

# UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION

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UNITED STATES OF AMERICA  
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

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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

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

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

16 MR. RUSSELL: Good morning.

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

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

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

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

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

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

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

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

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

23 MR. RUSSELL: No.

24 The staff believes that the three hour  
25 barriers --

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

4 MR. RUSSELL: Yes.

5 COMMISSIONER REMICK: Will you discuss  
6 other possibilities?

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

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

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

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

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

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

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

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

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1 those eight plants?

2 MR. RUSSELL: We can.

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

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

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

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

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

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

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

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

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

22           MR. TAYLOR: Florida Power and Light.

23           MR. RUSSELL: Florida Power and Light.

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

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

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

9 MR. WEST: Thank you, Bill.

10 Good morning.

11 CHAIRMAN SELIN: Good morning.

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

14 CHAIRMAN SELIN: As much as last time?

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

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

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

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1 of that plan.

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

14 COMMISSIONER ROGERS: Have exemptions been  
15 granted in the past?

16 MR. WEST: Yes, sir, we have.

17 COMMISSIONER ROGERS: Numerous or --

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

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

22 DOCTOR THADANI: And scheduling.

23 MR. WEST: And schedules.

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

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1 areas.

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

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

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

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

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1 Again --

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

6 COMMISSIONER ROGERS: They have used  
7 another material?

8 DOCTOR THADANI: Yes.

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

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

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

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

20 MR. WEST: Absolutely.

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

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1 DOCTOR THADANI: That's absolutely  
2 correct.

3 MR. WEST: That's part of it.

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

13 MR. WEST: That's right.

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

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

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

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

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

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

25 CHAIRMAN SELIN: Okay.

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

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

23 MR. WEST: That's correct.

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

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1 They would always have the option.

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

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

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

15 MR. WEST: Right. That's right.

16 CHAIRMAN SELIN: Okay.

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

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

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

4 With respect to the three hour barriers,  
5 they continue to present challenges, but there are  
6 alternatives that exist and we've touched on some of  
7 those this morning and they're all identified in SECY-  
8 94-127. Just to bring everybody up to speed, a couple  
9 of them are to reevaluate the shutdown analysis to  
10 reduce the number of barriers that would require  
11 upgrading or some consideration. We found that some  
12 plants in their desire to achieve compliance and get  
13 a license or resolve an issue, when there was any  
14 doubt as to whether a barrier was required, they would  
15 just go ahead and install it. If you do a finer  
16 analysis now or you can change your shutdown  
17 methodology, that barrier, in fact, may not be needed  
18 to achieve compliance.

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

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

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

6 MR. WEST: That's right.

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

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

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

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

24 CHAIRMAN SELIN: Okay.

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

20 CHAIRMAN SELIN: We don't know that there  
21 are options, but there may turn out to be options to -  
22 -

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

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

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

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

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

16 MR. WEST: That's right.

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

25 MR. WEST: I would say that for the plants

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

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

13               MR. RUSSELL: Yes.

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

16               MR. WEST: That's right.

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

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

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

25               MR. WEST: There may be limited cases like

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

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

9 MR. WEST: Right.

10 MR. RUSSELL: That's correct.

11 CHAIRMAN SELIN: Thank you.

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

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1 rulemaking.

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

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

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

13 MR. RUSSELL: Yes.

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

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

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

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

13 MR. TAYLOR: Except to personnel.

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

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

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

6 COMMISSIONER REMICK: Steve, a question  
7 for clarification. Earlier when we were talking about  
8 exemption you said something, as I understood it, I  
9 was a little confused about. You said something that  
10 exemptions were anticipated, therefore that provision  
11 was put in the rule. I assume we're talking about  
12 50.12 exemptions or is there something specific for  
13 fire protection?

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

16 DOCTOR THADANI: Appendix R.

17 COMMISSIONER REMICK: It is in Appendix R?

18 MR. WEST: Yes.

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

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

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

7 CHAIRMAN SELIN: Right.

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

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

22 MR. RUSSELL: Or 20 minutes.

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

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

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

13 CHAIRMAN SELIN: Right.

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

20 (Slide) Slide 6, please.

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

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

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

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

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

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

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

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

25 CHAIRMAN SELIN: Are you ready to make a  
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1 generic statement that in cable rooms we think that  
2 fires could very well --

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

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

8 CHAIRMAN SELIN: Right.

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

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

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

3 DOCTOR THADANI: That's right.

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

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

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

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

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

8 MR. RUSSELL: That's correct.

9 CHAIRMAN SELIN: Anybody --

10 DOCTOR THADANI: That's right.

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

13 MR. WEST: That's correct.

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

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

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

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

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

20 MR. TAYLOR: -- past specific exemptions.

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

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

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

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

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

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

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

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

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

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

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

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

24 MR. TAYLOR: Area by area.

25 MR. RUSSELL: We could not object to --

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1 DOCTOR THADANI: We could not object.

2 CHAIRMAN SELIN: Would not object?

3 DOCTOR THADANI: No.

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

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

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

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

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

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

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

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

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

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

13 MR. TAYLOR: To the individual fire  
14 coding.

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

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

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1 MR. TAYLOR: Yes. We would need --

2 CHAIRMAN SELIN: -- we would entertain  
3 that.

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

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

10 DOCTOR THADANI: That's right.

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

16 Would you agree?

17 MR. RUSSELL: Yes.

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

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

24 MR. WEST: That's correct.

25 CHAIRMAN SELIN: It says you don't have to  
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1 wait for us to do the generic curves. If you care to  
2 do this analysis, we would entertain that. The real  
3 question is if we never got around to doing the  
4 generic curves, would we still entertain it? What Mr.  
5 Taylor is saying, you would need some Commission  
6 guidance.

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

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

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

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

25 COMMISSIONER ROGERS: Could I just ask a  
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1 question? It's my impression that -- and please  
2 straighten me out if I'm wrong on this -- that when we  
3 adopted the rule and we referred to the necessity of  
4 rated for certain periods of time, I don't know, did  
5 we explicitly refer to the ASTM E119 in the rule or  
6 did that appear in the --

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3 MR. WEST: We have been scrambling to try  
4 and get as much information as we could before this  
5 morning's meeting and really the NIST or NBS study,  
6 that's the only one they're aware of and we would hope  
7 over the next six months to try and identify similar  
8 studies. I think Sandia actually did this study or as  
9 a part of a study looked at this question in the mid-  
10 '70s. It may have been when they were writing the  
11 rule to see if it made sense. But we would hope they  
12 gather all of that information and fully consider what  
13 has been done in the past and what kind of conclusions  
14 have been drawn.

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

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

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1 where that can't be done.

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

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

14 CHAIRMAN SELIN: Commissioner de Planque  
15 has a question.

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

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

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1 curve.

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

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

8 COMMISSIONER de PLANQUE: Okay.

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

17 MR. TAYLOR: It doesn't envelope  
18 everything.

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

25 COMMISSIONER de PLANQUE: Sure.

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

3 MR. WEST: Right.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

12 CHAIRMAN SELIN: Different from one site  
13 to another site?

14 MR. WEST: That's right.

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

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

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

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

4 MR. WEST: I can talk about those.

5 In any event, that's what the -- in the  
6 context of the Thermo-Lag issue, that's what's being  
7 characterized as a performance-based approach. How it  
8 stacks up with the performance-oriented risk based  
9 fire protection rule, they don't quite match up in  
10 terms of definition of what performance-based means.  
11 But we do know that through the responses to the  
12 50.54(f) letter that we sent out in December, that 22  
13 sites would like to use a performance-based approach.  
14 That's 35 plants. We went back and took a look at  
15 those plants and not surprisingly most of those plants  
16 have substantial amounts of Thermo-Lag. So, this is  
17 being viewed by industry as a solution that could  
18 resolve a lot of the Thermo-Lag problems in their  
19 individual plants.

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

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

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

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

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

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

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

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

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1 They took the --

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

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

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

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

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

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

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

13 COMMISSIONER de PLANQUE: Thank you.

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

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

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

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

8 MR. WEST: No.

9 COMMISSIONER de PLANQUE: Okay.

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

20 CHAIRMAN SELIN: Ashok, which rule did you  
21 say?

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

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

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

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

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

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

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

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

25 CHAIRMAN SELIN: So, 3 would use  
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1 probabilistic reasoning to applying the separation in  
2 barriers. Four would say let's go whole hog, let's  
3 have a rule that applies to fire risk period.

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

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

8 MR. WEST: Absolutely.

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

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

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

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

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

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

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

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

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

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

23 MR. RUSSELL: Yes.

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

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

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

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

8 COMMISSIONER ROGERS: Right. Okay. All  
9 right.

10 CHAIRMAN SELIN: It's Russell's constant.

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

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

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

17 (Slide) Can I have slide 10, please?

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

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

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

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

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

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1 a single facility.

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

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

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

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

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1 from the Commission.

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

7 MR. RUSSELL: Yes.

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

11 MR. RUSSELL: Normal process for petition  
12 for rulemaking.

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

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

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

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1 correct on that?

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

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

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1 CHAIRMAN SELIN: Sure.

2 MR. TAYLOR: That concludes our  
3 presentation.

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

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

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

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

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

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

25 MR. RUSSELL: That and timing.

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1 COMMISSIONER REMICK: And timing, yes.

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

5 COMMISSIONER REMICK: Yes.

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

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

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

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

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

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

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

23 CHAIRMAN SELIN: Commissioner Rogers?

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

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

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

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

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

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

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

13 Yes, Bill?

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

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

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

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

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

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1 separate issues.

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

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

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

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

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

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

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

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

25 COMMISSIONER ROGERS: Well, let me just

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

13 CHAIRMAN SELIN: Thank you.

14 Commissioner de Planque?

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

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

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

22 MR. WEST: That's right.

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

25 MR. WEST: We have, however, published our  
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1 criteria through the generic letter.

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

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

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

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

25 As far as the three hour barriers are  
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1 concerned, I think your approach which says assume one  
2 hour, require detection and take a look at suppression  
3 options is both justifiable from a regulatory point of  
4 view and very practical from an implementation point  
5 of view.

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

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

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

9 If they can't meet the one hour, then  
10 basically they should upgrade to meet the one hour,  
11 again generously defined or -- well, not generously,  
12 but more practically defined. I personally would  
13 limit the exemptions to very few where the exemption  
14 means coming in at less than one hour. If you have a  
15 plant with 20,000 lineal feet of one hour Thermo-Lag,  
16 if they have a few hundred or a thousand where it's  
17 just so out of sight from a cost or practicability  
18 point of view, that's one thing. But to say they can  
19 get 10,000 up to one hour and they want another 10,000  
20 feet of exemption, I'd look at that very hard. I'm  
21 personally not sympathetic to what I understand option  
22 3 is if it's instead of complying.

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

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

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

17 So, in response to your question, clearly  
18 1 is something we ought to do. I'm personally not  
19 sympathetic to option 3 in that if it means instead of  
20 complying let's do a probabilistic analysis about why  
21 much less than an hour is called for. I would  
22 redefine option 2 as not so much we do generic curves  
23 or we don't, but we look at ways to analyze power  
24 plants for realistic one hour fires and then within  
25 that you have some suboptions which really the staff

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

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

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

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

25 I guess the last thing I would say is fire

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

5 Commissioners, do you have anything in  
6 closing? Fine.

7 Thank you very much.

8 (Whereupon, at 11:39 a.m., the above-  
9 entitled matter was concluded.)  
10  
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# **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)**