January 31, 1994

Dr. J. Ernest Wilkins, Jr., Chairman
Advisory Committee on Reactor Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Dr. Wilkins:

SUBJECT: THERMO-LAG FIRE BARRIERS

We have reviewed your letter of December 16, 1993, regarding the Nuclear Resources Management Council (NUMARC) Thermo-Lag fire barrier test program. We appreciate the Advisory Committee on Reactor Safeguards prompt review of the technical differences between the U.S. Nuclear Regulatory Commission (NRC) staff and NUMARC. I believe that ACRS played an important role in NUMARC's decision to install thermocouples in accordance with the NRC staff's recommendations.

In your letter, you addressed Thermo-Lag fire barriers and several other fire protection issues. Our initial thoughts on these issues are in the enclosure to this letter. The NRC staff is interested in meeting with the ACRS during March 1994 to fully discuss these and any other fire protection issues of interest to the ACRS.

Please have your staff contact Ms. Helen Pastis, the Office of Nuclear Reactor Regulation/ACRS Coordinator, to arrange a meeting schedule that is convenient with you.

Sincerely,
Original signed by
James M. Taylor

James M. Taylor
Executive Director
for Operations

Enclosure:
As stated

cc: The Chairman
Commissioner Rogers
SECY
Commissioner Remick
Commissioner de Planque
J.T. Larkins
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ENCLOSURE

PRELIMINARY RESPONSES TO FIVE POINTS RAISED IN
LETTER OF DECEMBER 16, 1993
FROM J.E. WILKINS, ACRS, TO THE CHAIRMAN

1. *Recommend that the Thermo-Lag cold side surface temperature be measured and that several identical Thermo-Lag configurations be tested with different cable loadings.*

The ACRS recommendations to measure the Thermo-Lag cold side surface temperature and that several identical Thermo-Lag fire barrier test specimens be tested without a cable load and with different cable loadings is a good approach towards testing raceway fire barrier systems. The staff agrees that this approach, if performed in a manner that would bound conduit and cable tray sizes, cable loadings and cable types, could produce the additional data needed to support engineering analyses and would be a better method to broaden the applicability of fire test results. However, the staff, in an effort to find a timely and cost effective solution to the Thermo-Lag fire barrier technical issues, has approached the problem by applying fire endurance testing acceptance criteria which are consistent with existing NRC fire protection regulatory guidance and guidance. The staff considers that its proposed position (Generic Letter 86-10, Supplement 1) on raceway fire barrier testing and the specified test specimen thermocouple placement will provide sufficient thermal data tc evaluate the adequacy of these test specimen to perform their fire resistive function under the specified fire test conditions.

Recently, the staff has issued 10 CFR 50.54(f) letters to those licensees which use Thermo-Lag fire barriers. In these letters, the staff requested additional information regarding Thermo-Lag fire barrier configurations and amounts; fire barrier construction techniques, cable fill and construction, and raceway bounding parameters; and ampacity derating. The staff considers that the thermal data as determined by fire tests preformed in a manner which is equivalent to its proposed position, the additional information from individual licensees, and the technical adequacy of the NUMARC application guide are key to a timely resolution of the current Thermo-Lag fire barrier technical issues.

2. *Recommend that at least one test be duplicated with in-service aged Thermo-Lag.*

During May 1992, the National Institute of Standards and Technology (NIST) conducted chemical analyses of six Thermo-Lag samples for the NRC staff. The samples consisted of old (1981), middle-aged (late 1980's), and new Thermo-Lag materials. NIST concluded: "Except for the water content of [the trowel-grade material], all six samples are similar in composition and behavior. Differences have been observed only in the minor components. All of the components detected, except 2-phenoxyethanol, are those found, or closely related to those found, in fire retardant materials, especially intumescent fire resistant paints." This information, coupled with the fact that the fire barriers are

subject to routine surveillance inspections which lead to repairs of degraded barriers, indicates to the staff that aging may not be a significant issue.

Finally, it may not be possible to remove intact sections of Thermo-Lag from existing in-plant barriers for full-scale testing. As a result of the plaster like texture of fully cured Thermo-Lag fire barrier materials, structural damage to an existing barrier system may result in disassembling one of these fire barrier systems. Even if a section of Thermo-Lag protected cable tray could be removed from a decommissioned plant the Thermo-Lag fire barrier assembly would have to be completely disassembled in order for it to be properly instrumented with thermocouples. This would require that the fire barrier test specimen be reconstructed with new materials (e.g., stainless steel banding, trowel grade Thermo-lag 330-1 fire barrier material). In addition, it should be recognized that the conservatism in fire resistive performance of these fire barrier systems as required by the current regulations should be sufficient, in most plant applications, to compensate for any aging and provide an adequate level of fire safety under actual plant fire conditions.

3. *Standards and practices based on fire protection standards developed for other industries should be specifically evaluated for use in nuclear power plant applications. The move toward risk-based regulation leads us to question present fire risk methodologies.*

The ACRS did not provide specific examples of industry standards and practices that should be evaluated for nuclear industry application. The staff will address any specific standard or practice of concern to the ACRS. However, it is the staff position that the consensus fire protection standards that are referenced in the Standard Review Plan (SRP), such as those issued by the National Fire Protection Association, when used in accordance with the SRP, are adequate to develop nuclear power plant fire protection programs. The staff considered the relevance of the referenced standards to nuclear power plant design, construction, operation, and maintenance when it prepared the SRP. The staff also reviews for endorsement fire protection standards that are not referenced in the SRP, as needed and appropriate.

The fire protection standards referenced in the SRP address distinct fire protection practices, features, and systems that are applicable to a variety of industries. For example, the NFPA standard for sprinkler systems is not industry specific, but covers essential elements of systems design, installation, and maintenance for any sprinkler installation. The SRP provides bases and staff guidance for determining where sprinklers should be installed to give adequate coverage. The standard is used after a decision has been made to install sprinkler protection to ensure that the system is properly designed, installed, and maintained.

Staff assessment of fire risk methodologies will be integral to its efforts to develop a risk-based fire protection regulation. The Office

of Nuclear Reactor Regulation (NRR) has a technical assistance contract with Brookhaven National Laboratories (BNL) and RES has a contract with BNL and the National Institute of Standards and Technology (NIST) to assist with this effort. The staff will meet with ACRS as appropriate during the rulemaking process and will address any specific concerns or comments.

4. *The move toward risk-based regulation leads us to question the adequacy of fire science talent within the agency.*

Regulation using fire risk methodologies and risk-based fire protection is an emerging concept. The development and application of risk-based methods will present considerable challenges to both the staff and industry. This effort cannot be successfully completed by fire protection engineers alone, but will require the coordinated and integrated efforts of fire protection engineers, systems engineers, and probabalistic risk assessment (PRA) specialists. NRR has recognized the importance of having fire protection engineers with significant experience with fire protection practices. In order to further enhance our capability NRR recently hired an additional senior fire protection engineer well versed in the state of art of fire protection engineering. NRR is also in contact with the international community to remain cognizant of relevant information. We also expect the PRA expertise of the NRR engineers will mature along with the risk methodologies. It is also expected that there will be mutually beneficial transfer of knowledge between the disciplines involved in the development and application of these methodologies. The staff will also use the technical assistance of contractors, as appropriate.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 31, 1994

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

CHAIRMAN

January 28, 1994

The Honorable John Dingell, Chairman
Subcommittee on Oversight and Investigations
Committee on Energy and Commerce
United States House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

During your Subcommittee's March [illegible], 1993 hearing on the use of Thermo-Lag fire barriers in nuclear power plants, the Commission testified on the status of NRC's efforts to resolve concerns about the barriers. Subsequently, members of the NRC staff have discussed these continuing efforts with your staff on several occasions, most recently on November 30, 1993. I am writing at this time to inform you of recent developments affecting resolution of the remaining issues.

In briefings on Thermo-Lag issues by the NRC staff on October 29, 1993, and by NUMARC on November 24, 1993, the Commission expressed concern that the NUMARC test program alone may not facilitate resolution of the issues. The Commission asked the NRC staff to consider alternatives to the NRC's action plan in the event the test program should prove not to be sufficient to reach an acceptable solution. In response to this request, the staff reconsidered the safety significance of the issues and assessed several alternatives to the current action plan. The staff concluded that continued use of compensatory measures, such as fire watches, will ensure adequate fire safety until resolution is achieved. The staff also concluded that the action plan, with some adjustments, will help ensure expeditious resolution of the remaining issues.

NRC's original action plan was based on industry completing the NUMARC test program, applying the test results to existing in-plant fire barriers, and implementing plant-specific resolution plans for unique fire barrier configurations. This plan assumed that generic Thermo-Lag upgrades could be promptly developed for existing in-plant barriers. However, based on the results of preliminary tests and the scope of the NUMARC test program, it now appears that developing generic upgrades for all barrier configurations may not be possible. Therefore, some licensees relying on NUMARC's program may need to take actions above and beyond the NUMARC program to address concerns about their barriers. This has complicated the resolution and has extended the completion schedule originally targeted by the NRC staff. It also appears that some licensees may not have evaluated the applicability of the NUMARC program to their plant designs. Failure to do so now could further delay completion of the action plan.

To help ensure that an acceptable solution is clearly defined in a reasonable amount of time, the staff in December 1993 sent a letter to each licensee relying on the NUMARC test program to request information as a followup to the licensee's original response to Generic Letter (GL) 92-08, "Thermo-Lag 330-1 Fire Barriers." The letter requests information on the configurations of

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Thermo-Lag fire barriers and amount of Thermo-Lag materials installed in the plant, how the NUMARC 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 issues identified in GL 92-08. The NRC staff will use this information to review the proposed NUMARC guidance for evaluating and upgrading Thermo-Lag fire barriers and to assess the plant-specific plans for resolving the issues. To further improve the timeliness of Thermo-Lag issue resolution, the NRC staff has increased senior management involvement in resolving the remaining issues with NUMARC.

The NRC staff and industry continue to devote significant resources and attention to the resolution of the Thermo-Lag issues. The Commission continues to place high priority on the accurate and timely resolution of the issues associated with the Thermo-Lag fire barrier system and will continue to take all actions necessary to ensure that the public health and safety are protected.

We will continue to keep you informed of our progress in resolving issues related to the use of Thermo-Lag in nuclear power plants.

Sincerely,

Ivan Selin

cc: Rep. Dan Schaefer