an exemption from the requirement.

MR. WYLIE: So that would be an acceptable approach.

MR. WEST: But what we're saying, the message we're trying to deliver in the Commission paper is we don't think those approaches should be considered at this point an acceptable technical basis for giving exemption, because, number one, it deviates -- those approaches deviate significantly from what the regulation says.

And if you're going to exempt a lot of plants from the regulation on a common basis, you really should change the rule.

I mean, you should get the public involved in the process of reviewing it. It shouldn't be something that's done by the staff and industry in isolation.

MR. WYLIE: Was that what the staff feels? It should change the rule?

MR. WEST: Well, I think the general staff -- I'm not sure exactly what the policy is, but once you start making so many changes it becomes a generic change, you

should do -- if there is a rule involved, you should do rulemaking.

MR. CATTON: Fifteen hundred exemptions are not enough?

MR. WEST: Well, those exemptions run the board of all the requirements for appendix R, scheduler exemptions, emergency lighting, associate circuits analysis.

They're not focused on one specific thing like this would be, you know, one or three-hour barriers.

I mean, if you're basically going to tell half the industry out there that you don't need a one or three-hour barrier like the regulation requires, you can come up with some model or some other approach to show that what you have is okay.

MR. CATTON: Option 2 doesn't change one or three hours, it just changes the insult to the barrier.

MR. WEST: Right. That's a good --

MR. CATTON: Option three allows you to change the time, doesn't it?

MR. WEST: Option three allows -- I'm sorry?

MR. CATTON: With Option 3, you could argue that I don't need one hour. Twenty minutes is enough.

MR. WEST: Right.

MR. CATTON: Option 2, you still have to have the one hour and three-hour. It's just the insult is such that,

although it will not survive E119, it would survive the particular environment.

MR. WEST: Right. That's right. That's a good lead-in to option 2. We should move into it.

But, let me just say the reason we mention exemptions here is we wanted to -- what we're looking to do is business as usual. The regulation allows exemptions. The Commission recognized when it promulgated the regulation that exemptions should be allowed. It's built into it.

And we in industry have taken advantage of it where there's a sound technical basis for an exemption.

And all we're saying here is we're going to require compliance. We're going to continue with what the current regulation says, and we're going to continue to grant exemptions where they're technically justified.

MR. MICHELSON: I think I was a little puzzled by some statements you made earlier. I think you indicated that option 2 could not be used as an exemption under option 1. And I fully agree.

However, the information might have been developed if one were following option 2, such as a new time temperature curve, and so forth, could very well be used in a basis for an exemption under option 1.

It's just that the whole approach, per se, cannot be said: I'm going to do option 2 as my solution.

And I think, no, you can't do that. The regulations spell out what you have to do, but you use the information you might have developed in showing that your approach is equally safe to what one normally requires.

And I didn't quite hear those same kind of words coming out, but maybe I just didn't listen too well.

MR. WEST: Well, as we said yesterday, we're not trying -- if we stick with option 1 and we agree that we can grant exemptions, we're looking back at all the exemptions we granted in trying to establish what the boundaries were. And we're not trying to shut the door on any particular exemption, or type of exemption.

We have an open mind to look at things, and look at the technical bases. At this point, we can't rule out anything.

I'm telling you what our expectation was with the option.

MR. MICHELSON: And I'm assuming there's some new potential boundaries for exemption, such as a new time temperature curve, which you might never have run into under your old exemption process. Nobody ever came in with a new curve.

Now I think it would be legitimate to come in with a new curve if you can show that you have an equally safe situation.

And that curve would have to be based on what's really burning and not what's hypothetically burning.

MR. VIRGILIO: Carl, it's not clear to me that you even need an exemption to use option 2. We talked about yesterday with the subcommittee clearly going through the public review process. The statements of consideration to the rule clearly call out the E119 as the basis that we used in establishing the three-hour and one-hour barrier rating.

MR. MICHELSON: You're blowing my mind again because I thought it was very clear. Option 1 is the regulation.

MR. VIRGILIO: Right.

MR. MICHELSON: We have to follow it, not any other option.

MR. VIRGILIO: Right. But, option 2 --

MR. MICHELSON: But we could use the information developed in option 2 to justify our actions under --

MR. VIRGILIO: Right. And all I'm saying is the information in option 2 may, in fact, be compliance. And the way we talked about yesterday proceeding with option 2 was going through the public review process.

We would, for example, we might want to choose, if we were to adopt option 2, revise our generic letter 86-10, supplement 1, go with the supplement 2, which would explain how one would go about doing a test program that would

satisfy the regulations.

If we were to adopt option 2, it wold clearly go through the public review process. But it doesn't necessarily mean that there is an exemption associated with option 2. That's not clear to me. There may be. But, in my mind, your E119 is in the statements of consideration, not a hard and fast requirement of the rule.

MR. CATTON: And I guess FMRC -- Karydas yesterday how you could do that without having your curves like option 2.

MR. VIRGILIO: Right.

MR. CATTON: Or, you could relate the load in a given room to the present testing program under ASTM E119. A nice, clean, almost a nomograph for accomplishing it.

MR. VIRGILIO: But, clearly, we would want to invite public comment in the process. Clearly, we would go through the review process that we've established. And I don't see that you would gain any time through that mechanism. You would just not have to go through the exemption process.

[Slide.]

MR. WEST: Maybe we should just go to Option 3 -- but there were a couple of things I wanted to say about Option 2, so let me just say for the benefit for those who weren't here for the presentation yesterday, there are some

feeling and there are, you know, really disagreements among fire protection professionals on what all this means, but there is some feeling that the ASTM E119 standard time temperature curve that is used to do fire endurance testing may be a more severe fire than that which you would expect in a nuclear power plants in many areas, not all areas.

Clearly, the diesel generating room is going to have a higher fuel load if you have the release of fuel and that kind of thing.

[Slide.]

MR. WEST: This is the curve that is used when you test an assembly. Just briefly, this is one-hour and three hours, and you put something in the furnace and you turn on the burners, and you follow this time temperature profile, and you run this thing for the duration of the rating you are looking for, and you reach 1000 degrees in five minutes, and then you taper off.

For a one-hour test, at the end of one hour you should be at 1700 degrees, and at three hours, 1925.

MR. LINDBLAD: What is measured there, gas temperature or radiant --

MR. WEST: Gas temperature, thermocouple. Well, the environment with thermocouple in the furnace.

Now, what this option says is that there -- I have given this presentation several times formally and to a lot

of people who are interested, Commissioner's assistants that are trying to help the Commissioners make up their minds. Sometimes you hear, well, doesn't this lead you into Option 4 which is a performance-oriented, risk-based rule, something that addresses these concerns of fire barrier performance? And my answer to that is, no, it doesn't.

It is possible that some of the results of this work may be used in that rule, but right now we have a clean slate and what the option says is maybe you can replace this curve and do your testing with another curve.

So what we said in our paper was maybe we can have a lower curve where the fuel load is lower, use this curve for some fire areas where the fuel load is higher, and then in the diesel room you may even need a higher curve.

MR. DAVIS: Excuse me. Maybe you mentioned this before, but do you recall what hypothetical fire this curve is supposed to represent?

MR. WEST: This curve is based on fire testing that was done at the turn of the century using typical building construction and occupancy from the late 1800s and early 1900s.

MR. DAVIS: So it would be like wood fires?

MR. MICHELSON: I thought it was a hardwood fire.

MR. WEST: Ordinary combustibles, principally wood.

MR. MICHELSON: Hardwood.

MR. WEST: And between the turn of the century and now people still work on this curve and try to see if it is valid, what it means for this building, that building and all that kind of stuff.

So what we are saying is we will look at some different curves. I am going to spend some time on this because this is a really interesting option.

So we may end up with three curves, okay? What we are saying is it is not a performance-based approach. It is an approach of looking at the individual areas, yes. But as Marty was saying, the real purpose is to redefine what you mean by a one and a three-hour barrier so that you can live within the existing regulation that specifies in the regulation that you need a one-hour or a three-hour barrier, but it doesn't specify in the body of the regulation that you need to use E119.

It does say in the statement of considerations that when you want to put in a one and three-hour barrier, it may mean it is a barrier tested in accordance with this. And that is not Appendix R; that goes back to the original NRC Staff Guidance before Appendix R that said you will use E119.

Now, when you talk about coming up with these curves, we had some discussion yesterday about, what do you

mean you are going to look at the feasibility of this? Well, what I mean is we don't know if this is practical, we don't know what these curves would look like.

Let me give you an example. Every time we come down here, we make a big show of saying, gee, you go in these areas and the fuel load is low; it is 5 minutes, it is 10 minutes; it is 20 minutes. Well, what the heck does that mean?

What it means is if you take all the combustibles that are in some area of the plant and you add them up, add up the weight of all the cable installation, the lube oil and everything else, and then you spread it across the area uniformly and you burn it, you can say in that area we have a 15 minute fuel load.

Now, 80,000 Btus equates to a one-hour fire severity on this curve, so when we say there is a 15-minute fuel load, we do that Btu calculation, and we say there is the fuel load. That's your fire severity for that room. Okay?

So you just do the math. You figure out what will burn, how much you got, you burn it, and you say, oh, 15-minute fuel load; there's my fire severity.

Now, if you are going to take that fire severity -- say you do -- you find out one-third of the areas of the nuclear power plant have this 15-minute or 20 or 30-minute

fuel load. Now, you are going to convert that into another curve that is going to give you a one-hour fire rating.

So what are you going to do? Are you going to take the area under that curve, come up with a new curve that looks like that and gives you the same area? Well, if you do that, your fire protection is going to be -- you increase your ventilation rates to get rid of that nuisance heat.

MR. MICHELSON: And this is all under the assumption that uniformed distribution of the combustibles is a valid model and it clearly is not.

MR. WEST: Exactly. What I am saying is why we want to study this is -- we have some questions that need to be answered. Are you going to do this? Are you going to take the fuel in the room and say we are going to burn that fuel for three hours and it is going to be like standing in your kitchen when you turn the oven on and it gets a little uncomfortable?

Or, are we going to say we are going to take that fuel, we are going to do some fire tests, we are going to do a free burn and come up with the curve for the free burn where you may get the curve that goes like this?

It is a little exaggerated but the point is when you do that free burn experiment you may come up with a curve based on that little bit of fuel, which is more severe

earlier and decays faster. It may never get to an hour. You may have to do some kind of fancy-shmancy math and say, oh, I'll take this part of the curve and add it here and come up with a curve.

You will find, and research has been done, a little bit -- we haven't found a whole lot yet -- but when you take assemblies that are rated at this curve and subject them to a more severe fire severity earlier, they won't last as long so a small fuel load can be more of a problem than you think based on this fuel load business.

This work or work along these lines has been done by Sandia --

MR. MICHELSON: But it's totally dependent on where the target is relative to where the fire is. That becomes very -- that's case by case.

MR. WEST: Exactly. Exactly.

MR. MICHELSON: These curves are almost meaningless except as some way of at least starting but changing these curves and playing around is not giving you the answer.

MR. CONNELL: -- relative comparisons.

THE REPORTER: I'm sorry, I can't hear.

MR. CONNELL: This is Ed Connell.

The curves are only useful for relative comparisons.

MR. MICHELSON: That's correct.

MR. CONNELL: Everybody knows that a one-hour barrier -- knows what that means. It doesn't mean it is going to last one hour but they know that a one-hour barrier isn't as good as a three-hour barrier. It is all relative.

MR. WEST: Okay, so what we meant in the Commission paper when we said we want to study this, we meant we have a lot of questions and we don't feel comfortable now saying to the Commission we should proceed with developing curves. We don't know if it will be three curves. It may be four curves.

The Chairman says why don't you have a different curve for each area, and then there may be 5,000 curves. Maybe if you model every area you will come up --

MR. MICHELSON: You have to have a curve to reach a target in each area depending on where the fuel is relative to where the target is that you are trying to protect. We want lots of curves.

MR. WEST: We want to make sure that when we study this thing that we are not building in an oversimplification that could take away margin or cause a worse problem just because of the tests you are doing than you actually have in the plant, and that is why we say we want to study this.

We want to look at it. We want to think about it. We want to -- if the Commission wants us to study it we may

be back down here asking you when we develop these questions, what do you think?

But the point is the way the option is structured is we were saying by doing something like this, if it is feasible we will redefine what a one hour and a three hour barrier is, period, so instead of having, as somebody said yesterday, one prescription that you can follow to meet the rule, you will have three prescriptions you can follow and hopefully you will have the engineering expertise to decide which one you should follow.

Hopefully the Staff will agree with you when they come out and do their inspection.

I think I am on my soap box.

MR. MICHELSON: Could you clarify one thing on your Option 2 slide that I have in my hand in Tab 3?

MR. WEST: Yes.

MR. MICHELSON: It says if approved, the Staff will report results within six months. "If approved" means if the Commission tells you to proceed, is that what it means?

MR. WEST: If the Commission says we think you should do this study, we see merit in this approach, we would like you to study it and tell us, answer these questions, we would study it and hopefully get back to the Commission.

MR. MICHELSON: You think it would take about six months to come back with your appraisal of the situation? That's what it means?

MR. WEST: Well, that would be our plan.

MR. MICHELSON: That's all I wanted to know.

MR. WEST: I love this option, to talk about it anyway.

MR. CATTON: That was for my benefit, I'm sure.

MR. WEST: I will talk about this to anybody that will listen.

[Slide.]

MR. WEST: Option 3, one thing we found -- you know, we were concerned ourselves but then the Commission became concerned and we got more concerned.

It didn't look like these test programs and things were going to result in a timely resolution of the issues so we went back out to every plant that uses Thermo-Lag and we said give us some information about what you have and what you are doing about it and if you have any options you are considering for resolving this issue that we haven't thought about yet, why don't you tell us what they are so we can start thinking about them too and let you know if they are okay.

When we did that what we got back was 35 plants at 22 sites were planning to use something that they called a

performance-based approach or solution. In other words they were going to try and justify their existing Thermo-Lag barriers using fire modeling and PRA or PSA insights and results.

We looked at that and in fact actually one licensee came in with -- most of them just said we are going to do this and they didn't tell us a whole lot about what they meant -- but one licensee did come in, Florida Power & Light, with kind of a outline of what they meant by this approach.

We looked at it. They wanted to meet with us. We met with them. We met with them again and we had, you know, frankly, we had some problems technically with what they were doing but we also had a problem with the other people we were talking to on the phone said, well we are going to do it but we are not doing exactly what Florida Power & Light is doing -- we have this twist or we have that twist.

We started saying are we going to get into this cycle of reviewing all these things that we don't have a high level of competence in right now?

We have a plan before the Commission to develop a performance-based rule; wouldn't it be better to do that, where we're looking at the rule in its entirety across the fire protection program and not just looking at Thermo-Lag fire barriers.

MR. CARROLL: Now when you say across the fire protection realm --

MR. WEST: Realm? Or program

MR. CARROLL: Or program -- you do include in that fires during shutdown?

MR. WEST: Yes.

MR. CARROLL: Good.

MR. WEST: It will be handled by one regulation or another.

[Laughter.]

MR. WEST: We plan to handle that by regulation. I'll leave it that way.

We worked with Florida Power and Light for a while, and we got concerned. And the Commission was saying, you know, there was a feeling that this really departs from appendix R. It's nothing that we have not used fire models and PRAs or PSAs to assess, or ensure regulatory compliance.

So we felt that we needed to go back to the Commission and say, We're getting a lot of -- there's a lot of industry interest in this. We don't really like this approach. And, in fact, we're not planning to do anything else with these approaches unless you want us to.

And that's what our Secy 94-127 says about option 3. We stopped all work on this activity, and we're not doing anything. And, unless the Commission comes back to

us, we're not going to use it.

MR. MICHELSON: On the little discussion we had on option 2, of course, we began to appreciate the importance of knowing where the target is, as well as knowing what kind of fire we had and its location.

If you're doing the PRA approach versus the pure, simple, deterministic approach, the PRA has to reflect what the failure of probability is dependent upon where the fire is, exactly relative to the target, and what its combustible content is -- and, man, that's a very extensive PRA. I haven't seen one like that so far.

MR. WEST: Now, remember, we're talking about solutions for thermo-lag fire barriers. We're not against using an approach like that. But we said we already have the vehicle to do that. We're, you know, the agency is looking at a performance --

MR. MICHELSON: You have the methodology by which you could do such a PRA. I doubt anybody in their right mind would try to undertake justification by that route. It would just be insurmountable -- it would be much more expensive than fixing the thermo-lag.

MR. WEST: You may be surprised.

MR. MICHELSON: I might be, pleasantly.

MR. WEST: There's at least one licensee that tells us they can do that.

MR. MICHELSON: Yes. I'd like to see the product.

MR. WEST: Well, we don't want to see it because we don't want to do this review.

[Laughter.]

At least, not for this purpose, we don't want to see it. We are interested in it, of course.

So, anyway, we said, you know, there's a lot of technical challenge in this. We have a plan to develop a performance-based rule. Industry is interested in that. They're preparing a petition. They know what they want. Let's get that. Let's look at it.

And that's really option 4.

So, option 4, in and of itself, with respect to the performance-oriented risk-based rulemaking, is not really an option. It's something the agency is doing. It's something industry is working on. And it's something we actually have a schedule to do, which was provided in Secy 94-090.

The Office of Research is leading that effort, and NRR is providing quite a bit of technical support, obviously.

So, we told the Commission that, you know, we'll continue down this path. This is where we should be looking at these other things, looking at curves, looking at PRAs, looking at fire models. We're not afraid of fire models.

We like fire models.

But, we're not sure there's a fire model out there that we can use to make regulatory decisions. And it goes without saying in this room that we're taught, you know, that these fires can have serious consequences.

Society will accept the fire in this room and a couple of us dying in it. Society won't accept a fire in the nuclear power plant that results in an inability to shut down the plant.

And we need to be careful at trying to fine-tune fire protection so fine, looking at these risks, that we lose sight of that. Appendix R in the statement of considerations says:

This agency will not accept a design basis fire. Fire is unpredictable. Things change. Conditions change. You run your fire model today, and everything looks great. Two weeks later, somebody brings a drum of oil in your area.

Sure, you have administrative control to prevent that, but it happens. So we're saying let's do it, but let's use this approach when we do that. Let's go through the rulemaking. Let's get all the interested parties involved.

And if, as a result of this, a licensee can use the results to help resolve the thermo-lag issue, that's fine.

MR. CATTON: I think here we agree with you.

MR. CARROLL: Oh, whoa, whoa, whoa. No, no. That's what we said in the Commission paper. The Secy 94-127. This Secy paper says something different.

MR. WEST: Because you're not going to have option 4 employees in the time frame you want to resolve thermo-lag.

MR. WEST: If we meet the schedule that Research has set up with the NEI input, this rule will be in place in August of 1996. If you look at some of these other options, 2 and 3, we haven't spent a lot of time talking about schedules. It was mentioned yesterday, and maybe I'll mention it again to emphasize it.

These are not short-term projects. You could get into internal arguments on some of this stuff.

MR. CARROLL: Whoa, whoa, whoa. What I'm saying is I don't see your statement that licensees could use the results of this to solve their present thermo-lag problem.

MR. WEST: That's something that's before the Commission. I'm not saying that -- I'm not saying that's a given. That's before the Commission. That's why it's an option here.

It's not an option. We're doing it. The option is will this be useful as a way of resolving the thermo-lag problem down the road.

And we don't know what the rule is going to look like, so I don't know if it's going to help anybody or not.

MR. CARROLL: Okay. And your best estimate of when this would be in place would be what?

MR. WEST: The schedule we put in the Secy paper says this will be in place in August of 1996.

MR. DAVIS: When does that assume the NEI petition will be submitted?

MR. WEST: By early fall.

MR. DAVIS: This fall?

MR. WEST: Right.

The Secy paper assumed it would be here in July. There has been a delay. We've checked with Research, and a couple of months slipped there. They say it doesn't impact the schedule. It's an ambitious schedule.

MR. VIRGILIO Let me just add to that.

What you're recalling is the schedule, our current schedule. If you go back to that Commission paper, it was based on an assumption that the NEI petition would come in, in May.

And at that time, we believed we could publish the final rule in August. Now, the last time we spoke to NEI, we were told that that was going to be delayed and we didn't expect their petition until July.

Now, yesterday, we heard that it's more like

September or the fall time frame. So I think that August '96 date that Steve is talking about is getting into -- it's jeopardy now.

MR. CARROLL: Okay. That's fine.

MR. SHACK: But it just seems like an incredibly ambitious schedule to me. Does that really include a validated fire model? Or, is this just an outline of a rule? Or, do you really think you'll have the tools in place by then?

MR. WEST: Personally?

MR. CATTON: Nobody's seen the rule yet.

MR. WEST: We haven't seen the rule so we don't know -- so I can't give you --

MR. SHACK: Is that a schedule for having the rule in place, or is it somebody saying that they're going to have the rule and tools in place by then?

MR. VIRGILIO: It's the publication of the final rule, is August '96.

MR. SHACK: Publication of the final rule.

MR. WEST: But we would be working in parallel and implementing guidance.

MR. SHACK: If you look at the dates here on the building and construction people, and, you know, they're working five-six years and they're still not there, just --

MR. WEST: Yes, I wanted you to see that paper. I

brought it down here. I'm not convinced you can go to K-Mart and buy a fire model.

MR. CARROLL: Well, on top of that, I guess we'll hear from NEI. I'm not even convinced they're -- how serious they are about proceeding with this.

MR. WEST: That's another thing that's a possibility. I think there have been proposed rules in the past that have never made it to 10 CFR.

MR. CATTON: I understand that there is a -- and this is aside from the Thermo-Lag issue because I think we all agree this is not the place to deal with Thermo-Lag. But when it comes to performance-based rules, my understanding that Australia has one in place, Canada has one in place and the English are about to have one in place and are having some sort of hearings on June 23.

This is general fire regulation.

MR. MICHELSON: This is PRA and so forth.

MR. CATTON: It's risk based.

MR. MICHELSON: You have got to look and see what kind of risk analysis is required to follow their particular rule versus what we have made.

MR. CATTON: All I am trying to do is to make the point that there are three countries -- two countries that I know of that have them in place, one that is considering it and having hearings soon. And I understand EDF also uses

the fire -- the performance-based fire regulation in their plants.

The possibility is putting it a little bit far out, I think.

MR. DAVIS: Do any of them use COMBURN as the basis?

MR. CATTON: we heard yesterday that COMBURN is -- I can't quite remember the words that went along with it, but George Apostolakis who is its father reacted as I expected he would when I told him.

MR. WEST: He said that COMBURN III, I think he said, totally inadequate.

MR. CATTON: That's right.

MR. WEST: And the fire model that FM was working on was -- you could use it now off the shelf and two years from now somebody will be in here telling you the FM thing was great in its time --

MR. CATTON: Not only FM. There was also the mention of others and that apparently there are a number of these kinds of tools around the world.

MR. WEST: I suspect these may be some of the issues that NEI is grappling with as they work on their petition. I am not going to kid you, the Staff has a lot of questions about fire models. Is the state of the art there that we feel comfortable using them for regulation? There

are a lot of good models out there for using for assessments. They give you an idea.

My personal opinion is the state of the art for nuclear power plant fire model is not fully developed. That's not to say it could not be.

MR. CATTON: I don't think this is the place to discuss that, but I really look forward to the opportunity when we meet to hammer it out.

MR. WEST: I do, too.

I think we would like -- I don't know if it was mentioned yesterday -- we would like to come back and meet with the subcommittee and discuss other fire protection issues that we are working on because there are a lot of interesting things going on.

MR. DAVIS: Yes. And at one time, Mr. Subcommittee Chairman, we were going to discuss the FIVE methodology and I would still like to keep that on the agenda for the future.

MR. CATTON: In particular because the FIVE methodology is based on COMBURN III. And after what we heard yesterday, I am sort of eager to hear what EPRI would have to say about such a statement.

MR. CARROLL: We did go into FIVE in great detail a couple of years ago before you were on the committee.

MR. CATTON: We had questions about it then, Jay.

MR. CARROLL: I am sure you can, if you really want to get up to speed, you can get the minutes and the handouts --

MR. DAVIS: I believe that FIVE has been augmented and upgraded since then, quite a bit. And I know COMBURN has changed since then. I think it's time to revisit it.

MR. MICHELSON: You are talking about the current version of COMBURN in these statements?

MR. DAVIS: COMBURN III, yes.

MR. CATTON: COMBURN III is what's supposedly now used with the FIVE methodology and it was not at the time we heard about it.

MR. CARROLL: Maybe it is a good idea then.

MR. CATTON: I'm going to move this along.

MR. WEST: I was going to say, Dr. Larkins asked me to hand over the microphone.

So just in closing, just very briefly, the Staff-proposed approach was Option 1. We would do the study under Option 2 if the Commission thinks it's a meritorious option. Option 3, we don't want to be rehearing plant-specific performance-based approaches. And Option 4, the rulemaking, we would continue to support that and work with industry to implement.

MR. CATTON: For a few adventuresome utilities, there is no way to preclude them from exercising Option 2

anyway, as near as I can tell. If they come in and present a good case.

MR. CARROLL: The whole issue revolves around what the Staff will accept for requests for exemptions under Option 1.

MR. DAVIS: I understood yesterday that what they would accept is what has already been accepted but not much beyond that. Whereas, Option 2 would allow more latitude in what --

MR. VIRGILIO: We agree. I mean, what we are talking about is limited exemptions. And although that's sort of a subjective word that has not yet been defined, I don't think we are constrained to doing exactly what we did in the past. But we are not looking forward to PRA models or fire models or any exotic --

MR. CATTON: Option 2 does not require PRA models. It just requires analysis of a given fire.

MR. BRADLEY: We proposed that as Option 2, not as Option 1. Not as what we would look at as a limited exemption.

MR. MICHELSON: That's where you keep giving me two different signals. I thought earlier somebody could justify a new time temperature curve that you would entertain it under Option 1 for an exemption.

MR. McCRACKEN: Conrad McCracken, Staff.

I will say, again -- I think I said it the same way yesterday -- all the options that we've approved in the past under Option 1 that we talked about as preliminary exemptions, to the best of my knowledge, we have never approved an exemption for something less than an one-hour barrier or for a different -- I know we have never approved it for a different fire curve. Under limited exemptions under Option 1, we are not proposing to do that.

That doesn't prohibit somebody from submitting it, but it is not my intention under Option 1 to approve it.

MR. MICHELSON: You are prejudging already that you don't want to see a new time temperature curve. Isn't that what you're saying?

MR. McCRACKEN: I didn't say that. What I said is, under Option 1 I am not proposing to approve it. If the Commission tells us to go ahead and we look at that and we see that it is a viable option, then that's something that we would be discussing again with you before we implemented it and probably with the Commission before we implemented it. At that point, it could be done.

But as far as what I would approve as our normal routine way of doing work, I consider that a broad enough expansion beyond where we currently exist that I would not do that without making sure everybody knew what I was up to.

MR. MICHELSON: It's a little different than I

thought I understood yesterday.

MR. CATTON: I just finished reading the Commission -- the minutes from the meeting you people had with the Commission and I sort of got the flavor out of it that you agreed that there was a spectrum from 1 to 4 and that you could probably slide a little bit into Option 2 through the exemption process. At least that's -- I'm not sure if I interpreted it right.

I was probably looking for that when I read it.

MR. McCRACKEN: It's not our intent to do that. We are trying to make them four distinct options and we have heard a lot of comments, yeah, but they all flow together. And technically, sure, you can make them all flow together.

But our intent to Option 1 is to process out, process exemptions the same as we have in the past on the same basis. I am not going to use Option 1, based on what we have presented, to downgrade fire barriers or to go to a less than one-hour barrier. It's our intent for one-hour barriers that they upgrade the barriers. For the three-hour barriers, we would look at ways of addressing it within the regulations or, as I said yesterday, perhaps something in addition to suppression.

We are open for how you could address three-hour barriers and make them equivalent to what we thought was in the regulation.

MR. CATTON: Well, that's just a different slant on Option 2, isn't it? I didn't hear you -- let me --

MR. MICHELSON: He's not saying that.

MR. CATTON: If you would say it's a three-hour barrier according to ASTM E119, period, now you've separated clearly 1 and 2.

If you allow me to come in and tell you my fuel loading is less here, I've done calculations that show this is the insult and I put up a Karydas-kind of curve that shows you how the E119 barrier that lasted one hour has an equivalent rating of three hours under this fire loading, would you allow that?

MR. McCRACKEN: If you did it exactly the way you said, I would probably not allow it because he was trying to develop a new curve.

MR. CATTON: I'm saying it is the same curve.

MR. McCRACKEN: If you came in and told me that it was a three-hour barrier, you thought, and then you came back and reviewed the design and it was really a one and a half hour barrier, that based on fuel loading, fire brigade response time, other suppression capabilities, that that barrier would be adequate to protect public health and safety, that's the basis that we've always granted exemptions on.

And I would grant it on that basis.

MR. CATTON: Then I basically see no difference between 1 and 2 other than the formalism associated with different curves.

MR. McCRACKEN: But the formalism of that curve is the only basis that we've used up until now is ASTM E119.

If I'm going to back off of 119 as my basis for the rating for fire barriers, that I don't think I should be doing by sticking it under option 1 and sneaking a few of them in.

That should be a conscious process that we as a regulatory agency have agreed to, the Commission's agreed to, and then we're going to start doing it.

MR. CATTON: The only thing that I said that's any different than what you're saying is that I offered a calculation that showed you that, indeed, this was the case.

And as soon as I say that, you say no. That should be a good indication for the industry on how to deal with it. Just argue about it long enough, and they will agree.

And I think that's kind of silly, frankly. That if you want it to be one and one alone, then you should say so. Three hours, according to ASTM E119, period.

MR. McCRACKEN: That's what it is as of today.

MR. CATTON: Period. Because as soon as you know exemptions of the kind you're talking about, it seems to me

it's easy enough for me to demonstrate that this thing that you have, that you call a barrier, using an ASTM E119 curve can be shown to survive for three hours. We saw how it should be done, yesterday.

MR. McCRACKEN: Right, we saw how it should be done. But, the argument you're making is that I shouldn't be granting exemptions on the basis I'm granting them. We put those in the rule.

MR. CATTON: So I think there's --

MR. McCRACKEN: The rule was there and it said right in the rule.

MR. CATTON: No, I understand.

MR. McCRACKEN: Exemptions are a way of addressing this issue. If I'm going to come off E119, which I think is a substantial change from the position we're in, then that's one that we should have approval. You people should have reviewed it and agree that's how we should do it. The Commission should have reviewed it.

We should say we as an agency are going to do this.

I'm not saying it's technically the wrong way to go. I'm just saying it's enough of a change in the way we handle policy.

MR. CATTON: No. I just was trying to understand how you would deal with the exemptions. I think I

understand now. And I think I wouldn't know how to deal with you as a utility now.

MR. McCRACKEN: Well, they do know how to deal with them. That's why we granted 1,600 exemptions.

MR. CARROLL: Let me ask a question to help clarify. You mentioned yesterday, Conrad, that you got requests for exemptions for a utility in trying to bullet-proof themselves to get a license, slathered thermo-lag all over the joint. And then came in and said, well, this particular application is ridiculous. There isn't any fire source in this area.

And you granted them an exemption. And they just abandoned the stuff in place.

Now your rationale in that case was that they didn't need it in the first place. Is that it?

MR. McCRACKEN: I don't think you're quoting what I said yesterday. You may be embellishing something. I think the --

MR. CATTON: I think the slathering was a misuse.

[Laughter.]

MR. McCRACKEN: I don't remember using slathering at all.

What I said was there was one licensee who came in requesting an exemption for thermo-lag. And he had it applied on a safe shut-down cable that was all by itself

running out alone in an area; that if he had asked me for that exemption with no thermo-lag on it, I would have said yes.

That was consistent with my previous-based. But, because he --

MR. CATTON: Yes, I've got you.

MR. McCRACKEN: But, because he had thermo-lag on it, thermo-lag was indeterminate, I said, no, I'm not going to review it now, until we resolve the issue of how we intend to address thermo-lag, I'm not going to do that. I won't grant that exemption.

But there was no slathering involved.

[Laughter.]

MR. CATTON: But, if you took it off, it would be okay.

MR. McCRACKEN: If it had not been on when he came in and asked for the exemption, I would have granted the exemption.

MR. SHACK: And if option 1 was in place, if you decided how to handle the thermo-lag problem, you would have approved it.

MR. McCRACKEN: Absolutely. Under option 1, they'd come in and I'd say, Yep, you've got your exemption.

MR. WEST: I'm going to sit down, but one of the things I brought for you this morning is a letter we wrote

to NIST last year, where they had the feeling one of their scientists, that we were basing exemptions and doing reviews based just on fire load. The concept I discussed up here.

And that letter describes what the exemption process is, how we look at exemptions, the things we look for, and just -- that may give you a good understanding of what we go through. It's probably the best documentation of what exists conceptually of what we do.

MR. MICHELSON: I have a somewhat different question I'd like to ask, since I'm still puzzled by it. And that is you do a three-hour test, and let's assume that it passes the three-hour test. That's one test.

How many more three-hour tests of a similar nature must I perform to say that I really have passed it?

I only got a sample of one. Now the statisticians and the PRA people go through all of this. I think we'd be hard-pressed to say a sample of one is adequate for PRA reliability purposes.

MR. McCRACKEN: I do not disagree at all with your statement. What you have to do is you have to look at the entire body of tests that have been conducted, not just any one test.

The entire body of tests as of now is around 50 tests have been conducted, say, on thermo-lag.

MR. MICHELSON: Of similar geometry, and so forth?

MR. McCRACKEN: Yes, over the last --

MR. MICHELSON: The same similar geometry, and so forth?

MR. McCRACKEN: over various geometries, but the intent was to get all the geometries you could get.

MR. MICHELSON: But you don't have 50 of a given geometry. You have got 50 of a --

MR. McCRACKEN: Oh, no.

MR. MICHELSON: -- variety. Maybe, only one of a given geometry --

MR. McCRACKEN: Right.

MR. MICHELSON: -- depending on what --

MR. McCRACKEN: I believe there are sufficient to draw conclusions from most configurations. However, there are still some configurations that we know have not been tested.

You were talking about some of them yesterday. Some of the wall enclosures.

MR. MICHELSON: Even, say, good statisticians might question 50 as an adequate sample of this kind of a problem with that kind of diverse --

MR. McCRACKEN: We're not trying to do it statistically. I mean, obviously, you can't.

MR. MICHELSON: No. No way.

MR. McCRACKEN: If you're trying to do it

statistically, you never get done.

MR. MICHELSON: If you're going to do a performance base, you've got to go back to PRA and statistical, and all the other things. And you're going to do that --

MR. DAVIS: They're not recommending the performance-based option.

MR. MICHELSON: No, no. I say option 4. Their option 3 is getting to performance base, as will the rule be a performance-based option 4.

And if you go to option 4, all of these questions have got to be raised. They're a lot of issues that -- no matter which way we go, there are a lot of issues to resolve.

MR. WEST: Is Alex going to come up?

MR. CATTON: Yes, but I think, Mr. Chairman, could we have a 12-minute break?

MR. KRESS: Let's see. We have a presentation by NEI? And we're scheduled for a break at this point right now.

Why don't we go ahead and have the 12-minute break, and come back here at 11 o'clock.

MR. CATTON: Good.

[Recess.]

MR. LINDBLAD: Let's get started again. Ivan,

would you introduce the next topic?

MR. DAVIS: I just want to remind members that they have in front of them a trip report that I prepared from the Manchester meeting on thermal reactor safety. That's all I wanted to say.

MR. LINDBLAD: Okay. Thank you.

Ivan.

MR. CATTON: Alex.

[Slide.]

MR. MARION: Good morning. My name is Alex Marion. I am a manager in the Technical Regulatory Division of the Nuclear Energy Institute.

The material that is being passed out to you is essentially the same as was presented to the subcommittee yesterday. I don't intend to go through every slide, but the information is there for your use and understanding.

If you have any questions, please feel free to ask. But I will blow through this material quickly to get to the resolution strategy that we have developed.

I think it is important to stress the fundamental objective of the test program the industry had undertaken originally through NUMARC and continues to pursue through NEI.

With the NRC declaring Thermo-Lag test reports indeterminate, utilities cannot essentially take credit for

those reports to demonstrate a one- or a three-hour fire rating to comply with the regulation. So, consequently, we had to reestablish the performance capability of the material in a fire environment and we used the ASTM E119 curve that was discussed this morning.

From the standpoint of plant safety, with the utilities implementing compensatory actions in the form of fire watches or enhanced detection that are acceptable to the NRC. That essentially addresses any potential safety concern.

[Slide.]

MR. MARION: I am going to skip on to slide number 6, which essentially touches on the results of our Phase I testing. We had two phases in our program. Phase I essentially tried to demonstrate acceptable performance using designs developed by the manufacturer of the Thermo-Lag material. And the results are summarized in slides 2 through 5.

Essentially, the bottom line results from that phase of the test program was that a reasonably good understanding of what contributed to the failures or from the standpoint of the construction attributes of the test assemblies. But you need to keep in mind that when we refer to a base line configuration, that base line is established on -- as a result of a survey we had undertaken of utility

installation techniques. And we essentially captured the worst case installation technique in our test program to be conservative in that regard.

So we effectively minimal material thicknesses as well as some of these other construction attributes, which are identified in that package of material.

The lessons learned from the exercise we integrated into the Phase II testing program that I am going to get into a little more detail on in a few seconds.

[Slide.]

MR. MARION: Going on to slide 7, this captures the results of the one-hour nonupgraded or base line fire barriers, if you will. And you can see clearly a number of these installations exceeded 20 minutes. Many of them in the range of 39, 48 and 50 minutes and even an hour for boxed conduits. This is the worst case installation base line.

[Slide.]

MR. MARION: For a three-hour base line, this is the -- this slide which is number 8 represents the duration in terms of thermal performance and you can see clearly exceed the one-hour from 63 minutes on to 102 minutes in some cases.

MR. CARROLL: What happened at 63 minutes?

MR. MARION: The temperature --

MR. CARROLL: The thermocouples had the --

MR. MARION: Yes, the single point temperature reading.

MR. CARROLL: Had reached what?

MR. MARION: The 325 degrees plus ambient. Whatever it was specifically for that test, I don't know off the top of my head.

MR. DAVIS: At the cable surface?

MR. MARION: I would have to check the test report to specify which thermocouple was.

But the reports have been developed and sent -- forwarded to the NRC as well as to industry.

And I might want to add during our discussion yesterday, there was a request for a couple reports of ours. There were some questions raised relative to the combustibility testing and the results of that testing on the Thermo-Lag material. And I have provided to Doug Coe a copy of that combustibility report with an addenda as well as representative a test report on a 36-inch aluminum tray as well as a test report on a range of conduit sizes.

[Slide.]

MR. MARION: Other results of Phase II, one-hour configurations that were upgraded. We were able to demonstrate acceptable performance for these types of assemblies, essentially building on what Steve West

indicated this morning by the addition of stress skin and trowel-grade material on the joints because it was clear that failures at the joints were extremely significant. But the simple addition of stress skin with trowel grade appears to be a reasonable fix for that sensitive area.

MR. CARROLL: So in general, Alex, when a 3/4-inch conduit failed, at 63 minutes reached this magic temperature, you could correlate that with a joint failure?

MR. MARION: No. With a conduit, the thermocouples are inside the conduit and the application of Thermo-Lag around the conduit is with two C-sections or half-round sections. Where this material is preformed into a C.

MR. CARROLL: All right.

MR. MARION: Was that a baseline? I don't recall.

MR. CARROLL: Yes, it was a baseline. I was just picking an example but yes, it was a baseline.

MR. MARION: But I encourage you to look at the test report that we have because for the conduit assemblies that are in that one that goes through all that particular detail.

MR. CARROLL: Well, how about a cable tray then? Was in general the thermocouple location, was it --

MR. MARION: Let me -- I'm trying to go through this quickly and there were things I mentioned yesterday

that I am trying to blow through today for the sake of time, but let me touch on it.

Last time we spoke before this committee was in December and one of the points of contention between industry and the Staff was the location of the thermocouple underneath the cable tray rungs.

We agreed to install the thermocouple right below the cable tray rungs for the purposes of developing engineering data, just to ascertain whether or not it makes sense to make your go/no go decision relative to pass-failure criteria of the assembly on the bottom thermocouple or other thermocouples.

For our test assemblies we found in Phase 2 that absent a structural failure or an opening underneath the cable tray to recognize the fire source in the oven is coming in from the bottom and again it is recognized the joints and the way you protect the joints is very critical and if you develop an opening during the course of the tests then that bottom thermocouple will pick up that opening immediately.

On the order of six to eight minutes afterwards, based upon our data, the side rail temperatures, the thermocouples on the side rails of the cable tray, will pick that up. As long as the structural integrity at the bottom is maintained, the side rail thermocouples dominated the

thermal performance.

MR. CARROLL: No, no. That wasn't what I was getting at.

MR. MARION: Oh, okay. I'm sorry.

MR. CARROLL: What I am really getting at was in general is the fact that you reach an early magic temperature limit the result of a structural failure?

MR. MARION: It's a combination. In some of the installations where you have a broad tray span, you get the material under its own weight is going to sag and stress the joints because this material on the fire exposure is going through a changing state.

MR. CARROLL: And is that where the --

MR. MARION: Yes, for large installations. Now if you can reinforce that joint, you can have a successful test but not in all cases were they structural failures.

MR. CARROLL: All right, thank you.

MR. MARION: All right, now this --

[Slide.]

MR. MARION: -- this Slide Number 10 lists some of the key construction attributes that we have learned quite a bit about and have been able to develop configurations that will effectively survive the one-hour rating, et cetera, but just keep in mind that our baselines are the most conservative case.

All of these attributes are adequately addressed to a level of detail in the application guide. Now the application guide is a key document relative to capturing the essence of the test program results and communicating that to the utilities so that the utilities can begin to do their assessment of the test program results to their installations and conclude whether or not they are bounded and if they are not bounded, exercise some other options and I will get into that in a little more detail later on.

[Slide.]

MR. MARION: The next couple of slides just basically capture the content and the schedule of activity relative to the application guide, but let me just take a moment and indicate that the application guide will include all the testing that has been conducted under our program as well as the testing of TU and TVA and other utilities as well, should utilities decide to progress with that testing.

MR. SHACK: Question -- on the one-hour barriers which everybody seems to agree that you can upgrade if you find the joints, you mentioned yesterday that sometimes it wasn't too easy to find the joints. Do you have any idea of what fraction of the time it will be possible to identify the joint and what fraction of the time it's going to be impossible?

MR. MARION: No. I don't have that information

and the position that we are taking with the utilities is if through a sampling process at a minimum you cannot establish definitively what your baseline configuration is, then assume the worst case, okay?

In other words, if you can't demonstrate what you did to the joints, then put on some stress skin and trowel grade material. Go conservative.

That is what basically the position that we are taking --

MR. CARROLL: Is anybody looking at nondestructive techniques to find the joints?

MR. MARION: There are no nondestructive techniques that we are aware of to assess the joints or any configurational aspects of this material.

You will recall from that picture yesterday, and I think I have an overhead here that captures it, that this material --

MR. CARROLL: If there is a discontinuity at the joint it would seem to me ultrasonics might --

[Slide.]

MR. MARION: Yes, that's basically what it looks like and you have to recognize that in utility installations at these corners and joints and even in the panel sections going horizontally here in this graphic, the utilities apply trowel grade material and if they don't have some kind of

construction detail that indicates there was stress skin or they pre-buttered the joint or what have you, they have no way of knowing.

What we are suggesting is you may want to do a sample if you don't know. Just open up some of these and see what is there and draw your own conclusion and absent that, go worst case.

MR. MICHELSON: Didn't the procedures generally call for field installation though?

MR. MARION: They vary. They vary. In some cases --

MR. MICHELSON: I'm surprised there was an engineering drawing of exactly where to put the joint and so forth on something like this.

MR. MARION: In some cases utilities know exactly what they did and in other cases they just had a general installation diagram that was used to cross the spectrum of installations.

[Slide.]

MR. MARION: Let me just indicate very briefly that in December of last year we formed a working group to address some of the policy level questions that were before us in terms of the extent of coverage across the industry for all installations or some percentage that is reasonably close, and how much value you are going to get by expanding

the program to pick up another two or three utilities, et cetera.

We felt that we needed some executive level leadership and guidance, so we formed a working group in December chaired by Bill Cavanagh, Carolina Power and Light. Co-chair persons are Don Hince from Entergy and Oliver Kingsley from TVA.

The fundamental objective of the working group is to help us with the resolution, short-term and long-term, of three issues, if you will, all within the umbrella of fire protection, the first being Thermo-Lag. The second being similar concerns with other manufacturers and materials. That's the point I couldn't recall yesterday. Lastly is the petition for rulemaking effort in terms of the more broader improvement in the entire fire protection arena.

Now, that working group has reviewed this flowchart from the conceptual point of view and trying to rationalize what are the decision-making elements that one would proceed as they go through evaluating the need for fire barriers. This can be applied to, more obviously, directly to Thermo-Lag installation, but also installations of fire barrier systems of other manufacturers.

Now, briefly, this broad bold darkened arrow represents entry points into the process here, and there are multiple entry points for here and there is one here.

Utility can conclude that the barriers that they identified in their Appendix R program that have been reviewed by the NRC, et cetera -- their fire protection program, I should say -- that they are not going to go back and revisit the basis for installing that barrier.

So they would come into, yes, a barrier is required at this particular point. One option is to reroute the safe shutdown circuits. If they don't want to mess with or apply resources to evaluate the application guide and run through the rest of the process, they can get kicked out at this particular point.

Now, this flowchart represents a number of activities that are being pursued by utilities. For example, the FP&L approach that you heard about this morning and yesterday is basically picking up on a combination of these elements right here.

Quite frankly, this represents in our thinking a combination of Options 1 and 3. The output of this could be adequately demonstrated to support Option 2 in terms of modeling techniques of the actual hazard, et cetera, as well as supporting Option 4.

MR. MICHELSON: You heard our discussion this morning about the kind of tool required to do this kind of performance-based examination. Do you think you will have available in a timely fashion the tools it takes to do all

of this?

MR. WEST: Yes.

MR. MICHELSON: You are working on the tools now?

MR. WEST: Well, for example, the tools that are currently available for modeling techniques, there is an FPA methodology, there is COMBURN and FIVE.

MR. MICHELSON: Are you proposing to change the time temperature curve of E119?

MR. MARION: If Option 2 is recommended by the Commission I think we will seriously consider industry taking the lead on doing that.

MR. MICHELSON: But for this methodology you are trying to demonstrate, are you trying to come up with new time temperature curves?

MR. MARION: Yes, this would support it.

MR. MICHELSON: You are working on that right now?

MR. MARION: No. We are waiting for the Commission guidance to come out clearly on Option 2.

MR. MICHELSON: You think you can clearly come up with what you need?

MR. MARION: If it does -- yes, I personally believe that we will take the lead.

MR. MICHELSON: And in terms of the PRA tools, the statistical tools, and all the other things it takes to do this?

MR. MARION: And a PRA -- you brought up an excellent point earlier in the discussion about failure rates, which is clearly the purity that you want to achieve --

MR. MICHELSON: Got to get it.

MR. MARION: -- but as I understand it with PRA space today, the utilities, in their analyses, want to achieve a mission that takes credit for some of these safe shutdown capabilities and circuitry. They assume that the barrier is functional. They assume that's an adequate barrier.

Now, they can go back to the model and now conclude that the barrier is not there, so that circuit is compromised: what alternate path or capabilities do they have. That's the extent of that analytical tool right now.

MR. MICHELSON: So you would use a failure rate of 1 --

MR. MARION: Yes.

MR. MICHELSON: -- at a certain point in the analysis, and if you show you are still okay, fine. I mean, that's a good way to do it. If you aren't, it is kind of hard to decide where you are at.

MR. MARION: Absolutely. Absolutely. Anyway, through a combination of these efforts, some utilities are revisiting their fundamental Appendix R basis in terms of

their safe shutdown analysis and fire hazards analysis.

These are new techniques that have been developed since the rule was promulgated, but they are techniques that can be used nonetheless, and it feeds into this decision element relative to whether or not you need that fire barrier.

There are some other considerations which we refer to as "soft," if you will, for areas and specific barriers within areas.

For example, you don't need a sophisticated analysis to tell you that if you have Thermo-Lag fire barriers in your cable spreading room, that's important. You have to deal with it. You don't need a model, you don't need a PRA to tell you that. I mean, that should be clear. So these types of considerations would come into this particular block.

Now, the application guide fits in at this particular point, and the position that we are taking with the industry is that the utilities are going to have to conduct this evaluation, and they are going to have to apply resources. Our goal and objective is to make that application guide as useful and friendly from a user point of view as we possibly can so that the utilities can evaluate it technically and draw a conclusion relative to whether or not the test results apply to their particular

installations or not.

If they don't apply, they can go back and sharpen the pencil. We have already identified a couple of instances in our generic program that require additional testing. As we mentioned yesterday, there are two areas. One is a group of five or six utilities that have Thermo-Lag and wall applications, and we are coordinating that testing program.

On a more generic level, there is a group that comes under what we refer to as boxed applications that represents, I believe, on the order of 22 utilities. The working group has recommended that we consider what we can do for that.

From the standpoint of the other elements here, we are looking at the various blocks and trying to reach a consensus on what additional guidance may be necessary for utilities.

But before I elaborate on that further, this represents the resolution alternatives. Let me just go through this briefly. If you are enveloped by the test program in terms of your evaluation of our results, and your conclusion that it indeed is representative of your installation, then you can conclude that the install configuration is acceptable for the one or three-hour basis.

If your fire hazard is relatively low, as we

mentioned this morning, 20 minutes, then -- you see in that slide that we had earlier that if it is one of the installations, let's say, where we attempted to achieve a one-hour success on baseline and it came up 40 minutes, for example, that gives you a two to one ratio relative to the hazard.

The record as we understand it from what utilities has been telling us -- and this is something we need to follow up with the NRC on when they evaluate the exemptions -- but the record indicates that if you got a two or one margin, that may or may not be acceptable and that is one of the things we want to clear up.

MR. CARROLL: I thought Conrad made that clear this morning.

MR. MARION: That's what I just said, I think we need to clear that up and have some further discussion on it because one of the things that has happened in our working group, one of the action items that we have is to consider a framework for exemption activities because what we need to realize is that the rule allows for exemptions, and we cannot discount that element. That is one of the areas we are going to entertain further discussion with the NRC Staff.

Another element is enhanced defense and depth measures. For example, if you have a three-hour barrier

installation -- and we already know that we don't have any data that shows that a three-hour Thermo-Lag installation will meet that rating, but our reports indicate that performances are in excess of an hour. So utility can, in effect, change the rating, if you will, to one hour and the rule allows detection and suppression.

And as we understand it from the discussion yesterday, Conrad McCracken identified some considerations relative to defense and depth and we intend to capture these as well.

From the standpoint of an existing installation and doing a modification, we prepared to try to work on that but we not aware of any other manufacturer that has a material that meets the three-hour rating based on the current acceptance criteria.

There are a couple manufacturers who are conducting tests right now.

In terms of the more vintage acceptance criteria or the more vintage tests, I think you heard correctly from Steve this morning that the Staff is evaluating some of these and I don't know to what extent the utilities can take credit for some of those older tests because we are going back 10, 15 years in time in some cases.

MR. CARROLL: Now you are talking about tests of other materials?

MR. MARION: Yes, that were done years ago.

For example, there are three materials that are predominantly used. The greatest is Thermo-Lag. The second runner is 3M material and the third is Promatec -- if I have that -- Promatec or somebody like that. There were three that are used throughout the industry.

All of them -- 3M has a wide spectrum of test reports and they are reviewing those reports with their customers to see if they have any misgivings or weaknesses in their documentation path in trying to improve it.

MR. CARROLL: So it is at least conceivable that the plants that do not have Thermo-Lag do have a problem with three-hour barriers?

MR. MARION: There is a potential, yes. The action that's been suggested by the NRC Staff in communicating their concerns on Thermo-Lag, they have also -- the Staff -- and please help me out if I misspeak, they sent letters to the other manufacturers posing very similar questions, et cetera, and received some responses and that is part of the evaluation that is ongoing.

We have communicated to utilities that this may be more than just a Thermo-Lag issue; look at your test reports and make sure everything is in order because the NRC is going to come in and ask and that is the position that we have taken.

MR. CARROLL: What is the timeframe for getting that issue resolved?

MR. MARION: Ah -- good question.

The second piece of the mission statement of the working group is to develop a position on other manufacturers' materials and we have a report and recommendation in-house right now that evaluates the performance of Thermo-Lag relative to performance of the other materials and there are differences in terms of the failure mechanisms, et cetera, and that recommendation will be considered by the working group at the next meeting which I am expecting we will have at the end of this month or July.

We will have a position on that in terms of what else we need to do.

We have advised the manufacturers as well as the utilities to ensure to their satisfaction that the test reports that they are talking credit for in regulatory space can withstand today's scrutiny and these are reports that were found to be acceptable 10, 12 years ago or whatever, but people are going to come in and look at them today and just make sure they are solid and you can establish a reasonable basis for the adequacy of those materials.

3M is doing a lot of work in that regard.

MR. CARROLL: Is the protection principle of the

other two vendors different from Thermo-Lag? Thermo-Lag relies on an ablation sort of technique.

MR. MARION: I don't know. I think the NRC can probably answer that question best. It is different, yes.

MR. McCRACKEN: Yes. Thermo-Lag is the only one that is relying on the ablation technique. The others are thermal barriers basically.

MR. CARROLL: Thank you.

MR. McCRACKEN: I would like to make a statement, though, based on what you said earlier.

The reason we feel comfortable in not going at a faster pace on the other materials is we did run some small-scale scoping tests at NIST that we talked a little bit about yesterday. We have seen nothing that tells us that we have a major problem with those barriers so far as the basic barrier material, so we are focusing our resources first where we know there is a problem, and then we will get down to looking at the other barriers.

MR. MARION: Well, anyway, just to quickly conclude, these are the key elements of a resolution strategy to address fire barrier concerns.

We have gone through two iterations with our working group. Second iteration some changes were suggested for adding additional elements in configuring this a little bit differently.

We have had discussions with NRC management on this and we will continue to have discussions with them as we finalize the strategy and this is what we will communicate to utilities for the process thinking if you will in evaluating the adequacy of their barriers.

That concludes my presentation and for those of you who heard it yesterday, please bear with me for being so expeditious but there are a couple points I would like to make.

MR. CARROLL: Do you happen to have in your bag of tricks a picture of one of those assemblies as it came out of the furnace, just for the benefit of those that weren't there?

MR. MARION: There were outstanding pictures in the test reports but I do have a graphic that we have used before and let me show that. I don't know how clear that is going to be.

MR. CATTON: But they are not colored in the report --

[Slide.]

MR. MARION: This is the one -- you remember that one picture yesterday that showed the separation? All right, this is from a cable tray. This is underneath the tray and here is the separation and in that photograph you could see the cable in this general area.

MR. CARROLL: Icicles hanging down --

MR. CATTON: This is the slathering you were talking about.

MR. CARROLL: Those icicles hanging down are melted fiberglass.

MR. MARION: Yes, for those of you -- and possibly some water, too -- for those of you who are Alien fans, that may look familiar if you orient it the other way -- from the movies?

But in the test reports there are very good photographs that have been reproduced and I urge you to look at those.

MR. MICHELSON: Now this stress skin was carbon steel. What happened to the stress skin on the outside?

MR. MARION: On that one this was a baseline test if I am not mistaken.

MR. MICHELSON: It was not stress skin on it?

MR. MARION: Right.

MR. MICHELSON: What happens when you do have a stress skin on the outside?

MR. MARION: That doesn't occur.

MR. MICHELSON: No, but what happens to the stress skin? Is it all intact? Is that what you are saying?

MR. MARION: Oh -- if it was on this one and it separated?

MR. MICHELSON: No, no -- a typical, time and temperature curve exposure. Is it still there at the end of the test?

MR. WEST: Steven West. It is still there but it is significantly -- remember, the stress skin is on the outside of the three-hour barrier and at the end of three hours they are significantly degraded.

It can come apart through the development of the char layer, which would put stresses on it and it weakens in the heat and it can come apart, but it pretty much still maintains the shape of the barrier.

MR. MICHELSON: It gives you some indication of temperatures in that region because of the material you have -- carbon steel, I think you said.

MR. WEST: Well, the temperature there is going to be the temperature of the furnace. That is going to be at the three-hour test almost 2000 degrees.

MR. MICHELSON: I just wanted to make sure what it was.

MR. CATTON: What is the sublimation temperature of the material?

MR. MARION: It is in that report.

MR. DAVIS: I thought it was 600 degrees C from yesterday.

MR. MARION: Somewhere, 500 -- 600 degrees F.

[Slide.]

MR. MARION: This is a representation of some of the thermocouples. What we did on Phase II is we maintained these two thermocouples, bare copper conductor coming at you this way. And every six inches you have a thermocouple. On top of the cable, underneath the cable, we also added that bottom thermocouple underneath the tray rung. And there was also a thermocouple located on the side rail here and here. And as I indicated earlier, this is where the leading thermal indicator occurred absent a breech at the bottom. If you had a breech at the bottom, of course, the bottom thermocouple would kick in.

Just quickly, a point of clarification on the NIST tests. As Conrad just indicated a few minutes ago, there were small-scale investigatory tests of other manufactured materials but there was also a full scale test of Thermo-Lag in trying to replicate some of their vintage test reports. I just wanted to clear that up, because they are kind of apples and oranges.

Also, the only other point I want to make is we are going to submit the petition for rulemaking. One of the questions that we will consider is the overall benefit given the institutional nature of the fire protection programs at utilities, but we are going to submit that rulemaking. And as that SECY indicated, the approach is to allow utilities

to voluntarily commit, if you will, to the new rule of whatever form that's going to take.

So that option will exist to stay with the status quo in terms of the regulations if you're comfortable with it, or move on to a new regulation.

MR. CATTON: Yesterday, you were a little bit indecisive when we asked the question about the rule. Today, you are positive.

MR. MARION: I was focusing on the concern about the benefit to be had by --

MR. CATTON: That was a separate question.

MR. MARION: That's what I was reacting to.

MR. CATTON: But you will -- you are going to go forward?

MR. MARION: I have two people working on it right now.

MR. DAVIS: What is your schedule for submittal?

MR. MARION: September.

MR. CARROLL: You are going to submit the rule. Good. There is no possibility that when your working group looks at the implications of having such a rule in terms of what's needed to support it that they may not find it meets the benefit cost?

MR. MARION: Let me just take a second. We used an ad hoc advisory committee in the fall of last year to

develop the general framework of the structure of the new rule. And that's what we have been working with and building upon. We had some discussions with RES staff on it as well.

We had provided a copy of that to our working group and had there been any serious concerns, they would have been identified by now. But, as we finalize the package before we submit it, we will review it thoroughly with the working group and I don't have a sense that they will suggest that we not submit it.

MR. CATTON: And shutdown fire is not included in it?

MR. MARION: At this particular time, we are not including it because --

MR. CARROLL: But it will be when you submit it?

MR. MARION: Let me just explain.

MR. CATTON: It may be when we get through with it.

MR. MARION: It's our understanding -- it was our understanding that the NRC was pursuing a separate rulemaking. And that, of course, complicates the situation. But up until these recent discussions on shutdown, we haven't -- we were not addressing it and will seriously consider it at this point.

MR. CARROLL: Have you talked to Tony about all of

this?

MR. MARION: Yes, Tony's -- Tony used to work for me. Yes. I have. I talked to him this morning, as a matter of fact.

MR. CARROLL: I guess I would say that the rulemaking, in the words of our departed colleague, David Ward, sounds good when you say it fast. It may not be as good when you try to carry it out.

MR. MARION: Based on what we've done, without getting into a whole lot of specifics, there is a lot of benefit and areas for improvement from the current regulation because a lot of resources are being applied on the technological aspects of fire protection as it existed when the rule was promulgated and technologies have advanced. So as a very minimum, if we can bring that regulation up to current approaches, I think that will give a tremendous benefit to everyone, not only the regulators but the utilities as well.

MR. CATTON: It should make the whole process more scrutable, too, and I think that is worth something, at least to me.

[Laughter.]

MR. CATTON: Thank you, Alex. I would like to thank the Staff also for their participation and I turn the meeting back to the Chair.

MR. KRESS: At this point then, I propose to do a first reading. So we can close the meeting -- close the record, I mean. We don't require the reporter for this.

[Whereupon, at 11:40 a.m. the hearing was recessed, to reconvene at 1:00 p.m. this same day.]

AFTERNOON SESSION

[1:03 p.m.]

MR. KRESS: We are now moving to the part of our agenda which is after lunch, and it is the proposed revisions to the license renewal rule. The subcommittee chairman is William Lindblad. I will turn it over to you.

MR. LINDBLAD: Thank you.

I am quickly going to look back and see if we have staff support for this.

MR. CARROLL: We do.

MR. LINDBLAD: Good. As we segue into -- this is Tab 4 on your binder reference material, and it deals with the license renewal rule which is Part 54 of the agency's regulations, and you will recall that we had meetings on this about a year ago, and part of the meetings reflected on the new vocabulary that came out of the rule, and new programmatic considerations.

You will recall that former Commissioner Curtiss, or at the time Commissioner Curtiss, wrote a letter about some of his views just before leaving the Commission which seemed to reflect some of the committee members ideas as well.

The staff has undertaken to look at all these thoughts and considerations and is now preparing to invite public comment on some revised views of this, and Mr.

Newberry is going to present this.

Mr. Travers, are you going to make the presentation?

MR. TRAVERS: Yes.

MR. LINDBLAD: Thank you.

[Slide.]

MR. TRAVERS: Good afternoon. My name is Bill Travers of the staff. As Mr. Lindblad said, what we have recently done in the license renewal area is to submit to the Commission several proposed revisions to the existing Part 54 rule in SECY 94-140.

I have given you a set of handouts. Basically we want to cover what is on this table of contents, and I am going to cover through principal changes, and then Steve Reynolds is going to talk to you in a little bit more detail about how the integrated plan assessment under the proposed revisions would work. Also discuss any time limit and aging analyses, and the standards for issuance of a renewed license, and lastly I give you a feel for the schedule that we are on for completing these proposals to the Commission.

[Slide.]

MR. TRAVERS: By way of background, we have had a chance to brief the committee in the past. Most recently, I think it is last January we were down here after having had a public workshop and after having provided the Commission

with staff views and recommendations that we thought proposed revisions to the rule were warranted given some of the interactions we have had with industry and some difficulties they perceived in connection with the existing rule.

In February of this year, the Commission agreed with our recommendations ostensibly and directed the staff to go forward and develop a proposed rule. So we have had about four months to do this. It has been a very tight schedule. We have based what we have done in this package on Commission directives, on our recommendations, and we have had to institute a fairly unique process in getting it done in four months. We have utilized a team effort made up of senior staff people from the Office of Nuclear Reactor Regulation, from the Office of General Counsel, and from the Office of Research in connection with the line management and NRR and, lastly, directed by a group of senior managers who we had opportunities every week or two weeks to go before and present issues.

The principal reason for this was to get them resolved quickly. We didn't have the time and luxury to take months or even multiple weeks to resolve key issues.

This senior steering group was headed by Bill Russell, Director of NRR, and included Jim Milhoan as a Deputy Executive Director for Operations, Jack Heltemes from

the Office of Research, and Marty Malsch as the Deputy General Counsel.

I think it worked well, frankly. We succeeded in meeting a very tight schedule, and we are going to be briefing the Commission tomorrow.

MR. SEALE: Mr. Travers, could I ask a somewhat related question?

MR. TRAVERS: Yes.

MR. SEALE: A little later on we are going to talk about a letter having to do with the proposed modification in the rulemaking process that talks about the use of this senior steering group approach. Is that what you have tried to embody here?

MR. TRAVERS: I haven't seen that, so I can't comment on it, but I have heard some discuss the approach we took in connection with this effort. I, myself, am not familiar with it.

MR. SEALE: Have you found that to be very helpful?

MR. TRAVERS: Certainly, in my view is, in this case it worked very well. A key to the success was our ability to resolve issues among Research, NRR, OCG, by having senior managers committed to the effort and our access to them was fairly frequent.

In other words, we drove a schedule for meeting

with them depending on whether or not we had issues and when we had them. So it worked very well.

MR. SEALE: Thank you.

[Slide.]

MR. TRAVERS: Our general objectives in tackling revisions to the license renewal rule are stated h I won't go over them, but basically after having gotten a direction from the Commission to make certain changes, we looked to see if we couldn't optimize in the sense of making the rule more clear and simple and providing flexibility in it, certainly greater flexibility, and we think we have achieved that.

The bottom line to all this is, we think that what we will have by virtue of the first three objectives being met, or if they are met, is a more stable and predictable process under which the industry can judge whether or not and what circumstances would drive their application for renewal.

[Slide.]

MR. TRAVERS: We have made a lot of changes to the rule, but what I would like to touch on first is areas where we think the rule has not changed, and our view is that although we have made a lot of changes that certainly the fundamental and underlying regulatory principles, as they are delineated in the existing two principles of license

renewal have not be changed.

Most importantly, we think that the first principle which essentially states that aging, aging in the extended period of operation, was the issue in Part 54. We believe that is still the issue, the exclusive issue for the proposed revisions that we have submitted to the Commission.

Except for the possible detrimental effects of aging in the extended period of operation, we believe that the regulatory process continues to ensure that a plant-specific licensing basis will continue to provide an adequate measure of safety for a plant.

So this was the fundamental principle that the existing rule was founded on, and we think we have retained that concept. As a result, we think the license renewal process needs to be and must be focused on ensuring that the effects of aging will be managed for plant equipment which may not be adequately addressed by current programs and activities for the extended period of operation.

Maintaining the current licensing basis in the face of aging effects is really what we are going to be tackling in license renewal. And it is the second principal license renewal, and it's retained again in this revision.

MR. LINDBLAD: I'm not so sure I understand what that statement means and why it becomes a principle.

Is that a new principle are you saying?

MR. TRAVERS: It is not, no. We think -- well, it is. These two principles are the principles that were the underlying regulatory foundation for the way that part 54 rule is crafted.

In other words, the Commission, in promulgating that rule, established aging, aging unique to the period of extended operation, as the issue that needed to be evaluated in connection with the renewal review application, staff review, hearing and the findings the Commission would make.

All other issues, issues that are normally addressed when we initially license a plant -- whether it be emergency planning, operating license, what-have-you, design of the plant -- would have been addressed at the time the plant was initially licensed.

And that the continuing regulatory process, which is dynamic to CLB's continuing as a living and evolving thing through 40 years of operation will continue to maintain an adequate measure of safety.

So the Commission used this argument in establishing an exclusive focus on managing aging in the extended period of operation.

This exclusive focus on the effects of aging only in the extended period of operation was the conceptual basis for the existing -- the current rule's use of the term "age-related degradation in license renewal."

And that term has been deleted in our revised rule.

ARDUTLR, which is the acronym for age-related degradation -- license renewal, was intended in part 54 to focus the review -- focus it on aging, unique aging in the period of extended operation.

And what we found through some experience of course was that it didn't work very well. In fact, this term, as it was used in the rule when we went to implement it in some of our work with some of the industry groups, created a great deal of confusion.

And as a result, in addition to approving the staff recommendations that were contained in Secy 93-311 -- I'm sorry -- 331 -- the Commission directed that this term, ARDUTLR, be eliminated from the rule.

And we've done that. We've made a number of other conforming changes along with it. And we think that we've done it in a way that removes the confusion that has surrounded the use of this term in the rule.

The next slide lists some additional things that have been retained in our revisions, some of the provisions that are currently applicable in the current part 54 rule.

And, fundamentally, the rule is centered around the conduct of an integrated plant assessment. We've talked about that in briefings of the Committee before.

It's really the heart of the rule. The rule remains a process rule rather than one that specifies technical criteria within it. It requires in the context of carrying out an integrated plant assessment a rather broad, at least a beginning broad, evaluation of plant equipment.

But, it provides mechanisms which quickly focus. And we think, as a result of these revisions, even more quickly focuses the review to a very select set of equipment for which we think the renewal review should focus.

The initial scope of the renewal review is essentially identical to part 54. It includes safety-related equipment, equipment whose failure could affect the function of safety-related equipment, equipment required for compliance with certain regulations, such as fire protection, EQ, PTS, ATWS -- station blackout, and equipment subject to technical specification limiting conditions for operation.

So the same scope of equipment that would have been the initial starting point for the conduct of the integrated plant assessment is retained in this revision.

Additionally, the revision includes and requires a review of certain time-limited aging analyses. In addition to the integrated plant assessment, the revision requires that where time-limited aging analyses were relied on for safety conclusions by the licensees, particularly time-

limited aging analyses that were bounded by 40 years -- the current operating term -- that these be revisited, reevaluated and rejustified for the additional period of the requested extension.

Together with the results of the environmental review under part 51, the basis for the issuance of license would continue under this revision and be focused on both the results of the integrated plant assessments and the results of the conduct of the review of the time-limited aging analyses.

[Slide.]

So those are the principal elements of the current rule that have been retained by virtue of what we've done in preparing this revision.

I'd like to touch now on the principal changes that we've made. The first change is an important one. I had a chance to discuss it with the Committee the last time I was here. And it's meant to clarify and to correct some inconsistent language that exists today in the statement of considerations, which emphasizes the review based on a mechanistic approach.

That is, the identification of specific aging mechanisms versus an approach for review that would focus on aging effects, and the assurance of performance or condition of important plant equipment is retained in the extended

period of operation.

So what we've done in this revision is to clarify and emphasize that performance and condition monitoring, the kind of programs that are actively in place for most plants today, would be an acceptable basis for determining that the function of equipment in extended period of operation would be reasonably assured -- versus a specific requirement for detailed identification of aging mechanisms, and a mechanism by mechanism evaluation of why those mechanisms would be managed in any extended period.

The second bullet lists another item that we've addressed before, and that is the question of whether or not a license renewal review which focuses exclusively on assuring functionality of equipment is sufficient in itself to come to a conclusion that the current licensing basis would, in fact, be maintained.

Maintaining the current licensing basis is again the principal finding the Commission makes in the issuance of a license. So it's an important concept. And we have had some discussion about the breadth of the current licensing basis and maintaining it.

Certainly, there are aspects of the current licensing basis which go beyond functionality, operability requirements and quality assurance requirements, and so on.

But, recognizing that all aspects of the COB carry

over into the extended period of operation, and recognizing that our review which would focus on functionality is designed to assure that plant equipment which is needed for safe operation of the plant would be retained functional.

We think that a license renewal review which exclusively -- exclusively -- focuses on this issue of functionality in combination with the recognition that all other aspects of the COB carryover should be a sufficient basis for a Commission conclusion that the COB would be maintained in any extended period.

So we've emphasized that in the statement of considerations.

As I said before, we've eliminated the term, "Age-Related Degradation Unique To License Renewal," and we've eliminated a number of other terms that are in your handout, and which I won't flash out.

But we think, in combination, eliminating a number of these terms should help to simplify an understanding of the rule and how it might be implemented.

[Slide.]

MR. TRAVERS: The most significant change by far that we have made is related to the principal concern industry had with the existing rule and that is that because of the definition of age-related degradation unique to license renewal a great deal of plant equipment would be

brought into the review under Part 54.

A great deal of plant equipment would have to be submitted or at least a discussion of how aging would be managed for lots of equipment would have to be contained in an application.

The Staff would have to review it. The Commission would have to make a finding on it.

As I said before, this has been the biggest concern that we have experienced in our dealings with industry, most recently in the workshop we had late last year or early this year.

The current rule or rather our current revision to the rule proposes to narrow the focus of the renewal review by recognizing that for certain equipment existing activities and the regulatory process, including the maintenance rule, can be relied upon to continue to manage the detrimental effects of aging.

Where in Part 54 we would have expected fairly easy justifications based on existing programs this rule establishes generic credit for certain equipment which is currently covered by programs which, when you think about it, should be as applicable and as effective in any extended period.

So we are taking on a burden in this rulemaking of establishing that for certain equipment, namely equipment

that is active, long-lived -- I'm sorry -- active, short-lived, relatively short-lived, and redundant, that that equipment is already covered or it need not be the subject of the license renewal review and the equipment that is passive, long-lived, and nonredundant really ought to be the focus of our attention, our review for license renewal.

One thing I should mention is that the statement of considerations recognizes that as we get additional experience with aging and its management for passive, long-lived equipment, and as we possibly develop regulations that may address requirements for managing aging that the scope of the license renewal review could be further reduced.

Right now this is a fairly conservative approach that recognizes for certain equipment that the effects of aging are less readily observable, that our experience is relatively minimal for long-lived passive equipment, so it focuses the review down to that rather small set of equipment at least relative to what the original rule would have required.

[Slide.]

MR. TRAVERS: That narrowing of the focus is really the key issue that is addressed in this rule.

Once you establish a rule that provides categorical exclusion for all active, relatively short-lived and redundant equipment, you have managed to reduce

the set of equipment that is subject to the license renewal review.

The benefit of that of course is it allows you to focus on the equipment and put your resources on the review of that equipment that gives you the most pay-back in terms of establishing for any extended period of operation that the functionality of that equipment can be reasonably maintained.

Some other aspects of the rule that we have changed is that we have simplified the integrated plant assessment.

Steve Reynolds is going to be talking about this in some more detail but a simple measure of how we have simplified it is once it was six steps and now it is three, but that is too simple.

Fundamentally what we have done in the integrated plant assessment is to allow for flexibility on the part of an Applicant to assess how they are going to quickly focus, how they are going to identify the passive, long-lived, and nonredundant equipment.

Previously the integrated plant assessment was very prescriptive. It laid out a step by step, ordered procedure that had to be followed rather prescriptively and the changes that we have made within this process are to provide flexibility to arrive at a rather significantly

smaller set of equipment that becomes the focus for license renewal.

[Slide.]

MR. TRAVERS: One example of what is not required in carrying out the integrated plant assessment is a listing of all structures and components that are within the scope of the renewal review, so previously you would have had to establish a great detailed list of equipment that ultimately might get screened out. Right now the integrated plant assessment would have you focus and identify what becomes the set of long-lived passive, nonredundant as opposed to going through a lot of intermediate steps which are labor intensive.

Another thing we have done is to reduce the amount of information that would be compiled and submitted as part of the FSAR supplement.

Previously, under Part 54, the entire application would be submitted as part of an FSAR supplement. The proposed revision however would only establish the requirement for a summary description of the results of the integrated plant assessment and time limited aging analysis. We think this is more consistent with the kind of information that is in FSARs today.

It does vary, certainly, but we think that the current rule's requirement to have all of this information

provided in an FSAR supplement creates a number of burdens.

One of them is on the periodic updates that would be required. Any changes would have to be run through a process that probably isn't justified under the -- it would be inconsistent with the current processes and the type of information that is contained in FSAR supplements.

We think it is more consistent with current practice to reduce this information considerably and we have done that.

[Slide.]

MR. TRAVERS: The last thing I want to touch on before Steve goes through in some more detail the integrated plant assessment is that we have greatly reduced, essentially eliminated special reporting and the control requirements associated with the information submitted in the application.

Part 54 establishes its own reporting and control administrative mechanism for the information that would have been submitted and rather than create a new set of administrative requirements, what we are going to do within this revision is rely on the existing regulatory process to control this level of information.

We have the capability where we judge a piece of information so significant to make it a license condition or a technical specification and we would do that in any case

where a particular commitment relative to managing aging in the expended period is so significant and we think that the current process affords us enough control that we need not establish a separate and new one within the confines of Part 54.

With that I am going to turn it over to Steve Reynolds, who is going to give you a little bit more detail on the integrated plant assessment and time limited aging analysis.

MR. DAVIS: Excuse me. I have a question.

I was in a conference recently and learned that the United Kingdom is doing quite a bit of work on aging research and they are now getting some age on their reactors. Exactly.

I realize the designs are quite a bit different, but one of the things they are looking at in quite a bit of detail is concrete aging.

Are you aware of that work and taking advantage of it?

MR. TRAVERS: Yes. We have been interacting with NII on the work they are doing in both this process realm and in some of the technical realms as well.

I will be available throughout the briefing. So if it is convenient, we will go through Steve Reynolds's presentation.

MR. WYLIE: I believe as part of the NPAR program, concrete was looked at and there are some NUREGs out and some DOE documents out on concrete aging.

MR. REYNOLDS: I guess I will introduce myself a little bit. I am Steve Reynolds, but more importantly I was -- I guess I still am -- I am the leader of the licence renewal working group. We were the staff that actually wrote the rule and the statement considerations and the commission paper that you see before you.

[Slide.]

MR. REYNOLDS: What I plan to do now is to talk about some of the specific changes that we made to what we think is the heart of the rule. What we consider the heart of the rule in our case is integrated plan assessment which I'll talk about, this slide and a couple others.

We also have a section, the rule on time-limited aging analysis. And then, to follow that up to be consistent with these changes, also talk about the finding, how we changed the finding to be consistent with these changes.

Bill talked about simplifying the rule. This first step here used to be three steps and it was very prescriptive. You had to do step one and then step two and then step three. We simplified it. We think we can lead in it with just one step and this one step is just what we need

to review. And that is those systems and structures that we feel need to be -- excuse me, those structures and components that need to be reviewed for aging for the period of extended operation or for license renewal.

Giving credit for the maintenance rule and existing maintenance activities and programs we've got going on, we decided -- determined what needs to be reviewed for license renewal are structures and components that are passive and long-lived and nonredundant.

MR. KRESS: You are using that "and" and it is that it has to meet all three of these?

MR. REYNOLDS: Yes. Those are the ones that we think need to be reviewed.

MR. KRESS: Not just passive. But it has to be passive and long-lived and nonredundant?

MR. REYNOLDS: Those are the things that we need to look at. One of the flexibilities that I was going to talk about earlier but I'm glad I can go ahead and talk about right now is if the licensee only wants to determine what's passive and describe all that, that's fine. Or if they want to tell us what's passive and long-lived, that's fine. Or if they want to screen and tell us what's passive, long-lived and nonredundant. As you keep adding those ands, the scope gets smaller and smaller. With our language, the way you interpret it, we allow you some flexibility.

For some licensees, it may be easier to not go through the process of determining what's redundant and what's nonredundant. So that's one of the flexibilities we've added.

Again, we think we've added some simplicity here. Like Bill said, it would require three different lists. In the old rule here, it just says one list of what's passive, long-lived and nonredundant.

[Slide.]

MR. REYNOLDS: The next couple of pages, I try to describe what we consider as passive, long-lived and nonredundant. Again, you know, realizing where we came from and processes and experience we've learned, we decided to give maximum credit to the maintenance rule and the existing maintenance activities. So we can exclude from our review, plant-specific review, active equipment. But we need to focus on passive.

The reason we think we need to focus on passive is that passive equipment, they don't readily reveal the effects of aging based on the current condition of monitoring programs that currently exist out in the plant.

One of the things we decided to do with the terms "passive", long-lived and nonredundant is not use them in the rule. And "passive" is one of the best examples for why we didn't use the term "passive" in the rule.

We did some research, literature research, and came up with 40 existing definitions of "passive." That's various codes, committee standards, committees, international definitions have. And they're all slightly different.

We have reviewed all of them and said, will any of them capture what we really want. And it seemed a lot of them would capture a lot of mechanical equipment but they would miss electrical. Or it would be a good electrical definition but it would miss mechanical.

What we ended up settling on is we used a definition from ANS and we modified it slightly and what we mean now is the equipment that performs its function or its attendant function without moving parts, without a changing configuration or properties. We still recognize that that wasn't maybe as crisp or as clear as we would like it so we actually stuck examples in the rule language to make it even clearer exactly what we're going after. And we also included in the rule language examples of what we are not going after.

In addition to what's up here on the slide, some additional examples of what we consider as passive would be like accumulators, spent fuel racks, equipment hatch, cable trays.

Some examples of what would be excluded or not

passive would be like cooling fans, switch gears, diesel generators snubbers.

MR. MICHELSON: How about electrical cabling?

MR. REYNOLDS: Generally we would consider those passive.

MR. MICHELSON: You are not excluding them?

MR. REYNOLDS: Right. That's passive.

But normally or generally they will get exclusion on the redundant/nonredundant part.

So what I was going to end up here, which is a good point you pointed out, just because it's passive it doesn't mean it has to be subject to aging management review. Again, like I said earlier, if it's passive, long-lived and nonredundant it is subject to review.

MR. MICHELSON: But if you have a nonredundant, then you consider the electrical cabling and wiring and so forth required to support that system are all passive and are considered so under this rule; is that correct?

MR. REYNOLDS: Right.

MR. DAVIS: I need some clarification if you don't mind.

The nonredundant part confuses me because it seems to me like aging effects can be detrimental to redundant equipment also and if you are only looking at nonredundant equipment that seems to me would exclude safety-related

equipment which is redundant; is that correct?

MR. REYNOLDS: Right. In fact, to take it a step farther, aging affects active, it affects short-lived components.

Basically, we think for license renewal, in addition to the current requirements going on today, the current regulatory process we have --

MR. DAVIS: That will pick up the safety-related stuff, the current requirements.

MR. REYNOLDS: Yes. License renewal -- I'm getting a little ahead of my --

MR. DAVIS: I'm sorry. I can wait.

MR. LINDBLAD: It occurs to me that two slides he describes nonredundant. Why don't we hold your question until then.

MR. MICHELSON: My concern is that redundant electrical equipment is not considered for this, and that bothers me a little bit. It's not under the normal things that, you know, those are not actuating every day and moving and everything.

You do, of course, if it faults, you know, but it can be highly-degraded before it finally faults. And then you might even get multiple faults from it.

But, yet, that's not considered. Yes.

MR. NEWBERRY: Scott Newberry is my name.

I might as well comment on that now. It will come up again. Pete asked a very good question, and we'll talk about it some more. But I think what we considered in looking at the experience we had with this rule is that the license renewal rule is not the only place we look at aging in nuclear power plants.

And that the way to get at concerns of aging cable or aging equipment is not solely through the license renewal rule. Discussions with the Committee on EQ and fatigue identified --

MR. MICHELSON: How do you get it on cabling with your present programs?

MR. NEWBERRY: Currently, there's an action plan looking at the environmental qualification of equipment for operating reactors as it ages, prior to reaching 40 years.

MR. MICHELSON: Now, what does redundant versus non-redundant have -- how does that have anything to do with the issue, then? You just simply say we don't work with cable, whether it's a redundant system, or not.

MR. NEWBERRY: During the current term, it doesn't. What we're talking about here are elements of a methodology to focus for license renewal, which is above, I would say, the current requirements.

MR. MICHELSON: Now, what is the rationale why a non-redundant cable is considered to age, but not the

redundant?

MR. NEWBERRY: We aren't saying that it's not considered to age.

MR. MICHELSON: Well, I mean, considered to age in the sense of your program. You will look at the non-redundant, apparently, but will not look at the redundant.

MR. NEWBERRY: For license renewal, that's correct.

MR. MICHELSON: For license renewal.

MR. NEWBERRY: That's correct.

MR. MICHELSON: And what's the logic for that?

MR. NEWBERRY: The logic is largely the importance in that it is not backed up by redundant cable, and that realization that the rest of the current licensing basis will be carrying over into the extended period.

If the programs need to be improved for cable, monitoring of cabling, as they age, we need to get on to that now, rather than making it a license renewal issue.

MR. DAVIS: But, it seems to me like non-redundant cabling, it can't be safety-related, or it would have to be redundant.

MR. MICHELSON: Well, I think they're dealing now with these single trains of river water systems that we might flood the reactor with, or something.

That's the only non-redundant ones I know of.

MR. DAVIS: I guess I'm confused.

MR. MICHELSON: I think this is some kind of a system which is only single-train and, therefore, must be a tertiary backup for something.

MR. WYLIE: Have you got an example for it?

MR. NEWBERRY: Yes. The reactor vessel in the containment. I think it was that approach that really was the birth of this requirement.

MR. MICHELSON: We're talking about systems that require wires. What would be an example of a non-redundant system that's safety-related?

MR. NEWBERRY: With respect to the electrical aspects?

MR. MICHELSON: Yes.

MR. NEWBERRY: I don't have good examples for it.

MR. MICHELSON: Well, unless we --

MR. LINDBLAD: Why don't you proceed with your presentation? We may need to revisit this following your presentation.

MR. REYNOLDS: Next thing I want to talk about what we have in our rulemaking is long-lived. Again, here, we're not going to use the term in the rule. We want to be clear exactly what we're going after. We're going to go after the equipment that's not subject to replacement based on qualified, certified or specified time or period.

Specified time period would be before 40 years, and it's based on plant experience, qualified service life, and it's based on some sort of analysis for evaluation that say it's going to be replaced.

Here, again, we're given a generic exclusion, per se, for equipment that is not long-lived. The applicant won't have to describe that to us. They just have to screen in or focus on equipment that is long-lived.

One of the things we considered and we thought not to give a generic exclusion for was equipment that was replaced based on a performance or condition.

And if you go back the reason we're concerned about passive is that passive equipment doesn't readily reveal the effects of aging through existing condition and performance monitoring programs. The logic flows we then can't screen it out based on condition of performance monitoring.

So we said, generically, we can't give you that exclusion if it's replaced on condition with monitoring. However, plant-specific or component-specific applicants will be able to use that. We just aren't comfortable enough today to give you that exclusion.

However, we are comfortable enough today with the process that if you replace it on a fixed interval base, unqualified life, service life, specified time period, you

don't have to consider it.

But, things that are not replaced are within the scope of what we're going to review.

Again, some examples here would be like the vessel, steam generator, pressurizer. And for these types of replacements, we're talking life for life replacements.

Now we'll go back to redundant and non-redundant.

Again, one more time, we're not going to use the term "non-redundant" in the rule. Again, we think using the term would add some confusion, and so not using it would have some clarity.

I want to reiterate here, as I said earlier, that license renewal requirements that we're having in addition to the current requirements that licensee has to meet, remember the second principle -- to maintain the current licensing basis, whatever requirements they have to meet today during the term, first 40 term, they have to continue to meet that.

So we're focusing on those pieces of equipment, those structures and components that we feel need an additional review for an extended period of operation.

MR. DAVIS: Do these have to have anything to do with safety? I can think of a lot of known redundant structures that have nothing to do with safety.

Would they still be included under this

definition?

MR. REYNOLDS: If it comes in the initial scope of license renewal, and we may get some non-safety-related structures and components that could adversely affect safety, those pieces of equipment will come in the initial scope. And those may end up being non-redundant.

Fire protection may be an example you're thinking of. Fire protection we have an explicit requirement as within the scope of license renewal.

So if we have a passive long-lived non-redundant piece of fire equipment, that will be subject to an aging management review for license renewal.

MR. NEWBERRY: I thought of an answer to Mr. Michelson's question perhaps on electrical. The question on the scope prompted me thinking about them.

The third criterion for the scope includes regulations that are judged to be important. And they include not only fire protection, but station blackout and ATWS, where we don't always have safety-related requirements.

And I would think it would pick up perhaps some electrical systems that are not always redundant.

But, the other part perhaps on cable, maybe we can keep it in mind. I think Steve's going to talk about time-limited analysis, environmental qualification for many

plants, although it makes you consider the aging of equipment. Some plants would have to do that for cable.

I suspect they used a 40-year limit in their analysis. That's going to have to be looked at explicitly for license renewal, whether it's redundant or not.

MR. LINDBLAD: Well, I would suppose, if we were stretching to find one, that we could answer Karl's question by referring to the grounding network in the station.

The station grounding network is typically non-redundant, passive, long-lived system. And you could --

MR. MICHELSON: And those grounding lugs have been known to corrode as reported in LER's and cause the whole building to lift a bolt or so --

MR. LINDBLAD: I think I was talking about the buried part rather than the attachments to.

MR. MICHELSON: Oh, I know. Where -- it's where you connect to the buried part they've been having the trouble. Those corroded off, and that is --

MR. LINDBLAD: Well, then they would be called short-lived, wouldn't they?

MR. MICHELSON: Yes, indeed. They did have a short life. Didn't even last four years.

MR. CARROLL: But a bolt or so raises havoc with solid state control systems.

[Slide.]

MR. REYNOLDS: The last two steps are the methodology stuff and then the step where they actually describe their aging management activities.

Again, I think the way wrote the methodology stuff, they just have to describe and justify the methods they used to identify those structures and components that are passive along with nonredundant structures and components that are subject to aging management review. We have added a lot of flexibility there.

The Licensee can choose or develop their own method of how they get from the initial plant, go through a scope of license renewal to that final list which is subject to aging management review. We didn't dictate it in the rule. We weren't prescriptive. We were just interested in the bottom line and the methodology of how they got there to make sure that they captured all the right equipment, so we gave them some flexibility there.

We think in general with these three steps, as Bill Travers said earlier we went from six steps to three steps, adds some simplicity.

We also added some other flexibility like I spoke of earlier. When you are doing your determination of structures and components that are subject to aging management review you can screen on passive first, then long-lived, and then nonredundant or what suits the

Applicant better would be to screen on long-lived first, and then passive, then nonredundant -- whichever way you want to do that.

Leave it up to the Licensee. One way may work better for one Licensee than the other. We are just interested in what the final list is.

Another way we added some flexibility is in the current rule the Licensee will have to describe the equipment that is not subject to further review in addition to the equipment that is subject to further review.

Here we are giving maximum credit for existing programs and the maintenance rule to the point where we are going to give you a generic exclusion per se so that you don't even have to tell us in the application what those pieces of equipment are and what are you doing with them.

We're saying all we want to know about is those passive long-lived, nonredundant pieces of equipment.

MR. KRESS: Is there an implied assumption in this exclusion of redundant systems that redundant systems that age, when they fail they will not fail at the same time?

MR. REYNOLDS: Right. That's part of our assumption. The system has redundancy; you won't have a simultaneous failure, loss of system function due to aging.

MR. KRESS: What do you mean by simultaneous in that? Is there a time frame associated with that like

between inspections or between tests or for these systems?

MR. REYNOLDS: I don't think we have defined that.

MR. TRAVERS: This is Bill Travers again. It's one argument we use. However, in the statement of consideration we recognize that simultaneous failures could in fact occur although they are less likely so the argument in part is based on this less likely expectation of aging effects resulting in a simultaneous coincident failure such that the system or structure failure would be lost.

MR. LINDBLAD: It seems to me that it is implicit in the three descriptors of passive, long-lived, and the like that there is a dispersion in time for failure not prompted by the actuation if it is a passive structure and that its life is long with respect to the operating life of the plant.

MR. TRAVERS: Yes. Scott and Steve have both pointed this out and I have to keep reminding myself and the people I talk to that license renewal and what we are causing to be reviewed for renewal is an additive exercise and it is addi. of the aspects of the current licensing basis th. ntinue to apply, in fact, some new ones that may develop over time.

We are looking now, for example, at adopting IWE and IWL as in the Section 11 requirements, so as we get experience we combine that new experience and the

possibility of new regulations and even backfits.

But all of the regulatory requirements that apply in the first four years would continue so one way to look at what we are doing in focusing the license renewal review is to recognize that in connection with exercising in the most efficient way we can a concentrated effort on that equipment where we suspect the possibility at least that today programs may not provide an adequate level of ensuring functionality.

When we look, we may find that even the programs that exist today for that equipment are in fact reliable enough that we simply accept them for what they are and apply them in the extended period of operation in the same way that they apply them today but what we are doing in the renewal is focusing on what at least has to be examined for the issuance of a renewed license.

MR. WYLIE: Let me ask, the EPRI-URD has a section on the aging management program requirements. Have you examined that? Is that part of what you are referring to here under managing aging?

MR. NEWBERRY: You mean the EPRI Utility Requirements Document?

MR. WYLIE: That's right.

MR. NEWBERRY: That would be used for the standardized designs?

MR. WYLIE: Yes. I mean they have a whole section in there on aging management.

MR. NEWBERRY: I have to say personally I am not familiar with it.

MR. WYLIE: I would think you'd have looked at that.

MR. NEWBERRY: Thank you.

MR. CARROLL: Its applicability, Charlie, of course is to the advanced reactors, not to -- just to the advanced reactors, not to existing plants but there is a lot of good wisdom in there.

MR. WYLIE: It's a good place to start because they go into quite some detail as to how you do this.

[Slide.]

MR. REYNOLDS: The next major part of the rule I would like to spend a couple minutes on is time-limited aging analysis.

Bill Travers said earlier both it is continued from the old rule but it is new in the fact that we highlight it now. In the past it was part of the definition of ARDUTLR. With the deletion of that and trying to be clearer, we pulled it out and put it in as a separate section in the rule. This is the one case where we added a definition to the rule.

Bill spoke earlier and we skipped over the

definitions on page 8 that were deleted from the rule. Here is one place where we think adding a definition makes it clearer.

There appeared to be some confusion about exactly what we meant by "time-limited aging analysis" so we put a definition in the rule that spelled out what we mean. It's those calculations and analysis that a Licensee relies upon to determine their equipment will perform its intended function and it is based on aging effects and it is based on explicit assumptions during the current operating term.

A couple of examples that we consider a time-limited aging analysis in addition to what Scott Newberry talked about, EQ reactor vessel neutron embrittlement is a time-limited issue, and in-service flaw growth, and concrete containment tend to pre-stress are some examples that we have for a time-limited aging analysis.

Some people have asked, well how many of these do we have? So far on a generic basis we have only identified very few. It is not a huge amount of issues. It is just a very small subset.

One thing that we tried to do when we actually put the language in the rule how to do it was you'd have to identify and give us a list of time-limited issues but we are going to give you three ways or give the Licensee three ways to demonstrate that the equipment will perform its

intended function during the period of extended operation.

[Slide.]

MR. REYNOLDS: One of the way is to demonstrate that the analysis that they had for 40 years would remain valid -- is good for the next 20 years if the applicant would choose to go for a 20-year renewal period, or they can redo the analysis, project it out longer. When they redo the analysis, it will be based on a current licensing basis. They won't have to use a current standard that is not part of the licensing basis.

The Fed option that we said would be acceptable to us is if they develop an aging management program for the systems, structures and components that deal with these time-limited issues. We won't necessarily have to redo analysis.

We figure any one of those three or any combination of those three, the licensee can choose whatever best fits their need, we'll allow them to do that.

[Slide.]

MR. REYNOLDS: With the changes that we have made to the rules, integrated plan assessment and time limit aging analysis, we had to change the standard or the finding we have to make.

We deleted the term of ARDULTR. We had to change the finding. We think it is a lot clearer now. It spells

out exactly what we are going to make -- the NRC is going to make a finding on. Those actions that a licensee applicant has made or will make for those structures and components subject to aging and management review, and what actions the licensee has taken or will take for those system structures and components subject to a time-limit aging analysis.

MR. CARROLL: Why isn't systems in the first bullet?

MR. REYNOLDS: What we did is we figured on the focus on just those structures and components that -- it is really when you go from redundant and non-redundant, whose failure could result in loss of system function.

If you look at a system, why we included systems tor a time limit aging analysis is that some time limit aging analysis is on a system basis. We really wanted to focus on just structures and components, but we had to go to system for time limit aging analysis.

MR. CARROLL: I'm happy.

MR. REYNOLDS: We added two new paragraphs to the finding, and those paragraphs are sections -- we added for clarity to say that a current term issue will be dealt with in the current term or as a current operating issue, and will not be a license renewal issue.

We had that question come up several times. We tried to cross some language with the help of our general

counsel's office to say if you come up with the current term operating, it is going to be handled, then current term will not be a license renewal issue.

I think now with the specific changes we made to the rule language and with the explanations and discussions and examples that we have and the statement's consideration, that the rule that we are proposing to go out with is a lot simpler and a lot clearer, while it still was not going to provide a considerable amount of flexibility for an applicant.

We feel that this proposed rule which gives maximum credit for maintenance rule and existing maintenance program and activities will provide the stability and predictability that will allow licensees and potential applicants to determine whether or not they want to come in and apply for a license renewal.

MR. CARROLL: What is the current situation? Are there licensees or owner groups or whatever that are actively following this and indicating that they are going to be submitting applications?

MR. REYNOLDS: I will give you my answer, but we have representatives from NEI who may also want to answer it or clarify any statements I make.

We have been working with several owners groups. In fact, we are meeting with B&W owners group this morning.

Baltimore Gas and Electric has still been involved with us in license renewal. Virginia Power has indicated that they are very interested and they may come in relatively short-term as far as --

MR. CARROLL: Didn't I read that they are not looking for the full 20 years?

MR. REYNOLDS: They have talked about coming in for five years.

MR. CARROLL: Why is that? Do you know?

MR. REYNOLDS: I will show my ignorance in economics, but they say it is based on economics, and I can't take it much farther than take their word for it as far as my economic values go.

MR. CARROLL: It would also seem to me it would be just as easy to do 20 years as 5 years, and then you have some flexibility.

MR. REYNOLDS: They indicated it would work out better for them economically, and in discussions with their public utility commission.

We think the technical evaluation is pretty much the same. You are going to have to repeat it four times if you going to have to end up going five, five, five, five.

MR. CARROLL: Yes.

MR. TRAVERS: When you consider that this is a process driven rule, you are right, Jay. The advantage

isn't obvious why you would want to come in for five, but in our discussions with VEPCO they have identified some pretty significant economic returns in the way they amortize their plan. That, at least in part, is what is driving them. I think there is a perception that it might be somewhat easier. There may be some lessened technical argument associated with extending five years and 20.

But given the process nature, what would have to be reviewed, the scope of it and so on and so forth, if you envision ultimately going for as many as 20 and you envision going through it four times, it could be prohibitive.

[Slide.]

MR. REYNOLDS: And the last thing I would like to conclude with is our schedule. We are proposing a 90-day comment period which should end up some time in October if everything goes as we expect.

We think we can wrap up the public comments and revise the rule package within five months and get back to the Commission in March. That means that we will be back to you somewhere around January this time, well ahead of the Commission instead of one day ahead of time.

MR. CARROLL: Do you believe that in March of '95 there will be people beginning to submit applications or prepare applications?

MR. REYNOLDS: I think people may start working on

applications, but I don't think we will get one that early -- earlier indications, I don't know what their current status is. Virginia Power said maybe sometime in '95 they will come with an application or applications for their plants.

MR. TRAVERS: One other piece of information that we've had in working with the B&W owners group is that while they haven't identified a specific B&W plant, they have indicated that as a result of their generic efforts, they would like to be in a position and they expect to be in a position in fiscal '97 to come in with one of their plants as the prototype B&W license renewal application.

MR. NEWBERRY: I think what we are going to see in '96 and '97 are generic reports, so there will be a lot of work after the rule, I would think, generically.

MR. LINDBLAD: Mr. Travers, Mr. Reynolds has said you are going to be back to us after the public comment period and before you go back to the Commission.

MR. REYNOLDS: That's correct.

MR. TRAVERS: Yes, that's right.

MR. LINDBLAD: Are you looking for a letter from us today?

MR. TRAVERS: It is always difficult for the staff to tell you whether you should have gone to the Commission or not.

MR. LINDBLAD: I am saying, we may decide to do one on our own volition, but do you find it required in your process?

MR. TRAVERS: I think I would view it as useful. Let me say that in the past the committee has written a number, at least two or three, of letters on the subject of renewal.

MR. CARROLL: That was to get your attention.

MR. TRAVERS: You have it. The last one was in June, I think, of last year. Basically, your comments were directed at a better recognition in the rule of existing programs and their continued effectiveness in the extended period of operation now. Regarding future communication with the Commission, let me say that we are meeting with them tomorrow, and let me say that they are interested in moving out rather quickly on a proposed rule if they find this one acceptable.

So if you do decide to communicate, it would probably have to be in the relative near term to have meaningful influence on their actions regarding this proposed rule.

MR. LINDBLAD: Let me point out to the members that what we have in Tab 4 is a close to final version of what the SECY was that will go to the Commission tomorrow. It was a six-week old version that just today we received

copies of something that is two weeks old, I suppose, that will be used at the Commission. Through some inadvertence, ACRS was not put on the distribution at the timely point, so we only received the copies recently.

MR. TRAVERS: I am sorry to hear that, normally the distribution is made elsewhere.

Let me make mention, if I may, Mr. Lindblad, of a commitment that we had to update this committee on any changes between the draft document that we sent to you and this final package. We have reviewed what we sent you very recently, and while we have made a number of changes in the length of some of the justifications in the statement of consideration, and some of the characterizations in the SSC, we couldn't find significant changes between what we sent you a number of weeks ago and this package that is before the Commission now. So we don't think that exists, and if we find out that that is wrong, we will let you know as soon as we can.

MR. LINDBLAD: Fine. Thank you, Bill.

Any other questions of the staff?

[No response.]

MR. CARROLL: It sounds like they are going to get this thing on the road on about the first anniversary of Jim Curtiss' departure.

MR. LINDBLAD: Yes.

We have some remaining time, one could either use Ivan's ability to work some more on his letter, or is there interest in the committee in making sure we send a letter out on this particular subject of license renewal that would have to get to them before tomorrow.

MR. DAVIS: Don't we need to look at SECY 140 to provide a meaningful letter.

MR. LINDBLAD: The one that was distributed early is very close to it.

MR. DAVIS: I haven't looked at it yet.

MR. CARROLL: Our usual notion on writing letters at this juncture, that is before it goes for public comment, is, we see something badly flawed with what the staff is going to put out for public comment, and we want to get our oar in at that point because after it goes out for public comment it sometimes seems like it is very difficult to change things.

MR. LINDBLAD: Do you think we have triggered that?

MR. CARROLL: In this case, I don't think we have that kind of an issue. I think we could almost do it with a -- my feeling from what I read is, we do a Larkins-gram that says we don't --

MR. LINDBLAD: Looking forward to seeing you again after the public comment period.

MR. CARROLL: That would be my recommendation.

MR. DAVIS: I will agree.

MR. LINDBLAL: I would think so, too.

MR. KRESS: That seems to be the sense of the committee.

MR. CARROLL: That is what two people said.

MR. KRESS: Well, [illegible]ked around and reading eyeballs it looks like there is a substantial agreement.

MR. SEALE: Unless you wanted to write something that said, earlier we wanted to get their attention and it looked like we did.

MR. LINDBLAD: That is an "I told you so."

MP. KRESS: We don't issue I told you sos.

MR. CARROLL: We don't do those kinds of letters.

MR. LINDBLAD: Mr. Chairman, I return the chair.

MR. KRESS: With that, Ivan, I would like to ask when you have to leave?

MR. CATTON: Ten minutes.

MR. KRESS: Do you think it would be productive for us to spend that ten minutes on your letter before you leave?

MR. CATTON: I don't think so.

MR. MICHELSON: It didn't get you into any difficulty that you might have foreseen?

MR. CATTON: I did add a sentence at the end

because Conrad reminded me that we had also committed to review something called a Task Action Plan for fire protection, and I didn't say that in the letter but felt I should.

MR. MICHELSON: We didn't really review it.

MR. CATTON: No, that we would.

MR. MICHELSON: In other words, we are going to review the rule as soon as it becomes available, and we also plan to review the Task Action Plan in some detail in the near future.

MR. CARROLL: What is it, the Task Action Plan for what?

MR. CATTON: Do you remember 93-143?

MR. CARROLL: Right.

MR. CATTON: There are a whole bunch of things in it.

MR. CARROLL: And it is to resolve those issues?

MR. CATTON: That's right. It is separate from the rule.

MR. KRESS: I propose then that we take a --

MR. MICHELSON: Excuse me, one clarification. Did you give us a sentence some where referring to the one-hour versus three hours as we may have to do?

MR. CATTON: Yes, I stuck it in there. It is in my draft that I left with Doug.

MR. KRESS: I propose then that we can now go off the record for the rest of the day.

[Whereupon, at 2:11 p.m., the meeting was adjourned.]

REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission
in the matter of:

NAME OF PROCEEDING: 410th ACRS Meeting

DOCKET NUMBER:

PLACE OF PROCEEDING: Bethesda, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Marilynn Estes
Official Reporter
Ann Riley & Associates, Ltd.

NRR STAFF PRESENTATION

TO THE ACRS

- Protective Action Guides and Their Use in Emergency Planning

- Emergency Planning Considerations Under 10 CFR Part 52

June 9, 1994

TOPICS TO BE DISCUSSED

- EPA Protective Action Guides (PAGs)
- Relationship of PAGs to Emergency Planning
- Emergency Planning Under 10 CFR Part 52
  - Early Site Permits
  - Standard Designs (CE System 80+)
  - Combined Operating Licenses
- Licensing Review of ABB-CE System 80+
- Staff's Current Examination of Emergency Planning Basis for Passive Reactors

PROTECTIVE ACTION GUIDES (PAG)

- A PAG is the projected dose from an unplanned release of radioactive material at which a specific protective action is recommended.

- US EPA, "Manual of Protective Actions Guides and Protective Actions for Nuclear Incidents," EPA 400-R-92-001, May 1992

Table 2-1 PAGs for the Early Phase of a Nuclear Incident

Protective Action	PAG (projected dose)	Comments
Evacuation (or sheltering[a])	1-5 rem[b]	Evacuation (or, for some situations, sheltering[a]) should normally be initiated at 1 rem. Further guidance is provided in Section 2.3.1
Administration of stable iodine	25 rem[c]	Requires approval of State medical officials.

RELATIONSHIP OF PAGs TO EMERGENCY PLANNING

- The regulations state that emergency plans must contain guidelines for the choice of protective actions that are consistent with Federal guidance. [10 CFR 50.47(b)(10)]

- NUREG-0654 states that protective actions be in accord with the recommendations of the EPA PAG Manual. (Criterion II.J.9)

- EPA PAGs were used in the development of the 10-mile Emergency Planning Zone (NUREG-0396)

PLANNING BASIS FOR THE CURRENT REQUIREMENTS FOR THE SIZE OF THE 10-MILE EMERGENCY PLANNING ZONE (EPZ)

- Projected doses from DBAs should not exceed PAGs outside the EPZ.
- Projected doses from most core melt sequences would not exceed PAGs outside the EPZ.
- For the worst core melt sequences, immediate life threatening doses would generally not occur outside the EPZ.
- Detailed planning within the EPZ would provide a substantial base for expansion of response efforts if necessary.

10 CFR PART 52

- ★ SUBPART A -- EARLY SITE PERMITS
- ★ SUBPART B -- STANDARD DESIGN CERTIFICATIONS
- ★ SUBPART C -- COMBINED LICENSES

EARLY SITE PERMITS

★ [52.17] Application must:

- Identify physical impediments to emergency planning
- Describe contacts and arrangements with offsite authorities

May propose major features of emergency plans or complete integrated plans

★ [52.18] NRC review in consultation with FEMA

★ Proposed Criteria: NUREG-0654/FEMA-REP-1, Revision 1, Supplement 2

STANDARD DESIGN CERTIFICATIONS

★ [52.47] Application must:

- Contain information relevant to design (not site specific)
- Demonstrate compliance with TMI requirements in 50.34(f).

★ Standard design includes:

- Technical Support Center (TSC)
- Operational Support Center (OSC)
- Support Facilities (lab and decon facility)

★ [52.47] Applicant must propose ITAAC

COMBINED LICENSES

- [52.79] application must contain emergency plans which provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.

- Applicant must propose ITAAC including those applicable to emergency planning.

- Prior to operation, NRC shall find that acceptance criteria are met.

- [52.81] application will be reviewed according to the standards in 10 CFR Parts 20, 50, etc...

ABB-CE SYSTEM 80+ STANDARD PLANT DESIGN EMERGENCY PLANNING REVIEW

- Nuclear power applicants must meet the emergency planning requirements of 10 CFR 50.47 and Appendix E to Part 50.
- ABB-CE System 80+ is being reviewed under 10 CFR Part 52.
- Emergency plans are not required for issuance of a design certification under Part 52.
- Standard designs required to demonstrate compliance with TMI requirements in 50.34(f) - [TSC, OSC]
- PAG dose calculation in Chapter 15 of ABB-CE System 80+ FSER does not signal change in assessment of EP for advanced reactors.

ACCIDENT ASSESSMENT REVIEW IN CHAPTER 15 OF ABB-CE SYSTEM 80+ FSER

- Design Basis Accidents
  - Evaluated Against 10 CFR 100 Guidelines
- EPA PAG Dose Calculation
  - Done for Illustrative Purposes

SECY-93-087, "POLICY, TECHNICAL AND LICENSING ISSUES PERTAINING TO EVOLUTIONARY AND ADVANCED LIGHT WATER REACTOR (ALWR) DESIGNS"

- Certain modifications to EP requirements may be appropriate for the passive designs based on their unique characteristics.
- Need to consider a plant's ability to prevent a release or to provide very long delay times for all but the most unlikely events.
- More information concerning source term and risk is required.
- EP requirements following the TMI-2 accident were not based on strictly technical factors.
- As a policy matter it may be that even very low calculated probabilities may not be considered a sufficient basis for changes to EP requirements.

SECY-93-092, "Issues Pertaining to the Advanced Reactor (PRISM, MHTGR, and PIUS) and CANDU3 Designs and their Relationship to Current Regulatory Requirements"

ISSUE

Should advanced reactors with passive design safety features be able to reduce emergency planning zones and requirements?

Staff Response

- Staff proposes no change to the existing regulations at this time
- Information obtained from ongoing accident evaluations will be factored into the EP requirements for advanced designs
- Based in part on these accident evaluations, the staff will consider whether some relaxation from the current requirements may be appropriate

STAFF REQUIREMENTS MEMORANDUM OF JULY 30, 1993 (RESPONSE TO SECY-93-092)

- Premature at this time to reach a conclusion on EP for advanced reactors.
- For ongoing review purposes, staff should use existing regulatory requirements.
- Staff should remain open to suggestions to simplify the EP requirements for reactors that are designed with greater safety margins.
- Staff was requested to submit recommendations for proposed technical criteria and methods to use to justify simplification of EP requirements.
- The work on EP for advanced reactors should be correlated with the work on Accident Evaluation and Source Term.

STAFF ACTIONS IN RESPONSE TO SRM

- Staff initial response proposed three technical factors as possible basis for simplifying EP requirements:
  - Reduction in source term
  - Reduction in probability of release
  - Increase in delay time preceding release
- Staff noted EP must consider public perception of risk from nuclear power plant accidents
- Staff efforts are being focused on passive designs (SBWR and AP-600) as opposed to advanced reactors because:
  - Availability of design and risk assessment information
  - Level of licensing interest
  - Insights from review of EP for passive reactors should be applicable to advanced reactors
- Re-evaluation of planning basis in NUREG-0396 using the insights from NUREG-1150 and new source term initiated by RES
- Coordination with industry efforts (NEI)

THERMO-LAG FIRE BARRIERS

June 8, 1994

Steven West, Chief
Special Projects Section

Office of Nuclear Reactor Regulation

OVERVIEW

- October 1993 - Commission briefing by staff
- November 1993 - Commission briefing by NEI
- Commission concerns

  - NEI test method. Results and applicability of tests
  - Timeliness of resolution

- Staff actions

  - ACRS meetings
  - NRR-NEI senior management meetings
  - 50.54(f) request for additional information
  - SECY-94-128, status paper - conclusions regarding 1- and 3-hour barriers
  - SECY-94-127, options and policy issues

OPTIONS FROM SECY-94-127

1. Require compliance with existing NRC requirements. Grant limited plant-specific exemptions in accordance with the regulations and past practice.

2. Study feasibility of developing new guidance for rating fire barriers on the basis of representative plant fire hazards.

3. Develop performance-based approach for resolving Thermo-Lag issues with lead plant.

4. Develop performance-based fire protection rule (SECY-94-090).

OPTION 1
COMPLIANCE WITH EXISTING REGULATIONS

- Fundamental objective of Thermo-Lag Action Plan
- 22 units have or plan to achieve compliance
- 1-hour barriers can be upgraded
- 3-hour barriers are a problem but alternatives exist
  - relocate cables and components
  - reclassify as 1-hour and install suppression
  - replace barriers
- Staff will consider limited exemptions
- NRC resources are planned for this option
- 2 to 5 years estimated to return to compliance

OPTION 2 - FEASIBILITY STUDY
RATE BARRIERS BASED ON
FIRE HAZARDS

- ASTM E119 may exceed fire severity in some areas
- Developing fire severity curves tailored to actual plant fire hazards may be technically feasible
- If feasible, new curves can be used to achieve compliance with existing regulations
- Developing and implementing new curves will be complex and resource intensive
- Staff study, if approved by the Commission, will address technical feasibility, resource estimates, and schedules
- If approved, staff will report results within 6 months

OPTION 3
PERFORMANCE-BASED SOLUTIONS

- Existing regulation is prescriptive
- Performance-based methods use fire models and probabilistic assessments to define fire protection
- Proposed for 22 sites (35 plants)
- Could be developed with lead plant and incorporated into new fire protection rule
- Will be technically challenging
- May require additional resources
- Policy issues

OPTION 4
PERFORMANCE-BASED RULE

- SECY-94-090 institutionalized program
- NEI plans to submit petition for rulemaking
- Staff proposes to provide comments to the Commission on the petition 6 months after receipt
- Results of work with lead plant (Option 3) could be incorporated into new rule
- NRC resources are planned for this option

STAFF RECOMMENDED APPROACH (FROM SECY-94-127)

- The staff recommends continuation of Option 1 (compliance with existing NRC requirements) consistent with the Thermo-Lag Action Plan.

- If the Commission approves this option, the staff will advise industry of the Commission position and request continued industry efforts to implement the option.

STAFF POSITION ON REMAINING OPTIONS (FROM SECY-94-127)

- If acceptable to the Commission, the staff will evaluate the technical feasibility and resource estimates for Option 2 and will report back to the Commission in 6 months

- The staff will not proceed further with Option 3 unless the Commission approves the use of performance-based approaches to resolve the Thermo-Lag issues.

- The staff will continue to be receptive to the performance-oriented, risk based rulemaking described in SECY-94-090. The staff will provide its comments on NEI rulemaking petition 6 months after receipt of the petition. (Option 4)

BACKGROUND INFORMATION

STATUS AS REFLECTED IN SECY-94-128

- Senior management meetings
- 50.54(f) request for additional information
- GL 86-10, Supp. 1, Fire Test Acceptance Criteria
- NEI and licensee fire endurance tests
- NEI application guide
- NRC full-scale fire and ampacity derating tests
- Staff position on 1- and 3-hour barriers
- Combustibility of Thermo-Lag

OPTION 2- BACKGROUND
STAFF-INDUSTRY INTERACTIONS

- September 1992 - NUMARC proposed to develop and use NPP-specific fire curves for rating fire barriers

- October 1992 - NUMARC changed its proposal and decided to use ASTM E119 for barrier tests because:

  - ASTM E119 is common with tests of all other assemblies and building components
  - Experience gained with ASTM E119
  - No new "standard" exposure can be defined to eliminate all objections
  - Utilities assess fire protection on basis of standard ASTM E119 exposure

REQUEST FOR ADDITIONAL INFORMATION

- Detailed information submitted on amounts
- Limited information submitted on installation methods and barrier parameters
- Limited information submitted on fire barrier designs outside the scope of the NEI program
- Evaluations of derating awaiting NRC acceptance of NEI program
- Alternatives - performance-based approaches (21 plants), exemptions, reevaluating shutdown methods and prior commitments.

GL 86-10, SUPPLEMENT 1
FIRE TEST ACCEPTANCE CRITERIA

- Issued March 25, 1994
- Clarifies previous guidance (GL 86-10)
- For future fire tests
- ASTM E-119 standard fire
- Provides options for hose stream tests
- Provides methods for addressing deviations

STAFF CONCLUSION REGARDING THERMO-LAG BARRIER PERFORMANCE

- 1-hour baseline Thermo-Lag fire barriers
  - Provide 20 to 30 minutes of fire endurance
  - Can be upgraded with Thermo-Lag materials
- 3-hour baseline Thermo-Lag fire barriers
  - Provide about 1 hour of fire endurance
  - Cannot be reasonably upgraded with additional Thermo-Lag materials

1 HOUR THERMO-LAG FIRE BARRIERS

- 14,000 lin. ft. on cable trays (33 units, 58% at 5 sites)
- 62,000 lin. ft. on Conduits (47 units, 62% at 5 sites)
- 5,500 sq. ft. on junction boxes (26 units)
- 1,400 sq. ft. on equipment enclosures (6 units)
- 800 sq. ft. as radiant energy shields (2 units)
- 200 sq. ft. as a fire wall (1 Unit)
- 142 sq. ft. as floor/ceiling assembly (1 Unit)
- 450 sq. ft. as penetration seals (2 units)
- 5,600 sq. ft. of miscellaneous applications (13 units)

3 HOUR THERMO-LAG FIRE BARRIERS

- 7,700 lin. ft. on cable trays (25 units, 60% at 3 sites)
- 25,000 lin. ft. on conduits (49 units, 52% at 7 sites)
- 3,300 sq. ft. on junction boxes (27 units
- 700 sq. ft. on equipment enclosures (7 units)
- 50 sq. ft. as radiant energy shields (1 unit)
- 10,000 sq. ft. as fire walls (6 units)
- 1,100 sq. ft. as floor/ceiling assemblies (2 units)
- 635 sq. ft. as penetration seals (9 units)
- 13,000 sq. ft. of miscellaneous applications (28 units)

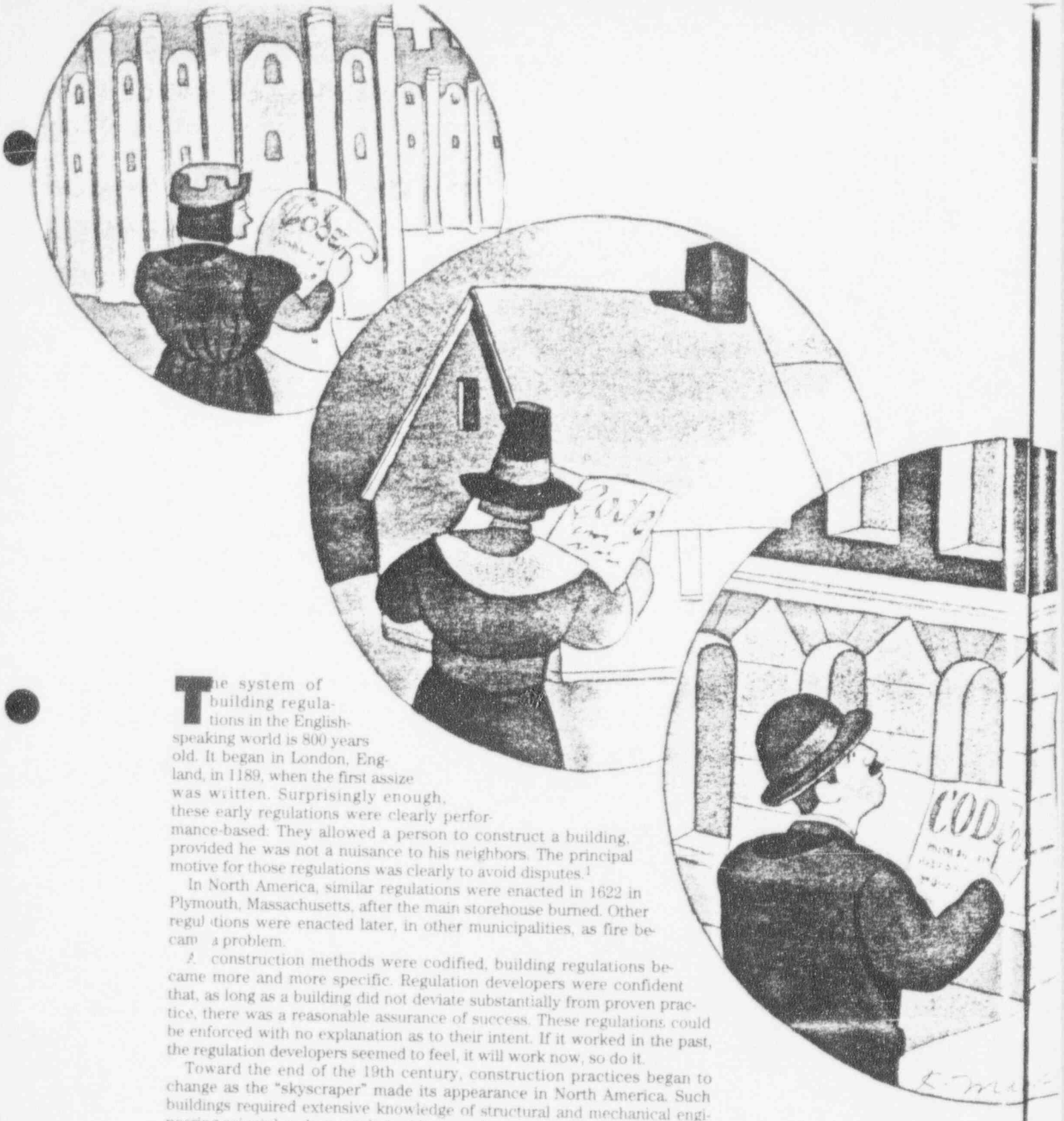
NON-FIRE RATED BARRIERS

- 1,900 lin. ft. for physical independence (5 units)
- 700 lin. ft. to enclose combustibles (1 unit)

J.K. Richardson, P.E.

Moving Toward Performance-Based Codes

We in North America are poised on the edge of a major change in the way we develop, use, and enforce fire safety codes.



The system of building regulations in the English-speaking world is 800 years old. It began in London, England, in 1189, when the first assize was written. Surprisingly enough, these early regulations were clearly performance-based: They allowed a person to construct a building, provided he was not a nuisance to his neighbors. The principal motive for those regulations was clearly to avoid disputes.[1]

In North America, similar regulations were enacted in 1622 in Plymouth, Massachusetts, after the main storehouse burned. Other regulations were enacted later, in other municipalities, as fire became a problem.

As construction methods were codified, building regulations became more and more specific. Regulation developers were confident that, as long as a building did not deviate substantially from proven practice, there was a reasonable assurance of success. These regulations could be enforced with no explanation as to their intent. If it worked in the past, the regulation developers seemed to feel, it will work now, so do it.

Toward the end of the 19th century, construction practices began to change as the "skyscraper" made its appearance in North America. Such buildings required extensive knowledge of structural and mechanical engineering principles. As a result, building regulations were gradually amended to accept designs based on stated performance objectives. There were no similar developments in the field of fire safety, however.

Throughout the 20th century, fire safety regulations developed into an extensive set of specifications, often supported by an array of standards. Although efforts have been made to move most codes toward performance-based fire safety requirements, today's fire safety regulations do not ap-

CATHERINE MARCHEY

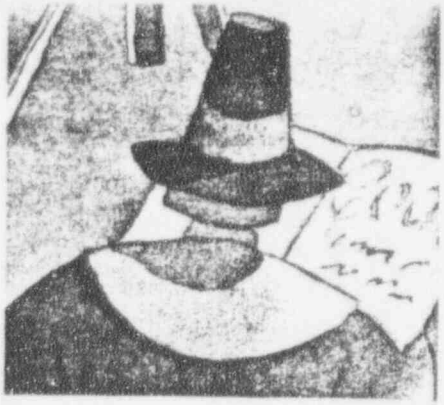
proach the performance-type requirements now in place for the structural and mechanical engineering aspects of building construction. With new fire safety design methods based on technically proven computer models, however, a North American performance-based code may be in place by the end of the century.[2]

A performance code

Exactly what is a performance-based code? To many, any model code available in North America today is a performance-based code. Some feel that any code, no matter how prescriptive, is performance-based because it relies on the proven "performance" of the various systems, designs, and approaches with which it deals. Others feel that these codes are performance-based because they describe, not how an item is made, but how it should perform during a fire.

However, none of these codes is performance-based in the sense that the codes of the United Kingdom and New Zealand are performance-based. How do the British and New Zealand codes differ from those followed in North America?

First, they state their objectives clearly and in terms of outcomes that are valuable in themselves–for example, lives and property saved–and not just because of a presumed link to valued outcomes. Second, they specify verifiable performance requirements with demonstrated, quantifiable links to the objectives. And third, they permit any solution that meets the performance requirement. In addition, the performance goals generally specify a level of safety.[3]



Today's fire safety regulations do not approach the performance-type requirements in place for the structural and mechanical engineering aspects of building construction.

Let's examine these two performance-based codes more closely.

New Zealand's building code

According to the *New Zealand Building Code*, a building performs acceptably if its design and the activities that take place within the building do not present an unreasonable probability of a fire occurring.[4] A building is also considered to perform acceptably if, in the event of fire, all of its occupants have enough time to escape to a safe place without being overcome by the effects of the fire, and the fire service has enough time and suitable access to undertake rescue operations and protect property.

In addition, a building is said to perform acceptably during a fire if the fire does not spread to other fire cells within an acceptable time or to adjacent household units and other property and if significant hazardous substances are not released to the environment. If neither the building nor its contents are seriously damaged, and if any damage to the building can be easily repaired, the building has also performed acceptably.

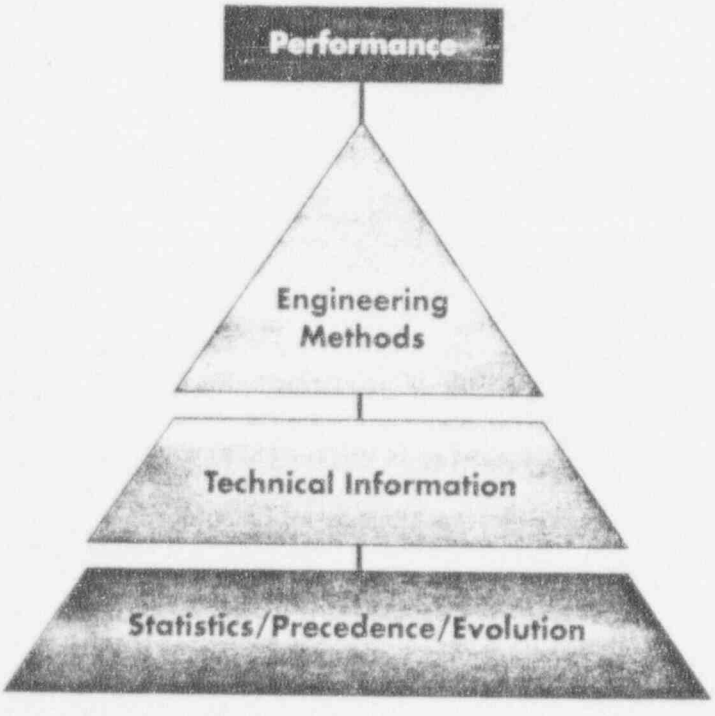
The *New Zealand Building Code* then goes on to establish objectives, functional requirements, and performance statements about the outbreak of fire, the means of escape, the spread of fire, and the building's structural stability during a fire. For example, the objective of the clause dealing with a building's structural stability during a fire is to safeguard people from injury and to protect households and other property from damage resulting from structural instability caused by a fire.

The clause's functional requirements state that a building is to be constructed in such a way that it will remain structurally stable enough during a fire to allow people sufficient time to evacuate safely, to give firefighters enough time to undertake rescue and firefighting operations, and to keep adjacent households or other property from being damaged or collapsing.

The clause's performance provision notes that the fire resistance of a building's structural elements must be appropriate to their function, to the fire load, to the intensity of the fire, to the fire hazard, to the height of the building, and to the fire control facilities outside and within the building. Furthermore, the fire resistance of the structural elements should be no less than that of any element within the fire cell that they support. The collapse of elements with lesser fire resistance should not lead to the collapse of elements that are required to have a higher fire resistance.

FIGURE 1

Technology Needed to Support Performance-Based Codes



In this example, the objective is clearly to safeguard people from injury and protect property from damage due to structural failure during a fire. The code user will immediately ascertain that myriad technologies can be used to achieve this objective. The objective is further qualified in the functional requirements, which define how long the objective must be met, something that can be verified by test or calculation. The time duration is also stated in terms of allowing occupants enough time to evacuate the building and firefighters enough time to perform their operations.

The code user is free to choose any technology that will provide fire resistance for the lengths of time stated. These times can, in turn, be quantified through tests, calculations, or models of evacuations and post-flashover fires.

This approach clearly differs from the traditional North American prescriptive code for structural stability, which states that floor assemblies and their supporting structure must have a certain fire-resistance rating for a specified occupancy. The definition of the occupancy may contain numerous possible fire loads and ventilation configurations–which may be more or significantly less severe than can be protected by assemblies having the specific rating–and, hence, may result in numerous possible fire attacks on the structure. In addition, the actual length of time it takes to evacuate occupants from, and perform fire service operations in, a building may vary considerably from the time assumed by those who define the fire-resistance rating.

This example thus highlights the difference between the two approaches. One is flexible and based on stated, verifiable objectives. The other provides a minimum specified rating that may or may not be sufficient to achieve the objective the code writer had in mind.

It should be noted that New Zealand's performance-based code includes requirements for verifying proposed safety solutions using calculations, tests, and other means. The code user and enforcer must thus have some means of assessment, based on calculating risk, that will allow quantification.[5] Since the code does not quantify the level of safety required in the global sense, those using it must have a large degree of fire engineering experience and judgment.

Building regulations in the United Kingdom

The United Kingdom's building regulations follow a pattern similar to that found in New Zealand's regulations.[6] The regulations put forth five fire safety aims.

If a performance-based code is to be applied properly, we must have fire safety engineering and risk assessment tools to demonstrate that we have met the stated performance objectives.

First, they call for a satisfactory standard for means of escape for building occupants in the event of fire. Second, they require that fire spread over the internal linings of buildings be inhibited. Third, they require that buildings remain stable in the event of fire, that there be a sufficient degree of fire separation within buildings and between adjoining buildings, and that the unseen spread of fire and smoke in concealed spaces in buildings be inhibited. Fourth, they require that external walls and roofs adequately resist the spread of fire in the external envelope and that the spread of fire from one building to another be restricted. And finally, they require that fire appliances have satisfactory access to buildings and that buildings provide facilities to assist firefighters in saving lives in and around buildings.

Each of these aims is expanded to include a specific performance requirement and statements of expected performance. Considerable explanation follows these performance statements.

For example, the code's means of escape provisions state that a building must be designed and constructed to provide the occupants with some means of escape, which can be used safely and effectively at all times, to a place of safety outside the building. The code further states that this requirement will be satisfied if certain criteria are met.

The building must have enough suitably located routes of sufficient capacity to allow the occupants to escape to a place of safety in the event of fire. These routes must be adequately protected from the effects of fire by an enclosure, where necessary, and they must be adequately lit. The exits must also be suitably marked. In addition, appropriate facilities must be available to limit the movement of smoke into the escape routes, or suitable measures must be taken to restrict the fire and to remove the smoke to the extent determined by the use of the building, its size, and its height.

Some means of measuring performance is integral to these regulations, and a fire safety engineering approach may be the only feasible way of achieving a satisfactory standard of fire safety in some large and complex buildings.

It is obvious from these two examples that a performance-based code is possible. If it is to be applied properly, however, we must have the appropriate fire safety engineering and risk assessment tools to demonstrate that we have met the stated performance objectives.

Technology to support a performance-based code

Figure 1 shows the hierarchy of technology needed to support a performance-based building code. The two lower tiers of the triangle have, for the most part, been fulfilled over the past decades and form the basis of our prescriptive codes. Emerging engineering methods that are now being validated consist of such fire safety design tools as CFAST and EXITT, which allow one to calculate certain fire safety aspects, and more complex risk assessment methods that provide calculations on the overall risk of fire to occupants of buildings.[7] Recall that code writers in both New Zealand and the United Kingdom stated the need for such engineering methods.

There are many other technical requirements for a performance-based code and for the fire safety engineering methods available to satisfy some of these requirements.[8] Although the level of validation for a number of these methods is not yet sufficient to give many code officials confidence in their results, the validation process is on-going internationally.

The overall fire risk assessment methods, such as those developed by the National Institute of Standards and Technology (NIST) for the National Fire Protection Research Foundation and the National Research Council of Canada (NRCC) risk-cost assessment model, are still being validated, as well. Indeed, the latter model is in an advanced stage of validation.[9,10] These models hold the key to providing a sound technical basis for a performance-based code because they quantify risk to building occupants,

the very thing the codes are attempting to regulate. This quantification provides code officials with comparative results for new, innovative designs and materials, compared to the pre-established minimum safety level embodied in the existing code.

The tools needed to support a performance-based code are emerging. In fact, many are currently available for use. Coupled with the need for the tools, however, is the need to teach potential users in the design and code regulatory professions how to use them. Education is a key element in the development and success of performance-based codes.[11]

Status in North America

Canada and the United States still have a long way to go before performance-based codes become a reality. A number of changes must be made in moving toward such codes, some of which will affect designers, code officials, and code developers.[12] There are other roadblocks, as well, and the cost of liability insurance and the potential for litigation are significant issues.[13]

Despite these difficulties, however, progress is being made. Over the past 20 years or so, a number of major efforts have been undertaken in the United States to develop credible performance criteria and measurement methods for fire safety in buildings.[14]

One notable achievement was the fire safety evaluation system (FSES) that NIST developed for NFPA 101, the Life Safety Code®. Currently incorporated in NFPA 101M, Manual on Alternative Approaches to Life Safety, the FSES methods provide, to a certain extent, a means of quantifying fire safety, in general. Based on a committee consensus approach, these FSES methods serve as significant stepping stones in the development of engineering tools capable of supporting performance-based codes. There has been little movement in the development of the codes themselves, however.

In Canada, two methodologies have been developed to support a performance-based code, both assuming risk as a basis.[15] One of these, the risk-cost assessment model developed at the NRCC in cooperation with Victoria University of Technology in Australia, appears to be in a good position to support the development of a performance-based code. The Canadian provincial building code authorities support the move toward a performance-based code, and the NRCC's Institute for Research in Construction has identified this as a priority for future research.

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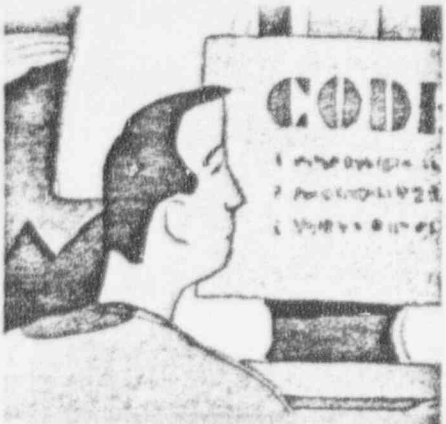

Fire risk assessment models will provide a sound technical basis for a performance-based code because they quantify risk to building occupants, the very thing the codes are attempting to regulate.

Where do we go from here?

We in North America are poised on the edge of a major change in the way we develop, use, and enforce building codes. Performance-based codes are becoming a reality in other parts of the world, and those in North America are moving in that direction, as well. We are leaders in developing the engineering methods essential for using performance-based codes, and professionals from all fire safety disciplines are calling for action.

Despite the numerous difficulties that are bound to arise in using and enforcing a performance-based code, such codes have many advantages. They clarify the intent of our regulations, they provide economic benefits to construction, and they allow greater design freedom and the removal of nontariff trade barriers–all of which make them an attractive option.

An interim step in our drive to develop performance-based codes may be to make both a performance code and a specification code available and let the designer choose which one to use. This is similar to the "acceptable solutions" option provided in the regulations of both New Zealand and the United Kingdom.

After we gain experience with performance-based fire safety codes, we will no doubt find that a gradual move toward their exclusive use is inevitable. Remember, the structural and mechanical engineering aspects of codes have been performance-based for approximately a century, and it is doubtful that those professions are going to move toward more specification-based requirements.

As a leader in the development of fire safety standards in North America, the NFPA is in a key position to affect the development of a performance-based fire safety code in North America. It is, therefore, appropriate that the NFPA become a key player in this undertaking. ♦

J.K. Richardson, P.E., is head of the National Fire Laboratory at the National Research Council of Canada's Institute for Research in Construction in Ottawa.

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2. "Strategies for Shaping the Future," *Proceedings of the Conference on Firesafety Design in the 21st Century*, Worcester Polytechnic Institute, Worcester, Mass., 1991.

3. A.H. Buchanan, "Fire Engineering for a Performance-Based Code," *Proceedings of the Sixth International Fire Conference–Interflam 93*, Interscience Communications Ltd., London, England, 1993, pp. 457-468.

4. *New Zealand Building Code Handbook*, Building Industry Authority, Wellington, New Zealand, 1992.

5. A.H. Buchanan, "Fire Engineering for a Performance-Based Code."

6. *The Building Regulations 1991*, Department of the Environment and the Welsh Office, HMSO, London, England, 1991.

7. R. Friedman, "An International Survey of Computer Models for Fire and Smoke," *Journal of Fire Protection Engineering*, Vol. 4, No. 3, 1992, pp. 81-92.

8. R. Bukowski, "Toward the Goal of a Performance Fire Code," *Proceedings of the International Fire Safety Engineering Conference: The Concept and the Tools*, CSIRO, Sydney, Australia, 1992.

9. R. Bukowski, F.B. Clarke, J.R. Hall, and S.W. Stiefel, *Fire Risk Assessment Method*, National Fire Protection Research Foundation, Quincy, Mass., 1990.

10. D. Yung and G.V. Hadjisophocleous, "The Use of the NRCC Risk-Cost Assessment Model to Apply for the Code Changes for 3-Story Apartment Buildings in Australia," *Proceedings of the Symposium on Computer Applications in Fire Protection Engineering*, Society of Fire Protection Engineers, Boston, Mass., 1993.

11. "Strategies for Shaping the Future," *Proceedings of the Conference on Firesafety Design in the 21st Century*.

12. J.K. Richardson, "Regulatory System Changes Needs to Gain Acceptance of Fire Safety Engineering Methods," *Proceedings of the SFPE Seminar on International Fire Protection Engineering Issues*, Society of Fire Protection Engineers, Boston, Mass., May 1993.

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14. J.E. Snell, "Status of Performance Fire Codes in the U.S.A.," *Proceedings of the Nordic Conference on Fire Safety Engineering*, V.T.T., Helsinki, Finland, 1993.

15. J.K. Richardson, I. Oleszkiewicz, and D. Yung, "Toward a Performance-Based Code in Canada," *Proceedings of the Nordic Conference on Fire Safety Engineering*, V.T.T., Helsinki, Finland, 1993.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

07/02/93
Discussed w/
Andy Fowell.
SW.

June 30, 1992 3

Dr. Andrew J. Fowell, Chief
Fire Science and Engineering Division
Building and Fire Research Laboratory
National Institute of Standards and Technology
Building 224, Room B250
Gaithersburg, Maryland 20899

Dear Dr. Fowell:

This letter provides the results of our final review of the opinions expressed by Dr. Vytenis Babrauskas in a letter to Pat Madden of July 30, 1992, regarding (1) the use of fire severity/fuel load concept by licensees in lieu of 1 hour or 3 hour fire resistance ratings to justify providing abbreviated fire endurance, and (2) determining the time period for which fire endurance is needed based on predicted sprinkler activation times. Dr. Babrauskas stated that these approaches are nonconservative and are not permitted by U.S. building codes for the design of normal commercial buildings.

The fire barriers in question are unique in their purpose, design, test acceptance criteria, and by the fact that they are specified in Nuclear Regulatory Commission (NRC) regulations as an acceptable approach for the separation of redundant safe shutdown trains located within fire-resistive structures. We have concluded that within the context of the NRC's overall reactor fire protection program, which relies on the defense-in-depth concept and NRC evaluation and approval of deviations from NRC requirements, using the two design approaches within the framework of the overall fire hazards analysis is acceptable. Our bases for this conclusion are presented below.

The NRC adheres to the application of a defense-in-depth concept of echelons of safety systems to achieve the high degree of safety required for nuclear power plants. This concept is also applicable to nuclear power plant fire safety. Therefore, the NRC and the licensees do not solely rely upon general building and construction standards. The defense-in-depth approach applied to the fire protection program is aimed towards achieving an adequate balance in: (1) preventing fires from starting; (2) detecting quickly, controlling, and extinguishing promptly those fire that occur; and (3) protecting structures, systems, and components so that a fire that is not promptly extinguished will not prevent the safe shutdown of the plant. The defense-in-depth principle states that strengthening any one of the three echelons can compensate for weaknesses in the others. The NRC's fire protection guidance implements this defense-in-depth approach and specifies a level of fire protection which considers the potential consequences that a fire may have on the safe shutdown of the reactor.

The NRC's fire protection regulation is Title 10 of the *U.S. Code of Federal Regulations*, Part 50, Section 50.48, "Fire protection," (10 CFR 50.48). Section 50.48 states that each operating reactor must have a fire protection program that satisfies General Design Criterion (GDC) 3, "Fire protection," of

Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50. The objective of the fire protection program is to minimize both the probability and consequences of fires.

Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," to 10 CFR Part 50 establishes fire protection features required to satisfy GDC 3. The Appendix R requirements of interest here are specified in Section III.G, "Fire protection of safe shutdown capability." The objective of Section III.G is to ensure that a means of achieving and maintaining safe shutdown conditions will be available after a nuclear power plant fire. When redundant trains of systems needed to achieve and maintain shutdown conditions are located in the same fire area, licensees can satisfy Section III.G by either (1) separating the redundant trains by a fire barrier having a 3-hour fire resistance rating, or (2) separating the redundant trains by more than 20 feet with no intervening combustibles or fire hazards and installing fire detectors and an automatic fire suppression system in the fire area, or (3) enclosing one of the redundant trains in a fire barrier having a 1-hour rating and installing fire detectors and an automatic fire suppression system in the fire area.

The fire barriers in question are unique in that they are required specifically by the NRC to separate redundant safe shutdown trains. The fire barriers are located within fire-resistive structures. They are not structural components nor are they installed to satisfy life safety or other typical building code objectives. The NRC fire protection requirements of interest here are focused on fire protection features needed to protect nuclear safety-related systems with emphasis on protecting the systems needed to perform shutdown functions in the event of a fire. Compliance with the NRC's fire protection requirements does not relieve a licensee from its responsibilities to satisfy fire protection requirements imposed by other authorities having jurisdiction over its plant. In addition, at this point, it is important to mention that reactor licensees cannot deviate from the NRC's fundamental regulatory requirement to provide either 1-hour or 3-hour rated fire barriers to separate redundant safe shutdown functions without prior NRC approval.

Guidance for implementing NRC fire protection requirements is contained in (1) Branch Technical Position Auxiliary and Power Conversion Systems Branch 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants," May 1976, (2) Appendix A to BTP APCSB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976," August 23, 1976, and (3) Standard Review Plan (NUREG 0800), Section 9.5-1, "Guidelines for Fire Protection For Nuclear Power Plants," July 1981.

These documents provide information, staff recommendations, and guidance which may be used by the licensees to meet the requirements of 10 CFR 50.48, Appendix R, and GDC 3. These documents also refer the licensees to national consensus standards, such as American Society for Testing and Materials (ASTM) and National Fire Protection Association (NFPA) standards, for detailed guidance on implementing typical industrial fire protection features such as fire detectors, sprinkler systems, and building construction. Designs and methods different from the guidelines recommended in these documents can be

used by a licensee if the licensee provides suitable bases and justification for its alternative approaches and the staff concludes that adequate fire protection is provided by the alternative approaches.

Using the NRC guidance and applying the defense-in-depth concept, the licensees determine the fire protection features for plant safety systems and fire areas by analyzing the effects of the postulated fire relative to maintaining the ability to safely shut down the plant. The variables used to evaluate the level of fire protection needed in a given fire area extend well beyond fuel loads, calculated fire severities, and automatic suppression system actuation times. A full fire hazards analysis is performed by the licensee to demonstrate that the plant will maintain the ability to perform safe shutdown functions in the event of a fire. The licensee in the fire hazards analysis addresses the following attributes:

- The NRC fire protection requirements and guidance that apply.
- Fire loading and *in-situ* fire hazards.
- Automatic fire detection and suppression capability.
- Layout and configurations of safety trains.
- Reliance on fire barriers including, the quality of the materials and system, and the quality of the installation.
- Fire area construction (walls, floor, ceiling, dimensions, volume, ventilation, and congestion).
- Location and type of manual fire fighting equipment and accessibility for manual fire fighting.
- Potential disabling effects of fire suppression systems on shutdown capability.
- Availability of oxygen (for example, inerted containment).
- Amount of cable insulation and other combustible materials.
- Alternative or dedicated shutdown capability.

During reviews of licensee fire protection programs and subsequent inspections, the NRC evaluated these variables to ensure that each licensee provided an adequate level of protection. In addition, the NRC has granted licensee requests for exemptions from specific Appendix R requirements and has approved deviations from staff guidance. As discussed below, the staff performed safety evaluations and granted the exemptions and deviations based on fire hazards analyses performed by the licensees that demonstrated that an alternative approach provided an adequate level of fire protection.

When the fire hazards analysis shows that adequate fire protection can be provided by an alternative approach (i.e., an approach different from that

specified by NRC guidance such as the use of a 1-hour fire rated barrier where a 3-hour barrier is specified), the licensee may request NRC approval of a deviation from a specific NRC requirement or guideline. This request must demonstrate that the fire protection defense-in-depth is appropriately maintained. In order to maintain an adequate balance in the level of fire protection provided, the licensee may be required to install or improve automatic suppression and/or detection in the area of concern and or implement more restrictive fire prevention measures (e.g., improved controls over combustibles and ignition sources). This is not unlike the trade-offs and substitutions of alternate methods and materials allowed by commercial building codes used in the United States. The licensee must submit a technical justification for the alternative approach for NRC review and approval. Of the two analysis approaches questioned by Dr. Babrauskas, the analyses submitted with the justification typically includes fuel load and fire severity as one element. The licensees rarely propose to take credit for calculated or predicted sprinkler system actuation times. In addition to one or both of these elements, the analyses typically address the remaining elements of the fire hazards analysis. The NRC evaluates the deviations based on fire hazards analyses performed by the licensees to ensure that the alternative approach provides an adequate level of fire protection.

It is also important to note that this fire hazards analysis approach is consistent with that recommended in NFPA 803, "Standard for Fire Protection for Light Water Nuclear Power Plants." The standard recommends, in part, that the fire hazards analysis consider "the types of fires, based on the quantities of combustible materials, their estimated severity, intensity, duration, and the hazards created." The standard also recommends that for each fire reviewed that the total time involved be indicated in the fire hazards analysis.

In summary, the fire barriers in question are unique in their purpose, design, test acceptance criteria, and by the fact that they are required specifically by the NRC to separate redundant safe shutdown trains located within fire-resistive structures. The fire barriers are not structural components of a building nor are they installed to satisfy life safety or other model building code requirements. In addition, the level of fire resistance required, 1-hour or 3-hours, is specified by NRC regulation. Moreover, a licensee must obtain NRC approval before it can deviate from this regulation. In limited cases, the NRC has approved reduced fire resistance for specific barriers. However, such approvals were based on defense-in-depth designs. Fuel loads, calculated fire severities, and predicted suppression system actuation times are generally included with the licensees' technical justifications for reduced requirements and alternative approaches, but in and of themselves, these were not the only factors used by the licensees or the NRC for determining the acceptability of reduced fire resistance. We have concluded that within the context of the overall NRC reactor fire protection program, which relies on the defense-in-depth concept and NRC staff evaluation and approval of licensee proposed deviations from NRC requirements for using fire barriers to protect redundant safe shutdown trains, the use by licensees of the two design approaches questioned by Dr. Babrauskas, within the framework of their overall fire hazards analyses, is acceptable.

A copy of 10 CFR Part 50, Section 50.48, and General Design Criteria 3 are enclosed for your information. Copies of the other NRC documents referenced in this letter were previously provided to Dr. Babrauskas.

If you have any questions, please contact Steven West at 504-1220.

Sincerely,

Original signed by

Conrad E. McCracken, Chief
Plant Systems Branch
Division of Systems Safety and Analysis
Office of Nuclear Reactor Regulation

Enclosures:
As stated

Distribution
SPLB TSI File
Central File
JTaylor
TMurley
FMiraglia
WRussell
AThadani
MVirgilio
CMcCracken
SWest
PMadden
DOudinot
DWilliams

SPLB:DSSA
PMadden
6/23/93

*See previous concurrences.

SPLB:DSSA	OAC:DRIL	SPLB:DSSA	DD:DSSA	D:DSSA
SWest*	JLee*	CMcCracken*	MVirgilio*	AThadani
6/10/93	6/10/93	6/10/93	6/14/93	6/23/93

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Industry Thermo-Lag Program

OBJECTIVE:

To re-establish the technical and licensing basis to qualify Thermo-Lag materials for use in one and three hour fire ratings as required by Appendix R

Thermo-Lag 330

- Predominant cable raceway fire barrier material used for Appendix R
- Large scope of installation:
  - 1 hour conduit: 69,000 linear feet
  - 1 hour cable trays: 16,000 linear feet
  - 3 hour conduit: 22,000 linear feet
  - 3 hour cable trays: 13,000 linear feet
- All previous tests declared indeterminate by NRC staff

Generic Fire Barrier Test Program

- Purpose:
  - Assess Thermo-Lag performance for representative plant cable raceway installations
    - » Baseline
    - » Upgrades using Thermo-Lag
    - » Upgrades using other materials
- Scope:
  - 13 test configurations
  - Phase 1 - six tests
  - Phase 2 - seven tests
  - Further tests may be undertaken

Phase 1 Test Results

- All Phase 1 tests were *upgrades* designed by TSI, using 330-1 material
- Phase 1 configurations exhibiting satisfactory performance
  - 1-hour rated conduits (3 sizes, steel and aluminum) and junction box
  - 3-hour rated straight run 24" steel cable tray
  - 3-hour rated junction box
  - 3-hour rated 3/4" conduit

Phase 1 Test Results (Continued)

- Phase 1 upgraded configurations with temperature exceedances in final 1 to 13 minutes of test, no cable damage observed
  - 3-hour rated 24" aluminum cable tray with "T" section
  - 3-hour rated wide span (36") steel cable tray
  - 1-hour rated wide span (36") steel cable tray
- Phase 1 upgraded configurations not demonstrating satisfactory performance:
  - 3-hour rated medium and large conduits
  - 3-hour rated air drop assembly

Phase 1 Test Results (Cont)

- "Limiting" baseline installations contributed to test results
  - Minimum material thickness
  - Minimum construction attributes
- Observed failure mechanisms considered in design of Phase 2 upgrades

Phase 2 Test Results

- Duration of satisfactory performance for one hour *non-upgraded* fire barriers:

– 3/4" conduit	27 minutes
– 2" conduit	39 minutes
– 4" conduit	48 minutes
– 6" conduit	50 minutes
– 6" cable tray	48 minutes
– 24" cable tray	21 minutes
– Boxed conduits (mounted to concrete)	60 minutes

Phase 2 Test Results (Cont)

- Duration of satisfactory performance for three hour *non-upgraded* fire barriers:

– 3/4" conduit	63 minutes
– 3" conduit	91 minutes
– 6" conduit	102 minutes
– 6" cable tray	85 minutes
– 24" cable tray	85 minutes

Phase 2 Test Results (Cont)

- Upgraded one hour configurations providing satisfactory performance for full duration:
  - 3/4" conduit
  - 3" conduit
  - 6" conduit
  - 6" cable tray
  - 24" cable tray
  - 36" cable tray (with internal barrier supports)
  - Conduits in box enclosure mounted to concrete

Program Applicability

- Many parameters of installation have been shown through testing to affect Thermo-Lag performance
  - material thickness
  - pre grouting of joints
  - direction of structural ribs
  - internal panel supports
  - band or tie wire spacing
  - type of joints
  - unsupported span distance
  - support protection
  - cable fill
  - raceway mass
  - raceway dimensions
  - raceway material
  - others

Industry Application Guide

- Purpose:
  - Provide guidance for use of test results, comparison to installed configurations
  - Address installation parameters
- Intent:
  - Achieve agreement with NRC on content, provide final version to industry ASAP

Industry Application Guide

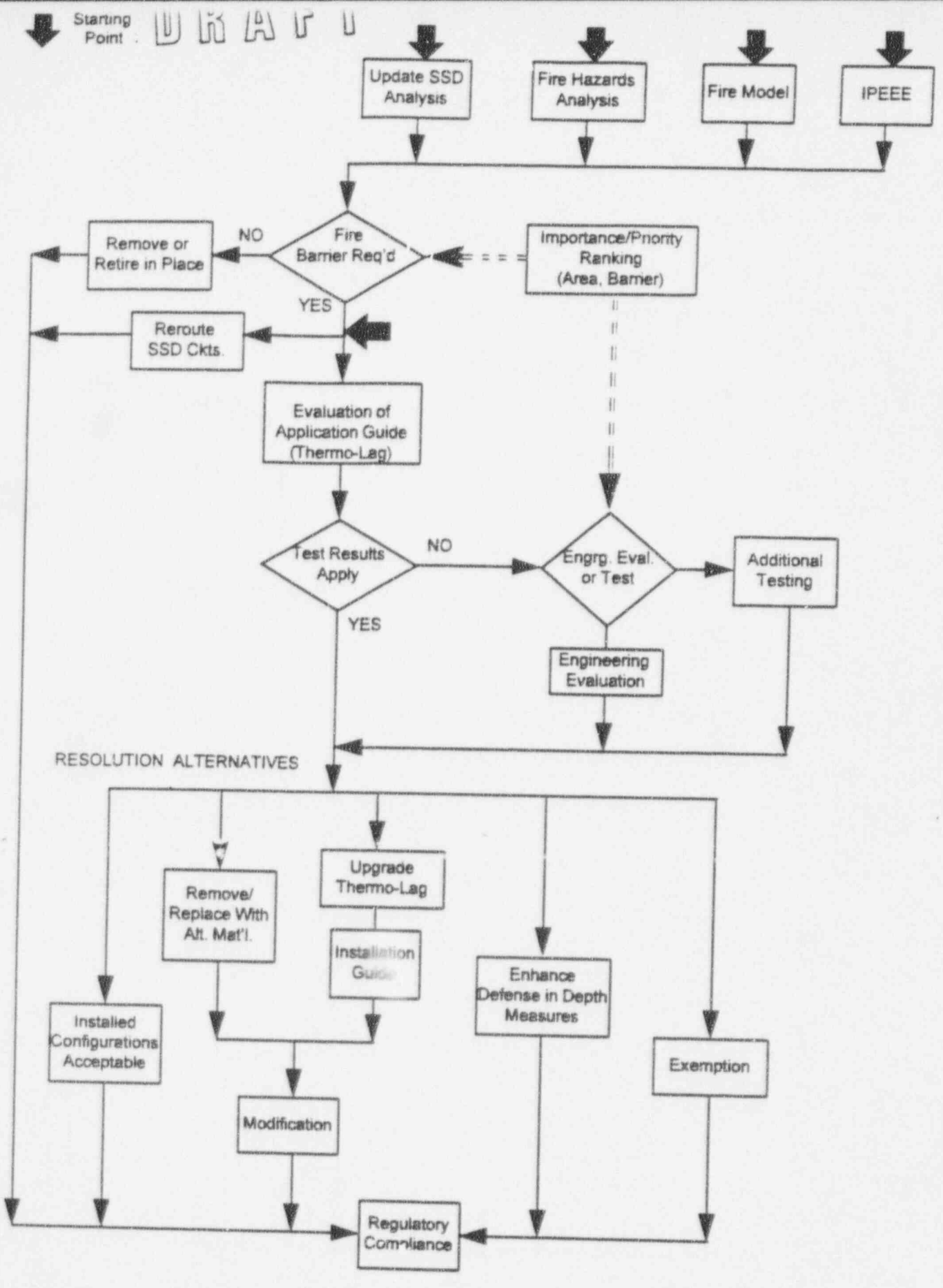
- Makes use of all generically applicable test data
  - TUEC
  - TVA
  - NUMARC Phase 1 and 2
- Addresses evolution of test/acceptance criteria
- Will be updated to reflect further applicable test results
- Addresses baseline and upgrade testing

Chronology

- Draft submitted to NRC on March 4
- NRC meeting to discuss March 16
- Draft provided to WG on March 25
- Draft provided to industry on April 13
- Discussed in detail at April 20-21 industry meeting
- NRC staff comments received April 7

Chronology (Cont)

- NEI response to NRC staff comments: May 18
- Final revision underway
  - Address NRC and WG comments
  - Incorporate Phase 2 test results
- Will provide final revision to NRC on June 17


Starting Point
Update SSD Analysis
Fire Hazards Analysis
Fire Model
IPEEE
Fire Barrier Req'd
NO
Remove or Retire in Place
YES
Reroute SSD Ckts.
Importance/Priority Ranking (Area, Barrier)
Evaluation of Application Guide (Thermo-Lag)
Test Results Apply
NO
Engrg. Eval. or Test
Additional Testing
YES
Engineering Evaluation
RESOLUTION ALTERNATIVES
Remove/ Replace With Alt. Mat'l.
Upgrade Thermo-Lag
Installation Guide
Installed Configurations Acceptable
Enhance Defense in Depth Measures
Exemption
Modification
Regulatory Compliance

United States
Nuclear Regulatory Commission

Presentation to the Advisory Committee on Reactor Safeguards

Proposed Amendment to the License Renewal Rule (10 CFR Part 54)

June 9, 1994

Table of Contents

Background

- Final Part 54 effective January 1992
- Industry and NRC experience implementing the rule
- Senior NRC management review of issues
- September 1993 public workshop
- December 1993 staff recommendation to revise rule
- February 1994 Commission SRM to revise rule
- March 1994 public meeting with Nuclear Energy Institute (NEI)

Approach to Rulemaking

- SRM used to develop proposed rulemaking package -- retain *Principles of License Renewal*

- Steering Group and Working Group established to give priority attention to this rulemaking.
  - Steering Group: NRR, RES, and OGC senior managers, and Deputy EDO
  - Line Management
  - Working Group: NRR, RES, and OGC senior staff

Objectives of License Renewal Rulemaking

Clarity	✓	Be clear on what is and what is not subject to review.
Simplicity	✓	Simplify rule by not using terms like ARDUTLR, ITLR, SSCs, and by minimizing the use of definitions.
Flexibility	✓	Allow applicant the flexibility to develop methodology for determining the review scope.
Stability / Predictability	✓	Be straight forward and clear such that an applicant can make a timely decision whether to pursue license renewal.

Retained in Proposed Revision

- Principles of License Renewal
  - Regulatory process is adequate to ensure the current licensing basis (CLB) will continue to provide an acceptable level of safety --- with the possible exception of aging effects in the period of extended operation.
  - The plant-specific CLB must be maintained during the period of extended operation.

Retained in Proposed Revision (cont'd)

- Integrated Plant Assessment (IPA)
  - Initial broad consideration of plant systems, structures, and components.
  - Quickly focuses review.
- Initial Scope of License Renewal.
- Review of Time-Limited Aging Analyses.

Principal Changes

- Focus on Aging Effects vs. Aging Mechanisms.
  - Performance and condition monitoring.
- Focus on Ensuring ***Functionality***.
  - Regulatory process ensures all other CLB aspects.
- Eliminates the Term ARDUTLR
  - Other definitions also deleted.
  - Concept of ARDUTLR retained.

Principal Changes (cont'd)

- Definitions Deleted from Current Rule.
  - ARDUTLR.
  - Age-related degradation.
  - Aging mechanisms.
  - Effective Program.
  - SSCs ITLR.

Principal Changes (cont'd)

- Narrowing the Focus of the Aging Management Review
  - Current rule results in unnecessarily broad review.
  - Proposed revision credits the effectiveness of the regulatory process and existing programs and activities as adequate for certain structures and components.
  - Resultant review focuses on
    1) Structures and components that are "passive," "long-lived," and "nonredundant" and
    2) Systems, structures and components that are subject to time-limited aging analysis.

Principal Changes (cont'd)

- Simplified Integrated Plant Assessment (IPA).
  - Deletes requirement to list *Systems, structures and components important to license renewal.*
  - Flexibility to develop methodology for identifying "passive," and "long-lived," and "nonredundant" structures and components.

- Reduced Information in Final Safety Analysis Report (FSAR) Supplement.
  - Proposed revision would require only a summary description.
  - Currently entire application submitted as FSAR supplement.

Principal Changes (cont'd)

- Reduced Reporting and Control Requirements.
  - Minimizes special requirements for license renewal.
  - Relies on existing regulatory process.
  - Approach for treating and controlling information is consistent with treatment of similar information during the current operating term.

§54.21(a) Integrated Plant Assessment

- "Identify and list those structures and components subject to an aging management review."
  - "Passive" and
  - "Long-lived" and
  - "Nonredundant"

"Passive"

- Term not used in proposed rule.
  - Extensive review of existing definitions and standards.
  - No one definition captured all the equipment judged to warrant review.

- Structures & components that "perform an intended function, without moving parts or without a change in configuration or properties."
  - "These structures & components include, but are not limited to, pressure retaining boundaries, component supports, reactor coolant pressure boundaries, the reactor vessel..."
  - "Excluding, but not limited to, pumps (except casing), valves (except body), motors, batteries, relays, breakers, and transistors"

"Long-lived"

- Term not used in proposed rule.

- Structures and components not subject to replacement by either:
  - Qualified service life, or
  - Specified time period.

"Nonredundant"

- Term not used in proposed rule.

- Structures and components "whose failure would result in loss of intended system or structure function as described in §54.4(b) during the period of extended operation."

§54.21(a) Integrated Plant Assessment (cont'd)

- "Describe and justify the methods used..."
- "Demonstrate that the effects of aging will be managed so that the intended function(s) will be maintained for the period of extended operation."

Time-limited Aging Analyses

- Definition in proposed rule.

- "[L]icensee calculations and analyses that form the basis for a licensee conclusion regarding the capability of systems, structures, and components within the scope of this part to perform their intended function(s) that --

  (1) Consider the effects of aging; and

  (2) Are based on explicit assumptions defined by the current operating term of the plant."

§54.21(c) Time-limited Aging Analyses

- Provide a list of time-limited aging analyses.

- Demonstrate that --

  - The analyses remain valid for the period of extended operation; or

  - The analyses have been projected to the end of the period of extended operation; or

  - The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

§54.29 Standards for Issuance of a Renewed License

- "Actions ... have been or will be taken with respect to ---"
  - Structures and components subject to an aging management review, and
  - Systems, structures, and components subject to time-limited aging analyses.

- Not current term issues.

Schedule for Completing the Rulemaking

- Proposed amendment published for public comment. 07/94
  (Environmental Assessment and Regulatory Analysis are also available for public comment)
- End of public comment period (90 days). 10/94
- Final rule to Commission for review and approval. 03/95

Will keep Steering Group / Working Group approach to meet the aggressive schedule for completing the final rule.