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NUCLEAR REGULATORY COMMISSION

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BRIEFING ON STATUS OF THERMO-LAG

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PUBLIC MEETING

Nuclear Regulatory Commission
One White Flint North
Rockville, Maryland

Friday, May 20, 1994

The Commission met in open session, pursuant to notice, at 10:00 a.m., Ivan Selin, Chairman, presiding.

COMMISSIONERS PRESENT:

IVAN SELIN, Chairman of the Commission
KENNETH C. ROGERS, Commissioner
FORREST J. REMICK, Commissioner
E. GAIL de PLANQUE, Commissioner

STAFF SEATED AT THE COMMISSION TABLE:

JOHN HOYLE, Acting Secretary

KAREN CYR, Office of the General Counsel

JAMES TAYLOR, Executive Director for Operations

WILLIAM RUSSELL, Director, NRR

ASHOK THADANI, Associate Director for Inspection and Technical Assessment, NRR

STEVEN WEST, Chief, Special Projects Section, NRR

CONRAD McCRACKEN, Chief, Plant Systems Branch, NRR

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

10:00 a.m.

CHAIRMAN SELIN: Good morning, ladies and gentlemen.

This morning the staff will brief the Commission on the status of solutions and options for their problems that involve barriers in general and specifically the Thermo-Lag material.

Since the Commission has been briefed on this topic before, I would ask the staff to focus the presentation on the results and the options and keeping the background to a polite minimum, if you wouldn't mind, because there are lots of questions to go into this very thought-provoking, very interesting paper.

Copies if the slides and the Commission paper on the status of Thermo-Lag fire barriers are available at the entrances to the room.

Commissioners?

Mr. Taylor, would you proceed, please?

MR. TAYLOR: Good morning. With me at the table from NRR are Bill Russell, Ashok Thadani, Steve West and Conrad McCracken, all of whom have been working the Thermo-Lag issue.

Recently, the people with me at the table

and I concluded that there was sufficient information that had been developed on the characteristics of Thermo-Lag through what the industry had done as well as what the Agency has done in dealing with the problem of Thermo-Lag as a fire barrier. We felt we had sufficient experience and information that we could at least develop to present to the Commission certain options of how we should continue to treat this problem. I did provide to the Commission this paper which discussed these potential options of handling this problem. That paper was provided on May 12th.

The briefing will concentrate on the discussion of those options and it will be started by Bill Russell.

MR. RUSSELL: Good morning.

(Slide) Can I start with slide 3, please?

During our last Commission briefing in October, the staff advised the Commission of concerns with the NUMARC, now NEI, test program which the staff viewed at that time would limit the generic applicability of test results and had the potential to significantly increase staff and licensee plant-specific reviews and the overall schedule for resolution of Thermo-Lag issues. The staff was

concerned that it did not have sufficient information on the amount and configuration of Thermo-Lag barriers to judge the acceptability of the NUMARC application guide. We also briefed you on the importance of construction techniques to the performance of Thermo-Lag barriers.

The Commission was not satisfied that sufficient action had been taken by the staff or industry to timely resolve inoperable Thermo-Lag fire barriers. You also requested that the staff seek ACRS views on the Thermo-Lag test program and the overall approach to resolution of the Thermo-Lag problem.

The staff has taken action to focus senior NRC, NEI and utility management attention on resolution of the Thermo-Lag problems. In addition to ACRS and senior NRR management and NEI management meetings related to generic issues, we have required utilities to provide plant-specific information on the amounts and as-built configurations of Thermo-Lag fire barriers. We also requested information on installation methods and barrier parameters which, based upon testing to date the staff believes are important to barrier performance. As-built barrier parameters are necessary to apply the generic NEI test results to plant-specific configurations and is

critical to the staff's approval of the NEI applications guide.

Because the NEI generic program was never intended to cover all plant-specific installations, we also requested information on plant-specific plans for resolution of Thermo-Lag barriers which were outside the scope of the NEI test program and application guide. Additionally, we requested information on plans for addressing ampacity derating factors.

We have developed a database from licensee replies to the 50.54(f) request which will assist the staff in managing its review and inspection activities. We have summarized licensee responses, the results of additional testing and the basis for the staff conclusions on one and three hour Thermo-Lag fire barriers in SECY-92-128. Specifically, we have concluded that one hour fire barriers can reasonably be upgraded using additional Thermo-Lag materials and that three hour fire barriers cannot reasonably be upgraded with additional Thermo-Lag materials.

CHAIRMAN SELIN: Are there any differences between conduits and cable in these conclusions?

MR. RUSSELL: No.

The staff believes that the three hour barriers --

COMMISSIONER REMICK: Excuse me, Bill. Will -- you mentioned specifically upgrading the three hour with Thermo-Lag.

MR. RUSSELL: Yes.

COMMISSIONER REMICK: Will you discuss other possibilities?

MR. RUSSELL: We will be discussing other possibilities in the briefing.

The staff believes that three hour Thermo-Lag barriers will perform their intended function for one hour.

(Slide) Could I have the next slide, please?

I'd like to summarize a policy issue and four options for resolution of Thermo-Lag fire barriers that are discussed in SECY-94-127, after which Steve West will discuss the details of each of the four options. Following Steve's discussion, I will summarize the staff's recommendation and identify areas where the staff is seeking guidance from the Commission.

An adequate level of fire safety currently exists at all plants with Thermo-Lag fire barriers. During NRC review of individual plant fire protection programs, licensees and NRC anticipated that from time

to time fire barriers could become inoperable due to maintenance modification work or for other reasons. As a result, compensatory measures are specified in individual facility licenses and/or NRC-approved fire protection programs. Licensees have implemented the required compensatory measures. Some licensees have received NRC approval for alternative compensatory measures. The policy issue therefore is not the current level of safety as it relates to fire protection. Rather, it is the potentially long duration of compensatory measures which were not envisioned at the time we approved such measures.

Because of the extensive use of Thermo-Lag in some facilities, it is possible that cost to repair and/or replace Thermo-Lag barriers could exceed the cost of continued compensatory measures. For other facilities with small quantities of Thermo-Lag, the cost of compensatory measures, if continued, would exceed the cost of repair or replacement. As described in SECY-94-128, eight plants no longer use Thermo-Lag materials and 14 other plants have specific action underway to resolve the Thermo-Lag issues.

COMMISSIONER ROGERS: Bill, just on that eight plants, if you're not going to come back to those -- are you going to say anything more about

those eight plants?

MR. RUSSELL: We can.

COMMISSIONER ROGERS: Well, just you said that they no longer use Thermo-Lag materials. Do they no longer use Thermo-Lag materials to comply with our fire protection requirements or they've actually taken them out and put something else in place?

MR. RUSSELL: They may have implemented a number of options. They could have rerouted cabling. they could have --

COMMISSIONER ROGERS: They're just not relying on Thermo-Lag.

MR. RUSSELL: They're just not relying on Thermo-Lag, so that it's basically resolved for those eight. We still have inspection activity to follow up to confirm the adequacy of that resolution.

COMMISSIONER ROGERS: That material may still be in place though.

MR. RUSSELL: It may be in place. They may have decommissioned in place. In fact, I would expect most cases that would be the approach. But basically the staff proposes to monitor resolution of Thermo-Lag issues on a plant by plant basis consistent with the complexity of plant-specific issues and the amount of Thermo-Lag installed in the plant.

The four options, and I would like to start by characterizing, the staff has within its action plan and resource planning resources to continue to execute option 1, which is compliance with existing NRC requirements and granting on a limited basis plant-specific exemptions in accordance with the regulation and past practices. There are significant additional resource implications for the other three options.

The second option is to study the feasibility of developing new guidance for rating fire barriers based upon the level of fire hazard present. For example, high, medium and low fire loadings and develop guidance on how you would evaluate barriers based upon variability in fire loadings.

The third would be to develop a performance-based approach for resolving Thermo-Lag issues using a lead plant. This would be a combination of technical approaches using performance-based, probabilistic risk assessment, looking at fire loadings similar to what Florida Power has proposed.

MR. TAYLOR: Florida Power and Light.

MR. RUSSELL: Florida Power and Light.

The four is to continue the work as it relates to the marginal to safety activities and

develop a performance-based fire protection rule based upon a petition from NEI. The staff has not yet received that petition and technical information.

Before discussing the options in more detail, what I'd like to do is have Steve go through and give you some of the details in each one and then it will come back to me with the staff recommendations.

MR. WEST: Thank you, Bill.

Good morning.

CHAIRMAN SELIN: Good morning.

MR. WEST: It's a pleasure to be here again.

CHAIRMAN SELIN: As much as last time?

MR. WEST: (Slide) Susan, could I have slide 5, please? We'll start with that.

We have four options and I'd like to go through the options and the thought processes that went behind the development of these options.

Option 1, which is the staff-preferred approach, is to require plants to return to compliance with existing NRC requirements. As you know, the fundamental objective of the Thermo-Lag Action Plan was to return plants to compliance. When we developed that plan two or so years ago, that was the objective

of that plan.

I think it's important to note, since you'll be considering the staff-recommended approach, that industry has completed extensive evaluations and modifications over the years to implement Appendix R. There's a certain satisfaction, I think, with the level of safety that's been achieved by compliance with that regulation. Probably with the exception of some Thermo-Lag fire barriers, industry is in nominal compliance with Appendix R. Periodically you find a minor glitch, but I think overall through years of analysis and evaluations that plants have achieved compliance.

COMMISSIONER ROGERS: Have exemptions been granted in the past?

MR. WEST: Yes, sir, we have.

COMMISSIONER ROGERS: Numerous or --

MR. WEST: We believe we have granted about 1500 exemptions across industry.

MR. TAYLOR: Of course, I would note that exemptions can be given for just small areas.

DOCTOR THADANI: And scheduling.

MR. WEST: And schedules.

MR. TAYLOR: One has to balance that number against the total number of potential fire

areas.

MR. WEST: The Commission recognized when it issued Appendix R that a lot of the requirements would not be needed or practical. Well, I shouldn't say practical. Not needed for some areas and they built that exemption process into the rule. So, industry has taken advantage of it and I will say also that we've denied a number of exemptions. It's not an automatic thing.

COMMISSIONER ROGERS: I'd leave the word "practical" in there.

MR. WEST: Also, just with respect to the current requirements, there really is no technical basis at this time for questioning the adequacy or the soundness of that regulation. It does provide a certain level of comfort that the plants are fire safe.

As Bill had mentioned, there are 22 units that either already have taken actions to resolve the Thermo-Lag problems at the plant or they have made commitments to the staff through the 50.54(f) response or other correspondence to resolve the issues. Largely, they could be, as Bill mentioned, removing the Thermo-Lag, replacing it with someone else, relocating equipment, that kind of thing.

Again --

DOCTOR THADANI: In fact, I just -- Commissioner Rogers, I just visited a plant last week and they have removed Thermo-Lag and use another material.

COMMISSIONER ROGERS: They have used another material?

DOCTOR THADANI: Yes.

COMMISSIONER ROGERS: Well, I'm interested in hearing more.

CHAIRMAN SELIN: I would assume that every plant is trying to control combustibles regardless of what they do.

MR. WEST: There would be administrative controls in the plant that would --

CHAIRMAN SELIN: Well, I didn't administrative. I mean the trend is to make sure that people don't move about, but then you get places that could produce sparks or fix places that could burn.

MR. WEST: Absolutely.

CHAIRMAN SELIN: I would assume that what industry is doing and certainly in our program, the first emphasis would be no so much to build barriers in case there's combustion, but to remove the combustion.

DOCTOR THADANI: That's absolutely correct.

MR. WEST: That's part of it.

CHAIRMAN SELIN: And there is a lot of room for improvement. I'm not saying that there are huge fire risks in the plants, but when you really get down to it, as the people have looked at least in the plants I've been through since this started, everybody has come up with fairly significant improvements. There are things like moving switch boxes and relay boxes. They're not things that are easy to do necessarily, but there are significant improvements.

MR. WEST: That's right.

CHAIRMAN SELIN: There are a lot of good things in your paper, but I think point zero should be remove the combustible risk as much as possible.

MR. RUSSELL: In fact, the approach is broadly control of combustibles and ignition sources and minimize that to the best that you can. Secondly, to provide for early detection and capability to suppress and then to establish a barrier. So, there is a broad defense in depth approach which has taken the fire protection. In general, when we talk about compensatory measures, you are supplementing one activity to compensate for a weakness, in this case

for a barrier. So, you provide fire watches and those fire watches are -- they're not just as a detecture activity, but also to control activities going on in the area, ignition sources, combustibles, et cetera, transients that may be coming in the area.

CHAIRMAN SELIN: The reason I bring up the combustibles is that, first of all, in any action plan that's got to be one of the first two or three steps. But secondly, a major part of what we're doing today is to try to find what kind of credit to give us the combustibles can be controlled below what you might have considered to be the design basis threat. Appendix R is sort of freestanding. It says, "That shalt have barriers that have these pieces." Presumably, if it turns out not to be feasible to completely comply without the exemptions to Appendix R, it should be some measure of what's been done on the threat, therefore on the combustibles.

So, we should be encouraging people to do these, but trying to find some way to give them credit when they get down to extraordinarily low levels of combustibles.

DOCTOR THADANI: That is discussed as part of some of the options.

CHAIRMAN SELIN: Okay.

MR. WEST: Okay. As Bill mentioned, the staff does believe that the one hour barriers, Thermo-Lag barriers can be upgraded to achieve a nominal one hour rating. There's been a lot of testing done that we've briefed you on before and we'll go through all that again, but I think the staff believes that based on that testing and some other testing that's planned, particularly by TVA, there's going to be a pretty good body of test data. We believe that someone could take that data and probably develop or design a generic upgrade or maybe a couple of upgrades, say one for conduits, one for cable trays, or maybe a couple that could be applied across industry and we could say, "We accept this upgrade and we don't need to get into another series of testing." That would facilitate the part of Option 1 that deals with one hour barriers.

CHAIRMAN SELIN: So, that would leave the utility the option of either just doing the fix and washing their hands of it or coming in and trying to show -- this is in all options, trying to show us that, in fact, the barrier does get the one hour under a reasonable range of fires --

MR. WEST: That's correct.

CHAIRMAN SELIN: -- and each of the threats. I mean they wouldn't have to do the upgrade.

They would always have the option.

MR. WEST: They'd always have that option under the regulation today, that's right.

MR. RUSSELL: We do believe, however, that there are going to be some areas where the fire loading is such that you would need to upgrade barriers.

CHAIRMAN SELIN: Oh, yes. But what I'm saying is we're not replacing, we're saying, "We're giving you another option. You can either show us that what you have meets the spec or conversely by reference use one of our standard upgrades. If you do this and you do it properly, we will give you credit for the --"

MR. WEST: Right. That's right.

CHAIRMAN SELIN: Okay.

COMMISSIONER REMICK: Steve, am I correct that in the case of TVA, the testing of upgrades is with Thermo-Lag, additional Thermo-Lag material or are they also considering other materials in the upgrade?

MR. WEST: We haven't received their test plan formally yet, but I attended a presentation where they talked about it and most of their testing is going to be based on using existing Thermo-Lag 330-1. But I understand there's a couple of tests that

they're going to do that uses a new improved Thermo-Lag product. We hope to have additional details about that this month from them.

With respect to the three hour barriers, they continue to present challenges, but there are alternatives that exist and we've touched on some of those this morning and they're all identified in SECY-94-127. Just to bring everybody up to speed, a couple of them are to reevaluate the shutdown analysis to reduce the number of barriers that would require upgrading or some consideration. We found that some plants in their desire to achieve compliance and get a license or resolve an issue, when there was any doubt as to whether a barrier was required, they would just go ahead and install it. If you do a finer analysis now or you can change your shutdown methodology, that barrier, in fact, may not be needed to achieve compliance.

The other thing that some licensees have done and could do is to relocate cables or components to achieve compliance with the existing regulation. We have found through the testing that the three hour barrier or the barrier that's designed for three hours actually will last about an hour. So, one option would be to reclassify the three hour barriers as one

hour barriers and then install the suppression system and then you'd comply with the regulation that way.

CHAIRMAN SELIN: With analogy to what you said before about the one hour, having a three hour rated barrier would be an improved one hour barrier --

MR. WEST: That's right.

CHAIRMAN SELIN: -- absent some reason to doubt it.

MR. WEST: That's right, yes. I think there's been enough tests done that we're pretty reasonably confident that the three hour will last an hour or maybe a little better than that.

CHAIRMAN SELIN: As I remember from plant visits, there's quite a variability in how joints have been made, whether they've been ordered or just -- are you confident that over a wide range of three hour barriers as installed we get an hour even with this range of installation?

MR. WEST: From the testing we've seen, yes. I think we'd look at that. We would want to do a complete evaluation of that, but I think based on the testing we've seen of conduits and cable trays, that would be true.

CHAIRMAN SELIN: Okay.

MR. WEST: The other option, of course, is

to continue to develop upgrades for the three hour barriers. We don't think it's going to be possible to develop a reasonable upgrade using additional Thermo-Lag materials. Some attempts have been done to do that by NEI and they just have not been -- they've only had very limited success. The upgrades have been so substantial that we couldn't -- we don't feel that it would be practical for any licensee to actually install them in their plant. However, there are options of using other materials which they're -- most of this is anecdotal information, but we do know that the 3M Company has worked on some upgrades using their fire barrier material over top of Thermo-Lag for the three hour and they've had, they tell us, fairly good results with that. Of course when you do that you need to look at other factors like ampacity and weight for seismic issues and that kind of thing. So, it's not fully -- you know, those kinds of evaluations have not been fully developed yet.

CHAIRMAN SELIN: We don't know that there are options, but there may turn out to be options to --

MR. WEST: They may turn out to be options, that's right. We've had contacts from other vendors of fire barrier products that claim that their

products can be used to upgrade Thermo-Lag barriers. We've had claims that they have a barrier that is suitable as a replacement for Thermo-Lag.

CHAIRMAN SELIN: Assuming that we come to conclusions about the automatic suppression aspect of one hour barriers, it seems to me that most licensees in almost all situations would be better off declassifying the barrier and living with a one hour rating than trying to get back a three hour. I mean they already have automatic detection in almost every case, don't they?

MR. WEST: That's right. Assuming that it's practical to --

CHAIRMAN SELIN: So, the regulatory difference is automatic suppression, right?

MR. WEST: That's right.

CHAIRMAN SELIN: So, depending on how we handle the automatic suppression for diesel rooms and places like that, it may turn out to be in almost every case not really a relevant option to try to convince us that they have the three hour barrier rather than accept the derating. That is a question. I know it doesn't sound like a question, but it's intended to be a question.

MR. WEST: I would say that for the plants

that have moderate amounts of three hour barrier, there probably are a lot of areas where they could install sprinklers. In fact, I read in the newspaper that Callaway is thinking of doing just that. There are some plants that have extensive amounts of three hour barrier. WNP-2 is one, River Bend is another. It runs throughout the plant and I'm not sure it would be -- they would consider is practical to install sprinklers throughout their reactor building, for example.

CHAIRMAN SELIN: But your paper considers other means of --

MR. RUSSELL: Yes.

CHAIRMAN SELIN: -- satisfying the safety requirements of suppression than sprinklers.

MR. WEST: That's right.

CHAIRMAN SELIN: So, sort of that decision, I guess, would depend somehow on --

MR. WEST: It's got to be looked at on a --

CHAIRMAN SELIN: -- somewhat on how you come out on the automatic suppression. Have we found places that don't have automatic detection in three hours?

MR. WEST: There may be limited cases like

that, but I think in most cases when you have safety-related or safe shutdown equipment in an area, you're going to find detection systems.

CHAIRMAN SELIN: So, it's really the trade-off between -- the difference between one hour and three hours, for a practical matter, is the tradeoff between additional time and the degree of automatic suppression.

MR. WEST: Right.

MR. RUSSELL: That's correct.

CHAIRMAN SELIN: Thank you.

MR. WEST: I'll just summarize. Bill has mentioned that we would consider limited exemptions under this option in accordance with what the regulation allows and our past practice. One area may be, for example, suppression where a licensee may want to install a suppression system, but they're reluctant to do it because an automatic actuation may cause a negative safety impact. So, they want to put it in, but they want to use a manual system. Those kinds of things would have to be looked at on a case by case basis. If we found areas where there was a widespread interest in a certain exemption and there was a technical basis then, of course, we would look at it as something that should be handled through

rulemaking.

CHAIRMAN SELIN: I mean we've already accepted on a temporary basis fire watches. So, we've already accepted the principal that in certain situations non-automatic suppression is feasible where three hour barriers are not --

MR. WEST: That's right. We've accepted the compensatory measures. That's not a result of Thermo-Lag. That's been the history of the nuclear power plants that they --

CHAIRMAN SELIN: But what I'm saying is there is a precedent of --

MR. RUSSELL: Yes.

CHAIRMAN SELIN: -- places that would require three hour barriers where we have accepted a set of measures that do not include automatic suppression, at least on an extended temporary basis.

MR. TAYLOR: But Steve did mention the concern and I think it's a valid concern that in some areas automatic suppression inadvertently activated could reduce safety and that, of course, is a very great concern and that would have to be looked at if additional suppression systems were installed. That decision is an important one so inadvertent actuation does not compound --

CHAIRMAN SELIN: You would add not only manual actuation, but some non-sprinkler suppression, like fire brigades or --

MR. RUSSELL: Probably we'd be looking at some type of installed fire suppression that would be manually actuated rather than be automatically actuated, rather than just using hose stations and fire brigade fighting, firefighting capabilities. So, it would be some kind of a sprinkler deluge or other systems. Generally there are not adverse effects associated with Halon or some of the other automatic suppression systems.

MR. TAYLOR: Except to personnel.

MR. RUSSELL: Generally there are timers and alarms that warn personnel to leave the area before actuating.

MR. WEST: I think if we talk about this in the context of an exemption, when we've looked at these exemptions in the past, you're not focused just on one thing, do you have an automatic or manual suppression system, you're looking at the whole integrated fire protection program for that area, including the fire brigade response, detection capability, combustibles in the area, any other fire hazards. And each one in the past has been reviewed

on a case by case basis. I suspect under this approach it's going to depend a lot on if a licensee wants an exemption. A lot of them don't want exemptions from the regulation. They want to meet the regulation.

COMMISSIONER REMICK: Steve, a question for clarification. Earlier when we were talking about exemption you said something, as I understood it, I was a little confused about. You said something that exemptions were anticipated, therefore that provision was put in the rule. I assume we're talking about 50.12 exemptions or is there something specific for fire protection?

MS. CYR: There's a specific provision in --

DOCTOR THADANI: Appendix R.

COMMISSIONER REMICK: It is in Appendix R?

MR. WEST: Yes.

MR. TAYLOR: The reason, going back in history, I think this was a backfit for plants. And I think the Commission took that into specific account in writing that section back.

MR. WEST: Now, one thing before we move on to option 2. One thing you can ask yourself is that there's already been this extensive industry

effort to come into compliance with Appendix R, to request exemptions where they thought they were justified. The staff has reviewed all those. So, until the Thermo-Lag issue came up, these fire protection programs were operating along fairly trouble free.

CHAIRMAN SELIN: Right.

MR. WEST: So, I think the exemptions we would grant now would be purely to deal with Thermo-Lag issues. But in some cases there are licensees, like I said, they went in, they took the conservative road and maybe if you sharpen your pencil something else makes perfect safety sense. You don't reduce your margins of safety.

CHAIRMAN SELIN: Well, it seems to me the key issue really isn't what do you do about three hour barriers that are good for an hour because, as the discussion is made clear, there's a whole set of alternatives available and the question is what do you do about one hour barriers that are only good for half an hour?

MR. RUSSELL: Or 20 minutes.

CHAIRMAN SELIN: Or less. My impression is that as a practical matter that will be where most of the attention is focused because according to our

rules you can't take compensatory matters, steps except in those few areas where we give an exemption. You have to get up to an hour and then we take a look at what it takes to get there, whereas you don't have to get up to three hours, you can allow -- you can switch from a three hour to one hour barrier with additional suppression.

MR. RUSSELL: I would like to emphasize that what we've been talking about thus far, a limited exemption, some of the other options would require broad exemptions that would be generic that the staff does not propose at this point in time.

CHAIRMAN SELIN: Right.

MR. WEST: Okay. In closing on option 1, I'll just say again that this is the staff recommended approach. It will take advantage of the two years of staff and industry effort to find solutions to these problems, although there's obviously still work to complete.

(Slide) Slide 6, please.

The standard time temperature fire that's specified in the ASTM standard which is used to test and qualify fire rated assemblies, and by this I mean Thermo-Lag barriers or any other similar barrier, fire doors, dampers, walls, et cetera, not only for the

nuclear industry but across the United States, that standard time temperature fire may be more severe than the fires that can be expected in some plant areas. Therefore, another possible approach for resolving the fire endurance issues is to characterize the severity of the fires that can originate in representative nuclear power plant areas and develop a specified set of fire exposure conditions that can be applied to fire resistive testing. In other words, develop new nuclear power plant-specific time temperature curves that can be used to test and qualify fire rated assemblies.

We gave this option quite a bit of consideration over the past couple of months. Our bottom line was we felt it was worthy of consideration, but we didn't feel comfortable recommending that we go ahead and develop these curves. There were a number of questions and issues and concerns raised by the staff and management and we felt it would make more sense to spend a little bit more time and to study the technical feasibility of the development of such curves.

I think everyone agrees that this would be a complex and fairly resource intensive effort. We would hope to share that effort with industry. In

fact, we would expect industry to play -- if development of these curves is in fact feasible, we would expect industry to play a major role in developing the curves with the staff providing the normal regulatory oversight and do some verification validation in that kind of activity.

What this would require would be extensive data gathering, analysis of the data and testing. We believe, although this is preliminary, and this would come out in the study, that probably three curves could be used to define or bound the range of fire hazards in the plants. Probably a low hazard curve, a medium hazard curve which may be similar to the existing ASTM curve, and then maybe a high hazard curve for areas such as diesel generator room or cable spreading room where you have high concentrations of combustible materials.

CHAIRMAN SELIN: Are you saying there are areas where we think that the current ASTM curves are, in fact, not conservative?

DOCTOR THADANI: There might be, in fact, some areas where the load would be greater than that conceived initially in the ASTM E119 development of that time temperature curve.

CHAIRMAN SELIN: Are you ready to make a

generic statement that in cable rooms we think that fires could very well --

DOCTOR THADANI: No. I think that's difficult to do.

MR. WEST: The reason we don't do that is that this is -- the fire resistive aspect is one part of defense in depth.

CHAIRMAN SELIN: Right.

MR. WEST: These areas have suppression systems which are not considered at all by the testing, the fire resistive testing of detection, fire brigade and everything else. So, even if we find that there are areas that exceed the time temperature curve, the standard time temperature curve, that would be compensated for by the other elements of defense in depth.

DOCTOR THADANI: Yes. If I may go back, I think it was probably about -- oh, I think it was about a year and a half or so ago at one of the briefings we presented to you various loads, typical loads in different parts of the plant. We indicated that there were some parts, such as a diesel generator room at some plants may, in fact, exceed the kinds of loads that were considered in the development of the curves.

CHAIRMAN SELIN: But diesel rooms are particular amenable to combustible control.

DOCTOR THADANI: That's right.

CHAIRMAN SELIN: I would think the first thing we would do is we would try to get people to get their diesel rooms to be below the curves.

MR. RUSSELL: Well, but in some cases there are controls on the size of the fuel loading because you want to make sure that the diesel is capable of performing its safety function for a period of time without having to refill the day tank, for example. So, you end up with fairly significant fuel oil loads in the relatively small rooms.

What we're trying to do is just characterize that this is not a simple issue. It also becomes one that's somewhat geometry specific in the room. If you have high combustible loading in one part of a room where a large room, how does a fire spread in that room? So, the issue is not a straightforward issue to address. But there are, I think, some generic implications as it relates to what could be done under option 3 or option 4. That is, if we don't know how a fire where there's either a lower combustible loading will behave and how it would behave vis-a-vis barriers, there are some questions in

the past that we may have made which were based upon judgment which said that the fire loading is less, therefore the situation in total is acceptable. So, there may be some applicability of this work to either options 3 or 4.

CHAIRMAN SELIN: Well, option 2 is clearly not an option, it's an add-on to option 1.

MR. RUSSELL: That's correct.

CHAIRMAN SELIN: Anybody --

DOCTOR THADANI: That's right.

CHAIRMAN SELIN: Anybody would still have the option to just conform to option 1.

MR. WEST: That's correct.

CHAIRMAN SELIN: But what I'm trying to understand, trying to get at, is something a little bit different, which is if a particular utility did the option 2 analysis themselves, not with generic curves but they did this -- they took the relatively limited areas where they had a problem with a barrier say surviving an hour against the standard fire but they thought it would survive an hour against a more like -- would we be in a position to analyze their results or would we have to say it's too hard to analyze these? As Mr. Russell said, a lot of it depends on geometry. Well, if they come in and say,

"In our room here's the design basis fire and here's the geometry," could we do this or would we have to say, "Come back in six months when we have generic curves. We can't analyze these on a case by case basis?"

DOCTOR THADANI: Steve, you may want to add, but you could, yes. It will require a fair amount of effort to go through that review because if it's based on -- presumably this would be based on fire growth models and temperatures and whether it's a small room, large room, where the jets and plumes would be and so on. What this would require would be to see if the model that's been used by the licensee is one that we'd be comfortable with. So, the process would be look at the model, review the model, what database was the basis for that evaluation.

MR. TAYLOR: That has been the basis of --

CHAIRMAN SELIN: Of the work we've done so far.

MR. TAYLOR: -- past specific exemptions.

DOCTOR THADANI: There have been some exemptions, but if you had to go through this process, someone were to come in with a proposal like that, you'd review the model, first of all, and come to some understanding of what kinds of time temperature

profiles you would see in different parts of the room. Then you'd say what kind of testing you have to show that the barriers would, in fact, law for a certain time period.

CHAIRMAN SELIN: What I'm trying to get at is there an option 2 minus, which is absent or before or instead of doing the generic work that we allow people to interpret Appendix R not as an ASTM 113 standard fire but as real fires, real crossing that they would come in and say, "If you interpret this not as being one hour rated in the language that's in Appendix R, but that it could withstand the kind of fires we're expecting," --

DOCTOR THADANI: Yes, certainly we could review that. The concern would be you don't want to end up with 100 different curves because that gets to be a very difficult thing to --

CHAIRMAN SELIN: There's probably a thousand different curves.

DOCTOR THADANI: Or a thousand different curves, that's right.

CHAIRMAN SELIN: You know, same locations in each of 100 --

DOCTOR THADANI: That's right. Instead, what we thought would probably be reasonable would be

to come up with a limited set which would then have some margin built into it where the licensees could then decide how many rooms are covered by which specific time temperature curve instead of trying to develop literally thousands of such curves.

MR. TAYLOR: We're trying to developing bounding type curves.

DOCTOR THADANI: Yes. We're saying some margin will still be maintained, if you follow this approach.

CHAIRMAN SELIN: I understand. It's obviously much more desirable if we're calling the shots to do it in a way that's more convenient. But what I'm positing is a slightly different situation. The licensee decides that they want to come in and do real fire analysis and not generic fire analysis. They are, in effect, asking for a kind of an exemption from the way the rule now reads. They're saying, "We think we can meet one --" I'm not talking about people who say, "We only can make 30 minutes, but it's good enough because we have the compensatory measure," but say, "We think we can make one hour against real fires and we'll demonstrate this on a plant-specific basis."

MR. TAYLOR: Area by area.

MR. RUSSELL: We could not object to --

DOCTOR THADANI: We could not object.

CHAIRMAN SELIN: Would not object?

DOCTOR THADANI: No.

CHAIRMAN SELIN: Even without guidance from the Commission that says, "Interpret one hour to be against real fires, not against ASTM fires?"

MR. RUSSELL: It would be a change in practice, but at this point I don't believe we're talking about a change in regulation to implement such an approach because we're talking about changes in what has been staff guidance and practice as compared to change in regulation.

CHAIRMAN SELIN: Well, let me go a step further. Do you interpret option 1 as including the case where the licensee decided that maybe it's so foolish because the analysis is so expensive, but the licensee decides to come in and say that for all intents and purposes our barriers are good for one hour against the real kinds of fires that could have given our program. They could do this under your option 1?

MR. WEST: Under the exemption process I believe they could.

MR. RUSSELL: At this point in time, based upon what we've done by way of staff practice and

approach, absent plant-specific exemption requests with a basis, it puts it in an overall context.

CHAIRMAN SELIN: Well, it would be a plant-specific --

MR. RUSSELL: That would be the approach we would be taking.

MR. TAYLOR: That would be a rather large exemption process. Wouldn't you say so, based --

MR. RUSSELL: It depends upon how broadly they're going to apply it. If they're going to apply it to plant-specific throughout the plant or it's a particular area.

MR. TAYLOR: To the individual fire coding.

DOCTOR THADANI: But I think what you're saying, it seems to me, is you could call an option which is combination of options 1 and 2. That's, I think, what you're saying. I think the licensees --

CHAIRMAN SELIN: What I understood Mr. Russell to be saying is it's implicit in option 1 through the exemption process that if they want to go to the trouble of doing a real fire analysis with real fires for as many areas as they don't think they can meet the current rule for one hour against the standard fire --

MR. TAYLOR: Yes. We would need --

CHAIRMAN SELIN: -- we would entertain that.

MR. TAYLOR: We would need the Commission's endorsement of that approach because that would be a rather widespread, by fire loading by fire loading area by area, request.

CHAIRMAN SELIN: So, it would be a new option, 2 minus basically.

DOCTOR THADANI: That's right.

MR. TAYLOR: I have no idea the number of specific exemptions or requests, but that would be a -- that's possible, but that would require a broad exemption application. That's speaking judgment, not --

Would you agree?

MR. RUSSELL: Yes.

MR. TAYLOR: In past review of fire specific, the number would grow very significantly, I suspect.

CHAIRMAN SELIN: It's not fundamentally different from your option 2, but tactically it's different.

MR. WEST: That's correct.

CHAIRMAN SELIN: It says you don't have to

wait for us to do the generic curves. If you care to do this analysis, we would entertain that. The real question is if we never got around to doing the generic curves, would we still entertain it? What Mr. Taylor is saying, you would need some Commission guidance.

MR. TAYLOR: I would believe because I think there would be in many of the plants a significant number of exemption requests. What the staff has done in granting exemptions in the past is the geometry of the plant. Right? Then you get into the part that's been very, very difficult.

MR. WEST: Absolutely. It's very complicated.

MR. TAYLOR: It's small barriers and we look at those --

MR. RUSSELL: The issue really is based upon whether we believe these are limited exemptions which were within the context of what was approved before and the practices that have evolved, or whether we're talking about a change in practice, change in approach where we would be using something generically on a particular plant that would result in a broad exemption for that facility.

COMMISSIONER ROGERS: Could I just ask a

question? It's my impression that -- and please straighten me out if I'm wrong on this -- that when we adopted the rule and we referred to the necessity of rated for certain periods of time, I don't know, did we explicitly refer to the ASTM E119 in the rule or did that appear in the --

DOCTOR THADANI: It's in the statement of considerations.

COMMISSIONER ROGERS: It's in the statement of considerations.

MR. RUSSELL: The staff guidance, which is why we would propose to go through some kind of notice and comment process associated with a change in guidance to indicate an acceptable alternative.

COMMISSIONER ROGERS: But in referring to ASTM E119, I don't believe we went through the kind of a process that we're talking about here now, that actually looked at what the kinds of fires would be and what the challenges would be, that it was a convenient standard to refer to at the time and so we adopted it. I think we have to keep that in mind at some point. We have a regulation and we're very concerned about compliance with that regulation. However, I think that when we talk about the possibility of fires either exceeding or not coming

anywhere close to the fires under which the tests are conducted with the ASTM standard, that we may never have really contemplated very carefully what kind of a fire was going to take place in the plant with respect to the tests of the ASTM standard. Those were standards that commercial -- generally used in some kind of industrial situations, a convenient standard to adopt and we adopted it. But we really didn't consider whether that was, in fact, the right standard for nuclear power plants. It was a convenient one, it was an acceptable one and it was taken.

My guess is today with the way we approach things with risk as a basis for arriving at new regulations, that we would adopt much more of the approach that we're talking about here now. We'd tend to look at what is required in each particular point in the plant and try to minimize the enormous effort that's required to do those kinds of studies, but nevertheless we would take much more of an analytical approach towards what was actually required and then see whether a standard such as the ASTM E119 standard in fact was an appropriate standard.

My impression is that we really didn't do that in the past. Now, we have a regulation based on that standard and we've got a problem on our hands

because everybody thought it was easy to comply with. But I do think that we should keep in mind that the sanctity of this standard for its application in a nuclear power plant was never really thought through all that carefully in the very beginning. Am I wrong on that?

MR. WEST: I don't know if you're wrong, but I don't know that I agree with you.

COMMISSIONER ROGERS: Okay. Well, that's just a nice way of saying -- that's all right.

MR. WEST: I mean I think the staff -- really the standard goes back to the original NRC guidance documents back in 1976. You're right, it's an industry consensus standard that's used not only by the nuclear industry, all of industry and in the design of the building we're sitting in. But I think this -- from reading the statement of considerations, I think the Commission at the time recognized that those standard fires were conservative. In fact, it's stated right in there, "We think this is conservative, but given the consequences of a failure of one of these barriers, we think it's justified."

So, I think there was a lot of consideration. There was debate about those standards at the time. There wasn't a thorough analysis of does

this match up with this hazard kind of thing like you mentioned, but there was a consideration of the conservatisms both in those standards and their application to our industry. I think a conscious decision was made that those conservatisms were justified. I think it's worth doing the study, obviously. We think we should study it.

But I get the sense that there's a general feeling that when we do this it may solve a lot of the problems because you're going to have a less severe curve and that may be. We've tried to do before this meeting some preliminary look at what -- has anybody done this before? What's out there? We have found -- just one thing of interest. NIST, or NBS at the time, had done this kind of study. What they found from their study is that when you look at the actual fuel load in an area, you're not going to follow the standard time temperature curve. But even if you have a lower fuel load, what you've got in all of their tests was a fire of shorter duration but it had a higher intensity at the beginning of the fire. When they tested assemblies using the standard curve against that curve, you had much earlier failures using the curve that had a higher intensity for a shorter duration.

So, those are the kinds of issues that we felt we needed to study before we came to you and said, "Gee, we ought to go ahead with these curves. They look good." Those kinds of things need to be considered. We would expect to get the assistance actually of NIST and probably Sandia National Laboratory who have been intimately involved in NRC and nuclear research, and hopefully in six months be able to get back to you and answer these questions and tell you whether on a generic basis -- and I think this would slop over into the plant-specific, is it suitable for plant-specific -- get back to you and give you the results of our feasibility study.

DOCTOR THADANI: But I may just add to that, Commissioner Rogers. I think I certainly agree with you intellectually. Today the approach you would want to use would be to get good understanding of what the real hazard is and what's the real risk and then deal with it on that basis. So, if we had to start today, in my view certainly that would be the way to go forward.

COMMISSIONER REMICK: Steve, you partially answered a question I was going to ask and that is what precedence do we know of in other industries. But it seems to me do we know what might have been

done in naval vessels or space or petroleum industry along this line, other industries or activities?

MR. WEST: We have been scrambling to try and get as much information as we could before this morning's meeting and really the NIST or NBS study, that's the only one they're aware of and we would hope over the next six months to try and identify similar studies. I think Sandia actually did this study or as a part of a study looked at this question in the mid-'70s. It may have been when they were writing the rule to see if it made sense. But we would hope they gather all of that information and fully consider what has been done in the past and what kind of conclusions have been drawn.

MR. TAYLOR: In naval applications, separation was preferred because you may be in combat and that type of thing. But to the degree these types of things are looked at, that's the preferred option, a so-called port-starboard type steering controls, which are all very vital. So, that indeed is the whole approach. Of course, one must remember that the designs, if you went back to the beginning, you would design the separation features, which is the ideal.

COMMISSIONER REMICK: Bill, separation is obviously preferred but there are always situations

where that can't be done.

MR. TAYLOR: Right. Then that is a recognized design vulnerability.

MR. RUSSELL: I would like to point out though that independent of whether we go forward with an evaluation, to proceed to a regulatory guide and coming up with three time temperature curves I think that the technical work to evaluate how barriers perform for different fire loadings, what are the implications of geometry would be appropriate to understand it. So, the issue here is one that we are looking at reallocation of resources because it's beyond what we have planned.

CHAIRMAN SELIN: Commissioner de Planque has a question.

COMMISSIONER de PLANQUE: Yes. Back to Steve. The NBS tests that you're talking about, I may have missed what you said. Was that for standard industrial situations?

MR. WEST: I don't have all the details. I think they had modeled a room and I think it may have been for a house for HUD and used that room model to -- the fire curve that came out of that room model to test for ceiling assemblies and they compared the one that came out of the room model with the E119

curve.

COMMISSIONER de PLANQUE: But what you're suggesting there is that would challenge the ASTM standard curve rather than the situation Commissioner Rogers is talking about.

DOCTOR THADANI: Yes. That's how I interpreted what he said also.

COMMISSIONER de PLANQUE: Okay.

MR. WEST: I think it did challenge the ASTM curve and they had a problem with that, from what I hear. The results of that work, as I understand it, never went anywhere because the ASTM would not back them. You have to remember, the ASTM is just a standard. It's a standard way of comparing all these barriers. Really, that's its purpose. There's meaning behind that, but it doesn't --

MR. TAYLOR: It doesn't envelope everything.

MR. WEST: Yes. It doesn't envelope everything, but when you're looking at one one hour barrier against another, you can see there are completely different ones built out of drywall, ones built out of cinder block. It still means something to an engineer to have a one hour barrier.

COMMISSIONER de PLANQUE: Sure.

DOCTOR THADANI: But the expectation certainly was that that was conservatively bounding.

MR. WEST: Right.

COMMISSIONER de PLANQUE: Yes, which would be questionable based on the NBS results.

DOCTOR THADANI: That's right. That's right.

MR. WEST: Yes. That's one study we found out about. There may be other studies that contradict that, but it appears that there has been some work done in this area, that we'd like to take advantage of that. Also, as part of our study, we'd like to get the industry input and feelings.

MR. TAYLOR: This will take, as Bill mentioned, significant work and we're not quite sure how successful the results will be in terms of its applicability.

CHAIRMAN SELIN: Okay. Now we're through with the easy part. Now explain option 3 to us.

MR. WEST: I think we've talked about option 3 somehow in all this.

CHAIRMAN SELIN: Quite frankly, I'm not clear as to differences between sort of what we discussed today versus generic exemptions. I really have trouble understanding what option 3 meant when I

tried to say it would cover this case or this case or this case.

MR. WEST: (Slide) We'll be talking from slide 7.

The best way to talk about option 3 which is this performance-based solution, and when we talk about a performance-based solution we're talking about really what you had mentioned earlier, looking at each individual plant and area and basing the fire protection features that are required on the fire hazards in the area.

CHAIRMAN SELIN: But let me make clear about what I was talking about afterwards. I was not talking about exemptions to say 30 minutes are good enough. I was talking about different ways of arriving at the hour, but keep the hour sacrosanct. To me, that's the difference between modernizing Appendix R and moving to a real performance rule that doesn't even talk about one hour or three hour, it just talks about probabilities.

MR. WEST: Okay. Okay. Well, the existing options for protecting safe shutdown trains that are specified in Appendix R are fairly prescriptive. You could use one and three hour barriers essentially. There is some relief, obviously

the exemption process and also if you are in a situation where you can't provide the one or three hour barrier or have the required separation, you can provide an alternative shutdown capability.

I think in the context of the Thermo-Lag issue or fire barrier issues, the regulation is fairly prescriptive. The performance-based methods that have been proposed by a couple of licensees are different in that they use a fire model to model the fire hazards in the area and the expected result from a fire in the area and determining whether or not the barriers that are in the area are going to be adequate for protection of the safe shutdown capability.

CHAIRMAN SELIN: What do they use for the fire model? Do they use the ASTM fire model or do they come up with new fire curves also?

MR. WEST: The approach we know the most about, and it may be the only one that actually exists because we haven't actually received anything substantial from anyone else, is the Florida Power and Light proposal. In a nutshell, the way it works is they run their fire model in the area and they would come up with a time temperature curve for that area and then compare the barrier rating remembering that the barrier is rated against E119 and see if the

barrier was going to be adequate for the predicted expected fire damage in the area.

CHAIRMAN SELIN: So, the time temperature curve is a derived curve. It's not --

MR. WEST: It's derived from the fire model itself.

CHAIRMAN SELIN: And it's a generic curve or is it something that's specific to --

MR. WEST: It would be specific -- that curve would be specific to each compartment they ran the model for.

CHAIRMAN SELIN: Different from one site to another site?

MR. WEST: That's right.

CHAIRMAN SELIN: It's not cable rooms in general, it's Turkey Point --

MR. WEST: Well, if you did five cable rooms, you may find they all come out about the same. But you would do -- you know, what they would plan to do at their plant is for each area where they needed to do this analysis, they would develop a new curve. We haven't heard that they've completed enough of the analysis to where they can make some general --

DOCTOR THADANI: Steve, were you going to add that there are, in fact, a number of questions

even with that proposal, technical issues and some of the assumptions that are made as they go forward? At least they seem to raise some issues in our minds.

MR. WEST: I can talk about those.

In any event, that's what the -- in the context of the Thermo-Lag issue, that's what's being characterized as a performance-based approach. How it stacks up with the performance-oriented risk based fire protection rule, they don't quite match up in terms of definition of what performance-based means. But we do know that through the responses to the 50.54(f) letter that we sent out in December, that 22 sites would like to use a performance-based approach. That's 35 plants. We went back and took a look at those plants and not surprisingly most of those plants have substantial amounts of Thermo-Lag. So, this is being viewed by industry as a solution that could resolve a lot of the Thermo-Lag problems in their individual plants.

We've had a couple of meetings with Florida Power and Light to understand their approach and we believe that it will be technically challenging to review and implement one of these approaches. As Ashok mentioned, we met with them. We had a number of questions and we got some additional information back

from them. We still have questions. We haven't really performed a comprehensive and formal review, but the questions would be on certain things like they've established certain safety factors and screening methodology that may not be conservative. So, if the Commission approves this approach or this option, we would get into this review cycle with Florida Power and Light or some lead plant because we think with the interest by 22 sites, it makes sense to work with a lead plant to develop an approach that can be applied to the other plants that would be interested in using it.

COMMISSIONER de PLANQUE: Do you agree with the basic model that Florida Power and Light is using? Is there agreement on the model per se?

MR. WEST: No. We would have to review the model. They've taken the model --

MR. RUSSELL: We're not going to agree or to disagree because we've not completed the review at this point in time.

DOCTOR THADANI: When you say model, do you mean the fire model or do you mean --

COMMISSIONER de PLANQUE: The model they're using to generate the curve.

MR. WEST: We haven't reviewed the model.

They took the --

COMMISSIONER de PLANQUE: Are there many models out there to choose from or does ASTM --

MR. WEST: In the fire protection engineering world there are a lot of models out there. A lot of major universities have models. NIST has models. There's a lot of people working on models. Some are very specific to model certain things and some are more broad. What Florida Power and Light proposes to use is the model the Compern 3 from the Five Methodology, which they have modified. So, we would need to do a detailed review of that model before we can really say whether we would accept it or not.

DOCTOR THADANI: And that model is used today. As Steve said, that's used in the Five Methodology.

MR. WEST: But it's a totally different application. It's not for identifying the fire protection required to protect the safe shutdown capability.

I'll just say with models, we have not reviewed or approved any fire model for regulatory compliance issues. All the exemptions we've reviewed and granted have been based on more traditional

analyses because the verification of models, as you know it's very complicated. Using models requires probably a whole new level of sophistication by the user and by the regulator to review it. They're subject to manipulation. Not that anybody would do that, but --

DOCTOR THADANI: I might just add though, in most areas we do use models, no matter how complex the processes might be. We traditionally haven't used that approach in a couple of areas, this being one of those. But again, if you were to start today, you might want to approach it that way.

COMMISSIONER de PLANQUE: Thank you.

MR. WEST: With respect to this option, we identified in the SECY paper that addressed the options a number of policy issues. I'll just mention what they are and I think Bill is going to summarize those later. But for the audience, the first policy issue is should performance-based approaches even be considered by the staff as a means of identifying solutions to the Thermo-Lag issue? These approaches are a significant departure from current Appendix R compliance methodology.

The other question or policy issue would be should we work with a lead plant and grant

exemptions for that lead plant with the expectation that the approach would be codified and that the other plants could use it to achieve compliance or should we grant exemptions for lead plant and any other plant that's interested in using the approach?

COMMISSIONER de PLANQUE: Do you have a volunteer at this point?

MR. WEST: No.

COMMISSIONER de PLANQUE: Okay.

DOCTOR THADANI: If I might go back to that issue still of models, sometimes the preferred approach would be to develop models and we did that with the ECCS rule. We specified the acceptable model and acceptable criteria and then, through experience, realized that that was causing a lot of difficulties. When they're small differences, as you learn more, models do change. For small differences you get in the situation of do you have to go back and change the rule.

CHAIRMAN SELIN: Ashok, which rule did you say?

DOCTOR THADANI: Emergency core cooling rule, 50.46. And that costs an awful lot of money to constantly go through reanalysis. So, you, in a way, got to a point -- I don't know if this was the case in

Appendix R discussions, but I know when we were discussing a regulation, anticipated transients without scram, we just kept going round and round. On one hand we said, "We really ought to have models and criteria." Then the concern was that you get into the same old situation we had with the emergency core cooling situation.

So, preferred method was prescriptive, just specify what you think is good enough to deal with the challenge. I'm wondering if, in fact, that wasn't the case here also, concerns that models go through changes and you might end up revising things again and again and maybe it's better to just specify what you think is good enough. I suspect that might have been the case here, although I don't know all the history on Appendix R.

MR. RUSSELL: Well, why don't we continue with option 4 and then we'll come back and discuss them broadly.

MR. WEST: (Slide) Option 4, slide 8, please.

Option 4, I won't spend a lot of time on this option. Option 4 is basically a continuation of developing a new performance-oriented risk-based fire protection rule as set out in SECY-94-090. The reason

we mention it here is we think this is obviously something the staff should be working on with industry. We expect industry to have a significant role in this. But when we look at the performance, this whole issue of performance-based regulation and what should we do today with the Thermo-Lag issues, I think the staff believes that we should be -- if we do anything under Option 3, we should ensure ourselves that what we do is going to be consistent with what comes out in the final rule and, in fact, this work should probably be fed or incorporated into the final rule.

I think that there should be some caution taken that when you look at a performance-based approach that focuses on the Thermo-Lag barriers, or say on fire barriers, it doesn't matter if it's Thermo-Lag, that's one narrow part of the overall fire protection program, whereas the performance-based rule was intended to look across the entire fire protection program. We want to make sure that we don't do something under option 3 that could cause problems later through the whole rule. We may find out later we shouldn't have had such a narrow focus on the barriers.

CHAIRMAN SELIN: So, 3 would use

probabilistic reasoning to applying the separation in barriers. Four would say let's go whole hog, let's have a rule that applies to fire risk period.

MR. WEST: That's right. And then if you could take advantage --

CHAIRMAN SELIN: You still have to keep the defense in depth concept --

MR. WEST: Absolutely.

CHAIRMAN SELIN: -- that within this overall probability that we put a certain amount of reliance on separation, whether there's barriers or --

MR. WEST: Right. That's why it may make -- I think what Bill is going to say is we're not proposing to go forward with the plant-specific performance-based approaches without specific direction. I think that's a big reason, is that we would -- you know, everyone agrees that look at the performance-oriented risk-based fire protection rule makes sense. It's a good idea and there's a lot of -- it's a meritorious idea, but it may not make as good a sense to look at one element of that now and try and feed it in later.

CHAIRMAN SELIN: You've got a separate problem with that, which is we would be severely and I think justifiably criticized for using probabilistic

methods where you can't otherwise get compliance rather than to get better safety. But you did explain the difference between 3 and 4, which I had missed before. So, that was very clear.

MR. WEST: And before I turn it over to Bill, I wanted to try and get the last word in on fire modeling, but if there's a question --

COMMISSIONER REMICK: I certainly see that option 3 as a performance base is providing us with an opportunity for additional insights if we do consider changing our practice or if we grant exemptions. I always look at performance-based and probabilistic as giving us additional insights that we might not have otherwise had. So, I've seen kind of the four options as a continuum, that they're all tied together. I don't know how we could quite separate them unless one adopts just option 1. Option 1 is very clear. But if we do from time to time grant exemptions under existing practices or modified practices based on new information, it seems to me we can't exclude probabilistic insights if they add to our ability to make those decisions. I stress as additional insights.

MR. RUSSELL: Let me summarize what the staff recommendation is and what we see we need some

guidance on and what some of the implications are both as it relates to schedule resources and approaches. Some of these have come up at various points in the discussion and I agree we recognize that options 1, 2 and 3 and 4, there are not very finely divided lines between them. It is a spectrum. But how we approach this has fairly significant implications.

First, our recommendation is to continue with option 1, compliance with the existing regulations consistent with the Thermo-Lag Action Plan where we would be granting limited exemptions where justified. Twenty-two facilities have already been doing this and we're satisfied with the approach. We have 59 for which there's some question. As we just identified, there are 35 that are going to be hard spots, where they have substantial amounts and proposed an alternate approach where that alternate approach, we think, has significant implications for how we proceed.

COMMISSIONER ROGERS: Excuse me, Bill. Those 22 sites, are those the same 22 that are listed on slide 7 that are proposed --

MR. RUSSELL: Yes.

COMMISSIONER ROGERS: -- proposing a performance-based solution?

MR. RUSSELL: No, no. But 22 are in Enclosure 2 of the SECY paper.

COMMISSIONER ROGERS: Twenty-two is the number that happens to apply to a different set of --

MR. RUSSELL: Yes. We actually had eight and 14 and we specifically identified those facilities. It's in Enclosure 2 of the status paper.

COMMISSIONER ROGERS: Right. Okay. All right.

CHAIRMAN SELIN: It's Russell's constant.

MR. RUSSELL: We didn't mean it to be. It was totally circumstantial.

COMMISSIONER ROGERS: Can't you get one more or one less in there in one of those groups?

MR. RUSSELL: I would be very pleased to have one more in the group that's resolved.

(Slide) Can I have slide 10, please?

As it relates to option 2, we believe that there is merit in proceeding with a feasibility study to find out what has been done, particularly to gather information as it relates to performance of barriers with variable fire loading and that that information may have generic applicability independent of whether we go forward with a development of a regulatory guide. Option 2 is really predicting that such a

study is feasible, that upon completion we would proceed to a regulatory guide through a notice and comment process to establish an alternative to the standard test for rating fire barriers and that this would provide for variability in the fire loading or fire hazard within the area.

COMMISSIONER REMICK: Bill, I assume by that you mean you would come up with a regulatory guide if you find that this is feasible.

MR. RUSSELL: If this is feasible, we would propose to go through the normal regulatory guide development process such that would be available as an option.

Option 3 has some significant implications, both policy-wise and schedule-wise and resource-wise. What we've suggested would be to proceed with a single facility in order to really understand it and develop it because we think it is very plant-specific. As we've discussed, it would require an understanding of the fire loading and modeling in individual areas, basically work out the details and try and understand the approach. That would mean that the other 33 or 34 plants that propose this approach would be basically in a status quo while we spent substantial time and resources dealing with

a single facility.

COMMISSIONER REMICK: Wouldn't the single facility also be in status quo until you came to some answer?

MR. RUSSELL: Until we come to some kind of conclusion. So, you're correct.

In option 4, we don't have the specific proposals yet addressing the scope of the program that we've been dealing with with NEI. I would also comment that I've already sent one letter back to a utility that proposed a performance-based approach and suggested that the staff was deferring activity on that and suggested they coordinate their approach with NEI such that it's within the four corners of the proposed rulemaking. The issue there is you're essentially deferring to a rulemaking and giving the appearance that you're rewriting the rules to resolve a problem rather than solving the problem with Thermo-Lag.

We believe that because these options have significant resource implications beyond that which we have planned for and laid out, we need Commission guidance back on which of these options to implement beyond option 1, which is the current plan and current approach. So, we would be looking for guidance back

from the Commission.

COMMISSIONER REMICK: Bill, on the last one, somebody comes in with a proposed rule. Now, that idea preceded any problem with Thermo-Lag. But am I correct that if anybody comes in with a proposed rule, we consider it.

MR. RUSSELL: Yes.

COMMISSIONER REMICK: In other words, we should publish it in the Federal Register and we'd get comments.

MR. RUSSELL: Normal process for petition for rulemaking.

COMMISSIONER REMICK: So, it's not a decision whether we would consider somebody's proposed rule. We'd have to consider it. At least I think we'd have to consider it.

MR. RUSSELL: What we've suggested here is that upon receipt of a petition for rulemaking that we would come back to the Commission within six months of that and provide our views and at that point recommend whether we go on a proposed rulemaking or how to proceed. So, option 4 --

COMMISSIONER REMICK: That would include a public opportunity for comment, right? It's published in the Federal Register typically. Am I

correct on that?

MR. RUSSELL: That would be our comments on it that we would then need to proceed. We would obviously notice the receipt of the petition, but whether we have completed the analysis of all the comments on the petition would be basically staff comments on that proposal within six months. I think it would be, in fact, longer to resolve all public comments and develop a proposed rulemaking package. Basically it will be to come back to the Commission with the staff views on the merits of such a proposal based upon the work that the staff has done during that period of time. That summarizes the issues that we are transferring and laying on your table.

MR. TAYLOR: As EDO, I thought after going through this with the staff that it was quite important to come to the Commission because there are several different paths that are potentially available and each of them has their resource and obstacles, but that Commission involvement was important. This involves certain policy decisions that certainly need to be made at the Commission. So, that was the idea even though some of these aren't totally developed. Before proceeding down those paths, I really needed Commission direction.

CHAIRMAN SELIN: Sure.

MR. TAYLOR: That concludes our presentation.

CHAIRMAN SELIN: Commissioner Remick, why don't you continue since you started on this line of discussion?z

COMMISSIONER REMICK: Well, yes. Just off the top of my head, it would seem that if we do anticipate a proposed rule, performance-based rule which is something that has been talked about for a long time because of difficulties with Appendix R and you said, what, 1500 exemptions we've made? It's been a very difficult rule in many respects. So, if we anticipate that's going to be the case, it seems to me that all three of the options and other options that you mentioned are important information that the staff would have in making its analysis, its views on such a proposed rule. All of those would lead in helping the staff.

As I say, I personally could not separate out, although I realize the need for you to come back because of the resource implications and trying to get Commission input and some other policy considerations. But personally I couldn't separate out from a logical standpoint that these were not a continuing leading to

eventual consideration of the performance-based rule along the way, hopefully resolving some of the Thermo-Lag problems. I cannot separate them out.

MR. RUSSELL: That is true and if resources were readily available and we were not constrained, we are at the point where we have to make some judgments about what are the priorities and where to proceed. So, I'm seeking guidance back -- I hope the answer is not back and do everything because the reason we're coming is that there are other priorities and other things that we are expending resources on. While the current situation is not satisfactory in the long-term, the current level of fire safety based upon implementation of compensatory measures meets our regulatory requirements.

COMMISSIONER REMICK: Yes. Well, as I see resource, option 1, we have to do that, we have to find a solution. Option 4, in my view, and I stand to be corrected, but if somebody proposed a rule, we'd at least have to go through a process of considering it. So, really we're talking about the resources for option 2 and option 3 that might be involved if the Commission so decides that you should pursue those. Am I correct?

MR. RUSSELL: That and timing.

COMMISSIONER REMICK: And timing, yes.

DOCTOR THADANI: Yes. But I think if you were to proceed along either option 2 or 3, that information becomes valuable for option 4.

COMMISSIONER REMICK: Yes.

DOCTOR THADANI: Certainly. It's a very good information base to go on. I can't let this go by because if one goes to performance-based rule, then in my view certainly that rule has to also pick up parts that Appendix R presumably has not captured because if you look at fire studies, fire still is a significant contributor to core damage. In my view, then one has to make sure we pick up things that we have not captured in the past. The second piece of that is going to be implementation and inspections and the guidance and so on that one would have to develop. I think that might be quite a challenge. But nevertheless, I think these are issues one has to really carefully address.

For that reason, I think it's going to be a fairly long process for that kind of a rule.

COMMISSIONER REMICK: And I agree with what I interpret one of the things you said there, although I do favor performance-based rules, sometimes prescriptiveness tells people exactly what they have

to do or what they should do and sometimes that's easier and there's less uncertainty about inspections and so forth. So, it's not a clear cut --

MR. TAYLOR: That was the idea. The week of the Browns Ferry fires, the Commission contemplated this whole area back in 1979.

COMMISSIONER REMICK: And I'd like to say in general I thought the papers were very clearly written and I think the discussion today has been extremely valuable. But particularly I found the paper very readable and so forth. So, I want to compliment the staff for that effort.

MR. RUSSELL: There is one issue that's come up in discussion, I guess I did not identify it in the papers, where the staff has underway an effort to go through and identify all of the exemptions which have been issued and to category those as to whether they're scheduled, et cetera, to see if that would identify particular portions of the regulations that we may want to focus on first. We expect to complete that activity within about the same six month time frame and that effort is underway.

CHAIRMAN SELIN: Commissioner Rogers?

COMMISSIONER ROGERS: Just on this performance-based rule, option 4. I'm just thinking

about it a little bit, not in great depth, but I wonder if it's conceivable that the kind of systems analysis that one really ought to carry out for a performance-based rule, which is the total systems approach, might not in fact be easier than say dealing with option 3. In fact, it might be sketchier in a sense, but it may lay out the important areas for attention that you lose when you're focusing just on fire barrier and ways of complying with the ASTM code.

And so, it's not clear to me that one might not be able to achieve a very great deal by looking at or trying to do the analysis for a performance-based rule. Not write the rule, but try to do the background analysis. That might make a lot of other things simpler and, in fact, better from a safety point of view in considering the total plan.

I'm just throwing that out as one possibility. It also might turn out that you can't do that very easily. But it seems to me that sometimes a rather gross analysis of a total situation reveals that you've been focusing all of your resources and attention on one point there that isn't the most important point. We're learning that time and time again as we use PRA for plant analysis, that many of those areas that we're very concerned about turn out

not to be so important and some other things that we weren't sufficiently concerned about are more important.

I wonder if the same possibility might not exist here that shouldn't be taken into account and so that at least some thinking on how one might do the system analysis for a performance-based rule would be worthwhile even if we ultimately don't decide that we really want to go the full route of trying to introduce a new performance-based rule.

So, I just throw that out as something that probably is worthy of some thought.

Yes, Bill?

MR. RUSSELL: Well, we have, in fact, through the individual plant examination for external events as it relates to fire hazard, that global type of look from both a systems needed and time needed and relative importance measure, looking at it as it relates to fires. There have been a number of facilities proposed integrating that process into their proposals, for example, using five methodology and the PRA type activities. That could help to focus on those areas which are most significant, but it does not address the compliance types of issues that we would have within the context of Appendix R.

So, I think that there is some merit in the approach. As you're aware, we've proposed a different approach to addressing fires as it relates to shutdown risk. What we're talking about is fire hazard essentially for events initiated from power and so we are looking at an alternative approach as it relates to shutdown. We are working on proposed rulemaking that we'll be coming back to the Commission on. So, we recognize that there may be alternative approaches in the future which would allow us to focus on the areas that really are important and do a very good job on those and not get involved in the areas that are less important and get involved in such detail.

COMMISSIONER ROGERS: On the other hand, we have an immediate problem to deal with.

MR. RUSSELL: We have an immediate problem to deal with here and the issue becomes one do you wait until such time as the rulemaking is completed and continue with compensatory measures, et cetera, for an indeterminate period of time until such time as you have revised the regulations?

COMMISSIONER ROGERS: Well, I'm not suggesting that they be combined. I'm tending to think myself that they should be considered as totally

separate issues.

Just on the 22 plants that believe they can achieve compliance, can you say anything about the extent to which three hour Thermo-Lag is involved in any of those 23 plants? Are they essentially free from use of three hour Thermo-Lag? Is that why it's so easy or --

MR. RUSSELL: What I'd like to suggest is that we provide to the Commission a plant by plant breakdown. We summarized --

COMMISSIONER ROGERS: If it's not too hard to do.

MR. RUSSELL: We summarized it in Enclosure 2 and we identified the facilities that have most --

COMMISSIONER ROGERS: Yes, I saw the lineal feet, but that doesn't tell me quite what --

MR. RUSSELL: And we broke it down to one hour and three hour barriers and how much they have in different configurations.

MR. TAYLOR: We'll get that to you, sir.

MR. RUSSELL: But I think we can provide you that information to supplement what's in the status paper.

COMMISSIONER ROGERS: Well, let me just

say that I found this meeting very helpful and I know that you've been giving it all a great deal of thought. It's helped to stimulate my own thinking on these issues. I quite agree with Commissioner Remick that the options are not clearly separate options, that there is sort of a continuum there. But I think I need a lot more reflection on these things to be able to offer any -- before offering any guidance to the staff at this point. These are difficult issues that we're dealing with in some ways. So, I just want to thank you for, I think, good papers presented to us and an excellent presentation.

CHAIRMAN SELIN: Thank you.

Commissioner de Planque?

COMMISSIONER de PLANQUE: I just have one question. What's the status of the ASTM standard? That was still --

MR. RUSSELL: I think last time we talked we were up to draft 13.

COMMISSIONER de PLANQUE: But nothing has happened? It's still in draft stage?

MR. WEST: That's right.

COMMISSIONER de PLANQUE: Okay. That's all I had.

MR. WEST: We have, however, published our

criteria through the generic letter.

COMMISSIONER de PLANQUE: Okay. I too would like to thank you for the presentation. It's been very helpful.

CHAIRMAN SELIN: Unlike the fast times, I really think you're on the right track on this and I have a few comments I'd like to make.

First of all, I found this illuminating, especially the distinction between 3 and 4, which I had completely missed until we had this discussion. Short of doing a performance rule for overall fire, I think there are a few criteria or few constraints that whatever we do have to meet. One is that people who comply with Appendix R today will continue to comply with Appendix R. If you start coming up with different fires or different pieces, that people should still have the choice.

The second is that however if they don't, then the first step should be before they start talking about regulatory or analytical changes is to reduce combustibles and an absolute minimum. Well, that might be too strong, but really take a really energetic question of producing the risk, not just changing an analysis so that they can pass.

As far as the three hour barriers are

concerned, I think your approach which says assume one hour, require detection and take a look at suppression options is both justifiable from a regulatory point of view and very practical from an implementation point of view.

As far as the nominal one hour barriers are concerned, either option 2 or an option 2 primed I'd find to be very attractive. In other words, to see if when defined in more realistic terms the one hour barriers hit a one hour standard. Now, I realize there's some change because as Mr. Thadani pointed out, no one ever did an analysis that said one hour is a long enough time to suppress. It was kind of a rating to say with separation you don't need a barrier. Otherwise you need a barrier and one hour was a kind of a shorthand, not a time.

But nevertheless, there's been some history of people have really in their operations, they really have said, "We've got to get in and be out in an hour and be able to handle these things." So, I think we ought to take the time very seriously. By that I mean if you decide -- I think the Commission is going to be interested in looking at this. If you decide that it's feasible to take a look at doing generic curves, fine. I would actually, if it were up

to me, be suggesting to licensees that we would, in fact, look at the kind of exemptions, fairly broad exemptions, which meet one hour where one hour is differently defined than the way it is when we do practice. That's the only kind of exemption I'm talking about. I'm not talking about 30 minutes, et cetera, but one hour in power plant terms as opposed to in generic rating terms.

If they can't meet the one hour, then basically they should upgrade to meet the one hour, again generously defined or -- well, not generously, but more practically defined. I personally would limit the exemptions to very few where the exemption means coming in at less than one hour. If you have a plant with 20,000 lineal feet of one hour Thermo-Lag, if they have a few hundred or a thousand where it's just so out of sight from a cost or practicability point of view, that's one thing. But to say they can get 10,000 up to one hour and they want another 10,000 feet of exemption, I'd look at that very hard. I'm personally not sympathetic to what I understand option 3 is if it's instead of complying.

I completely agree with Commissioner Remick's remarks about doing the analysis, seeing what the risk is is right. But I'd be unsympathetic to a

generic exemption which says that, "Here's a way to show us that you don't need to meet the one hour to comply."

Finally, Commissioner Remick's and Rogers' remarks about the new rule I think are exactly right. Not only do we have to do it, but generalizing in the IPEs and the systems analysis -- I use those as if they're the same thing. I'm not sure that they are -- to spot where the risk is high and where it's low is something we really have to do. That could inform the consideration of specific exemptions. If people really just can't for economic and practical reasons get up to one hour when defined in practical terms for a small part of their plant, then you have to be able to do a risk assessment. If it's relatively secondary risk, then that would be fine.

So, in response to your question, clearly 1 is something we ought to do. I'm personally not sympathetic to option 3 in that if it means instead of complying let's do a probabilistic analysis about why much less than an hour is called for. I would redefine option 2 as not so much we do generic curves or we don't, but we look at ways to analyze power plants for realistic one hour fires and then within that you have some suboptions which really the staff

has got to decide what's the most practical, whether it's case by case analyses or generic curves, what have you. But I do think we have to do that.

So, the big changes that I think that you've recommended and I'm sympathetic to are take a good look at what we mean by automatic suppression when you're talking about barriers that we thought were good for three hours but now we think are good for one hour. Take a look at how you calculate what one hour means in practical power plant areas, exemptions which are to convince us that we don't need one hour according to the more realistic definition should continue to be looked at with a fairly high barrier, not change that drastically, and try to inform or work with the probabilistic analyses, whether it's the fire barrier per se or the overall.

Commissioner Remick is exactly right. If you have literally hundreds and hundreds of exemptions, this ought to be telling us that it's time to update the rule. What was done made a lot of sense for the time, but it's 15 years now almost and it's time to update.

Very, very informative job. I think you're off really on the right track.

I guess the last thing I would say is fire

walks really are a very bad process in the long run. They will tend to lead to relaxation of attention and smugness that it's just very hard to keep people at that level of concentration in the long run.

Commissioners, do you have anything in closing? Fine.

Thank you very much.

(Whereupon, at 11:39 a.m., the above-entitled matter was concluded.)

CERTIFICATE OF TRANSCRIBER

This is to certify that the attached events of a meeting of the United States Nuclear Regulatory Commission entitled:

TITLE OF MEETING: BRIEFING ON STATUS OF THERMO-LAG

PLACE OF MEETING: ROCKVILLE, MARYLAND

DATE OF MEETING: MAY 20, 1994

were transcribed by me. I further certify that said transcription is accurate and complete, to the best of my ability, and that the transcript is a true and accurate record of the foregoing events.

Reporter's name: Peter Lynch

BRIEFING ON THERMO-LAG STATUS

May 20, 1994

William T. Russell, Director

Steven West, Chief
Special Projects Section

Office of Nuclear Reactor Regulation

AGENDA

- Overview
- Options
- Status

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)