

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, October 29, 1993

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:

SAMUEL J. CHILK, Secretary

KAREN CYR, Office of the General Counsel

JAMES TAYLOR, Executive Director for Operations

FRANK MIRAGLIA, Deputy Director, NRR

ASHOK THADANI, Director, Division of System Safety and Analysis, NRR

STEVEN WEST, Division of System Safety and Analysis, NRR

WARREN MINNERS, Director, Division of Safety Issue Resolution, RES

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

10:00 a.m.

CHAIRMAN SELIN: This is an interesting talk this morning. So much so I feel safe in drinking decaf without worrying that our attention will lag along the way.

COMMISSIONER REMICK: No pun intended?

CHAIRMAN SELIN: This morning we'll be briefed on the staff's progress on the Thermo-Lag action plan and the fire protection task action plan.

I should say this, to be frank about it. The charts might give you the impression that this is just another quarterly or routine update, but it really isn't. I feel and the Commission feels that we are at a crossroads in this program. It's been a longstanding program. There have been a lot of problems. It is possible that a solution to the fire barrier problem is in the offing in the near future, but it's not at all clear exactly where we stand and how we get to this point. So, we're looking forward not only to the update but really to what I hope will be quite a definitive discussion of the extent of the problem, the staff's current assessment of where we stand and what will be done, what has to be done and what actions, if any, should be taken so that this

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1 serious resource problem, safety problem, performance
2 problem can be resolved properly for one and for all.
3 Well, at least for awhile.

4 The Thermo-Lag action plan addresses the
5 technical and programmatic issues related to the use
6 of the Thermo-Lag fire barriers by nuclear reactor
7 licensees and there's also a fire protection task
8 action plan which is more generic and the staff is to
9 be commended on undertaking this activity which
10 addresses implementation of the recommendations made
11 and the NRC reassessment of the fire protection
12 program.

13 As I started to say, the failure of the
14 Thermo-Lag fire barriers has identified concerns with
15 the process used to identify potential problems at the
16 reactor site and so it's of utmost importance that we
17 address not only the Thermo-Lag problems, in fact not
18 only the fire barrier problems, but any underlying
19 problems in this process to correct all the problems
20 that have been identified. These two plans between
21 them have the intent to do just that.

22 Commissioners, do you have any --

23 Mr. Taylor, would you proceed?

24 MR. TAYLOR: Good morning, sir.

25 With me at the table are the people from

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1 NRR responsible for this operation, as well as Warren
2 Minners from the Office of Research. As you know, at
3 the request of the Commission, the possibility for
4 rulemaking, more performance-based rulemaking in this
5 general area is being examined by the Office of
6 Research and I asked him to join us in case there were
7 questions in that area.

8 Before turning the meeting over to the
9 staff, I'd like to note to the Commission that there
10 has been an exchange of letters between myself and Mr.
11 Colvin of NUMARC with regard to NUMARC testing, which
12 you are aware of and which the staff will provide more
13 information on. The concerns that I've had is that
14 there be agreement by staff with the various
15 parameters and requirements in those tests which the
16 first phase has been done, but there's an extensive
17 second phase of testing of Thermo-Lag configurations,
18 placement of thermocouples and what I'll call the
19 controlling features of the test. There's not been
20 agreement between NUMARC and the staff on that subject
21 and it's been my purpose to try to resolve those
22 differences before the tests are done so that the
23 value of the tests are recognized and accepted by both
24 NUMARC for the industry, and most importantly by the
25 staff who have technical responsibility. That's our

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1 own staff.

2 So, my last exchange was a letter to Mr.
3 Colvin which I signed yesterday which noted the
4 differences still remaining between the NUMARC people
5 who are controlling these tests and the NRC staff and
6 suggesting a prompt series of meetings so we can
7 resolve these differences. They are not yet resolved,
8 I regret to say, but we must do it.

9 So, with those few notes from my --

10 COMMISSIONER ROGERS: Just before you
11 leave that letter question, Mr. Taylor, I wonder if
12 there's just one little point that you could throw a
13 light on there, whether there's just a total
14 disagreement on something or whether there is another
15 issue here about what we're talking about.

16 In your letter, at the bottom, you said on
17 the first page, "The currently proposed staff
18 acceptance criteria are essentially in agreement with
19 the proposed ASTM standard for fire tests, raceway
20 barriers through Revision 14. In Mr. Colvin's letter,
21 on page 2.3, he said, "Our proposed thermocouple
22 placement approach is consistent with draft ASTM
23 standard E-5-11, standard test methods for fire tests
24 and fire resistant barrier systems, electrical
25 components."

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1 Is this just a total disagreement on
2 something or --

3 MR. TAYLOR: We'll address it. We will
4 address it.

5 DOCTOR THADANI: We place to specifically
6 address that issue.

7 COMMISSIONER ROGERS: Okay.

8 MR. TAYLOR: As part of our --

9 DOCTOR THADANI: What the issues are and
10 what's meant by what draft and the scope of
11 information that goes into it.

12 MR. TAYLOR: If you don't mind, we'll hit
13 it --

14 COMMISSIONER ROGERS: Fine.

15 MR. TAYLOR: -- as we proceed.

16 COMMISSIONER REMICK: One thing that might
17 be helpful in the presentation, if you have some kind
18 of a sketch which would show what cable tray rungs are
19 and this question of where a thermocouple should be
20 placed.

21 DOCTOR THADANI: Okay. We will see if we
22 can't get --

23 MR. TAYLOR: We can probably have somebody
24 draw on in the back room while we're starting the
25 presentation. We'll do that. The staff is here.

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1 I'll ask Doctor Thadani to continue,
2 please.

3 DOCTOR THADANI: Good morning.

4 CHAIRMAN SELIN: Good morning.

5 DOCTOR THADANI: (Slide) Could I have
6 slide number 2? There it is.

7 I'll briefly go over the status, the
8 action plan and then Steve West is going to give you
9 not only the status of where we stand, but also what
10 the significant issues are in each element of the
11 program plan and where we're headed.

12 (Slide) May I have the next viewgraph,
13 please?

14 Well, as a result of the many issues that
15 were identified, concerns that were identified with
16 the Thermo-Lag material, we did prepare a plan laying
17 out the technical work that had to be done and the
18 schedule by which we hope to resolve this issue. We
19 briefed the Commission last November on this matter.
20 Since then, we have completed two parts of this action
21 plan. Part 2 is completed. That is the small-scale
22 testing, not only of the Thermo-Lag material, but also
23 of the other materials that are used as fire barriers.

24 We also have completed, as the Chairman
25 noted, the fire protection program reassessment. This

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1 is the introspective look at our own activities, as
2 well as some of the issues that were identified in the
3 IG report that came out last year.

4 As we have gone through our evaluations as
5 significant issues have developed, we have kept the
6 Commission informed. Some of the examples are, again,
7 Comanche Peak issues as they were developing, as well
8 as some of the information we got on some materials
9 other than the Thermo-Lag material.

10 Now, as the Chairman noted, the
11 reassessment report was quite extensive and there were
12 a significant number of recommendations for action, as
13 well as for further study. At that time we decided
14 that we needed to factor those issues in and develop
15 a plan as to how we were going to get those behind us.
16 Now we have two action plans basically. So, we have
17 the Thermo-Lag action plan that deals with issues
18 related to Thermo-Lag material and the fire protection
19 action plan that relates to other materials as well as
20 the generic issues that were identified in this
21 reassessment report.

22 We have completed a number of other
23 activities, including issuance of some generic letters
24 to get information from the industry on specific
25 issues and the actions that we have taken as a result

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1 of information coming from some of the small-scale
2 testing that we've done. We keep the Commission
3 informed on a quarterly basis as well through our
4 status reports. The most recent one was provided just
5 about two weeks ago.

6 Our plans for this morning were to go
7 through each of the major issues, major activities and
8 what are the significant problems and how we hope to
9 resolve those problems, and that requires -- either we
10 know what the answer is, or at least the process we'll
11 have to go through to resolve the issues. Steve West
12 is going to go through all of that.

13 Steve?

14 MR. WEST: Thank you.

15 Good morning.

16 (Slide) Next slide, please.

17 I plan to cover this morning the major
18 activities that we've either accomplished or are well
19 along the way on since the November briefing. We'll
20 talk about the Generic Letter 92-08 which we issued
21 shortly after that briefing, our acceptance criteria
22 which are near completion, the NIST test that we did
23 on Thermo-Lag and other barrier materials, the plant-
24 specific programs that are either completed or
25 underway at this time, the NUMARC test program and

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1 then we'd like to conclude the discussion of the
2 Thermo-Lag action plan with a discussion of the
3 schedule and where we see ourselves in industry going.
4 And then following this discussion of Thermo-Lag
5 action plan we'll touch briefly on the fire protection
6 task action plan which we've also started some work
7 on.

8 (Slide) Next slide, please.

9 We last briefed you in November and a
10 month later we issued Generic Letter 92-08. This was
11 the generic communication that specifically identified
12 the staff's concerns with Thermo-Lag fire barriers.
13 It was the result of the work completed by the special
14 review team and then later by the staff following up
15 on those concerns that were identified.

16 Probably the most significant thing --
17 well, we recognize that there were quite a few plants
18 that use Thermo-Lag and the generic letter certainly
19 confirmed that. We found that there were 79 units
20 that use Thermo-Lag fire barriers to meet NRC fire
21 protection requirements. What's significant about the
22 responses in our minds is that of those licensees at
23 least 70 are waiting for the results of the NUMARC
24 program before they affect any corrective action
25 programs. So, really, we're in a position now of

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1 waiting for the NUMARC program to be completed and
2 we'll talk about what the elements of that program are
3 so you'll understand what our interaction has been
4 with NUMARC.

5 There were a couple of licensees that have
6 actually removed their Thermo-Lag from their plant.
7 These are a couple of plants that had minimal amounts
8 and they were either able to reroute cables or in some
9 cases use another fire barrier material to actually
10 replace it. So, there are a few licensees out there,
11 about six, that either are or will shortly be out of
12 the woods.

13 We are continuing to review the responses
14 that we've received on the generic letter and we're
15 replying back to each licensee and the final ultimate
16 close-out action for the Thermo-Lag problem will be an
17 inspection at each plant by the staff and that's still
18 sometime away, but we'll talk a little bit more about
19 what we're doing to prepare for that as we go through
20 the presentation.

21 Another very significant activity has been
22 the preparation of clarified fire endurance test
23 acceptance criteria. We have been working for some
24 time on this. We recognized shortly into the Thermo-
25 Lag review that the existing staff guidance could use

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1 some refinement and clarification. There was -- the
2 special review team and later the staff identified
3 that there was confusion within the industry despite
4 the staff's previous efforts to put forth guidance.
5 We have been working on that and we had recently
6 published the proposed criteria in the Federal
7 Register for comment. We've received those comments
8 and we have responded to all those comments and have
9 finalized the proposed acceptance criteria which are
10 currently under final management review.

11 I want to just point out quickly before I
12 move on that the fundamental regulatory requirement
13 that a licensee install a one or three hour barrier
14 depending on the other fire protection features to
15 meet Appendix R has not changed in any way. Also, the
16 scope of this criteria which are included and will be
17 included in this supplement to Generic Letter 86-10
18 are still within the broad scope or bounded by the
19 existing staff criteria. The only change which has
20 been discussed extensively with the Commission,
21 Chairman Dingle and the public and NUMARC and
22 everybody has been this hose stream business where we
23 have utilized other existing NRC guidance for hose
24 stream testing and are allowing licensees at their
25 option to apply it to the Thermo-Lag fire barrier or

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1 any raceway fire barrier in the future.

2 Okay. I said we've received comments.
3 We've probably got about 80 comments in response to
4 the generic letter and they focused on hose stream
5 testing, thermocouple placement, allowing an option of
6 testing raceways without cables installed, which we
7 had previously approved for TVA and which is a part of
8 the ASTM and UL standards. We have included that in
9 our guidance. We felt that --

10 CHAIRMAN SELIN: Could you just -- I'm not
11 familiar with the issue of whether the cables are in
12 the raceway or not when you do the testing. What's
13 the effect of not having the cables --

14 MR. WEST: Well, when you build one of
15 these test assemblies, be it a conduit or a cable tray
16 assembly, if you add cables to the test assembly
17 you're adding a heat sink which helps improve the
18 performance of the fire barrier system itself.
19 There's two schools of thought. One is that if you --
20 because in-plant configurations typically have cables,
21 you should be able to take advantage of that thermal
22 performance. The other school of thought is that
23 since you're really looking to see if the fire barrier
24 itself is qualified, you should not try to take
25 advantage of the heat sink provided by cables.

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1 The NRC will, in the criteria, allow
2 either option. There are slightly different
3 methodologies that you would apply, depending on which
4 option you followed. But the --

5 CHAIRMAN SELIN: Does that mean in
6 practice that people generally will test with cables
7 and --

8 MR. WEST: Well, in the two plant-specific
9 programs which were recently done, Comanche Peak chose
10 to use cables and TVA chose not to use cables. I
11 think from the standpoint of truly testing your fire
12 barrier and qualifying it, the preferred method would
13 be without cables, particularly if you're going to be
14 trying to apply your results generically. It's a lot
15 easier to apply -- do a plant-specific test and apply
16 the results with cables to a specific plant because
17 you're using plant-specific cable configurations,
18 plant-specific equipment types of cables and you can
19 do functionality testing that will apply.

20 MR. TAYLOR: There are varying degrees of
21 loading in the trays. So, your cable load is within
22 the specs.

23 COMMISSIONER de PLANQUE: But in allowing
24 either option you're still keeping the test criteria
25 the same?

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1 MR. WEST: Yes, the basic criteria would
2 be the same where you're measuring a temperature rise
3 on the unexposed side of the barrier. In either case
4 there are options for demonstrating cable
5 functionality if you need to.

6 MR. MIRAGLIA: I think the key point
7 that's being made and Mr. Taylor's response to Mr.
8 Colvin more recently, and it bears on the issue of
9 thermocouple placement, amount of cable that's in
10 there, the real concern is the applicability of the test
11 configuration to the install conditions within the
12 plant.

13 In Comanche Peak's case, they chose to
14 pick configurations that were representative of their
15 plants, the cable loadings were consistent. So, the
16 applicability of those tests to Comanche Peak, while
17 they had concerns, they were bounded. We evaluated
18 those.

19 In TVA's case, they're taking, as Steve
20 has indicated, the broader perspective, rating the
21 barrier clearly and then if they have two percent
22 cable or 100 percent cable, it's applicable.

23 The standard, as I understand it, that's
24 under consideration in draft form and it's probably
25 two years away to final adoption has that as a

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1 preferred option. So, the thermocouple placement, the
2 amount of cables is what is the applicability of the
3 tests to what we have. The key point is we have 70
4 licensees waiting for the NUMARC test. If we have
5 questions relative to -- gee, it was 15 percent cable
6 and the thermocouple was on this side of the rung
7 versus the other side of the rung and there's
8 temperature differences. It raises questions then as
9 to the broadness or the applicability of that test to
10 a large amount of configurations out there. The focus
11 of our concern relative to temperature placement and
12 applicability is we need to try and run these tests so
13 there is as fewer questions that get raised. So, when
14 we try to apply it to the broad range of
15 configurations out there, we can cover the waterfront
16 because it's a very, very resource intensive kind of
17 effort. To the extent that we can increase the
18 applicability of these tests in a generic way, the
19 easier our job is and the easier the industry's job
20 is.

21 That's really the focus. They're going to
22 run some tests with thermocouples and it will say is
23 it 15 degrees or is it 40 degrees. But that will be
24 something that we'll have to evaluate an issue and
25 say, "Well, it was 40 degrees with 10 percent cable.

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1 Now we have this tray here, we have -- what would it
2 be with five percent or ten percent?" It raises those
3 kind of issues.

4 So, really the issue is the applicability.
5 It's well stated in Mr. Taylor's letter, is the
6 applicability of this test on a generic basis so we
7 can get on with the resolution of the issue.

8 COMMISSIONER de PLANQUE: I understand
9 your problem with applicability, but if you use the
10 same criteria, whether or not you have cables in
11 there, how much conservatism is then built in when you
12 test without cables? What's the difference between no
13 cables and the minimum amount of cables you're likely
14 to find in any given situation?

15 MR. MIRAGLIA: I think there would be
16 differences, but what we're saying then is if it's a
17 plant-specific application, then that temperature rise
18 that you see is the same. In other words, without
19 tests, there's probably more conservatism in a test
20 without cables than a test with cables. But in either
21 case --

22 COMMISSIONER de PLANQUE: Yes. Of course.

23 MR. MIRAGLIA: But the real question has
24 always been the functionality and then the temperature
25 rise is a surrogate for that.

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1 CHAIRMAN SELIN: Can I try this question
2 a little differently? The Appendix R and the generic
3 letter basically are saying in a specific application
4 there should be no more than a certain temperature
5 rise and that would include specific configurations,
6 including specific amounts of cable. What it's trying
7 to do here is take generic results so that nobody has
8 to test each configuration from scratch, that there be
9 a reference base.

10 If I understand it correctly, what you're
11 asking is that NUMARC do the test without cable or at
12 least a --

13 DOCTOR THADANI: As an option, yes.
14 That's an acceptable option.

15 CHAIRMAN SELIN: And then when a
16 particular utility comes in, then they have to show us
17 to your satisfaction that the effect of the cable
18 would be so much and therefore a generic test can be
19 evolved with correction based on real configurations
20 with real cables. But if the generic tests are run
21 with a lot of cable, then you don't know how to scale
22 up.

23 DOCTOR THADANI: That's exactly correct.
24 I know we're going to get into a lot of specifics
25 later on, but there is a lot more behind this issue.

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1 We're going to have a hard enough time, I think, when
2 we get down the road after the tests are completed to
3 make sure that the licensees that use this information
4 have adequate basis to say that the tests are, in
5 fact, applicable so we don't end up into yet a whole
6 new set of tests later on because we leave some
7 questions unanswered. This is just one part of that
8 process that we'll have to go through.

9 There is some good thinking behind the
10 preferred option of measuring temperature on the cold
11 side of the barrier because the loading may be
12 different on the cable trays, there may be sagging
13 involved, there may be contact involved between the
14 barrier and the cables. There are a number of issues.
15 I think we can get into a lot of that later on, but a
16 number of issues that say if we were to go forward and
17 have either no cables present or have bare copper wire
18 as close as possible to the barrier itself, then I
19 think we would have avoided some of these questions
20 that are bound to come up.

21 CHAIRMAN SELIN: Let me just go into
22 something. The barrier will not pass or fail the
23 NUMARC test. It's not a test in a sense of a pass or
24 fail, it's a test to establish a base set of data
25 which can then be used in specific configurations.

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1 So, if they run the test with a thermocouple on the
2 cold side of the barrier, you expect more of a
3 temperature rise than if they ran the thermocouple
4 where the cable would be.

5 MR. MIRAGLIA: That's right.

6 CHAIRMAN SELIN: But we're not passing or
7 failing the material based on that. We're saying this
8 is a more invariant baseline to be used in a specific
9 analyses, so please run this in the least variable way
10 so that when the individual utilities come in they
11 will have the best information.

12 DOCTOR THADANI: Exactly. That's exactly
13 what we're trying to do.

14 CHAIRMAN SELIN: Is that correct?

15 DOCTOR THADANI: That's correct.

16 COMMISSIONER de PLANQUE: My question will
17 still stand in the end. What degree of conservatism,
18 therefore, is built into that compared to a much more
19 likely real situation?

20 DOCTOR THADANI: Yes. There is -- we'll
21 get into it again later on, at least one test that
22 NUMARC is planning to conduct where they will have
23 bare wire on both sides basically to see what the
24 effect is. At this stage, one would expect that there
25 would be some differences and they may be dependent on

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1 the loading in the barrier. I suspect there would be.

2 COMMISSIONER de PLANQUE: So, the
3 temporary answer is we really don't know the answer to
4 that question yet.

5 DOCTOR THADANI: That's correct.

6 MR. MIRAGLIA: At least in terms of
7 magnitude, you expect the conservatism there.

8 COMMISSIONER de PLANQUE: Right. Yes.

9 MR. MIRAGLIA: And how significant -- you
10 know, one position that NUMARC says is that it's not
11 going to make that much of a difference. And these
12 tests will give us some insights into that question.

13 COMMISSIONER de PLANQUE: Right.

14 CHAIRMAN SELIN: But the objective is to
15 determine both sort of a reference level that is
16 extensible to each case and then a set of scaling
17 factors.

18 MR. TAYLOR: That's right.

19 MR. MIRAGLIA: That's exactly right, sir.

20 COMMISSIONER REMICK: Two questions. In
21 the case where tests are conducted with cables, are
22 the cables energized or not?

23 MR. WEST: No.

24 COMMISSIONER REMICK: The other question
25 is what's the significance of bare cable versus

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1 insulated cable?

2 MR. WEST: During the tests the cables are
3 not energized. They're just laid in the tray,
4 installed in the same fashion as they would be in the
5 plant or in the conduit.

6 COMMISSIONER REMICK: So they are a sink
7 in that case. Energized they may or may not be much
8 of a sink.

9 DOCTOR THADANI: That's right, they're a
10 sink.

11 MR. WEST: They are a sink. They're just
12 at ambient temperature at the start of the test.
13 There's no energy applied. The theory behind
14 measuring the temperature from a bare copper conductor
15 is you attach the thermocouple directly to that and
16 run it on the underside of the rungs in accordance
17 with our criteria. That copper conductor just serves
18 as a good heat sink so that the thermocouple will read
19 the temperature. It's shown that that temperature is
20 more representative of the actual temperature within
21 the enclosure than if you taped the thermocouple, for
22 example, to a cable jacket.

23 COMMISSIONER REMICK: But if the cable was
24 jacketed, the conductor would be running at a lower
25 temperature, right? In other words, it would be

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1 insulated from the fire source --

2 MR. WEST: Yes. The bare copper conductor
3 is just a way of trying to make the thermocouple
4 reading as efficient as possible because the cables
5 would be whatever insulation is to be used.

6 COMMISSIONER REMICK: But your real
7 concern is melting of the cable, the conductor, right?

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

10 MR. WEST: Cable damage.

11 COMMISSIONER REMICK: Without insulation,
12 it's going to be running at a hotter temperature than
13 it would be if it was insulated. Am I correct?

14 MR. WEST: But the bare copper wire is not
15 representative of the cables.

16 DOCTOR THADANI: It's just to place
17 thermocouples.

18 MR. WEST: It's just to make sure that --
19 it's just a wire to assure heat conduction to the
20 thermocouples.

21 DOCTOR THADANI: Right, because of its
22 content.

23 MR. WEST: It's just a way of attaching
24 the thermocouples inside the enclosure.

25 MR. TAYLOR: Go ahead.

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1 MR. WEST: Okay. In any event, we have
2 received and reviewed and responded in a document to
3 all the comments that we received from the draft
4 proposed staff criteria, and what's left to do is
5 complete the internal management review, show it to
6 CRGR again and then provide it to the Commission for
7 a look-see. We plan, hopefully, to issue that
8 criteria through the generic letter before the end of
9 November.

10 One of the tasks that we completed in the
11 action plan was the small-scale test that we did of
12 Thermo-Lag to give us a better understanding of the
13 thermal performance. These were done sometime ago.
14 I think actually we gave you preliminary results in
15 November when we met with you and really events have
16 really overcome these tests. They did show that
17 there's some problems with Thermo-Lag material itself
18 and that upgrades would probably be needed in quite a
19 few configurations. So, unless there's any specific
20 questions on that, I'm anxious to move along.

21 There have been a couple of series of
22 plant-specific tests. Texas Utilities did a series of
23 tests for Comanche Peak Unit 2. We briefed you on the
24 results of those tests in February during the
25 licensing review and we ended up approving all of the

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1 Comanche Peak configurations. They use only one hour
2 barriers in that plant and they have actually
3 installed all those barriers, completed all their
4 evaluations and all those barriers are operable. So,
5 it may be one of the few units around that has the
6 Thermo-Lag barriers that doesn't have fire watches.

7 TVA has also completed fire tests for the
8 barriers that they plan to install in Watts Bar.
9 Their tests were limited to one hour conduit tests and
10 they planned to rely on the Comanche Peak Unit 2 tests
11 for their cable trays. We have those test reports in-
12 house and they're under review right now. We observed
13 all these tests and we don't think there's any
14 particular problems. Again, they're one hour tests.

15 Comanche Peak recently completed another
16 series of tests for Unit 1. They decided to take the
17 high road and not wait for NUMARC, so to speak. So
18 they expanded their original test program a bit to
19 test some Unit 1 configurations. These barrier
20 designs were probably not quite as substantial as the
21 Unit 2 barrier designs. Unit 2 was going in as a new
22 installation. There were certain design features that
23 they could incorporate that are not readily
24 retrofitted, such as internal banding which helps
25 provide support to the barrier from inside the raceway

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1 and they didn't have quite as good results. They did
2 experience some high temperatures and some burn
3 throughs and as a result of this they had some visual
4 cable damage. The criteria we have allows for them to
5 evaluate that damage and see if it will have any
6 effect on cable functionality. Texas Utilities is
7 doing that now. So, we would expect to be reviewing
8 in the near future their cable functionality
9 evaluations.

10 Okay. If we could talk about the cable
11 tray configuration first and then maybe move into the
12 NUMARC test program, it may help explain -- help us
13 describe some of the issues we're talking about. We
14 have hard copies. I don't know if they'll be able to
15 come up on the monitors. But on the first page, this
16 shows a typical -- the first page shows a typical test
17 assembly, side view of a cable tray. Basically the
18 dark line across the top is the test deck itself and
19 then this tray is hung from the deck and there's two
20 steel channels that serve as supports. So you're
21 testing two radial band to straight run and then a
22 radial band. This looks like probably from the NUMARC
23 program.

24 Then what you do is you have this assembly
25 on this test deck and you lower it onto a furnace.

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1 Then they turn the fire on in the furnace and they
2 follow a standard time temperature curve and burn it
3 for one or three hours, depending on the rating you're
4 looking for.

5 (Slide) The next picture or drawing shows
6 a cable tray. If you were to look at the first one
7 and kind of look up underneath it and it shows the
8 side rails would run along the top and bottom there,
9 and then the rungs are shown going up and down. The
10 cables would lay --

11 COMMISSIONER REMICK: Not like the run of
12 a ladder then.

13 MR. WEST: Well, it's very similar
14 looking, but it's different. The cables, of course,
15 lay across the rungs. Now, some trays also have solid
16 bottoms and solid tops, but the rung configuration is
17 pretty common.

18 (Slide) The next slide just shows the
19 same thing looking from the end, and the last slide is
20 a 3-D view and that gives you a pretty good idea of
21 how the runs are. When we talk about the cable fill,
22 it would just be laying inside this tray on the rungs.
23 Typically they're tied down with the wire ties.

24 The NUMARC -- get into the NUMARC program
25 while we have the picture. The NUMARC program uses

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1 for their cable tray test specimens a 15 percent cable
2 fill nominal. What that basically is would be one
3 layer of cables completely across the tray. So, the
4 entire tray would be covered --

5 COMMISSIONER REMICK: Volume entry 15
6 percent or load 15 percent?

7 DOCTOR THADANI: I believe it's load 15
8 percent.

9 COMMISSIONER REMICK: Load.

10 MR. WEST: Any questions on the drawing
11 itself?

12 COMMISSIONER ROGERS: Now, the Thermo-Lag
13 material now surrounds this whole --

14 MR. WEST: Right. After you build the
15 tray, assemble the tray, put in the cables if you're
16 going to use cables, you would install the Thermo-Lag
17 barrier around this in the same way you would using
18 the same construction techniques and installation
19 details.

20 COMMISSIONER ROGERS: Those cables don't
21 extend out beyond the Thermo-Lag. In other words, in
22 the ends.

23 MR. WEST: Well, the cables would run from
24 here. They'd be chopped off up above the test deck
25 and run down and be chopped off on the other side of

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1 the test deck. They usually have about -- in the case
2 of Texas Utilities who chose to do -- use cables and
3 do functionality testing before and immediately after
4 the fire, they had about a 20 foot lead so they could
5 do their anchor testing or cable insulation resistance
6 testing. The NUMARC is not doing any functionality
7 testing. So I think theirs just chopped off up above
8 the test deck.

9 We've been working for quite some time
10 with NUMARC on the issues. The special review team
11 completed its work in February '92 and we met with
12 NUMARC at that time and discussed the issues and
13 requested that they consider coordinating an industry
14 response to whatever came out of the special review
15 team report. Ultimately they agreed to do that. So,
16 we started working with them in February of 1992 and
17 about a year ago in September, October time frame,
18 1992, they submitted some proposed test programs which
19 we rejected. Then there was a period of time where
20 they regrouped and they undertook an industry survey
21 which was quite a significant effort. I can
22 appreciate what they went through to try and identify
23 all the different types of raceways and Thermo-Lag
24 barriers and configurations and construction and
25 installation techniques that exist in industry. From

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1 that survey they went on to develop their test
2 program. What they did was from that survey develop
3 some baseline barrier configurations that they wanted
4 to test. And the first phase of the test was a series
5 of tests of baseline configurations that had been
6 upgraded in some way. So, they chose to test upgrades
7 before they test pure baseline barriers.

8 They planned to do seven tests and they
9 actually did six of those and deferred one because one
10 of the early tests, the results weren't very good and
11 the second assembly was an aluminum tray instead of
12 steel, so they didn't see the point of running that
13 test right away.

14 Of the tests they did in phase one,
15 probably only one we would agree is fully successful.
16 Now, we don't have to use the term "pass and fail,"
17 but we typically say successful or unsuccessful
18 because we do have a set of criteria and the idea is
19 that if you meet the criteria you're successful, if
20 you don't you're unsuccessful. In some cases if
21 you're unsuccessful in one area you can compensate in
22 other areas. For example, if the temperature exceeded
23 the acceptance criteria, you may then go into
24 demonstration of cable functionality. So, although
25 the test itself did not meet the criteria and was not

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1 successful, the NRC staff position or criteria would
2 allow you to deviate from the criteria if you could
3 demonstrate cable functionality. There's several
4 examples of areas where you can deviate and still
5 justify your barrier.

6 COMMISSIONER de PLANQUE: Which test
7 criteria now are we referring to?

8 MR. WEST: What I just described is what
9 is allowed by the staff criteria.

10 MR. MIRAGLIA: But the terms of success I
11 think Steve is using the temperature.

12 MR. WEST: Right.

13 COMMISSIONER de PLANQUE: Okay.

14 MR. MIRAGLIA: If that's your question.

15 COMMISSIONER de PLANQUE: Yes. But you
16 were already admitting there are several draft
17 standards out there and we need to know which ones
18 we're talking about.

19 MR. WEST: Well, there are several
20 initiatives. ASTM has a subcommittee who for the past
21 ten years has been working on a standard for fire
22 tests of raceway fire barriers. That subcommittee is
23 now up to draft 14 of their standard and that is a
24 standard that NUMARC wants to take some credit for and
25 the staff wants to take credit also for its criteria

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1 being very close to that standard.

2 COMMISSIONER de PLANQUE: So which ones
3 are we talking about in this case, the phase I NUMARC
4 tests?

5 MR. WEST: In phase I we're talking about
6 the criteria that NUMARC has proposed to demonstrate
7 success or no success. As we mentioned several times
8 in the briefing, there's still disagreement about
9 those criteria that we're trying to work out with
10 NUMARC.

11 So, if you look at the NUMARC criteria and
12 look at their test results, there was one
13 configuration, a one hour multi-conduit configuration
14 that we would agree met their criteria and I don't
15 think we have any problems with that either in the --
16 in the conduit configurations they don't use cables
17 and thermocouple placement use of cables and all that
18 is not an issue. So, we would agree with that test.
19 Based on our observations -- we haven't reviewed the
20 test report yet -- that it appears to be a successful
21 test.

22 There was one other test of a three hour,
23 24 inch wide cable tray where the tray itself appeared
24 to meet the NUMARC criteria. We do have some problems
25 with thermocouple placement for all the cable tray

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1 configurations that NUMARC has proposed and with the
2 use of cables principally because we think it's going
3 to limit the plant-specific applicability of the test
4 results. So that one we could say the cable tray met
5 the NUMARC criteria, but we have problems with the
6 criteria.

7 Okay. We met with NUMARC recently. They
8 went over these test results with us and discussed
9 also some of their plans for phase II. They have
10 another phase of tests planned. This will be eleven
11 tests and in this series they're planning to test some
12 other upgrade techniques and also test some baseline
13 barriers. In other words, a barrier that they think
14 is installed in the plant, they want to test it and
15 see how it performs without any upgrades.

16 Probably -- I guess the most disappointing
17 aspect of phase I is the performance of three hour
18 barriers. None of them really performed that well.
19 They were all upgraded significantly from what the
20 vendor would recommend for a three hour barrier.

21 In some cases, they took like a three hour
22 barrier, built it the way the vendor says with some
23 conservatisms in the direction of not being
24 substantial and then they actually enclosed it in like
25 an upgraded one hour barrier and they still had

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1 problems with burn-throughs and openings and high
2 temperatures and hose stream damage, even with the
3 lesser fog nozzle hose stream. So I think the staff
4 and NUMARC and probably industry are a little bit
5 concerned about the three hour barriers.

6 CHAIRMAN SELIN: They all exceeded the one
7 hour time period in this three hour barrier?

8 MR. WEST: The three hour barrier would
9 last for one hour.

10 CHAIRMAN SELIN: How feasible or
11 infeasible is it to have sprinkler systems or other
12 fire suppression systems in these plants where --

13 MR. WEST: Where there are none now? It
14 would depend on the plant area. I would imagine in
15 some areas you could do it. In some it would be more
16 difficult.

17 I think the problem may be, if you take a
18 plant like River Bend or WNP 2 where they use three
19 hour barriers extensively throughout the plant, you'd
20 be talking about significant expense and probably
21 operational problems to retrofit sprinklers in those
22 areas. In some areas it may be very easy if you have
23 a pump cubicle or something where you had a conduit
24 running through it.

25 Okay. I'll just go on to describe the

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1 rest of the NUMARC program and then I'll get back to
2 the disagreements between the staff and NUMARC on
3 their program.

4 During the meeting we had earlier this
5 month with NUMARC, they advised us that they are going
6 to conduct a second industry survey to get additional
7 information on in-plant configurations and raceway and
8 they're going to use that to help them finalize phase
9 2. And they also mentioned that as a result of the
10 performance of the phase 1 assemblies they're
11 considering a phase 3, which would be additional
12 testing.

13 They're also looking at upgrades. All the
14 upgrades we've seen to date have been taking a Thermo-
15 Lag barrier and adding more Thermo-Lag or more TSI
16 products to it. They're now considering upgrades
17 where you would take an existing Thermo-Lag barrier
18 and maybe put some other fire barrier over it, cable
19 or what-have-you. Again, I don't want to speak for
20 NUMARC on this. They haven't given us any definite
21 ideas or proposals, but they mentioned it's something
22 they're looking at.

23 When NUMARC has completed their test
24 program they plan to develop -- actually it's under
25 development now, but they'll issue to industry a test

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1 application guide. That's the guidance that an
2 individual licensee would use to evaluate the test
3 results and make judgments as to what would apply to
4 its plant configuration, the plant conditions, and
5 decide whether or not it could use a particular test
6 to either declare an in-plant barrier operable based
7 on its current configuration or whether upgrades were
8 needed. The application guide will use both the tests
9 actually sponsored and conducted by NUMARC under this
10 program and any other tests that they can identify
11 that maybe have generic or industry applicability like
12 the Comanche Peak or Watts Bar tests.

13 I would like to mention just quickly too
14 that NUMARC has submitted a methodology for evaluating
15 the combustibility hazard in-plant and we got that a
16 couple of weeks ago and we'll be reviewing that also.

17 CHAIRMAN SELIN: Before you go on, why are
18 they being so stubborn about -- you know, basically
19 anything they do has got to pass muster with us, so,
20 if you just take a look at it from a cynical point of
21 view as opposed to a scientific point of view, it
22 really doesn't make sense for them to run some tests
23 that we're not happy with because no matter how
24 effective they might be to a third party they would
25 have indications that they would have trouble passing

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1 the staff review. That's about the most agnostic way
2 I can put it.

3 So, why are they being so stubborn about
4 not trying to accommodate what the staff wants?

5 MR. TAYLOR: I'll turn to my colleagues.
6 I find it not quite fathomable personally, but I'll
7 ask Steve or Ashok.

8 DOCTOR THADANI: I can't answer that
9 question.

10 MR. MIRAGLIA: I think the best answer,
11 Mr. Chairman, would be to examine the responses to the
12 inquiries of the staff Mr. Taylor has sent to NUMARC.
13 I think there is an honest technical disagreement in
14 that they don't see the bare thermocouple wire and the
15 placement as being a significant issue. They may have
16 some views that the 15 percent is representative of a
17 large number of configurations out there.

18 CHAIRMAN SELIN: I stipulate all that.
19 Let's say that they have world class talent in this
20 area and all this talent comes in and tells them that
21 they're right and the staff is being foolish and
22 silly, et cetera, but they still have to pass the same
23 staff. I mean, in a sense, yours are the court
24 appointed tests. So if they can't talk you out of
25 these tests or resort to some third party, they're

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1 going to eventually have to come pass.

2 I mean, is it so much more expensive to
3 run the tests the way the staff wants them run or is
4 it --

5 DOCTOR THADANI: No, no.

6 MR. TAYLOR: It's not cost.

7 CHAIRMAN SELIN: Is there some threshold
8 that says that these differences in where you put the
9 thermocouples will have a huge difference in
10 performance? I mean, is it likely that they'll be
11 satisfactory with one thermocouple replacement and not
12 another one?

13 MR. MIRAGLIA: I think any test that
14 proves acceptability of performance would be a useful
15 test and the concern would be what's the generic
16 applicability of it.

17 DOCTOR THADANI: If I can just -- just the
18 narrow issue, and I think the placement of
19 thermocouple is a narrow issue in itself, but there's
20 a broader issue of applicability of NUMARC testing
21 program because there are other variables which may be
22 much more important when one goes to apply these
23 things. But as to this narrow issue is concerned, I
24 did at the last meeting we had with NUMARC about
25 October 18th, I believe, I asked exactly the question

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1 that you're asking us.

2 The response I got was, "Well, this is
3 just adding an additional conservatism and we don't
4 want to do it, basically. We will do one test just to
5 see what it means." I just can't tell you any more.
6 That's the best understanding I have.

7 COMMISSIONER de PLANQUE: But there's no
8 data out there on any of these kinds of tests that
9 would indicate what degree of conservatism this is?
10 Nobody's done a test with the thermocouple inside and
11 the --

12 MR. MIRAGLIA: They've moved forward on
13 that point, Commissioner de Planque, in that they've
14 agreed to run one or two tests with the bare copper
15 wire to get a feel for it.

16 COMMISSIONER de PLANQUE: But all the work
17 in developing the ASTM standard, isn't there any
18 information that can even suggest what magnitude we're
19 talking about here?

20 MR. MIRAGLIA: As I understand it, Steve,
21 and you can correct me, the standard would say no
22 cable on cold side.

23 MR. WEST: Right.

24 COMMISSIONER de PLANQUE: Yes, but there
25 must have been work that went into the basis for that.

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1 MR. WEST: Well, there's a fundamental
2 disagreement between the staff and NUMARC.

3 The staff's criteria has always been, ever
4 since we specified fire barriers to meet our
5 requirements, to measure the -- during these tests to
6 measure the temperature on the cold side of the
7 barrier off the cold side surface. That's why our
8 criteria specifies the location of the thermocouples
9 underneath the cable rungs.

10 NUMARC is saying, "You're asking us to
11 measure temperature in an area where a cable cannot be
12 located and that's a flawed methodology."

13 COMMISSIONER de PLANQUE: I fully
14 understand these distinctions, but what I'm asking
15 for -- when people get together and they develop a
16 standard there's usually scientific research data
17 that's brought to bear on how you set up a criteria.
18 Is there no evidence out there anywhere that tells you
19 what the difference is going to be, measurably?

20 MR. WEST: There have not been any tests
21 or experiments to give you the number you're looking
22 for.

23 COMMISSIONER de PLANQUE: Or not even a --

24 MR. WEST: There's plenty of qualitative
25 arguments that will tell you that, if you take a

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1 thermocouple in the location the staff recommends
2 underneath the rungs and you move it to the location
3 NUMARC is using up in the cable bundle, you're going
4 to see differences in temperature.

5 COMMISSIONER de PLANQUE: Right. Logical.

6 MR. WEST: Now what our criteria says is
7 that, if you do it the way the staff specifies and you
8 meet the temperaturized criteria, you're home free.
9 You don't have to do anything else. You're okay.

10 COMMISSIONER de PLANQUE: But we're back
11 to the Chairman's argument. Why is there a big
12 resistance to the --

13 MR. WEST: I don't know why there's a big
14 resistance. You'll have to ask NUMARC that.

15 CHAIRMAN SELIN: My question is not an
16 academic question and it doesn't stop there. What I'm
17 really getting down to is it appears from this
18 presentation, and I think we should invite NUMARC in
19 very quickly to make their presentation, but it
20 appears to me that there's a course of action going on
21 that is not converging at a solution to the problem.
22 The fire watch, this whole set of points, was based on
23 the assumption that within a reasonable amount of
24 time, and that reasonable amount of time is pretty
25 long already, that we would get to some answers.

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1 None of us is very comfortable with the
2 fire watch. At least, I'm not very comfortable with
3 the fire watch. Apart from the expense that the
4 plants have and the temptation to short-cut it, people
5 walking back and forth are not as reliable as some
6 technical solutions.

7 If now the Commission is faced with the
8 prospect that either it will take longer or we can't
9 even put a time on when this will be converged, I
10 think we have to consider a different course of
11 action. So what I'm really asking you is are we to
12 the point where you have significantly less confidence
13 than you did when you came in with the original plan
14 that there's an industry course of action that will
15 lead to a resolution of these problems within a
16 reasonable amount of time one way or another or do we
17 have to -- do you have to consider and do we have to
18 review a quite different course of action from the one
19 upon which we are currently embarked?

20 DOCTOR THADANI: One is a clear case.
21 That is, the whole process has certainly been delayed
22 by at least, I would say, a period of about eight
23 months because of delays in testing.

24 CHAIRMAN SELIN: That's where we stand
25 today with the original approach?

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1 DOCTOR THADANI: Exactly.

2 CHAIRMAN SELIN: That's kind of a
3 baseline, the thermocouple on the cold side of the
4 debate, so to speak?

5 DOCTOR THADANI: No, no. Last November,
6 if you recall, when we went through the whole issue
7 and we said we've developed this action plan and this
8 action plan is based on completion of various
9 activities by date X and so on, we had hoped that the
10 generic testing would be completed earlier this year.

11 MR. MIRAGLIA: By the end of this year.

12 DOCTOR THADANI: And now we're already
13 seeing that's not happening and it's not going to
14 happen, assuming that the course we're on is in fact
15 an appropriate course of action, so there's number
16 one.

17 CHAIRMAN SELIN: So we have a translation
18 of eight months?

19 DOCTOR THADANI: Eight months as a
20 minimum.

21 The second issue is this applicability
22 issue. We want to meet with them and NUMARC has
23 agreed to meet with us and discuss this guide that
24 would be the technical basis for how to apply the
25 generic data to plant specific configurations and we

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1 hope that that would proceed as we expect.

2 So the only then issue remaining,
3 technical issue remaining that we know of today, is
4 the placement of thermocouple. And as Mr. Taylor said
5 earlier, we have elevated the importance of this whole
6 matter. We are expecting to meet with NUMARC in the
7 next few weeks before the construction of the phase 2
8 assemblies is completed. If this issue does not get
9 resolved, then clearly we --

10 CHAIRMAN SELIN: We're in deep trouble.

11 DOCTOR THADANI: -- we have a problem.

12 CHAIRMAN SELIN: We have not only an eight
13 month delay, but we have a course of action.

14 Now let's get on to a third point. If
15 there isn't the information that Commissioner de
16 Planque has so patiently but persistently asked for,
17 what would you do if you had the information that
18 we're talking about? You wouldn't have the gradings
19 to say how do you extrapolate from a base case,
20 conservative or not, to specific installations with
21 specific configurations. Or is it expected that this
22 set of tests will also produce the gradients as well
23 as the base information?

24 MR. MIRAGLIA: As we understand the
25 proposal for the next phase, they're going to run some

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1 tests with the bare copper wire that would at least
2 give some dimension to the conservatism with respect
3 to that.

4 CHAIRMAN SELIN: Well, it's not just
5 conservatism. Let me make it clear. "Conservatism"
6 makes it sound like it's a pass-fail test. I don't
7 much care if the base information is with thermocouple
8 one place or a second place if they're equally
9 invariant.

10 The real question is, no configuration is
11 going to be exactly the same as the reference
12 configuration and therefore, even if you and NUMARC
13 agreed on what the reference configuration would be,
14 you need the factors to say how do you extrapolate
15 from the reference configuration to any --

16 MR. MIRAGLIA: That's right.

17 CHAIRMAN SELIN: And I understand Mr.
18 West's answer to say we don't have those factors
19 today. I mean, if we don't know the degree of
20 conservatism, then we don't know the difference
21 between a temperature measurement at the cold side
22 and --

23 MR. MIRAGLIA: That's true in part in
24 terms of broadness, to make the test as broadly
25 applicable, but, if one supposes that they run tests

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1 with thermocouple placement, with loading, and they're
2 "successful," that at least would set a datum as to if
3 you have configurations that you can demonstrate are
4 reasonable configured like this. We have an answer
5 then for a percentage of the configuration out there.

6 CHAIRMAN SELIN: That's only one point on
7 a continuum, Frank.

8 MR. MIRAGLIA: That's right.

9 CHAIRMAN SELIN: I mean, the basic concept
10 of having a test case is that you then know you have
11 quantitative factors, not just polarities, on how you
12 extrapolate to dozens and dozens of different physical
13 configurations.

14 COMMISSIONER de PLANQUE: But the dilemma
15 is this. There's one situation that obviously sounds
16 like it's easier to extrapolate to more situations and
17 that's putting it on the cold side. But if that is --
18 let's be ridiculous and say ten times more
19 conservative than doing it in a realistic situation,
20 you need to know that, and then maybe the criteria are
21 unrealistic if you're doing your test that way. It
22 seems to me that's --

23 DOCTOR THADANI: I think we're in total
24 agreement on that, absolutely.

25 COMMISSIONER de PLANQUE: But nobody has

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1 the answer to that yet.

2 DOCTOR THADANI: And if we had a plant
3 specific configuration, plant specific information on
4 the loading, the types of cables, the type of
5 insulation material, et cetera, we had all the
6 information on thickness, geometry and all of that, it
7 would certainly be a lot easier to understand
8 placement of thermocouple as an example.

9 COMMISSIONER de PLANQUE: But that scaling
10 or that extrapolation is a problem no matter what you
11 use as your reference case.

12 DOCTOR THADANI: That's true.

13 COMMISSIONER de PLANQUE: One may make it
14 easier, but it's still a problem.

15 DOCTOR THADANI: Yes, it is.

16 COMMISSIONER de PLANQUE: The range of
17 configurations that you have out there in the plants.

18 DOCTOR THADANI: It's still an issue with
19 a number of variables. This is just one, clearly.

20 CHAIRMAN SELIN: Commissioner de Planque's
21 point, in the taxonomy I gave you, is actually a third
22 point which is the reference case is too far from the
23 center of gravity. The real case is then it wouldn't
24 even be a very good reference and without being able
25 to measure that -- but, even if one grants that these

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1 are small differences that you're talking about, you
2 still need both of these sets.

3 Now what do actual licensees do? Don't
4 they come in with a specific analysis that goes beyond
5 just the measurements? You know, "We had better cable
6 than you had in mind. It's less combustible," or "We
7 have a lower probability that there'd be a fire." I
8 mean, don't they come in with a specific configuration
9 and argue on specific grounds that it's safe from a
10 fire --

11 MR. WEST: If we could go back, you had
12 mentioned this earlier about the testing without
13 cables. If you test a configuration and you do not
14 use cables and you measure the temperature from the
15 unexposed side and it is below the temperature rise
16 cut-off for success or nonsuccess --

17 CHAIRMAN SELIN: You're finished.

18 MR. WEST: -- you're finished.

19 CHAIRMAN SELIN: But that's just a
20 surrogate.

21 MR. WEST: And what cables you have is
22 immaterial. You don't even have to consider it any
23 further. So the problem comes in where you're going
24 to get into these analyses, is when the 80 units come
25 in with 250 types of cables and try and use the data

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1 that was generated using the cable NUMARC has used and
2 equate that to their in-plant configuration and it's
3 not clear how that is going to work. These are
4 questions we've asked NUMARC. How is that temperature
5 profile that you generate during the test, even if
6 it's successful, how is that going to apply to another
7 plant configuration or somebody else's configuration?

8 So the conservatism we're looking for is
9 not so much, you know, are you this good or this good
10 if you use cables or do not use cables. It's how do
11 you apply the data from one test to 80 plants.

12 CHAIRMAN SELIN: That's fine, except if
13 the material can't pass those tests. I mean, the idea
14 of having a surrogate which is conservative enough to
15 say if you pass the first test you don't have to go to
16 the second or third, that's very attractive. But if
17 it's so conservative or if the material is so
18 defective, either way -- let me go on, if I might, to
19 another related -- we've been arguing about rather
20 esoteric questions of standards and tests. Now what
21 do we find out about the material itself, as opposed
22 to the fact that it doesn't pass some specific tests?
23 Does it burn? Does it not bond when you add more
24 Thermo-Lag to existing Thermo-Lag?

25 MR. MIRAGLIA: I think what we have now is

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1 a range of real test data now, Mr. Chairman, that
2 indicates that the performance of this material is
3 very configuration dependent. It's very subject to
4 how it's installed, the quality of installation, and
5 it has been demonstrated in some cases to be able to
6 perform, but the performance at that level is at a
7 significantly higher enhancement than exists at plants
8 today. So, as is it would not be expected to perform
9 at the one hour --

10 CHAIRMAN SELIN: With all due respect, Mr.
11 Miraglia, that's a pretty mushy answer. I mean, what
12 do we know? I mean, do we find where you double up
13 the thickness of Thermo-Lag and it doesn't do much
14 good --

15 MR. WEST: The Texas Utilities and the TVA
16 tests of one hour barriers have shown that the
17 material can be upgraded to work. Like I said during
18 the discussion of the NUMARC --

19 CHAIRMAN SELIN: That's Comanche Peak 2,
20 right?

21 MR. WEST: Yes, sir.

22 CHAIRMAN SELIN: But they didn't just --
23 as I understood, they didn't just stick in the
24 material. They went in and they bound the --

25 MR. WEST: No, that's with upgrades. And

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1 the upgrades for the one hour barrier appear to be
2 workable. Like I said, for the unit 1 tests that they
3 did they backed off a little bit from the unit 2
4 upgrades and the results weren't quite as good, but
5 even that showed us that there is some cutting edge
6 where you can probably achieve success.

7 The NUMARC tests for the three hour
8 barriers, as I mentioned, were much more
9 disappointing. Regrettably, the results were not that
10 good.

11 CHAIRMAN SELIN: Comanche Peak 1 and 2,
12 both one hour, did they have fire suppression --

13 MR. MIRAGLIA: They were all one hour
14 barriers, sir.

15 DOCTOR THADANI: They were one hour
16 barriers, right.

17 CHAIRMAN SELIN: So they don't illuminate
18 the three hour problem.

19 MR. WEST: No, and TVA as well. The first
20 three hour tests that we've seen since the problems
21 have been identified and reviewed by the staff in
22 detail have been the three hour tests conducted by
23 NUMARC in the last couple of months. As I've said,
24 they've been disappointing because they've been
25 significant upgrades and the results have not been

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1 that good.

2 The one 24 inch wide tray, three hour, was
3 not too bad. But again, it was upgrade. I think what
4 that shows is that we've been calling the three hour
5 barriers indeterminant, but probably they're just --
6 a three hour barrier installed the way the vendor
7 recommends today in a plant probably won't last three
8 hours.

9 CHAIRMAN SELIN: Extrapolating, given that
10 you've had these upgrades to the point that you have
11 serious doubts that brute force upgrading will meet --
12 even with brute force upgrading, they'll still be
13 unable to meet -- I'm sorry, triple negative. Will
14 they still be unable to meet the three hour barrier
15 even with serious upgrades -- I mean, the three hour
16 standard?

17 DOCTOR THADANI: Given the information we
18 have today, that's the way it looks.

19 MR. TAYLOR: That may say that where three
20 hour barriers are necessary they're going to have to
21 go back and potentially put in suppression --

22 DOCTOR THADANI: Spray or some kind of --

23 CHAIRMAN SELIN: Which means it wouldn't
24 require three hour barriers.

25 MR. TAYLOR: That would be -- yes, and

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1 that -- or another --

2 MR. WEST: That's one reason other options
3 using other fire barrier materials are being explored.

4 CHAIRMAN SELIN: May I continue in this
5 line?

6 COMMISSIONER REMICK: Sure. Oh, sure.

7 CHAIRMAN SELIN: Okay. Let's go a step
8 further. I don't want this problem with NUMARC to
9 obscure what seems to me to be a much more fundamental
10 problem, which is at this point we really have no
11 confidence that this brute force approach, at least in
12 three hour barriers, is going to lead to solutions.
13 We also have an untenable situation out there. We
14 have 70 some power plants that are operating in a
15 fashion that is acceptable at the most for temporary
16 course of action. What alternatives are available?
17 Are we going to have to require more detailed case by
18 case analyses? Are we going to end up, as Mr. Taylor
19 suggests, saying that people have to put in fire
20 suppression systems if they don't have them where
21 separation is called for? Are we going to set some
22 kind of time deadline and say, "Here's a set of
23 options to choose from, but you've got to do some of
24 them within a given amount of time."

25 This is just very serious situation. Here

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1 we are years some after we started paying attention to
2 it and we're really no closer to a solution, at least
3 for the three hour situation, than we perceived that
4 we were when we started, to be fair about it, or am I
5 over -- please, if I'm overstating the case, this is
6 the time to tell me this.

7 MR. MIRAGLIA: Well, there has been the
8 concern from the very outset of this and relative that
9 we've tried to put the safety significance into
10 context and we're saying the compensatory measures
11 that buys us time to consider those. The options that
12 you have articulated, Mr. Chairman, are all potential
13 options. These tests we're hopefully going to
14 illuminate, put further illumination on those issues.
15 The next phase would provide that kind of information
16 for us to make that judgment.

17 The three hour tests have not performed.
18 They've been on the range of two hours plus.

19 CHAIRMAN SELIN: Let me put the question
20 a little more -- even if you settle tomorrow with
21 NUMARC all these questions about degree of cable and
22 thermocouples and stuff, we're still very, very far
23 from a solution on the three hour answers. Is that
24 right?

25 DOCTOR THADANI: The current information

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1 says exactly that. They are planning --

2 MR. TAYLOR: I think it's appropriate to
3 look and I don't have the answer here today.
4 Typically in a plant a one hour barrier is much more
5 widespread than a three hour barrier --

6 MR. MIRAGLIA: Yes. Yes.

7 MR. TAYLOR: -- because you get the other
8 factors of Appendix R, separation, fire loading and so
9 forth. Is that not correct?

10 MR. MIRAGLIA: That's correct.

11 DOCTOR THADANI: Yes.

12 MR. TAYLOR: So, I can't look you in the
13 eye and tell you it's 80 percent one hour in a plant
14 and 20 percent three hour in a plant. If you go
15 through the plant, you will find the one hour barrier
16 with a much wider application. Where the spacial
17 separation of the redundant cabling and control cables
18 is not very good and where the fire loading is higher
19 you hit the need for a three hour barrier. But it is
20 a much more defined population.

21 CHAIRMAN SELIN: Let me follow up on the
22 implication of that. The issue is not really what's
23 the characteristic of Thermo-Lag, the question is what
24 do we do for fire separation protection in the power
25 plants. Therefore, it seems to me that you might

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1 consider a branch course of action, one that follows
2 along where we're going towards the places where the
3 one hour barrier is deemed to be adequate because we
4 all seem to believe we're in the ballpark there. I
5 wouldn't say we're quibbling, but we're getting --

6 MR. TAYLOR: Getting closer.

7 CHAIRMAN SELIN: Getting closer. You're
8 down to how much more buttressing is necessary to meet
9 the span and how do you measure it. On the three hour
10 barrier -- and one thing I'm sure you'll provide very
11 quickly is really some -- how much of the problem is
12 one hour and how much is three hour. There, even if
13 you had a complete settlement with NUMARC tomorrow,
14 the results to date don't give any confidence that the
15 approach being followed will, in fact, produce a
16 solution, namely better installation and more stuff.
17 There you might seriously consider that it's time to
18 look at another -- at least an additional course of
19 action like suppression or like mandatory rerouting or
20 something short of just saying, "We will go on however
21 long it takes until we find out how much Thermo-Lag it
22 takes and so on.

23 MR. MIRAGLIA: And as Mr. Taylor has
24 pointed out, there are other considerations with
25 respect to suppression and things of that nature. I

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1 think we could also go back and look. My recollection
2 would seem to say that even where they had less than
3 three hours without barriers, the rule, Appendix R,
4 allowed for a deviation to an exemption process and we
5 may have even approved --

6 CHAIRMAN SELIN: Upon meeting some very
7 good criteria.

8 MR. TAYLOR: Yes.

9 MR. MIRAGLIA: Yes, sir, and we'll look --

10 CHAIRMAN SELIN: It doesn't say, "Well, if
11 you can't do three hours, how about two and a half?"

12 MR. MIRAGLIA: That's exactly right. It
13 has to be looked at and evaluated in each case to rule
14 out for that and there may be some situations out like
15 that and we could look for those.

16 DOCTOR THADANI: You need technical --

17 MR. MIRAGLIA: So there is a range of
18 options on how to deal with the issue.

19 MR. WEST: I'd like to, just so it doesn't
20 look like all bad news with three hour barriers, point
21 out that the baseline three hour barriers that NUMARC
22 started with before they upgraded it were very
23 conservative in the direction of -- I mean weakness.
24 They used the dry fitting methods where the trowel
25 grade didn't seal the joints completely. They ran the

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1 ribs the opposite way of what the vendor recommends,
2 which doesn't give you the structural stability.
3 There may be three hour barriers out there that if
4 they were more robust and upgraded in the same fashion
5 would, in fact, pass. So, we don't really have that
6 information yet.

7 In fairness to NUMARC and what they're
8 doing, I think it should be pointed out that the
9 baseline barriers were very weak.

10 DOCTOR THADANI: The important element is
11 that's the information we have today, but NUMARC, as
12 I understand, we haven't seen the scope of their
13 planned testing for phase II. But I believe they
14 would be -- with some changes would be doing some
15 additional testing in the phase II to see if there
16 aren't ways one can deal with the three hour issue.
17 But we don't have the information yet to be able to
18 tell you exactly what they planned to do.

19 CHAIRMAN SELIN: Commissioner, do you have
20 comments before we go on to the more broad fire
21 protection test --

22 Mr. Taylor?

23 MR. TAYLOR: Steve, do you want to
24 continue?

25 MR. WEST: Yes.

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1 We had a slide 10 on the schedule for the
2 Thermo-Lag and we kind of touched on all the points
3 that are going to result in what we think will be a
4 delay from the date we gave you in November of -- May
5 of 1985 for total completion. There have been some
6 slippages and we're estimating now it could be eight
7 months to a year longer if things continue along this
8 path and assuming things go well.

9 COMMISSIONER ROGERS: I did have a
10 question I probably should have brought up. On the
11 inspection -- the TI inspection document.

12 MR. WEST: Yes, sir.

13 COMMISSIONER ROGERS: Where do you stand
14 on that? That's supposed to be done about now in this
15 quarter, issued for comments. Has that been issued
16 now yet?

17 MR. WEST: That temporary instruction has
18 been through several draft stages and we have given it
19 to -- it hasn't been widely circulated for comment,
20 but we are giving it to Region IV to use for a pilot
21 inspection at Comanche Peak Unit 1 since they will be
22 the first plant to actually complete their upgrades.
23 From the lessons learned of that inspection, we would
24 probably revise it again and then circulate it for
25 comment. Because of the delays in the overall

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1 schedule, getting the TI completed and issued is not
2 considered to be a critical path item right now,
3 although there may be some plants that don't have
4 extensive amounts of Thermo-Lag, say they just have
5 one hour conduits where there are probably upgrades
6 readily available.

7 COMMISSIONER ROGERS: Well, it may not be
8 a critical path item for wrapping up the Thermo-Lag
9 question, but it does seem to me it's an important
10 document to have out there for guidance, isn't it?

11 MR. WEST: No question about that. That's
12 why we are -- that's why we've drafted it and given it
13 to Region IV. We would expect that inspection to
14 result in a final document from the lessons learned.

15 COMMISSIONER ROGERS: I see from your
16 GANTT chart that you expect to have a workshop after
17 you've issued the final TI. I'm just a little puzzled
18 by that. Why a workshop after you've issued the final
19 TI? Why not before you issue the final TI?

20 MR. MIRAGLIA: It's very similar to the
21 question and comment and interaction since it is a
22 staff effort and it's a verification, the staff would
23 like to develop a criteria, have a position on it and
24 then interact outside and get comments. Inspection
25 and that kind of decision making, we feel, should rest

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1 with us to develop that criteria and put that out
2 there. If there are concerns and comments that come
3 with that, we can deal with it. It's very similar to
4 what we've done with the maintenance inspection and
5 it's that same approach that we're intending to use
6 here.

7 MR. WEST: If I could expand on that just
8 briefly, the real expertise in these fire barriers
9 rests within Headquarters here. What we have planned,
10 what our intention was with the workshops was to take
11 the Headquarter's employees out to the regions or have
12 the regions come in here and really do a data dump on
13 them and bring them up to speed to where they can
14 conduct these inspections. So, we'd want pretty much
15 a final TI set up. I'm not saying there may not be
16 some fine tuning if we got some good comments out of
17 the workshop, but really the idea is to pass the
18 information along to the people that are good
19 inspectors but don't have the expertise.

20 COMMISSIONER ROGERS: Okay. I guess I
21 just didn't understand what the purpose of the
22 workshop was. I see. It's really how to apply it.

23 MR. WEST: Right. It would be for the NRC
24 staff that will actually be performing the inspection.

25 COMMISSIONER ROGERS: All right. Fine.

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1 DOCTOR THADANI: And part of the process
2 does call for comments during the development,
3 comments from each of the regions.

4 COMMISSIONER ROGERS: Yes, I saw that. I
5 just didn't understand what the purpose of the
6 workshop was. Please go ahead, Steve.

7 MR. WEST: Okay. So, that's all I wanted
8 to say about the Thermo-Lag action. We can move along
9 to the fire protection task action plan.

10 As the Chairman mentioned, we did develop
11 an action plan to implement the recommendations that
12 came out of NRR's reassessment of the reactor fire
13 protection program. It's an extensive and
14 comprehensive action plan. We recently gave you the
15 second -- I guess the first update of the action plan.
16 Basically the action plan is broken up along the lines
17 of the reassessment report where the reassessment
18 report had recommendations for action. In other
19 words, things that we should be looking at near-term.
20 Then there were also some recommendations for further
21 consideration and then some confirmatory issues. So
22 the action plan itself is split along those lines.

23 (Slide) We wanted to talk today about
24 some of the recommendations for action. Slide number
25 12 lists all of those recommendations and I don't want

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1 to necessarily go through the list one by one today.
2 There are some I want to focus on in the next slides.

3 COMMISSIONER ROGERS: Are you going to
4 talk about the fire barriers other than Thermo-Lag?

5 MR. WEST: Yes, sir.

6 (Slide) So, slide 13.

7 One of the recommendations, just briefly,
8 was that NRR management should look at the resources
9 they've placed on the Thermo-Lag action plan and the
10 fire protection issues in general and ensure that
11 adequate resources are being applied. That has been
12 completed. One of the actions that we've taken in
13 response to the recommendation was to add another
14 senior fire protection engineering staffer to NRR and
15 we're very close to filling that position. So, that
16 recommendation has been completed.

17 Another one that involved the cooperation
18 of NUMARC, and I'd like to say they were very prompt
19 and efficient in their response, was to review the
20 fire-induced vulnerability evaluation methodology
21 that's commonly referred to as the five methodology.
22 That's a screening technique for evaluating fire event
23 sequences and it's the methodology that most of the
24 plants are using for their IPEEE reviews and
25 submittals.

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1 There was a weakness identified in that
2 methodology. We pointed that out to NUMARC and they
3 worked through EPRI to clarify that very promptly.
4 So, that's been completed.

5 The other recommendation that we've been
6 expending significant effort on since the -- actually
7 we started before the FP-TAP, as we call it, is a
8 review of other fire barrier materials. We've done a
9 couple of things. We have done similar testing of
10 these materials at the National Institute of Standards
11 and Technology as we did with Thermo-Lag. In other
12 words, small scale scoping tests to help us understand
13 something about the thermal properties and the fire
14 resistant performance of these materials.

15 So, we've tested all of these and we don't
16 see anything that's caused great alarm. Thermally
17 they appear to perform fairly well. One of the
18 materials, if you look at just the temperature rise
19 across the cold side of the material, if you look at
20 the raw test data, it looks kind of high. It doesn't
21 look successful in terms of looking at the criteria.
22 But the system itself has built into it, if you were
23 to install it on a raceway, an air gap, a frame you
24 build around it and then this material which results
25 in an air gap, which is an integral part of the system

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1 itself which we could not model in the tests we were
2 doing. So, that's kind of an anomaly we're looking
3 at.

4 But all the other materials in terms of
5 just our thermal performance, nothing of great alarm
6 came out of it. I'll just point out that these are
7 the fairly severe tests because it's just a -- the
8 pure material itself subjected to the standard time
9 temperature fire. There's no raceway, so there's no
10 thermal enhancement that would be normally provided in
11 full-scale tests. There's also pads between -- the
12 thermocouple is attached between the material and a
13 pad, which is a heat sink. So, you probably see a
14 higher temperature there than you would in a full-
15 scale test. On the other hand, it's not enclosed.
16 It's open to free air. So, there are tradeoffs.

17 COMMISSIONER ROGERS: Now, those
18 materials, does that include Flamastic? Is that one
19 of the materials?

20 MR. WEST: No, it doesn't include
21 Flamastic. Flamastic is usually -- is a mastic that's
22 sprayed or troweled onto cables directly. We haven't
23 looked at that. It's not really considered within the
24 scope of the fire barrier problem. It's an entirely
25 different material.

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1 CHAIRMAN SELIN: Is it possible to -- I
2 mean if somebody had a Thermo-Lag installation and
3 weren't up to snuff and were faced with quite a large
4 cost, is it possible to use one of these other
5 materials for the enhancement or do you pretty much
6 have to stick to --

7 MR. WEST: There are some independent
8 efforts underway by some of the other fire barrier
9 vendors to use their products as an upgrade of Thermo-
10 Lag barrier. A couple have come in and talked to us
11 informally and I believe some are talking with NUMARC.
12 Like I said, NUMARC is planning in phase II possibly
13 testing some of those. It seems feasible to the staff
14 that that may be an approach.

15 CHAIRMAN SELIN: I'm sorry. Thank you.

16 MR. WEST: Okay. Based on our early
17 reviews of some of the other fire barrier materials,
18 we did identify some technical concerns and they led
19 us to issue a couple of information notices just to
20 get the information quickly out to industry. We sent
21 those to you with a Commission paper at the time. We
22 also have asked each vendor a series of questions and
23 they have submitted to us their responses and test
24 reports and that kind of thing. So, we're kind of
25 going into the same type of review we did initially

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1 with the Thermo-Lag fire barriers. We're kind of
2 starting at ground zero looking back through what the
3 vendor or what utilities have done, what has the staff
4 done, have we looked at this material before and that
5 kind of thing. So, those reviews are all underway and
6 we're still on schedule to complete that early next
7 year. If we identify anything, depending on the
8 significance, of course, we may send out another
9 information notice or bulletin or what have you, but
10 we'll probably plan to summarize the results of all
11 that and put it out maybe in a generic letter or
12 something later.

13 Were there any specific questions on any
14 of the other materials?

15 CHAIRMAN SELIN: We probably should plow
16 ahead unless you actually get the question.

17 MR. WEST: Well, I'm down to my last
18 slide, just a summary of the -- well, before I get to
19 the last slide I'll just mention that one of the other
20 things that we're working on is with Office of
21 Research on the performance-based fire protection
22 rule. It's kind of in its infancy. We've had a
23 couple of meetings. In fact, we met with -- had a
24 good exchange of information with NUMARC yesterday on
25 some of their thoughts on how a performance-based rule

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1 should go. Research has the lead for that, but of
2 course we're supporting it and very interested in it.
3 So, that's underway also.

4 (Slide) The final slide is just a summary
5 of the schedule for the fire protection task action
6 plan. As you can see it's kind of a drawn-out
7 schedule. It goes through 1997.

8 CHAIRMAN SELIN: But these are looking
9 for, identifying and resolving new issues. They're
10 not like the Thermo-Lag for a known existing acute
11 problem. Is that right?

12 MR. WEST: Some of the issues were -- this
13 is an issue you should look at just to give yourself
14 a warm feeling that there's no underlying problem and
15 some were applying a lessons learned kind of approach
16 to other programs to see if there may be some other
17 program within NRR we want to look at closer.

18 CHAIRMAN SELIN: Do you know of any
19 problem even of a smaller scale like Thermo-Lag in the
20 sense that we have an acute problem today and it's
21 going to take three or four years to work it out?

22 DOCTOR THADANI: No, we don't know of any
23 such major issues.

24 MR. WEST: That concludes my presentation.

25 CHAIRMAN SELIN: Before I turn to my

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1 colleagues, I'd like to say three things. First, I
2 think on a tactful basis you've done a first rate job.
3 You've been thorough, careful, tough, rigid where
4 called for. You thought out what you want to do and
5 you certainly haven't bought a bill of goods or
6 anything like that. There's no implication in my
7 remarks of anything like that.

8 The second is there are clearly some --
9 from a I wouldn't even say methodological point of
10 view, but from a test point of view, as Commissioner
11 de Planque points out, there are a number of other
12 things that would be necessary. But the third thing,
13 my point is that occasionally one has to sit back and
14 say not what do we do next, but are we going to get to
15 where we have to get in a reasonable amount of time?
16 It's my opinion that this is the right time to ask
17 that question and not just look at this as an
18 undifferentiated problem. Again, it's not a Thermo-
19 Lag problem, it's a 70 power plant problem.

20 So, we'll get to what to do about Thermo-
21 Lag and TSI in a different area. Here the question is
22 how do these people in a not unnecessary, uneconomical
23 way, but quicker than we're getting now get up to
24 meeting our standards and that has to, I think,
25 probably be broken down into a number of sub problems.

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1 My suggestion is that it's time to consider that
2 question as well as how do we keep as close as
3 possible to the original course of action.

4 Commissioner Rogers?

5 COMMISSIONER ROGERS: Well, yes. I guess
6 I would -- just my own thoughts are a little bit
7 different from that, just really a concern about how--
8 thought it through quite what you might do about it,
9 but a concern about how long this is taking to get
10 resolved. I really think that it is taking much too
11 long, particularly the number of plants that are
12 susceptible here and liable. I think that something
13 has to move more rapidly towards closure. I'm
14 uncomfortable about some of these dates and slippages
15 and so on and so forth. I just don't think that
16 they're really tolerable. I think that I don't
17 understand why really it's taking so long. I'm not
18 blaming staff or anybody, but I think somehow it's
19 just to move more rapidly.

20 What's the situation with European
21 reactors? Do they have to satisfy similar kinds of
22 fire protection, fire barrier requirements to the ones
23 that we're imposing? If they do, what materials are
24 they using? Are they using other materials than are
25 being used in the United States?

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1 MR. TAYLOR: Are you in a position to
2 answer that?

3 DOCTOR THADANI: I'm not.

4 MR. TAYLOR: Let us take a look at that.

5 DOCTOR THADANI: We need to look.

6 MR. TAYLOR: I should note that even when
7 Appendix R was passed there was a great debate about
8 the backfit issue in the United States in 1980, I
9 think it was. It was a very tough decision because it
10 was known that the plant configurations didn't reach
11 what was necessary by separation alone, which is the
12 ideal way. I know a lot of the European designs have
13 gone to separation, those that were in a design state.
14 So, we'd have to look more at the older plants.

15 COMMISSIONER ROGERS: Well, I'm not asking
16 for an extensive research project in here, but just a
17 feeling of whether there's anything that suggests
18 itself from looking at those situations that might be
19 applicable.

20 DOCTOR THADANI: Yes. In fact, next
21 month --

22 MR. MIRAGLIA: With respect to the
23 circumstances here though, there is all the
24 information we have is shared in the international
25 community. So, our information is our generic

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1 letters. So, the concerns that have been raised here
2 are at least known.

3 DOCTOR THADANI: There's a planned meeting
4 next month, I believe it is, December, in December
5 when Mr. Madden is meeting with a number of countries
6 on trying to understand what they are doing on this
7 issue. We will get the information to you.

8 COMMISSIONER ROGERS: Thank you.

9 CHAIRMAN SELIN: Commissioner Remick?

10 COMMISSIONER REMICK: I must admit I'm a
11 little surprised to hear that the staff and the
12 industry are apparently at loggerheads on some of the
13 technical questions. I have enough experience to know
14 there are always two sides to any story and I
15 certainly support the Chairman's suggestion that
16 perhaps NUMARC should come in.

17 But another thought that goes through my
18 mind, have you vented this difference with ACRS where
19 both parties are there at the same time and both sides
20 are given and somebody listens to both sides,
21 technical arguments and tries to be helpful?

22 DOCTOR THADANI: Not so far, but there is
23 a meeting planned with the ACRS. I just don't
24 remember what the date is. We are planning to meet
25 with the ACRS.

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1 COMMISSIONER REMICK: And on the delays,
2 I'm certainly disappointed that it's taking more, but
3 in a way I'm not necessarily surprised. Is it due to
4 lack of diligence? Is it just taking longer than we
5 had estimated in our plan? I once again quote General
6 Eisenhower who said, "Plans are meaningless and
7 planning is everything." I don't have to go back too
8 far in time to realize that many times when we specify
9 things for others to do it always takes longer than we
10 estimated that it would take. But is it lack of
11 diligence? Is it just that there are problems, that
12 to build test equipment it takes time?

13 MR. MIRAGLIA: Commissioner Remick, we
14 started the dialogue, as Steve indicated, early in
15 '92. Industry came to an agreement that they would
16 consider a program in mid-'92. Our expectations were
17 when we came to see you a year ago that we'd be well
18 along the line to having the test completed and
19 knowing what the fixes were by this time. We
20 developed criteria. There was discussion about
21 criteria, should they move before our criteria was
22 finalized, after, and so those are all factors.

23 So, I think the answer is and the short
24 answer is all of those are factors into the equation.
25 We all hope that even with the tests starting in

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1 September, had this phase I presented the path for
2 solutions, we'd have been fairly close to being on
3 schedule. The tests that ran did not produce that
4 result. So, it's a long answer to a --

5 COMMISSIONER REMICK: So, it sounds as if
6 it's just taking longer than we had expected because
7 there are complications. Am I correct?

8 DOCTOR THADANI: Yes, I think that's
9 basically it. I hope we're not leaving you with an
10 impression that NUMARC is not pushing aggressively.
11 I think they are. I think their recent information
12 that they developed is, I think, not what they had
13 expected or we had expected. Therefore, it's no time
14 to sit back, as the Chairman said, how do you proceed.
15 There's some tough issues.

16 COMMISSIONER REMICK: Well, I certainly
17 urge that we forge ahead, but it sure appears like
18 it's a complex question. It appears that we don't
19 have all the answers. As I say, I'm a little more
20 surprised that we still have technical differences,
21 but I certainly would want to hear more about it
22 before I came down one side or another on why there
23 are still those technical differences. These are
24 complex matters, but they always end up taking more
25 time and all I have to do is look at BWR

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1 instrumentation, level instrumentation. It always
2 takes more time than we think it will take and people
3 actually have to carry these things out.

4 I appreciate the information that you
5 provided today and the job that you are doing.

6 CHAIRMAN SELIN: Commissioner de Planque?

7 COMMISSIONER de PLANQUE: Yes. I guess
8 I'm still surprised that there are arguments over the
9 criteria and the testing methods. If there aren't
10 data out there already to help resolve that, maybe
11 some of the tests should be aimed at resolving those
12 issues rather than randomly -- not randomly, but
13 selectively testing configurations per se, but aim the
14 tests at settling the disagreement about what the
15 criteria should be.

16 I have nothing further to add other than
17 I agree with most of everything that's been said.

18 CHAIRMAN SELIN: Thank you very much.

19 MR. TAYLOR: Thank you.

20 (Whereupon, at 11:36 a.m., the above-
21 entitled matter was concluded.)
22
23
24
25

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TITLE OF MEETING: BRIEFING ON STATUS OF THERMO-LAG

PLACE OF MEETING: ROCKVILLE, MARYLAND

DATE OF MEETING: OCTOBER 29, 1993

were transcribed by me. I further certify that said transcription
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THERMO-LAG FIRE BARRIERS AND FIRE PROTECTION PROGRAM REASSESSMENT

STATUS REPORT

**ASHOK THADANI, DIRECTOR
DIVISION OF SYSTEMS SAFETY AND ANALYSIS
AND
STEVEN WEST, CHIEF
SPECIAL PROJECT SECTION
OFFICE OF NUCLEAR REACTOR REGULATION**

OCTOBER 29, 1993

AGENDA

- **BACKGROUND**
- **THERMO-LAG ACTION PLAN**
- **FIRE PROTECTION TASK ACTION PLAN**

BACKGROUND

- NOVEMBER 1992, LAST COMMISSION BRIEFING ON THERMO-LAG ACTION PLAN
 - PART I - TECHNICAL ISSUES NOVEMBER 1994
 - PART II - NRC SMALL-SCALE TESTING COMPLETED: SEPTEMBER 1993
 - PART III - INSPECTION PROGRAM MAY 1995
 - PART IV - FIRE PROTECTION PROGRAM REASSESSMENT COMPLETED: FEBRUARY 1993
 - PART V - PLAN MANAGEMENT
 - COMMISSION INFORMED OF SIGNIFICANT ISSUES AS THEY ARISE
 - STAFF APPROVAL OF COMANCHE PEAK BARRIERS
 - PROBLEMS WITH OTHER FIRE BARRIERS
 - FIRE PROTECTION PROGRAM REASSESSMENT-----> RECOMMENDATIONS
 - RECOMMENDATIONS-----> FIRE PROTECTION TASK ACTION PLAN
 - OTHER MAJOR ACTIONS (GL 92-08, SMALL-SCALE TESTING OF OTHER FIRE BARRIER MATERIALS, ETC..)
 - ACTION PLANS UPDATED QUARTERLY (LATEST OCTOBER 8, 1993)
 - THIS BRIEFING WILL FOCUS ON MAJOR ISSUES, ACCOMPLISHMENTS, AND PLANS
-

THERMO-LAG ACTION PLAN

- **GENERIC LETTER 92-08, THERMO-LAG FIRE BARRIERS**
- **GENERIC LETTER 86-10, SUPP. 1, ACCEPTANCE CRITERIA**
- **NRC SMALL-SCALE TESTS**
- **PLANT-SPECIFIC TESTS**
- **NUMARC TEST PROGRAM**
- **COMPLETION SCHEDULE**

GENERIC LETTER 92-08 "THERMO-LAG 330-1 FIRE BARRIERS"

- **IDENTIFIED SPECIFIC TECHNICAL CONCERNS**
 - **70 UNITS AWAITING RESULTS OF NUMARC PROGRAM**
 - **2 LICENSEES PROPOSED APPENDIX R EXEMPTIONS**
 - **3 LICENSEES PROPOSED ALTERNATIVE COMPENSATORY MEASURES**
 - **STAFF PLANS TO CLOSE OUT THERMO-LAG BARRIER ISSUES BY INSPECTION**
-

GENERIC LETTER 86-10, SUPPLEMENT 1 ACCEPTANCE CRITERIA

- **CLARIFIES FIRE ENDURANCE TEST ACCEPTANCE CRITERIA**
 - **NUMARC, LICENSEES, UL, VENDORS AND INTERVENORS COMMENTED**
 - **DOMINANT COMMENTS FOCUSED ON**
 - **THERMOCOUPLE PLACEMENT**
 - **HOSE STREAM TEST METHODS**
 - **TESTING ASSEMBLIES WITHOUT CABLES**
 - **PLAN TO ISSUE NOVEMBER 1993**
-

NRC SMALL-SCALE TESTS

- **ASSESSED THERMO-LAG MATERIAL THERMAL PERFORMANCE**
 - **TWO 1-HOUR AND FOUR 3-HOUR PANEL TESTS**
 - **MAXIMUM TEMPERATURE RISE OF 250 °F EXCEEDED**
 - **TESTS INDICATED THAT THERMO-LAG MATERIAL NEEDED UPGRADES TO ACHIEVE FIRE RESISTANCE RATINGS**
 - **TESTS INDICATED THAT THERMO-LAG MATERIAL EXHIBITED COMBUSTIBLE PROPERTIES**
 - **TESTS DID NOT ASSESS PERFORMANCE OF ASSEMBLIES**
-

PLANT-SPECIFIC TESTS

- **TEXAS UTILITIES FOR COMANCHE PEAK UNIT 2**
 - **STAFF APPROVED TEN UPGRADED BARRIER DESIGNS**
 - **TENNESSEE VALLEY AUTHORITY FOR WATTS BAR NUCLEAR**
 - **TESTS OF UPGRADED CONDUIT BARRIERS**
 - **RESULTS OF TESTS UNDER STAFF REVIEW**
 - **WILL USE COMANCHE PEAK CABLE TRAY TEST RESULTS**
 - **TEXAS UTILITIES FOR COMANCHE PEAK UNIT 1**
 - **BARRIERS WITH LIMITED UPGRADES**
 - **TEXAS UTILITIES ASSESSING CABLE FUNCTIONALITY**
-

NUMARC TEST PROGRAM

- **PHASE 1 - SEPTEMBER/OCTOBER 1993**
 - VENDOR-DESIGNED UPGRADED THERMO-LAG FIRE BARRIERS
 - SIX FULL-SCALE FIRE ENDURANCE TESTS - ONE TEST DEFERRED
 - MOST TESTS DID NOT SATISFY ACCEPTANCE CRITERIA
 - THERMOCOUPLE PLACEMENT
 - PLANT-SPECIFIC APPLICABILITY OF RESULTS
 - **PHASE 2 - JANUARY 1994**
 - ELEVEN BASELINE AND UPGRADED FIRE BARRIER DESIGNS
 - **INDUSTRY TEST APPLICATION GUIDE**
 - **COMBUSTIBILITY METHODOLOGY SUBMITTED OCTOBER 1993**
-

THERMO-LAG ACTION PLAN COMPLETION SCHEDULE

- **COMPLETION SCHEDULE WILL BE IMPACTED BY:**
 - **NUMARC TEST PROGRAM SCHEDULE**
 - **TIME NEEDED FOR LICENSEES TO ASSESS TEST RESULTS FOR APPLICABILITY**
 - **TIME NEEDED FOR LICENSEES TO TEST OR ANALYZE UNIQUE CONFIGURATIONS**
 - **TIME NEEDED FOR LICENSEES TO EFFECT CORRECTIVE ACTIONS**
 - **TIME NEEDED FOR NRC TO INSPECT ALL PLANTS**

FIRE PROTECTION TASK ACTION PLAN

- **RECOMMENDATIONS FOR ACTION**
- **COMPLETED AND ONGOING ACTIONS**
- **REMAINING ISSUES**
- **SUMMARY STATUS**

RECOMMENDATIONS FOR ACTION

- **ASSESS RESOURCES NEEDED FOR ACTION PLAN REVIEWS**
 - **REASSESS THE FIRE-INDUCED VULNERABILITY EVALUATION METHODOLOGY**
 - **REVIEW FIRE BARRIERS OTHER THAN THERMO-LAG**
 - **REVISE NRC FIRE PROTECTION REGULATION (APPENDIX R)**
 - **DEVELOP INTEGRATED INFORMATION MANAGEMENT SYSTEM**
 - **EXPAND STUDY OF FIRE-RELATED ELECTRICAL LOAD MGT**
 - **DEVELOP TRAINING PROGRAM FOR NRC STAFF**
 - **COORDINATE FIRE PROTECTION AND SYSTEMS REVIEWS**
 - **REEVALUATE SCOPE OF FIRE PROTECTION INSPECTIONS**
-

COMPLETED AND ONGOING ACTIONS

- **ASSESSED ACTION PLAN RESOURCES**
- **CLARIFIED THE FIRE-INDUCED VULNERABILITY EVALUATION METHODOLOGY THROUGH NUMARC**
- **EVALUATING FIRE BARRIERS OTHER THAN THERMO-LAG**
 - **ISSUED TWO INFORMATION NOTICES**
 - **CONDUCTED SMALL-SCALE FIRE TESTS AT NIST**
- **DEVELOPING PERFORMANCE-BASED REGULATION CONSISTENT WITH COMMISSION REQUEST**

FIRE PROTECTION TASK ACTION PLAN SUMMARY STATUS

- **MAJOR RECOMMENDATIONS FOR ACTION**

SCHEDULED COMPLETION: FEBRUARY 1996

- **RECOMMENDATIONS FOR FURTHER STUDY**

SCHEDULED COMPLETION: NOVEMBER 1995

- **CONFIRMATION ISSUES**

SCHEDULED COMPLETION: MAY 1997

- **LESSONS LEARNED**

SCHEDULED COMPLETION: DECEMBER 1994







