UNITED STATES NUCLEAR REGULATORY COMMISSION OFFICE OF NUCLEAR REACTOR REGULATION WASHINGTON, D.C. 20555-0001

May 31, 1995

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NRC INFORMATION NOTICE 95-27: NRC REVIEW OF NUCLEAR ENERGY INSTITUTE, "THERMO-LAG 330-1 COMBUSTIBILITY EVALUATION METHODOLOGY PLANT SCREENING GUIDE"

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<u>Addressees</u>

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All holders of operating licenses or construction permits for nuclear power plants.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to inform addressees of the results of NRC staff review of the Nuclear Energy Institute (NEI) "Thermo-Lag 330-1 Combustibility Evaluation Methodology Plant Screening Guide." It is expected that recipients will review the information for applicability to their facilities and consider actions as appropriate. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Background

On December 15, 1992, NRC issued IN 92-82, "Results of Thermo-Lag 330-1 Combustibility Testing." On the basis of its review of Thermo-Lag combustibility tests conducted by the National Institute of Standards and Technology (NIST), the NRC staff concluded that Thermo-Lag 330-1 is a combustible material. NRC fire protection requirements (Section III.G, Appendix R to 10 CFR 50) preclude the use of combustible materials to (1) enclose other combustibles, such as cables, between redundant safe shutdown trains to eliminate the combustibles as a fire hazard or (2) provide radiant energy heat shield protection for shutdown components inside containments. These types of applications are the principal NRC staff concerns with respect to the combustibility of Thermo-Lag 330-1.

Discussion

On October 12, 1993, the Nuclear Management and Resources Council (NUMARC), now NEI, submitted for information to the NRC its "Thermo-Lag 330-1 Combustibility Evaluation Methodology Plant Screening Guide" (Accession No. 9310210224). In that report, NEI stated that Thermo-Lag 330-1 may not necessarily be considered a combustible material from a generic standpoint and recommended a performance-based approach, using fire modeling techniques, to evaluate the combustibility hazards presented by Thermo-Lag 330-1 PDR I+E Notice 95-027- 950531 installations. 9505240424 pdated \$15/95

The NRC staff, with technical assistance from NIST, reviewed the Thermo-Lag combustibility evaluation methodology prepared by NEI. The results of the staff review, which was based on existing NRC requirements and guidance, are detailed in the attached letter of March 13, 1995, to NEI (Accession No. 9503200111). In summary, the staff informed NEI that it will not accept the use of the NEI methodology to justify the use of Thermo-Lag materials, or other materials such as fire retardant plywood or cable jackets, as noncombustible where noncombustible materials are specified by NRC fire protection requirements. Alternatives to the NEI guide are discussed in the March 13, 1995, letter. The Commission approved the letter to NEI in a staff requirements memorandum of March 8, 1995 (Accession No. 9505090025).

Related Generic Communications

- Generic Letter (GL) 83-33, "NRC Positions on Certain Requirements of • Appendix R, * October 19, 1983.
- GL 86-10, "Implementation of Fire Protection Requirements," April 24, 1986.
- GL 86-10, Supplement 1, "Fire Endurance Test Acceptance Criteria for • Fire Barriers Systems Used to Separate Redundant Safe Shutdown Trains Within the Same Fire Area," March 25, 1994.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact the technical contact listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

Brian K. Grimes, Director

Division of Project Support Office of Nuclear Reactor Regulation

Technical contact: Pat Madden, NRR (301) 415-2854

Attachments:

- 1. Letter of March 13, 1995, from C. McCracken, NRC, to A. Marion, NEI, and its enclosures
- 2. List of Recently Issued NRC Information Notices



UNITED STATES UNITED STATES IN 9 NUCLEAR REGULATORY COMMISSION May 2 WASHINGTON, D.C. 2055-0001

ATTACHMENT 1 IN 95-27 May 31, 1995

March 15, 1995

Mr. Alex Marion, Manager Technical Division Nuclear Energy Institute 1776 "I" Street, N.W., Suite 300 Washington, DC 20006-3706

SUBJECT: THERMO-LAG 330-1 COMBUSTIBILITY EVALUATION METHODOLOGY PLANT SCREENING GUIDE

Dear Mr. Marion:

The Nuclear Regulatory Commission (NRC) staff has reviewed the "Thermo-Lag 330-1 Combustibility Evaluation Methodology Plant Screening Guide" that the Nuclear "anagement Resources Council, now the Nuclear Energy Instituce (NEI), submitted to the NRC by letter dated October 12, 1993. The NEI guide provides a performance-based approach, using fire modeling techniques, for evaluating the combustibility hazards presented by Thermo-Lag 330-1 installations.

In a Staff Requirements Memorandum (SRM) of June 27, 1994, "Options for Resolving the Thermo-Lag Fire Barrier Issue," the Commission approved the NRC staff recommendation to return plants to compliance with existing NRC requirements and explained its position with respect to the use of performance-based approaches to resolve Thermo-Lag issues (see enclosed SRM). The staff found that the NEI guide contains bases (interpretations) regarding material combustibility and the use of combustible materials in nuclear power plants that are not consistent with established staff positions. The NRC staff responses to the NEI bases are provided in Enclosure 2.

On the basis of its combustibility tests and review, the staff concluded that Thermo-Lag 330-1 fire barrier material has combustible characteristics similar to those of other nuclear power plant combustible materials, such as fire-retardant plywood and cable jackets. The staff also concluded that the NEI method does not provide a level of fire safety equivalent to that specified by existing NRC fire protection regulations and guidelines. Therefore, the staff will not accept the use of the NEI guide to justify the use of Thermo-Lag materials where noncombustible materials are specified by NRC fire protection requirements or to assess the combustibility hazards presented by Thermo-Lag materials.

As an alternative to the NEI guide, the staff recommends that licensees reevaluate their use of Thermo-Lag as radiant energy heat shields inside the containment or as an enclosure to create a 20-foot combustible-free zone between redundant trains and seek other solutions. Examples of possible solutions include the following: (1) reanalyze post-fire safe shutdown circuits inside containment and their separation to determine if the

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A. Marion

Thermo-Lag radiant energy shields are needed, (2) replace Thermo-Lag barriers installed inside the containment with noncombustible barrier materials, (3) replace Thermo-Lag barriers used to :reate combustible-free zones with noncombustible barrier materials, (4) reroute cables or relocate other protected components, or (5) request plant-specific exemptions where technically justified. For other Thermo-Lag applications, licensees, if they have not already done so, should address the presence of the combustible fhermo-Lag materials in the fire hazards analyses in accordance with existing NRC fire protection guidance.

The NRC staff will inform the licensees of the results of its review of the NEI methodology. If you have any questions, please contact Mr. Steven West at 301-415-1220.

Sincerely,

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Conrad E. McCracken, Chief Plant Systems Branch Division of Systems Safety and Analysis Office of Nuclear Reactor Regulation

Enclosures: As stated



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

June 27, 1994

OFFICE OF THE SECRETARY

MEMORANDUM TO:

James M. Taylor Executive Director for Operations John C. Hoyle, Acting Secretary

FROM:

SUBJECT:

SECY-94-127 - OPTIONS FOR RESOLVING THE THERMO-LAG FIRE BARRIER ISSUES

The Commission (with all Commissioners agreeing) has approved the continued use of Option 1, which requires compliance with existing NRC requirements and permits plant-specific exemptions where justified. The Commission does not intend to limit the staff's consideration of requests for exemptions currently permitted by regulations.

The Commission (with the Chairman and Commissioners Remick and de Planque agreeing) requests that the staff, in consultation with industry, consider possible new exemptions to Appendix R based on state-of-the-art fire protection methodology and technology and proceed to evaluate the feasibility of developing new guidance for rating fire barriers on the basis of representative plant fire hazards as described in Option 2. The responsibility for developing the technical basis for any new exemptions should rest with the licensees.

Commissioner Rogers disapproved proceeding with Option 2. In particular, he felt the staff should not proceed with the development of a Regulatory Guide in support of this option. However, he did not object to the staff's initiating a research project to investigate the feasibility of either developing standard fire curves or using realistic fire loads. This information would be applicable to a performance-based approach to a fire protection rule.

The Chairman and Commissioner Rogers approved the staff recommendation not to proceed with the development of a performance-based approach to resolve the Thermo-Lag issue as

SECY NOTE: SECY-94-127 WAS RELEASED TO THE PUBLIC ON MAY 20, 1994. THIS SRM AND THE VOTE SHEETS OF ALL COMMISSIONERS WILL BE MADE PUBLICLY AVAILABLE 10 WORKING DAYS FROM THE DATE OF THIS SRM.

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Enclosure 1

described in Option 3. They believe that the performance based approach should be applied to support development of the fire protection rule. Commissioner Remick and Commissioner de Planque had no objection to pursuing Option 3 if the responsibility and initiative came from industry.

The Commission (with all Commissioners agreeing) has approved the staff recommendation to proceed as planned with the development of a performance-based fire protection rule. This should be pursued by the staff as part of its continuing program for regulatory improvement and/or once a request for rulemaking is received. The Commission felt that the new rule should not be considered a means to resolve the Thermo-Lag issues.

cc: The Chairman Commissioner Rogers Commissioner Remick Commissioner de Planque OGC OCA OIG Office Directors, Regions, ACRS, ACNW, ASLBP (via E-Mail)

Response by the Office of Nuclear Reactor Regulation Flant Systems Branch To Nuclear Energy Institute Interpretations of Material Combustibility

Section 3.2, "Licensing Bases," of the "Thermo-Lag 330-1 Combustibility Evaluation Methodology Plant Screening Guide" that Nuclear Energy Institute (NEI) submitted to the NRC by letter dated October 12, 1993, provides NEI's bases for assessing material combustibility. The following are the NRC staff responses to the NEI bases.

1.0 Appendix R

1.1 NEI Basis

Appendix R does not provide a definition for combustibility. In [Information Notice] 92-82, the NRC uses ASTM E136 as a test of combustibility but there is no regulatory basis for the use of this standard's criteria.

1.2 NRC Response

Appendix R does not address all aspects of nuclear power plant fire protection programs. As stated in 10 CFR 50.48, each operating nuclear power plant must have a fire protection plan that satisfies GDC 3. Basic fire protection guidance is provided in a number of NRC documents. Branch Technical Position (BTP) APCSB 9.5-1 and its Appendix A was the basic fire protection guidance used by the NRC staff to review the fire protection programs of operating reactors at the time Appendix R was promulgated. BTP APCSB 9.5-1 defined noncombustible materials as "materials, no part of which will ignite and burn when subjected to fire." This definition was also used in Regulatory Guide 1.120. For plants licensed after January 1, 1979, the staff used Standard Review Plan (SRP) 9.5.1 to review nuclear power plant fire protection programs. This guidance defined noncombustible material as "[a] material which in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat." The SRP definition was derived from National Fire Protection Association (NFPA) Standard 220, "Standard on Types of Building Construction." NFPA 220, which is referenced in the SRP, defines noncombustible material as "[a] material which in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat. Materials which are reported as passing ASTM E136 ... shall be considered noncombustible materials." On this basis, the NRC staff used the test methods specified in ASTM E136, an industry consensus test standard, to assess Thermo-Lag combustibility. As reported in Information Notice 92-82, the NRC staff concluded that Thermo-lag 330-1 is combustible as defined in the aforementioned NRC fire protection guidelines.

Enclosure 2

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2.0 Thermo-Lag Combustibility

2.1 NEI Basis

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With respect to the noncombustible radiant energy shield, BTP CMEB 9.5-1 and BTP APCSB 9.5-1 essentially have the same definition of combustible:

Combustible Material - material that does not meet the definition of noncombustible.

Noncombustible Material - A material which in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat.

The important part of [the SRP] definition is "in the form in which it is used and under the conditions anticipated." If the physical geometry of the room (area) and the combustible loading (including combustible material geometry) is such that Thermo-Lag will not be ignited under the conditions anticipated then <u>Thermo-Lag can be considered non-combustible</u>.

2.2 NRC Response

The intent of the SRP definition is to focus material combustibility evaluations on the form in which the material is used and the conditions anticipated. For example, steel plate, when subjected to ASTM E136 test, would not ignite, burn, support combustion, or release flammable vapors. However, steel wool would ignite and burn.

The results of the NEI tests, ASTM E1321, "Lateral Ignition and Flame Travel Test," and ASTM E1354, "Cone Calorimeter Test" are used to determine specific combustion characteristics of a material. The NEI tests determined the ignition temperature and the heat release rates of Thermo-Lag 330-1. These combustible characteristics are similar to those of other nuclear power plant combustible materials, such as fire-retardant plywood and cable jackets. Therefore, the staff expects that when exposed to a postulated fire using the fire loadings, potential heat release rates of the known combustibles, and predicted fire severities of representative nuclear power plant areas, Thermo-Lag 330-1 material would release flammable vapors, ignite, and burn. In fact, it is by burning that Thermo-Lag provides its fire resistive capabilities.

3.0 Generic Letter 86-10

3.1 NEI Bases

With respect to intervening combustibles, Generic Letter (GL) 86-10 provides the following guidance:

For fire protection, "no intervening combustible" means that there is no significant quantity of in-situ materials which will ignite and burn located between redundant shutdown system. The amount of such combustibles that has significance is a judgmental decision.

Generic Letter 86-10 provides further guidance when discussing factors to consider when dealing with negligible combustibles. In Section 3.6.1 of GL 86-10 the NRC provides the following response as an allowable justification:

"The likely fire propagation direction of burning intervening combustibles in relation to the location of the vulnerable shutdown division should be considered."

Therefore, if a material such as Thermo-Lag will neither ignite nor propagate a fire (self extinguishes) between the two paths of safe shutdown equipment separated by the "20-ft separation" then the material can be considered a negligible quantity of intervening combustible and the requirements of Appendix "R" or a plant's specific license are satisfied.

3.2 NAC Response

In GL 86-10, the NRC staff also stated that if more than a negligible quantity of combustible materials (such as isolated cable runs) exists between redundant shutdown divisions, an exemption request should be filed. Moreover, the NRC stated that the regulation is focused on the absence of in-situ exposed combustibles and that there is no specific definition of no intervening combustible. In GL 86-10, the NRC staff identified cables in cable trays which are either open or fully enclosed and cables coated with a fire retardant material as intervening combustibles. On these bases, the staff concluded that Thermo-Lag 330-1 material located between redundant safe shutdown divisions should be considered an intervening combustible material. Whether or not the amount of Thermo-Lag has significance, could be determined by a licensee using the guidance of GL 86-10 (and cited in the NEI guide). If the licensee determines that the amount of Thermo-Lag has significance, it could use guidance of GL 86-10 (and cited in the NEI guide) to evaluate the technical merits of an exemption request. Attachment 2 IN 95-27 May 31, 1995 Page 1 of 1

LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
95-26	Defect in Safety- Related Pump Parts due to Inadequate Heat Treatment	05/31/95	All holders of OLs or CPs for nuclear power reactors.
94-61, Supp. 1	Corrosion of William Power Gate Valve Disc Holders	05/25/95	All holders of OLs or CPs for nuclear power reactors.
95–25	Valve Failure during Patient Treatment with Gamma Stereotactic Radiosurgery Unit	05/11/95	All U.S. Nuclear Regulatory Commission Medical Licensees.
95-24	Summary of Licensed Operator Requalification Inspection Program Findings	04/25/95	All holders of OLs or CPs for nuclear power reactors.
95-23	Control Room Staffing Below Minimum Regulatory Requirements	04/24/95	All holders of OLs or CPs for nuclear power reactors and all licensed operators and senior operators at those reactors.
95-22	Hardened or Contaminated Lubricants Cause Metal Clad Circuit Breaker Failures	04/21/95	All holders of OLs or CPs for nuclear power reactors.
95-21	Unexpected Degradation of Lead Storage Batteries	04/20/95	All holders of OLs or CPs for nuclear power reactors.
94-64, Supp. 1	Reactivity Insertion Transient and Accident Limits for High Burnup Fuel	04/06/95	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License CP = Construction Permit

The NRC staff, with technical assistance from NIST, reviewed the Thermo-Lag combustibility evaluation methodology prepared by NEI. The results of the staff review, which was based on existing NRC requirements and guidance, are detailed in the attached letter of March 13, 1995, to NEI (Accession No. 9503200111). In summary, the staff informed NEI that it will not accept the use of the NEI methodology to justify the use of Thermo-Lag materials, or other materials such as fire retardant plywood or cable jackets, as noncombustible where noncombustible materials are specified by NRC fire protection requirements. Alternatives to the NEI guide are discussed in the March 13, 1995, letter. The Commission approved the letter to NEI in a staff requirements memorandum of March 8, 1995 (Accession No. 9505090025).

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This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact the technical contact listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

orig /s/'d by BKGrimes

Brian K. Grimes, Director Division of Project Support Office of Nuclear Reactor Regulation

Technical contact: Pat Madden, NRR (301) 415-2854

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IN 95-XX May xx, 1995 Page 2 of 2

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IN 92-82, Supp. 1 April xx, 1995 Page 2 of 2

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