

Enclosure 1

# THERMO-LAG ACTION PLAN

## SIXTH QUARTERLY UPDATE

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# THERMO-LAG ACTION PLAN

## SIXTH QUARTERLY UPDATE

### EXECUTIVE SUMMARY

The Thermo-Lag Action Plan addresses the technical and programmatic issues related to the use of Thermo-Lag fire barriers by nuclear reactor licensees to satisfy U.S. Nuclear Regulatory Commission (NRC) requirements. This is the sixth quarterly update of the Thermo-Lag Action Plan.

### RESOURCES AND SCHEDULES

The staff revised the action plan to add new tasks and to reflect resource and schedule changes. The staff has extended the estimated completion date for Part I from November 1994 to March 1995, to allow additional time for the Nuclear Energy Institute (NEI) to define and perform its ampacity derating test program. The staff has also reopened Part II to document completion of its full-scale fire endurance and ampacity derating test program and its plans to conduct flame spread tests. The new completion date for Part II is December 1994. Despite these changes, the overall action plan completion schedule and resource estimates have not changed.

On May 20, 1994, the staff briefed the Commission on the four options and the recommended course of action that it submitted in SECY-94-127. Several of the options have significant work scope and resource implications. If the Commission guidance changes the present course of action, or impacts schedules or resources, the staff will reflect those changes in the next quarterly status report.

### SIGNIFICANT NRC STAFF ACTIONS DURING THE PAST QUARTER

- Appraised the overall status and results of the staff and industry efforts to resolve the Thermo-Lag fire barrier issues (SECY-94-128 of May 12, 1994). (Action Plan Part I)
- Reevaluated the course of action and available options for resolving the issues. Proposed options, recommended a course of action, and requested Commission guidance (SECY-94-127 of May 12, 1994). (Part I)
- Issued Generic Letter 86-10, Supplement 1, "Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used to Separate Redundant Safe Shutdown Trains Within the Same Fire Area." (Part I)
- Witnessed the NEI Phase 2 fire endurance tests. (Part I)
- Reviewed NEI draft "Application Guide to Evaluate Existing Thermo-Lag Fire Barrier Systems." (Part I)
- Conducted two NRC/NEI senior management meetings. (Part I)
- Reviewed information submitted by licensees in response to the staff requests for additional information issued in accordance with 10 CFR 50.54(f). (Part I)

- Issued Information Notice (IN) 94-22, "Fire Endurance and Ampacity Derating Test Results for 3-hour Fire-rated Thermo-Lag 330-1 Fire Barriers." (Part II)
- Issued IN 94-34, "Thermo-Lag 330-60 Flexi-Blanket Ampacity Derating Concerns." (Part I)
- Reviewed plant-specific fire test program for LaSalle. (Part III)
- Met with Florida Power and Light to discuss proposed performance-based approach. (Part III)

PLANNED ACTIONS

- Continue the review of the NEI test program and implementation guidance. (Part I)
- Finalize the fire barrier inspection guidance and conduct fire barrier inspections. (Part III)

# THERMO-LAG ACTION PLAN

## SIXTH QUARTERLY UPDATE

### INTRODUCTION

The Thermo-Lag Action Plan addresses resolving the technical and programmatic issues relating to Thermo-Lag 330-1 fire barrier systems supplied to the nuclear industry by Thermal Science, Incorporated. Many of the issues related to these systems were documented in the "Final Report of the Special Review Team for the Review of Thermo-Lag Fire Barrier Performance," of February 11, 1992, and April 1992. In its report of April 1992, the special review team concluded that:

- (1) The fire-resistive ratings and the ampacity derating factors for the Thermo-Lag 330-1 fire barrier system are indeterminate.
- (2) Some licensees have not adequately reviewed and evaluated the fire endurance test results and the ampacity derating test results used as the licensing basis for their Thermo-Lag fire barriers to determine the validity of the tests and the applicability of the test results to their plant designs.
- (3) Some licensees have not adequately reviewed the Thermo-Lag fire barriers installed in their plants to ensure that they meet NRC requirements and guidance, such as that provided in Generic Letter 86-10, "Implementation of Fire Protection Requirements," April 24, 1986.
- (4) Some licensees used inadequate or incomplete installation procedures during the construction of their Thermo-Lag fire barriers.

In addition, the Office of Inspector General (OIG), in its Inspection Report entitled, "Adequacy of NRC Staff's Acceptance and Review of Thermo-Lag 330-1 Fire Barrier Material," of August 12, 1992, found that the NRC staff did not conduct an adequate review of fire endurance and ampacity derating information concerning the ability of Thermo-Lag fire barrier material. The staff incorporated in the Thermo-Lag Action Plan tasks to address the following matters raised by the Commission in a memorandum of August 17, 1992:

- (1) The initial review process did not identify problems with Thermo-Lag 330-1, and deficiencies in the staff's response to later indications of problems existed.
- (2) Problems identified with respect to the initial review and the lack of follow-up to later indications of problems may represent a systematic weakness with the staff's review and response programs.

- (3) Corrective actions may be necessary to rectify deficiencies identified with respect to the review and response processes.

The Thermo-Lag Action Plan is divided into the following five parts:

- Part I Review and evaluate technical issues with industry coordination (as appropriate) and evaluate industry actions to resolve the fire barrier issues. (WITS 9200188)
- Part II Sponsor small-scale fire tests to assess concerns with combustibility and fire performance. (WITS 9200189)
- Part III Prepare inspection guidance and conduct inspections to evaluate the adequacy of in-plant fire barrier configurations. Resolve plant-specific issues. (WITS 9200190)
- Part IV Assess the NRC programmatic review and inspection processes regarding various aspects of the NRC fire protection program. (WITS 9200191)
- Part V Oversee action plan implementation, prepare status reports, respond to 10 CFR 2.206 petitions, respond to Congressional requests, and brief management.

A personal computer-based project management program is used to track and manage the Thermo-Lag Action Plan. The program tracks task details, schedules, milestones, and completion dates. The attachment to this action plan is a Gantt chart that identifies each summary task with its schedule and status. The Thermo-Lag Action Plan is revised as needed to add tasks that arise during the review, and to account for changing resources, work assignments, and priorities. Completion of the Thermo-Lag Action Plan within the stated schedules is dependent on the pace of work, results, and the availability of resources.

A reassessment of the NRR reactor fire protection program was performed under Part IV of the Thermo-Lag Action Plan in response to the programmatic concerns raised during the initial review of Thermo-Lag fire barriers. The results of the reassessment were provided in the "Report on the Reassessment of the NRC Fire Protection Program" of February 27, 1993. This action completed Part IV of the action plan. The reassessment report contained a number of recommendations. Implementation of the recommendations is addressed in the Fire Protection Task Action Plan (FP-TAP) and the Equipment Qualification Task Action Plan (EQ-TAP).

#### PART I TECHNICAL ISSUES

Objective: To coordinate resolution of technical issues with the industry, to monitor and review industry actions, and to ensure that these actions adequately resolve the technical issues associated with the performance of Thermo-Lag fire barriers.

Scope: Resolve the technical issues identified by the special review team, by the OIG, and that arise during the course of the review. Coordinate with the Nuclear Management and Resources Council (NUMARC), now the Nuclear Energy Institute (NEI), and individual licensees to resolve issues and resolve fire testing methodology and acceptance criteria through meetings, reviewing submittals, and observing fire endurance and ampacity derating tests.

Issue Generic Letter 92-08, "Thermo-Lag 330-1 Fire Barriers."

Prepare a staff position on fire endurance test acceptance criteria. Issue the position with Supplement 1 to Generic Letter 86-10, "Implementation of Fire Protection Requirements."

Issue Bulletins, Information Notices, other generic communications, and plant-specific communications as appropriate.

Review licensee responses to the generic and plant-specific communications.

Staff effort: 4.0 staff years.

Completion date: March 1995 (WITS 9200188).

Status: Started. Completion date revised. Resources unchanged.

The Part I completion date of November 1994 has been changed to March 1995. The overall completion of Part I depends on the schedule of the ampacity derating test program planned by NEI. As of the date of this status report, NEI has not provided a schedule for this program. Assuming NEI provides an ampacity derating test plan by August 1994, ampacity derating tests could be completed by early 1995. The revised completion date should allow time for staff review of the test results.

The revised Part I completion date does not change the overall action plan completion schedule of December 1996. Note, however, that in view of the options currently under consideration for resolving the Thermo-Lag issues, discussed below, the overall completion schedule is uncertain. If Commission guidance results in a need to change the course of action, the staff will reflect the changes in the next update of the Thermo-Lag Action Plan.

During the past quarter, the staff appraised the overall status and results of staff and industry efforts to resolve the Thermo-Lag fire barrier issues and, on the basis of this appraisal, reevaluated the course of action, and identified

options for resolving the issues. The staff sent the Commission the detailed status of the staff and industry efforts in SECY-94-128 of May 12, 1994. The staff proposed options, recommended a course of action, and asked the Commission for guidance in SECY-94-127 of May 12, 1994. The staff briefed the Commission on the options and the recommended course of action on May 20, 1994.

The staff continued to monitor and review the NEI Thermo-Lag test program. The staff witnessed Phase 2 fire endurance tests and met with NEI representatives to discuss the results of Phase 2 tests. The staff and NEI also discussed the NEI "Industry Application Guide to Evaluate Existing Thermo-Lag Fire Barrier Systems" which provides guidance for using NEI test results. NRC and NEI met twice at the senior manager level.

In response to Commission concerns about the timeliness of the resolution of the Thermo-Lag issues, the staff sent a request for additional information (RAI) in accordance with 10 CFR 50.54(f) to the licensees that use Thermo-Lag fire barriers to meet NRC fire protection requirements and are awaiting the results of the NEI test program. The RAI, which was discussed in detail in SECY-93-362 of December 30, 1993, required information on the configurations and the amounts of Thermo-Lag installed in the plant, how the NEI test results will be applied, how configurations particular to the plant will be addressed, what alternatives are available for configurations that may not demonstrate satisfactory performance by test or cannot be upgraded, and plans and schedules for resolving the technical issues identified in Generic Letter (GL) 92-08. During the past quarter, the staff reviewed the licensee responses to the RAI. The staff provided the results of its preliminary review of the responses in SECY-94-128.

During the past quarter, the staff also issued GL 86-10, Supplement 1, "Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used to Separate Redundant Safe Shutdown Trains Within the Same fire Area," and Information Notice 94-34, "Thermo-Lag 330-60 Flexi-Blanket Ampacity Derating Concerns."

The staff is continuing the review of NEI industry guide entitled, "Thermo-Lag 330-1 Combustibility Evaluation Methodology Plant Screening Guide," of October 12, 1993, as revised December 27, 1993. NIST is providing technical assistance.

The previous action plan update of February 4, 1994, indicated that a supplement to Generic Letter (GL) 92-08 would be issued by November 1994. The need for a GL



supplement is, however, on hold pending identification of a final solution to the Thermo-Lag issues.

## PART II NRC TESTING

Objective: To determine the combustibility of and assess the fire endurance performance of Thermo-Lag 330-1 fire barrier materials.

Scope: Develop, conduct, and document the results of the NRC test program.

Staff effort: 0.8 staff year.

Completion date: December 1994.

Status: Reopened. (WITS 9200189 completed.)

The staff completed the small-scale Thermo-Lag fire test program at the National Institute of Standards and Technology (NIST). The results were published in Report of Test FR 3991, "Pilot-scale Fire Endurance Tests of Subliming Fire Barrier Panels," January 6, 1993. The staff also conducted combustibility tests of Thermo-Lag material at NIST and issued the results in Information Notice 92-82, "Results of Thermo-Lag 330-1 Combustibility Testing," December 15, 1992. These tests completed the scope of Part II of the action plan (WITS 9200189) as originally planned.

During this quarter, the staff reopened Part II of the Thermo-Lag Action Plan to document the status of its full-scale test program and planned flame spread tests.

As documented under Part I of the fifth quarterly update of the Thermo-Lag Action Plan, the staff completed full-scale fire endurance and ampacity derating tests of 3-hour fire-rated Thermo-Lag fire barriers at Underwriters Laboratories, Incorporated, during December 1993. On March 16, 1994, the staff issued Information Notice 94-22, "Fire Endurance and Ampacity Derating Test Results for 3-Hour Fire-Rated Thermo-Lag 330-1 Fire Barriers."

During the past quarter, the staff also decided to conduct flame spread tests of Thermo-Lag panels in accordance with American Society of Testing and Materials Standard E-84, "Surface Burning Characteristics of Building Materials." This test, which is specified in the Standard Review Plan, will provide additional information on the flammability and burning characteristics of Thermo-Lag. The staff is currently modifying its contract with NIST to add the tests. The new estimated completion date of December 1994 allows time to modify the contract, to conduct the tests, and



analyze the test results. Estimated staff resources to complete this new activity is about 120 staff hours.

### PART III INSPECTION PROGRAM AND PLANT SPECIFIC ISSUES

Objective: To inspect in-plant fire barriers for compliance with NRC fire protection requirements and guidance and to resolve the plant specific issues identified by the NRR special review team and by the staff during its ongoing review of Thermo-Lag fire barriers.

Scope: Develop and issue a temporary instruction (TI) for fire barrier inspections.

Conduct inspection workshops for the regions.

Conduct fire barrier inspections (NRC regions) and assist the regions (NRR), as necessary, in resolving issues found during the inspections.

Coordinate with the regions and track plant-specific issues identified in the special review team final report of February 11, 1992, and other sources.

Staff effort: 8 staff years<sup>1</sup> as follows:

0.3 staff years for NRR to develop the TI.

7.0 staff years for the regions to conduct and document the fire barrier inspections.

0.7 staff years for NRR to assist in resolving inspections findings.

Completion date: December 1996 (WITS 9200190).

Status: Started. Completion date and resources unchanged.

During the past quarter, the staff reviewed the plant-specific fire endurance test program proposed by Commonwealth Edison Company (CECo) for LaSalle Station, and met with Florida Power and Light (FPL) to discuss its proposed performance-based approach for resolving the Thermo-Lag issues at Turkey Point and St. Lucie facilities.

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<sup>1</sup> Plant-specific issues and tasks are identified in Part III of the Thermo-Lag Action Plan to facilitate overall task management. Staff resources (NRR and regional) expended on these issues and tasks are charged to plant-specific TAC Numbers and inspection report numbers, but are not included in the action plan resources.

The TI has been drafted. As part of its assessment of the Thermo-Lag Action Plan, the staff will conduct a series of inspections at a sampling of plants to assess licensee efforts to resolve the fire barrier issues. The results of these inspections will be used to determine whether or not each reactor unit should be inspected. This revised inspection approach could shorten the completion schedule without adversely impacting plant safety.

As discussed under Part I, the staff has proposed to the Commission several options for resolving the Thermo-Lag issues. The staff cannot finalize the TI until the possible resolutions are clearly defined.

#### PART IV ASSESSMENT OF NRC'S FIRE PROTECTION PROGRAM

Objective: To address the issues identified by the Commission and NRR during its review of the OIG report of August 12, 1992, and the programmatic issues identified in the Thermo-Lag Action Plan revision of July 1, 1992.

Staff effort: 0.5 staff year.

Status: Completed February 27, 1993, by report entitled "Reassessment of the NRC Fire Protection Program." Staff actions to assess and implement the report recommendation are documented in the FP-TAP.

#### PART V MANAGEMENT/OVERSIGHT

Objective: To keep NRC management informed of current issues, progress, and the status of resolving technical issues. To disseminate information to the industry and the public. To track, manage, and resolve miscellaneous tasks.

Scope: Track the resolution of tasks in the action plan, add new tasks as appropriate, and update status as necessary.

Update the Thermo-Lag Action Plan quarterly and provide to the Commission.

Respond to issues identified in 10 CFR 2.206 petitions and other correspondence from the public regarding Thermo-Lag fire barriers.

Prepare information and responses to Congress regarding Thermo-Lag and fire protection issues.

Prepare presentations and briefings as needed.

Staff effort: 4.5 staff years.

Completion date: December 1996.

Status: Started. Completion date and resources unchanged.

During the past quarter, the staff prepared briefings, made a presentation at the Regulatory Information Conference, responded to Freedom of Information Act requests, responded to letters from the public, and prepared the action plan update.

### STAFF RESOURCE ESTIMATES

The staff estimates that 17.8 staff years will be required to complete the Thermo-Lag Action Plan, which will consist of the following:

NRR Resources:	10.8 staff years
Part I	4.0 staff years
Part II	0.8 staff year
Part III	1.0 staff year
Part IV	0.5 staff year
Part V	4.5 staff years
Region Resources:	7.0 staff years
Region I	1.8 staff years
Region II	1.8 staff years
Region III	1.8 staff years
Region IV	1.6 staff years

Note: 0.2 staff year was transferred from Part II of this action plan to Part I of the FP-TAP for the review of fire barriers other than Thermo-Lag. The resource estimate for Region IV includes resources for the Walnut Creek Field Office.

### GANTT CHART

The attached Gantt chart shows the summary tasks identified for resolving the Thermo-Lag issues and their status (future, started, or done)<sup>2</sup>. The bars indicate the scheduled duration for completing the tasks.

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<sup>2</sup> Note that the Gantt chart included with previous versions of the Thermo-Lag Action Plan showed the detail tasks (the specific subtasks needed to complete each summary task). The total number of tasks has grown to almost 400. To keep this action plan status report to a manageable size and a reasonable level of detail, only the summary tasks are shown on the Gantt chart. The staff, however, continues to manage the action plan and the work at the detail task level.

# THERMO-LAG ACTION PLAN

Task Name	1992	1993	1994	1995	1996
<b>PART I - TECHNICAL ISSUES</b>	Started				
SPEC REV TEAM GENERIC ISSUES	Started				
NRR IDENTIFIED ISSUES	Started				
OIG IDENTIFIED ISSUES	Started				
PROCESS OF RESOLVING ISSUES	Started				
Bulletin 92-01	Done				
Bulletin 92-01, Supplement 1	Done				
Generic Letter 92-08	Done				
50.54(f) Letters	Done				
Assess/Revise Action Plan - 2	Started				
Generic Letter 92-08, Supp 1	Started				
Fire Test Accept Criteria	Done				
Ampacity Derating Issues	Started				
IN 92-82, Combustibility	Done				
<b>NEI PROGRAM</b>	Started				
Combustibility Issue	Started				
Phase 1 Fire Tests	Done				
Review Phase 1 Test Results	Started				
Phase 2 Fire Tests	Done				
Review Phase 2 Test Results	Started				
Ampacity Derating Tests	Future				
Industry Application Guide	Started				
Assess/Revise Action Plan - 3	Future				
<b>NEI MEETINGS</b>	Done				

