UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D C 20555

February 21, 1992

OFFICE OF THE
INSPECTOR GENERAL

MEMORANDUM FOR: Frank J. Miraglia, Jr.
Deputy Director, Office of
Nuclear Reactor Regulation

FROM: Kent E. Walker, Chairman Harold Fossett, Jr.
TSI Task Force

SUBJECT: REFERRAL OF POTENTIAL HEALTH AND SAFETY ISSUE TO NRR

On February 12, 1992, OIG staff Harold Fossett and George Mulley met with Public Service Electric and Gas Company (PSE&G) officials at Salem Units 1 & 2 in Hancock's Bridge, New Jersey, to discuss their decision to use the 3M cable tray wrap material in the Salem plants. During the interview the PSE&G officials provided a copy of the 3M fire test report used to qualify the 3M FS-195 cable tray wrap material for use in the Salem Units as a 1-hour fire barrier. The report however, documents a test which appears to have failed. The NRC reviewed the 3M test report and in a March 18, 1981, letter concluded that FS-195 met the fire barrier requirements of Appendix R.

Based on this information, Fossett and Mulley contacted NRR staff Loren Plisco on February 14, 1992, concerning the 3M test report. On February 18, 1992, Plisco was provided a copy of the report and the potential shortcomings in the report were discussed.

If there are questions regarding this information please contact Harold (29026) or George (24473).

cc: L. Plisco, NRR
S. West, NRR
R. Architzel
E. Pawlik, OI
G. Mulley, OIG
H. Fossett, OIG

February 24, 1992

Mr. William Rasin
Vice President
Director, Technical Division
NUMARC
1776 I Street, N.W.
Suite 300
Washington, DC 20006

Dear Mr. Rasin:

Enclosed are the materials you requested during our February 12, 1992 meeting. These include:

- NRC's minutes of the February 12, 1992 meeting.
- List of fire endurance test reports involving Thermo-Lag 330-1 fire barrier systems known to the NRC.
- List of ampacity derating test reports involving Thermo-Lag 330-1 fire barrier systems known to the NRC.
- Mailgram from Rubin Feldman, Thermal Science, Inc., to James Taylor, U.S. Nuclear Regulatory Commission, October 2, 1986 and Mailgram from Rubin Feldman to Consumers Power Company, October 2, 1986.

If you have any questions, please contact either Ralph Architzel (301-504-2804) or Pat Madden (301-504-2854).

Sincerely,

/s/

Frank J. Miraglia, Deputy Director
Office of Nuclear Reactor Regulation

Enclosures:
As stated

DISTRIBUTION:
PDR
TSI File
CMcCracken
RArchitzel
PMadden
LPlisco
SWest
KWalker, OIG
EPawlik, RIII/OI
BHayes, OI

NRR	DD:NRR
SWest:jw	FMiraglia
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LIST OF FIRE ENDURANCE TEST REPORTS INVOLVING THERMO-LAG 330-1 FIRE BARRIER SYSTEMS KNOWN TO THE NRC

February 13, 1981	Fire Endurance Tests dated June 1981
April 27, 1981	TSI Technical Note 8275-1 dated June 1981
April 28, 1981	TSI Technical Note 8232-1 date June 1981
August 6, 1981	Engineering Report dated August 1981
September 1[illegible], 1981	Southwest Research Report No. 03-6491 dated October 27, 1981
March 1982	ITL Report No. 82-3-2
May 17-28, 1982	ITL Report No. 82-5-355A dated June 1982
June 18-25, 1982	ITL Report No. 82-5-355B dated July 1982
August 10, 1982	Southwest Research Report No. 01-7163
September 9-28, 1982	ITL Report No. 82-11-80 dated November 1982
September 10-Octo[illegible] 1982	ITL Report No. 82-11-81 dated November 1982
November 1982	ITL Report No. 82-11-240
October 22, 1982	ITL Report No. 82-11-241 dated November 1982

June 1, 1983	ITL Report No. 83-5-472A dated July 1983
June 7, 1983	ITL Report No. 83-5-472 dated September 1983 (Revision 1)
July 1984	ITL Report No. 84-6-109
December 13, 1984	ITL Report No. 84-12-181 dated June 1985 (Revision 2)
April 1985	ITL Report No. 85-4-235
June 18, 1985	SwRI Project 01-8305-040B (CTP 1092A)
June 1985	ITL Report No. 84-12-294
June 1985	ITL Report No. 85-2-382, Revision 1
June 1985	ITL Report No. 85-1-106, Revision 1
June 1985	ITL Report No. 85-2-382, Revision 1
June 1985	ITL Report No. 85-4-377, Revision 1
June 1985	ITL Report No. 85-3-314
June 1985	ITL Report No. 85-6-283
January 1986	ITL Report No. 86-1-143
March 10-17, 1986	3M Fire Test Report 86-42 and 86-43
June 13, 1986	3M Fire Test Report 86-73 (PJ-10)

August 19, 1986	3M Fire Test Report 86-92 (PJ-16) (Twin Cities Testing #414186-1119)
August 1986	ITL Report No. 86-8-207
September 17, 1986	3M Fire Test Report 86-102 (PJ-21)
October 21, 1986	3M Fire Test Report 86-112 (PJ-24)
November 21, 1986	Construction Technology Project No. CRE134/4324 dated January 1987
January 1987	ITL Report No. 86-11-155, Revision 1
February 1987	ITL Report No. 86-10-49, Revision 1
March 31, 1987	ITL Report No. 87-3-606 dated April 1987
April 1, 1987	ITL Report No. 87-4-3 dated April 1987
April 13, 1987	Warnock-Hersey International (WHI-495-PSV-0543)
May 7, 1987	ITL Report No. 87-5-76 dated June 1987
May 7, 1987	ITL Report No. 87-5-77 dated June 1987 (Revision I)
March 9, 1988	No Test Report
July 30, 1988	ITL Report No. 88-07-5982 dated September 29, 1988
April 14, 1989	Construction Technology Report dated October 1989 (Revision 1) (240056/824-63)

May 5, 1989	Construction Technology Report dated October 1989 (Revision 1) (240056-824/824-59)
May 5, 1989	Construction Technology Report dated November 1989 (240056-824/824-75)
May 5, 1989	Construction Technology Report dated November 1989 (240056-824/824-77)
October 26, 1989	SwRI Project No. 01-2702 dated May 1991 (Draft)
November 20 - December 17, 1990	Engineering Test Report dated January 1991 (Preliminary)

LIST OF AMPACITY DERATING TEST REPORTS INVOLVING THERMO-LAG 330-1 FIRE BARRIER SYSTEMS KNOWN TO THE NRC

Report Number	Date of Report	Description of Test	Derating Factor
TSI Technical Note 92981	9/81	14" steel cable tray 600 volt power cable 210' #00 AWG .562" D 2820' #10 AWG .215" D	7% 10%
TSI Technical Note 111781	2/85 (Rev 5) 11/81 (Orig)	1-hr 2" steel conduit 600 volt power cable 21' #00 AWG .562" D	7.47%
ITL 82-355-F1	1/85 (Rev 1) 7/82 (Orig)	1-hr solid bottom tray 600 volt power cable 210' #00 AWG 0.0562"D 2820' #10 AWG .215" D	12.48% 12.39%
ITL 82-5-355C	7/82	3-hr ladder back tray 1000 volt power cable 1485' #08 AWG 0.286"D 870' #04 AWG 0.377"D 300' #2/0 AWG 0.617"D	16.15% 16.86% 17.68%
ITL 82-5-355F	7/82	3-hr ladder back tray 1000 volt power cable 1485' #8 AWG .286" D 870' #4 AWG .377" D 300' #2/0 AWG .617" D	16.15% 16.86% 17.68%
ITL 84-3-275A	3/84	3-hr ladder back tray 1000 volt power cables 1485' #8 AWG .286" D 870' #4 AWG .377" D 300' #2/0 AWG .617" D	20.55% 19.24% 20.07%

Revised February 18, 1992

ITL 84-10-5	10/84	3-hr 2" steel conduit 600 volt power cable 21' #00 AWG .562 D	9.72%
SwRI Project 0 1 - 8 8 1 8 - 208/209a (3M PJ-19)	8/86	1-hr 24" steel ladder back tray #6 AWG 0.75" D	37.4%
SwRI Project 0 1 - 8 8 1 8 - 208/209c (3M PJ-19)	10/86	1-hr 4" steel conduit #6 AWG .75" D	1.27%
UL 86NK23826 File R6802 (South Texas)	1/87	1-hr 24" ladder back tray 3-hr 24" ladder back tray 2000 volt power cable 2980' #6 AWG 1" D	28.04% 31.15%
UL 86NK23826 File R6802 (South Texas)	1/87	1-hr 4" steel conduit 3-hr 4" steel conduit 2000 volt power cable 294' #6 AWG 1" D	0% 9.4%

Revised February 18, 1992

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

February 13, 1992

MEMORANDUM FOR: Thomas E. Murley, Director
Office of Nuclear Reactor Regulation

FROM: Frank J. Miraglia, Jr., Deputy Director
Office of Nuclear Reactor Regulation

SUBJECT: MINUTES - MEETING BETWEEN THE SPECIAL REVIEW TEAM FOR THE REVIEW OF THERMO-LAG FIRE BARRIER PERFORMANCE AND NUMARC

The Special Review Team for the review of Thermo-Lag fire barrier performance met with representatives of the Nuclear Utilities Management and Resources Council (NUMARC) on February 12, 1992, to discuss the results of our review and to obtain a commitment for a coordinated industry response to our concerns. Enclosure 1 is a list of attendees.

During the meeting, we gave the meeting attendees the proposed generic letter on Thermo-Lag fire barriers (Enclosure 2) and presented the information included in Enclosure 3.

NUMARC agreed to inform industry of our concerns regarding Thermo-Lag fire barriers. NUMARC also agreed to comment on the proposed generic letter and provide a preliminary schedule of actions to resolve the issues by February 28, 1992.

NUMARC requested a list of all of the test reports we identified during our review, a copy of TSI's October 2, 1986 Mailgram regarding ampacity derating, and a copy of the TSI vendor inspection report. We will provide the list of tests and the Mailgram to NUMARC with a copy of these meeting minutes. We will provide the inspection report when it is issued.

Frank J. Miraglia, Jr.

Frank J. Miraglia, Jr., Deputy Director
Office of Nuclear Reactor Regulation

Enclosures:
(3) as stated

cc w/enclosures:
J. Sniezek

Meeting Attendees

Name	Organization	Title
F. Miraglia	USNRC/NRR	Deputy Director, NRR
G. Holahan	USNRC/NRR	Deputy Director, DST
L. Plisco	USNRC/NRR	Section Chief, DLPQ
K. S. West	USNRC/NRR	Allegation Program Manager
P. Madden	USNRC/NRR	Sr. Fire Protection Engineer
C. McCracken	USNRC/NRR	Branch Chief, SPLB
R. Kiessel	USNRC/NRR	Staffer, OGCB
A. Thadani	USNRC/NRR	Director, DST
C. Berlinger	USNRC/NRR	Branch Chief, OGCB
R. Architzel	USNRC/NRR	Section Chief, SPLB
T. Bergman	USNRC/NRR	Project Manager, Comanche Peak
G. Mulley	USNRC/OIG	Sr. Special Agent
H. Fossett	USNRC/OIG	Inspector
R. Fields	USNRC/OIG	Special Agent
K. Walker	USNRC/OIG	Special Agent
S. Gagner	USNRC/OPA	Public Affairs Officer
B. Rasin	NUMARC	Vice President
A. Marion	NUMARC	Manager
G. Rombold	NUMARC	Sr. Project Manager
J. P. Sursock	EPRI	Program Manager
J. MacGregor	Winston & Strawn	Associate
M. Philips	Winston & Strawn	Attorney
J. Clarke	Energy Daily	Reporter
C. Beckett	TU Electric	Principal Engineer
D. Snell	TU Electric	EEI Fire Protection Committee
D. Woodlan	TU Electric	Docket Licensing Manager
E. Dorbeck	Consumers Power Co.	EEIFPC Secretary
R. Lohman	Thermal Science, Inc.	Manager, QA

Enclosure 1

DRAFT GENERIC LETTER
February 11, 1992

TO: ALL HOLDERS OF OPERATING LICENSES OR CONSTRUCTION PERMITS FOR NUCLEAR POWER REACTORS.

SUBJECT: THERMO-LAG FIRE BARRIERS (GENERIC LETTER 92-XX)

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this generic letter to require licensees to provide information to verify that Thermo-Lag 330-1 fire barrier systems manufactured by Thermal Science, Incorporated (TSI, the vendor), St. Louis, Missouri, comply with the NRC's requirements.

The NRC reviewed Thermo-Lag 330-1 fire barrier systems after receiving reports from Gulf States Utilities (GSU) that these systems had failed qualification fire tests and had installation problems. The NRC reviewed fire endurance and ampacity derating test reports, installation procedures, and as-built configurations and identified the following concerns regarding Thermo-Lag fire barriers: test results that are incomplete or indeterminate, installations that are not constructed in accordance with the vendor's installation procedures, incomplete installation procedures, and as-built fire barrier configurations that may not be qualified by a valid fire endurance test or justified by an engineering analysis. The NRC is concerned that licensees may not be meeting the requirements of Section 50.48, "Fire protection," and General Design Criterion (GDC) 17,

"Electric power systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," to Part 50 of Title 10 of the Code of Federal Regulations (10 CFR Part 50). The NRC is requiring information on compliance with 10 CFR 50.48, GDC 17, and associated license conditions under the provisions of 10 CFR 50.54(f).

Qualification Requirements for Fire Barriers

Section 50.48 requires that each operating nuclear power plant have a fire protection plan that satisfies GDC 3, "Fire protection." GDC 3 requires that structures, systems, and components important to safety be designed and located to minimize, in a manner consistent with other safety requirements, the probability and effects of fires and explosions. Systems associated with achieving and maintaining safe shutdown conditions are of major importance to safety because damage to these systems can lead to core damage.

Fire protection features required to satisfy GDC 3 include features to ensure that one train of those systems necessary to achieve and maintain hot shutdown conditions be maintained free of fire damage.[1] One means of complying with this requirement is to separate one safe shutdown train from its

[1]See Appendix R to 10 CFR Part 50, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979."

redundant train with fire-rated barriers. The level of fire resistance required of the barriers depends on the other fire protection features provided in the fire area.

The NRC provided guidance on acceptable methods of satisfying the regulatory requirements of GDC 3 in Branch Technical Position (BTP) Auxiliary and Power Conversion Systems Branch (APCSB) 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants;" Appendix A to BTP APCSB 9.5-1; BTP Chemical Engineering Branch (CMEB) 9.5-1, "Fire Protection For Nuclear Power Plants," July 1981; and Generic Letter (GL) 86-10, "Implementation of Fire Protection Requirements," April 24, 1986. In the BTPs and GL 86-10, the staff stated that the fire resistance ratings of fire barriers should be established in accordance with National Fire Protection Association (NFPA) Standard 251, "Standard Methods of Fire Tests of Building Construction and Materials," by subjecting a test specimen that represents the materials, workmanship, method of assembly, dimensions, and configuration for which a fire rating is desired to a "standard fire exposure" at a nationally recognized laboratory[2]. In GL 86-10, the staff also provided guidance on the acceptance criteria for fire tests and on evaluations of deviations from tested configurations.

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[2] American Society for Testing and Materials (ASTM) Standard E119 was adopted by the National Fire Protection Association (NFPA) as NFPA Standard 251.

GDC 17 requires that onsite electric power systems be provided to permit functioning of structures, systems and components important to safety. The onsite electrical power system is required to provide sufficient capacity and capability to ensure that vital functions are maintained. The Institute of Electrical and Electronics Engineers (IEEE) Standard 279, "Criteria for Protection Systems for Nuclear Power Generating Stations," provides guidance regarding acceptable methods of satisfying GDC 17. IEEE 279 states that the quality of the protection system components shall be achieved by specifying requirements, such as for the derating of components.

Areas of Concern

Fire Endurance Testing and Application of Test Results

Many fire endurance tests have been conducted on electrical raceways protected with Thermo-Lag 330-1 fire barrier systems. Although many of the test reports document results that meet the NRC's temperature acceptance criterion discussed in GL 86-10, some test assemblies have failed, such as the assembly tested in October 1989 at the Southwest Research Institute (SwRI) and discussed in NRC Information Notice (IN) 91-47, "Failure of Thermo-Lag Fire Barrier Material to Pass Fire Endurance Test."

The NRC has reviewed approximately 40 1-hour and 3-hour fire

endurance test reports involving Thermo-Lag 330-1 fire barrier systems and has found that the test assemblies met the NRC's temperature acceptance criteria when the test article protective envelope was constructed by TSI personnel using TSI's installation procedures. However, the NRC has found other Thermo-Lag 330-1 fire barrier test assemblies that failed to meet the NRC's temperature acceptance criterion. In most cases, the test assemblies that failed were either constructed by the licensee's or contractor's qualified installers, or did not follow TSI's installation procedures. In the fire endurance test conducted in October 1989 at SwRI, the test article that failed was constructed by TSI-certified licensee personnel using TSI's installation procedures.

The NRC reviewed fire test reports from various testing facilities and found that testing methods and procedures used during some of the qualification tests did not meet the NRC's guidance. NFPA 251 advises that the test conditions should be evaluated carefully because variations from the construction or conditions that are tested may substantially change the performance characteristics of the assembly. The test reports reviewed did not contain sufficient details of the construction methods used for the test article, did not contain details of the materials used, did not contain dimensioned drawings, and documented test configurations that were atypical of as-built configurations.

In GL 86-10, the NRC provided guidance on deviations from tested fire barrier configurations. While reviewing the Thermo-Lag fire barriers, the NRC staff found several instances in which licensees installed fire barrier configurations that may not have been qualified by fire endurance testing or justified by engineering analysis. For example, when the NRC conducted its review, some licensees could not justify their practice of extrapolating test results from small barrier enclosures to significantly larger enclosures, or installing barriers using procedures and materials that were different from those tested. The NRC visited site after issuing IN 91-47, and also found several licensees that had constructed fire walls, partitions, and vaults using Thermo-Lag as a component. These licensees could not provide qualification tests or engineering analyses of deviations from tested configurations to demonstrate the acceptability of these fire barriers.

Ampacity Derating Design Basis

Cables enclosed in electrical raceways protected with fire barrier materials are derated because of the insulating effect of the fire barrier material. Other factors that affect ampacity derating include cable fill, cable loading, cable type, raceway construction, and ambient temperature. The National Electrical Code, Insulated Cable Engineers Association publications, and other industry standards provide general ampacity derating

factors, but do not consider the effects of passive fire barrier systems. Although a national standard ampacity derating test method has not been established, ampacity derating factors for raceways enclosed with fire barrier material have been determined by testing.

TSI has documented a wide range of ampacity derating factors that were determined by testing. For example, TSI provided test reports to licensees that document ampacity derating factors for cable trays that range from 7 percent to 28 percent for 1-hour barriers and from 16 percent to 31 percent for 3-hour barriers. On October 2, 1986, TSI informed its customers by Mailgram that, while conducting tests in September 1986, at the Underwriter Laboratories (UL) facilities, TSI found that the ampacity derating factors for Thermo-Lag barriers were greater than previous tests indicated. However, the test procedure and test configuration differed from previous tests, and the results from the different tests may not be comparable to each other. The NRC is concerned that licensees may be using nonconservative ampacity derating factors since the tested configurations may not represent as-built configurations. The NRC learned during its review that testing conducted at SwRI found the ampacity derating as 37 percent for a 1-hour barrier.

Deficiencies in the Installation and Inspection Procedures

While conducting site visits after issuing IN 91-47, the NRC staff observed a number of installations that were not in accordance with TSI's installation procedures and some installations that did not appear to be qualified by fire endurance testing or an engineering analysis. In IN 91-79, "Deficiencies in the Procedures for Installing Thermo-Lag Fire Barrier Materials," the NRC staff discussed installation problems resulting from TSI's incomplete installation procedures, licensees' inadequate installation procedures, installer errors, incomplete or incorrect design documents, and inadequate quality control oversight. In IN 91-79, the staff listed the installation details in which it found differences.

Actions Covered by this Generic Letter

The NRC's regulations require that safe shutdown equipment be protected from fire. The NRC has found qualification test failures, test results that are indeterminate, installation problems, and differences between reported ampacity derating factors. Therefore, the licensees should confirm that Thermo-Lag 330-1 fire barrier systems have been qualified by representative fire endurance and ampacity derating testing and that these qualified barriers have been installed with appropriate quality controls to ensure that they comply with the NRC's requirements.

Reporting Requirements

All addressees are required, pursuant to Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR Section 50.54(f), to provide a written report within 120 days from the date of this generic letter. In this written report, the licensee shall:

(1) State that it has identified all fire barriers using TSI's Thermo-Lag 330-1 to meet 10 CFR 50.48 or that it does not use Thermo-Lag 330-1 at the facility to meet this requirement.

(2) State that it has qualified the Thermo-Lag 330-1 fire barriers by conducting a fire endurance test in accordance with NFPA 251 or in accordance with previous licensing commitments.

(3) State that it has constructed the as-built Thermo-Lag 330-1 fire barriers in accordance with the procedures used to assemble the qualification test article and that the as-built fire barrier configuration represents the materials, workmanship, method of assembly, dimensions, and configuration of the qualification test assembly configuration or that the licensee has analyzed the deviations from the tested configuration.

(4) State that the design basis for the ampacity derating

factors used for all raceways protected by Thermo-Lag 330-1 is consistent with the as-built configuration and that representative ampacity derating test results have been reviewed for applicability.

(5) List any necessary corrective actions and a schedule for any deficiencies identified while conducting the actions described above and describe any compensatory measures taken in accordance with technical specifications or administrative controls.

(6) List any Thermo-Lag 330-1 fire barriers that cannot be verified in accordance with reporting requirements (1) through (5), provide a justification for continued operation until such time as the identified barriers can be verified, and provide a schedule for completing the verifications.

The licensee should retain all documentation of any reviews performed to satisfy the reporting requirements for any future NRC audit.

If the addressee cannot provide the information required or meet the reporting deadlines, it shall include in the response a justification for alternative approaches and schedules. The NRC encourages licensees to work together to develop acceptable generic solutions to the problems addressed in this generic

letter.

The written reports required shall be addressed to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 under oath or affirmation. A copy of the report shall also be submitted to the appropriate regional administrator.

Backfit Discussion

The NRC is requiring information that will enable the NRC staff to determine if licensees are complying with 10 CFR Section 50.48. The staff is not establishing a new position regarding compliance in this generic letter. Accordingly, this generic letter does not constitute a backfit. Thus, 10 CFR 50.109 does not apply, and no backfit analysis need be prepared.

Request for Voluntary Submittal of Impact Data

This request is covered by Office of Management and Budget Clearance Number 3150-0011, which expires May 31, 1994. The estimated average number of burden hours is 200 person-hours for each addressee's response, including the time required to assess the requirements for information, search data sources, gather and analyze the data, and prepare the required letters. This estimated average number of burden hours pertains only to the

identified response-related matters and does not include the time to implement the actions required to comply with the applicable regulations, license conditions, or commitments. Comments on the accuracy of this estimate and suggestions to reduce the burden may be directed to Ronald Minsk, Office of Information and Regulatory Affairs (3150-0011), NEOB-3019, Office of Management and Budget, Washington, D.C. 20503, and to the U.S. Nuclear Regulatory Commission, Information and Records Management Branch, Division of Information Support Services, Office of Information and Resources Management, Washington, D.C. 20555.

Although not required, the following information would assist the NRC in evaluating the cost of complying with this generic letter:

(1) the licensee staff's time and costs to perform requested inspections, corrective actions, and associated testing

(2) the licensee staff's time and costs to prepare the required reports and documentation

(3) the additional short-term costs incurred as a result of the inspection findings such as the costs of the corrective actions or the costs of down time

(4) an estimate of the additional long-term costs that will be

incurred in the future to implement commitments such as the estimated costs of conducting future inspections or increased maintenance

If you have any questions about this matter, please contact one of the technical contacts or the lead project manager listed below.

Sincerely,

James G. Partlow
Associate Director for Projects
Office of Nuclear Reactor Regulation

Enclosure:
List of Recently Issued Generic Letters

Technical Contacts:
Pat Madden, NRR
301-504-2854

Ralph Architzel, NRR
301-504-2804

Lead Project Manager:

MEETING MINUTES

INTRODUCTION (Frank Miraglia)

- A special review team (F. Miraglia, L. Plisco, and S. West), which was established by Dr. Murley, has been reviewing concerns regarding Thermo-Lag fire barriers since July 1991. The purpose of the meeting is to advise industry, through NUMARC, of the results of the team's review.

- NRR plans to issue a generic letter that discusses the concerns. The letter will ask the licensees to provide information needed by the staff to verify licensee compliance with the NRC's fire protection requirements.

- NUMARC is requested to inform industry of the concerns and to coordinate an industry response to the concerns.

BACKGROUND (Frank Miraglia)

- As many as 50 stations use Thermo-Lag barriers to satisfy the NRC's requirements for protecting safe shutdown capability from fire (10 CFR 50.48 and Appendix R). The installation of Thermo-Lag on raceways also impacts ampacity derating (GDC 17).

- Gulf States Utilities reported fire barrier problems at River Bend Station:

  1987 - GSU started finding Thermo-Lag fire barrier installation problems at River Bend - removal of stress skin and ribs (LER 87-005).

  April 1989 - GSU reported additional fire barrier installation problems (LER 89-009).

  October 1989 - "as-designed" 3-hour Thermo-Lag fire barrier failed fire endurance test conducted at Southwest Research Institute (GSU "Informational reports," December 20, 1989 and January 9, 1990).

  March 1990 through May 1991 - GSU found additional installation problems at RBS (LER 90-003, Rev. 1, 2, and 3; and LER 91-008.

  February 1991 - the staff received allegations that raised questions as to the ability of Thermo-Lag to meet NRC requirements for fire barriers.

Enclosure 3

May 1991 - the staff visited RBS to review the circumstances surrounding the failed fire test and the installation discrepancies. The staff found that the results of the fire test raised questions regarding the ability of Thermo-Lag to provide a fire rated barrier.

- June 1991 - In response to the River Bend operating experience and the allegations, NRR established the special review team to review the safety significance and generic applicability of the technical issues regarding the use of Thermo-Lag.

SCOPE OF REVIEW - REVIEW ACTIVITIES (Loren Plisco)

- The review team's activities included:

  Reviewed docket information for River Bend, Comanche Peak, WNP2, Perry, Fermi, and Susquehanna.

  Reviewed information provided voluntarily by the licensees for Palo Verde, Callaway, and D.C. Cook.

  Reviewed vendor technical documentation, 40 fire endurance test reports, and 9 ampacity derating test reports.

  Visited River Bend, Comanche Peak, WNP2, Perry and Callaway to obtain information on the use of Thermo-Lag by the industry.

  Met with the vendor and conducted a vendor inspection at the vendor's site.

- During the course of its review, the review team:

  Issued IN 91-47, "Failure of Thermo-Lag Fire Barrier Material To Pass Fire Endurance Test," August 6, 1991. This IN informed the licensees of installation problems found by GSU at River Bend Station and of the results of a 3-hour fire endurance test of a 30-inch wide aluminum cable tray in October 1989 at the Southwest Research Institute (October 1989). In this test, the Thermo-Lag fire barrier failed resulting in high temperatures inside the cable tray envelope and loss of circuit integrity within about 60 minutes. Catastrophic failure and collapse of the tray occurred within 90 minutes.

Issued IN 91-79, "Deficiencies in the Procedures for Installing Thermo-Lag Fire Barrier Materials," December 6, 1991, which informed the licensees of installation problems that the team had found during visits to River Bend, Comanche Peak, WNP2, and Perry. Examples included: joint sealing, configuration and orientation of ribs, banding materials and methods, scoring and grooving of panels, and thickness acceptance criteria.

Prepared a proposed generic letter that presents its technical findings and concerns and requires the licensees to provide information needed by the staff to verify compliance with NRC requirements.

FINDINGS (Steve West - Walk through proposed Generic Letter and provide details.)

The special review team found:

- The NRC and the licensees have addressed similar concerns regarding fire barrier testing and installation in the past.

- The fire resistance ratings for the Thermo-Lag 330-1 fire barrier system are indeterminate.

  The review team reviewed about 40 fire endurance test reports and found that the validity of the tests and the acceptability of the test results as technical bases for establishing the fire resistance ratings of Thermo-Lag fire barriers are indeterminate. The problems identified by the review team included inadequate documentation of test procedures and results, incomplete or inadequate test procedures, unqualified test personnel, inadequate test equipment, questionable methods of assembly and quality assurance, and failure to meet NRC acceptance criteria. The team also found that the configurations of the test specimens for many of the previously performed tests are atypical of the field installations observed during the plant site visits.

- The ampacity derating factors for the Thermo-Lag 330-1 fire barrier system are indeterminate.

  The special review team also reviewed nine ampacity derating test reports and found conflicting test results. For example, the vendor has reported derating factors for cable

trays that range from 7 percent to 28 percent for 1-hour fire barriers and from 16 percent to 31 percent for 3-hour barriers. In addition, ampacity derating tests of Thermo-Lag materials conducted for 3M found the ampacity derating to be 37 percent for a 1-hour barrier. There are similar inconsistencies for conduit barriers.

- Some licensees have not adequately reviewed and evaluated fire endurance test results and ampacity derating test results to determine the validity of the tests and the applicability of the test results to their plant designs (reference Generic Letter 86-10).

- Some licensees have not adequately reviewed installed fire barrier configurations to ensure that they either replicate the tested configurations or provide an equivalent level of protection (reference Generic Letter 86-10).

- Some licensees used inadequate or incomplete installation procedures during the construction of their Thermo-Lag barriers (Information Notice 91-79).

PROPOSED ACTIONS (Frank Miraglia)

The issues potentially affect a large number of licensees. Therefore, the NRC recommends that NUMARC coordinate an industry response to the concerns.

NRC plans to work closely with the industry to achieve resolution of the identified concerns, and to be involved with any new qualification testing, if needed.

The special review team is being phased out and the remaining review and follow-up activities are being transferred to NRR's Division of Systems Technology (A. Thadani). The Plant Systems Branch will be the primary review branch (C. McCracken, R. Architzel, and P. Madden).

NUMARC RESPONSE

NUMARC agreed to inform industry of the concerns regarding Thermo-Lag fire barriers. NUMARC also agreed to comment on the proposed generic letter and provide a preliminary schedule of actions to resolve the issues by February 28, 1992.

NUMARC requested a list of all of the test reports identified by the review team, a copy of TSI's October 2, 1986 Mailgram regarding ampacity derating, and a copy of the TSI vendor inspection report. The list of tests and the Mailgram will be sent to NUMARC with a copy of these meeting minutes. The inspection report will be provided after it is issued.

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Western Union Mailgram

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01 ST LOUIS, MO. 2 OCT 1986

U S NUCLEAR REGULATORY COMMISSION
DIRECTOR/OFFICE OF INSPECTION/ENFORCEMENT
ATT MR JAMES TAYLOR, ESQ
WASHINGTON, DC 20555

RE: 1) ITL REPORT RU-3-2754 AMPACITY DERATING TEST FOR 1000 VOLT POWER CABLES INSTALLED IN A LADDER CABLE TRAY TEST ASSEMBLY PROTECTED WITH A 3 HR FIRE RATED DESIGN OF THE THERMO-LAG 330 FIRE BARRIER SYSTEM

2) ITL REPORT NO 82-355-F-1 AMPACITY TEST FOR 600 VOLT POWER CABLES IN AN OPEN TOP CABLE TRAY PROTECTED BY THE THERMO-LAG 330-1 SUBLIMING COATING ENVELOPE SYSTEM (1 HR FIRE RATED DESIGN)

ON SEPTEMBER 28TH AND 29TH, WE CONDUCTED CERTAIN 'PLANT SPECIFIC' AMPACITY TESTS AT UL. THE PROCEDURES AND TEST CONFIGURATION USED WERE CUSTOMER SUPPLIED AND VARIED FROM THOSE DELINEATED IN THE ABOVE REFERENCES.

THE PURPOSE OF THESE TESTS WERE TO MEASURE AMPACITY DERATING ON A 24"x4"x12 FT OPEN TOP LADDER BACK CABLE TRAY LOADED WITH 71 LENGTHS OF 1 INCH DIAMETER, 3 CONDUCTOR, 2000 VOLT, OKONITE POWER CABLES. IT WAS PLACED IN AN INSULATED PLYWOOD CHAMBER. THE AMBIENT TEMPERATURE CONTROL WAS PROVIDED BY AN ELECTRIC HEATER, CEILING PORTS, AND AN EXHAUST FAN, AS NEEDED. THE CONTROLLING AMBIENT TEMPERATURE OF 40C WAS MEASURED IN A HORIZONTAL PLANE 12 INCHES FROM THE ENCLOSED SIDES OF THE TRAY. THE CONTROLLING 'HOT SPOT' CONDUCTOR TEMPERATURE WAS NOMINAL 90C. THE FOLLOWING PRELIMINARY INFORMATION, SUBJECT TO VERIFICATION, REDUCTION, AND FORMAL REPORTING BY UL, IS AS FOLLOWS:

	BASE LINE	1 HR WRAP	3 HR WRAP
CONDUCT FLOW - AMPS	32.1	23.1	22.1
AVERAGE AMBIENT	40.1C	40.1C	40.1C
AVERAGE HOT SPOT	90.3C	90.2C	90.2C

AS SOON AS WE RECEIVE THE REPORTS FROM UL, WE WILL TRANSMIT COPIES TO YOU PROMPTLY.

TO THE BEST OF OUR KNOWLEDGE, AT THIS PARTICULAR TIME, THERE IS NO NATIONALLY RECOGNIZED ASTM TYPE TEST PROCEDURE AND UL DOES NOT HAVE A FORMAL TEST STANDARD BY WHICH TO TEST AND CLASSIFY THE 'AMPACITY' CHARACTERISTICS OF VARIOUS INSULATION MATERIALS.

THE PROCEDURES AND TEST CONFIGURATIONS USED AND REPORTED IN THE ABOVE REFERENCED REPORTS, WHILE HAVING SOME BASIC SIMILARITIES SUCH

AS THE MEASUREMENT OF THE 'HOT SPOT' CONDUCTOR TEMPERATURE, ALSO HAVE SUBSTANTIAL DIFFERENCES SUCH AS:

- REFERENCES 1 AND 2 EMPLOY A VERTICAL MODIFIED 'U' CONFIGURATION, WHILE THE 1 HR WRAP WAS TESTED ON A SOLID BOTTOM OPEN TOP CABLE TRAY.
  THE 3 HR WRAP WAS TESTED ON A LADDER BACK OPEN TOP CABLE TRAY.

- THE TEST ARTICLES EMPLOYED A MULTIPLICITY OF CABLE SIZES SUCH AS:

1 HR WRAP	3 HR WRAP
21 LINES OF NO. 00 AWG	99 LINES OF NO. 8 AWG
252 LINES OF NO. 10 AWG	58 LINES OF NO. 4 AWG
	20 LINES OF NO. 2/0 AWG

- THE CONTROLLING NOMINAL AMBIENT TEMPERATURE WAS TARGETED TO BE CIRCUMFERENTIALLY UNIFORM AROUND THE TEST ARTICLE AT A NOMINAL LEVEL OF 40C.

FOR EASE OF REFERENCE, SOME OF THE PERTINENT RESULTS FROM REFERENCES 1 AND 2 ARE SUMMARIZED AS FOLLOWS:

	CURRENT FLOW - AMPS				
	1 HR WRAP		3 HR WRAP		
	00 AWG	10 AWG	8 AWG	4 AWG	2/0 AWG
BASELINE	103.339	11.228	18.88	39.49	115.23
WRAP	90.437	9.836	15.00	31.89	92.10

WE ARE CAREFULLY ANALYZING THE RESULTS OF THE TEST SERIES CONDUCTED ON THE 28TH AND 29TH OF SEPTEMBER AT UL AND THOSE REFERENCED ABOVE. WE WILL INFORM YOU OF THE RESULTS OF THIS ANALYSIS AS SOON AS IT IS AVAILABLE.

THIS LETTER WAS ALSO SENT TO OUR CUSTOMERS AND ARCHITECTS AND ENGINEERS.

REGARDS,
RUBIN FELDMAN
(THERMAL SCIENCE, INC.
2200 CASSENS DRIVE
ST. LOUIS, MISSOURI 63026)

15110 EST

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CONSUMERS POWER CO.
ATTN MR ROBERT WESTERHOFF PURCHASING
P O BOX 486
SOUTH HAVEN, MI 49090

RE: 1) ITL REPORT 86-3-275A AMPACITY DERATING TEST FOR 1000 VOLT POWER CABLES INSTALLED IN A LADDER CABLE TRAY TEST ASSEMBLY PROTECTED WITH A 3 HR FIRE RATED DESIGN OF THE THERMO-LAG 330 FIRE BARRIER SYSTEM

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Western Union Mailgram

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THIS LETTER WAS ALSO SENT TO THE NUCLEAR REGULATORY COMMISSION.

REGARDS,
RUBIN FELDMAN
(THERMAL SCIENCE, INC.
2200 CASSENS DRIVE
ST. LOUIS, MISSOURI 63026)

16:41 EST

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Doc t No. 99901226

TSI

28 February 1992

RUBIN FELDMAN, P.E.
President

Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, Maryland 20852

Attention: Mr. Frank J. Miraglia
Deputy Director
Office of Nuclear Reactor Regulation

Reference: February 12, 1992 Meeting Between the Nuclear Regulatory Comission and the Nuclear Utility Management and Resources Council

Subject: Nuclear Regulatory Commission's Draft Generic Letter dated February 11, 1992 - Subject: THERMO-LAG Fire Barriers (Generic Letter 92-XX)

Dear Mr. Miraglia:

Thank you for affording our company the opportunity to attend the Nuclear Regulatory Commission (NRC)/Nuclear Utility Management and Resources Council (NUMARC) meeting of February 12, 1992. At this meeting, we received a copy of the above "Draft Generic Letter". The following are our comments.

Manufacturing Operations

As a starting point, we would like to emphasize that the role of Thermal Science, Inc. ("TSI") with the nuclear power industry is that of a building products supplier, providing a product with consistent qualities based on a rigidly maintained manufacturing process, supported by acceptable and rigorous insitu Quality Assurance and Quality Control programs. We believe that the results of the NRC's December 1991 audit of TSI's operations support the high level of quality control maintained throughout TSI's manufacturing processes.

Testing

We also recognize that the THERMO-LAG 330 Fire Barrier System Materials should also have a meaningful data base covering many properties. The fire resistive capabilities and thermodynamic response, such as ampacity reduction tests, comprise an important part of this data base.

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Telex: Domestic 44-2384 • Overseas 209901 • Telecopier (314) 349-1207

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The THERMO-LAG 330 Fire Barrier System has been extensively tested. The testing that was either sponsored by TSI or that TSI participated in, utilized procedures which were carefully prepared, defined and executed. Portions of the standards quoted by the NRC in its generic letter, to the extent such standards were applicable, were adhered to with considerable care. Quality control records were also maintained to provide the necessary details of testing as well as construction. In addition, until approximately 1986, the "generic" fire tests which constituted the written approval base of the American Nuclear Insurers, were also monitored and witnessed by ANI. The pertinent approvals are in written form.

These tests sponsored by TSI were all conducted in accordance with accepted industry standards. The NRC, in the draft generic letter, recognizes that specific procedures for fire resistance of cable trays, conduits, etc., as well as ampacity reduction of fire barrier enclosures, do not exist in the referenced published standards. Only selected portions are applicable. In the case of fire resistance testing, it is basically the ASTM E119 time/temperature curve, water hose stream impingement and general need for accurate reporting of materials used, dimensions, configurations for which the fire rating is sought and other related data. The American Nuclear Insurers in its Bulletin #5(79) and revisions thereto, provided its basic definition of circuit integrity and the minimum level of testing required for specific design approvals for insurance purposes only. Similarly, for ampacity derating testing, the industry provided specific procedures which were deemed to apply to the specific needs of the power transmission systems used.

Installation Procedures

TSI's installation procedures contained in Technical Note 20684, "THERMO-LAG 330 Fire Barrier System, Installation procedures Manual, Power Generating Plant Applications, Revision V, dated November 1985, were also carefully reviewed by the American Nuclear Insurers for conformance to as tested "designs" and approved in writing.

In addition, over a period of approximately ten years, and as a part of its licensing process, the NRC had access to and reviewed pertinent documentation on the THERMO-LAG 330 Fire Barrier System and found it to be acceptable.

Following TSI's review of the NRC's comments, we have enhanced the level of detail in TSI's Technical Note 20684, including additional schematics and descriptive matter. This revised manual should be published following the receipt of the written audit report from the NRC. We want to insure that any applicable comments detailed therein are incorporated into Revision VI of TSI's Technical Note 20684.

We also intend to offer an additional training program for installers. Installers with certificates of training dated before 1991 will be requested to obtain additional training and recertification. Notices to that effect will be issued shortly.

Additional Information

While TSI's position is that configurations constructed in accord with as tested details meet the necessary fire resistance prerequisites, we also recognize that some installed THERMO-LAG 330 Fire Barrier configurations may not have been tested. We intend to work with the industry to fill any testing voids. In order to perform this function with the proper diligence, we require clarification of several issues referred to in the above referenced proposed generic letter. These are:

(1) Failure of Qualification Tests: Other than the GSU tests conducted at Southwest Research Institute, we are not aware of any other qualification test failures. In one of the failed SWRI tests, the test article was incorrectly constructed, as outlined in our previous communications; in the other, the test article was void of the base layer of Stress Skin. Should results of any other failed tests be known to the NRC, we would appreciate you providing more details regarding these tests.

(2) Incomplete or Indeterminate Test Reports: We would appreciate the NRC identifying those reports, with specific reference as to what additional information is desired in the reports. That will help us in making sure that the testing laboratories are aware of this, and include that information in reports on future testing, to the extent it is appropriate.

Previous reports generally included a substantial amount of construction detail, such as size of components, specific thickness by location on the test article, support materials, cable size and type, thermocouple locations, etc., in the appendix section of the test reports. Has the NRC had the opportunity to examine this information in detail? If this information should be in the main body of the test report, we will so inform the respective test laboratories which we use in the future.

(3) Test Assemblies That Failed Fire Tests Which Were Built By Qualified "Non TSI Installers", Other Than The GSU Test Conducted At SWRI: We are not aware of any. Could the NRC provide TSI with a copy of all such reports involving THERMO-LAG, including the GSU fire test report.

(4) Ampacity Derating Testing: We concur with the NRC that the thickness of the fire barrier wrap and its thermal properties will determine the magnitude of the ampacity derating. This is in addition to other factors such as cable fill, loading and type, whether or not the cable tray is open or closed, and whether the enclosure is a conduit.

At this time, we believe that the industry has very conservative data for use in conjunction with THERMO-LAG 330 Fire Barrier System Materials as a basic input into its electrical integrity evaluations of fire protected systems. We base this on results presented in the Underwriters Laboratories Report Project No 86NK23826, File No. R6802, entitled: "Special Services Investigation Of Ampacity Deratings For Power Cables In Steel Conduits And In Open Ladder Cable Trays With Field-Applied Enclosures", dated January 21, 1987. In our opinion this test report represents a very conservative approach to testing in both methodology and test assembly construction.

Additionally, we have commissioned a consultant on the Staff of Washington University to perform an analysis on the effect of the THERMO-LAG 330-1 Subliming Material thickness on ampacity deratings of open top ladder back cable trays which are fully loaded with power cables of the type tested at the Underwriters Laboratories referenced above. Test results, coupled with the Quality Control measured THERMO-LAG 330-1 Subliming Material thicknesses used in the construction of the Underwriters Laboratories test assemblies, will be used. This is in addition to the 40°C ambient temperature and the 90°C hot spot temperature on the conductor. The results will be distributed as soon as they are available.

We have great concerns about the validity of the Southwest Research Institute (SWRI) one hour ampacity derating test referred to in the proposed NRC generic letter. The SWRI test resulted in a 37% derating, compared to the 28% reported by the Underwriters Laboratories in the above report, which was conducted after the SWRI test. The SWRI test was performed on a sample provided to SWRI by a competitor of TSI. To our knowledge the material tested was not established to be THERMO-LAG. We understand that it was void of Stress Skin. There were other major deficiencies including unreliable baseline testing and calibration of test equipment. The results of that test are highly suspect.

••

In conclusion, Thermal Science wishes to assure the NRC of its policy to provide the utmost cooperation with the Commission and the industry that it serves. TSI hopes that the Commission will provide TSI with the requested information as soon as possible.

Yours truly,

Rubin Feldman
President

RF/mgm

NUCLEAR MANAGEMENT AND RESOURCES COUNCIL

1776 Eye Street, N.W. • Suite 300 • Washington, DC 20006-2496
(202) 872-1280

March 3, 1992

Mr. Frank J. Miraglia, Jr.
Deputy Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

RE: Draft Generic Letter on Thermo-Lag Fire Barriers
Request for Comments

Dear Mr. Miraglia:

These comments are submitted on behalf of the nuclear industry, by the Nuclear Management and Resources Council, Inc. (NUMARC)[1] in response to your February 12, 1992, request for comments on the draft generic letter addressing Thermo-Lag fire barriers.

NUMARC supports the NRC's initiative to examine potential 10 CFR 50 Appendix R fire protection issues which may be related to the installation and/or testing of the Thermo-Lag fire barrier system. While NUMARC shares the NRC's view of the importance of proper installation and testing of fire barriers to ensure fire protection capabilities, we question the approach that the NRC is taking by issuing a generic letter that amounts to a complete reevaluation of fire barrier configuration. The issuance of a generic letter at this time appears to be premature because the full scope of the concerns are not yet well enough defined. The result is that licensees would be required to expend significant time and resources to develop the requested information which may or may not disposition the matter. A more appropriate approach would be to work closely with the industry to define the installations and configurations of concern and then to pursue a more focused evaluation of specific concerns.

Therefore, rather than issue a detailed generic letter at this time, we recommend that the NRC Staff, and NUMARC on behalf of the nuclear industry,

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[1] NUMARC is the organization of the nuclear power industry responsible for coordinating the combined efforts of all utilities licensed by the NRC to construct or operate nuclear power plants, and of other nuclear industry organizations, in all matters involving generic regulatory policy issues and on the regulatory aspects of generic operational and technical issues affecting the nuclear power industry. Every utility responsible for constructing or operating a commercial nuclear power plant in the United States is a member of NUMARC. In addition, NUMARC's members include major architect/engineering firms and all of the major nuclear steam supply system vendors.

continue their efforts to evaluate the questions outstanding and provide more focused guidance to licensees.

Despite our position on the issuance of this generic letter, NUMARC respectfully submits the enclosed comments on the draft generic letter. To this end, we have received input from EPRI, EEI and several utilities to provide as full a complement of comments as possible within the short time period given. The enclosed comments represent the review within a restricted time frame and were based on the best available information without the benefit of the actual test reports, inspection reports, or vendor inspection reports. Therefore, our comments should be considered in this light. NUMARC'S major comments are summarized as follows:

1. As noted above, the failure of the draft generic letter to identify specific concerns about the installation and testing of Thermo-Lag fire barriers makes it difficult for licensees to evaluate whether, and to what extent, any problem may exist at each plant. For example, the NRC should make available to NUMARC the test reports the agency reviewed and any other information regarding specific failures or test deficiencies.

2. Generic Letter 86-10 dated April 24, 1991, states that licensees must have a quality assurance program for fire protection systems, but that such systems are not "safety related" and therefore, are not within the scope of 10 CFR 50 Appendix B. In contrast to the NRC's position in Generic Letter 86-10, the draft generic letter refers to fire barrier systems that have been "qualified." The standards used in fire protection are not those related to environmental qualification contained in 10 CFR § 50.49, but rather those described in Generic Letter 86-10. We suggest that the word "qualified" be deleted.

3. The draft generic letter indicates that deviations between the as-installed configuration and the as-tested configuration be "justified by engineering analysis." This is a major addition to the current guidance specified in Generic Letter 86-10 which delineated five criteria in Enclosure 2 section 3.2.2 "Deviations from Tested Configuration." Because there is no regulatory requirement that these analyses be documented in detail for fire protection systems, the adoption of a new position by the NRC staff should be justified in accordance with NRC regulations.

4. The "Reporting Requirements" section of the draft generic letter requests that licensees provide information that we believe is premature pending further definition of installations of concern. NUMARC has provided a proposed revision to the Reporting Requirements (1) - (4).

   Although the reporting time and manhours required will vary substantially from plant to plant, the manhour estimate of

approximately 200 manhours is likely to be a significant underestimate for the vast majority of the affected plants, and the reporting time of 120 days is far too short a period for licensees to perform the requested evaluations. Such a limited time may unnecessarily impact already burdened utility resources and divert these resources away from significant activities. An improved understanding of staff concerns will allow utilities to reevaluate priorities and effectively allocate resources.

NUMARC will continue to coordinate the industry's efforts to address the NRC's concerns with respect to Thermo-Lag fire barriers. These activities will include the analysis of the data available and may result in the development of generic guidance to enable the industry to appropriately focus on this issue, and to provide a consistent approach to address staff concerns. In addition, we will continue to coordinate the industry's activities to provide constructive input on any additional regulatory actions under consideration.

We look forward to working with you and your staff to resolve the NRC's concerns and would be pleased to discuss this matter with you further. If you have any questions or desire additional information, please do not hesitate to contact me or George Rombold at NUMARC.

Sincerely,

Alex Marion

Alex Marion
Manager, Technical Division

AM/GBR/cma
Enclosure

Enclosure 1

Comments

PURPOSE (PAGE 1):

1. Paragraph 2:

   The Gulf States Utilities (GSU) licensee event reports referred to in the beginning of this paragraph focus on specific GSU installation and testing concerns. The as-installed configurations, associated "upgraded" configurations and related test reports are not generic in nature. Accordingly these reports should not be implied to the rest of the industry without details of the evaluations to substantiate such a position. While the GSU reports initiated the NRC investigations, this section should be revised to indicate that, in addition to the GSU licensee event reports, the basis for the generic letter is the review of the Thermo-Lag vendor and several utilities by the NRC special review team. We also recommend that the description of the GSU report include a statement to indicate that the results from the NRC review of the GSU reports was articulated in Information Notice 91-47. We believe the issuance of this information notice was an appropriate action to be taken by the NRC in response to plant specific experience.

2. Paragraph 2:

   Utilities have previously stated their compliance to the requirements of 10 CFR § 50.48 through Appendix R Fire Protection Programs. In addition, it is our understanding that each licensee program was reviewed by the NRC and a safety evaluation report (SER) documented the staff's acceptance of the program. We suggest that the purpose of the draft generic letter be stated as a request of information regarding the specific applications of Thermo-lag in light of the concerns resulting from the NRC special review team's review.

QUALIFICATION REQUIREMENTS FOR FIRE BARRIERS (PAGE 2):

1. Paragraph 2:

   The first sentence indicates that GDC-3 and 10 CFR § 50 Appendix R require that "one train of those systems . . . be maintained free from fire damage," and "safe shutdown equipment be protected from fire." However the language in 10 CFR § 50.48 (a) states that fire protection features must "limit fire damage to structures, systems, and components important to safety so that the capability to safely shut down the plant is ensured." In addition, this definition is supported by Generic Letter 86-10 Enclosure 1 Section 3. We suggest that this portion of the draft generic letter be revised for consistency.

2. Paragraph 3:

NFPA 251 does not address detailed test requirements for fire barriers used on cable tray or conduit. This standard addresses building construction and materials such as floors, roofs, walls, partitions etc. Because of the differences in physical characteristics of these applications, there are differences in test criteria and thermocouple placement requirements in NFPA 251. There are equally significant differences between these applications and cable tray and conduit applications. Although the applicability of NFPA 251 to cable trays and conduits is limited, however, it remains applicable for large vault and wall applications. Therefore, while the reference to the NFPA 251, Chapter 7, "Conditions of Acceptance" in Generic Letter 86-10 is appropriate, its application is limited. We recommend that any statement of compliance with NFPA 251 should be accompanied by a statement regarding the limitations of the applications.

3. Paragraph 3:

Cables are also tested for fire endurance in accordance with IEEE Standard 383 "Type Test of Class 1E Electric Cables, Field Splices and Connections for Nuclear Power Generating Stations." We recommend that this standard also be referenced.

AREAS OF CONCERN (PAGE 4):

1. General:

This section discusses the results of the NRC's review of various test reports utilizing differing test procedures for a number of specific configurations. This section also indicates there were tests which failed to meet the NRC's temperature acceptance criteria. The proposed text lacks detail about the specific reports. Such detail would assist utilities in assessing the applicability of the tests to their facilities. We recommend that the NRC provide detailed test references along with an indication of the tested configuration (e.g. one-hour 30 inch cable tray) and specific concern(s) of each test. It is only with this level of detail that the utilities can effectively evaluate the impact of the questionable test reports to their plant specific applications.

2. Paragraph 1:

It is our understanding that, according to Information Notice 91-47, the assembly tested in October 1989 at Southwest Research Institute (SwRI) was a three hour barrier for a 30 inch aluminum cable tray. We recommend that the specific test configuration be clearly noted.

3. Paragraph 2:

It is not clear whether there were failures of specific test assemblies (not including the October 1989 SwRI test article) that were constructed by Thermal Science Inc. (TSI) certified installers. The statement of "contractor's qualified installers" should be better defined to indicate whether they were TSI-certified or "qualified" by another means/method.

4. Paragraph 2:

It is our understanding that the validity of the October 1989 SwRI test has been questioned by the manufacturer and some utilities. The reference to the October 1989 SwRI test failure should indicate these doubts and refer to the generic applicability of this test as indeterminate.

5. Paragraph 3:

Please provide specifics on the test reports and test specimen failures that led to the listed concerns. It would also be helpful for the staff to indicate whether other reports were reviewed and determined to be acceptable.

6. Paragraph 4:

Generic Letter 86-10 provides guidance on treatment of deviations from tested fire barrier configurations. However, it is our understanding that this guidance is not necessarily an "engineering analysis." If there is no intention to revise the established guidance, the term "justified by engineering analysis" should be replaced throughout the document with "meet the five criteria delineated in Generic Letter 86-10 Enclosure 2 Section 3.2.2 "Deviations from Tested Configurations". This change provides consistency and supports the level of reasonable assurance for treatment of deviations from the test configuration.

7. Paragraph 4:

We suggest this paragraph indicate that the results from the site visits were summarized in Information Notice 91-79.

AMPACITY DERATING DESIGN BASIS (PAGE 6):

1. Paragraph 2:

As indicated in the first paragraph of this section, cable ampacity derating is an important design consideration for cable applications in conduit and raceways. We further acknowledge the supplemental derating necessary as the result of the encapsulation of conduit and raceways in fire barrier systems. However, without the specific information on the test specimen configurations

(percent fill, cable size, etc.), we cannot conclude that differences in derating factors are significant. It is also unclear whether the NRC is questioning the ampacity testing (as contrasted to the fire endurance testing). The concern appears to focus on whether the correct ampacity factors were supplied to utility customers and used to support customer specific applications. Please provide appropriate clarification.

2. Paragraph 2:

We recommend the addition of specific test references as well as details of the tested configurations.

DEFICIENCIES IN THE INSTALLATION AND INSPECTION PROCEDURES (PAGE 7):

1. We offer no comment on this section.

ACTIONS COVERED BY THIS GENERIC LETTER (PAGE 8):

1. Paragraph 1:

Generic Letter 86-10, paragraph D, states that licensees must have a quality assurance program for fire protection systems, but that such systems are not "safety related" and, therefore, are not within the scope of 10 CFR § 50, Appendix B. The indication that the barrier systems have been "qualified" by a representative fire endurance test should not suggest that the standards used in fire testing are similar to those of 10 CFR § 50.49 on environmental qualification. For consistency with Generic Letter 86-10, we suggest that the word "qualified" be revised to "reasonable assurance".

REPORTING REQUIREMENTS (PAGE 8):

1. General:

The "Reporting Requirements" section of the draft generic letter requests that licensees provide information that we believe is premature pending further definition of installations of concern.

Additionally, although the reporting time and manhours required will vary substantially from plant to plant, the manhour estimate of approximately 200 manhours is likely to be a significant underestimate for the vast majority of the affected plants, and the reporting time of 120 days is far too short a period for licensees to perform the requested evaluations.

2. Requirements (1) - (4):

While we share your view of the importance of proper installation and testing of the Thermo-Lag fire barriers system as one means to ensure fire protection capabilities in accordance with 10 CFR 50

Appendix R, given the lack of specific information available to the licensees, we believe the actions requested in the draft generic letter go beyond that which is necessary. We propose the following wording to replace actions (1) - (4).

> "Provide a written report within 120 days from the date of this generic letter that provides a schedule to complete a review of the applications of the Thermo-Lag 330-1 fire barrier system in cable tray, conduit, and wall/vault installations. It is expected that this review will be completed within 6 months from the date of the report."

Assuming a late second quarter issue date, the suggested schedule will provide the industry the opportunity to develop effective generic solutions to the staff concerns.

3. Requirement (5):

Revise the action to indicate that an additional report within 30 days of identification of a deficiency is required to identify corrective actions, schedule and compensatory measures taken in response to deficiencies identified while conducting the review required by action (1).

3. Requirement (6):

This action requires submission of a JCO for fire barriers that cannot be "verified". Generic Letter 91-18 states that a JCO is used to request authorization to operate in a "prohibited" manner. Such prohibitions generally are based on regulations, technical specifications, license provisions, etc. In contrast, fire protection provisions frequently are found in NRC guidance documents. In many cases, commitments to these NRC guidance documents have been incorporated into the FSAR. Changes to certain FSAR provisions can be addressed through the use of 10 CFR § 50.59 evaluations. Unlike many JCOs, these evaluations often do not require prior NRC approval. We suggest that this proposed action be revised to allow the use of 10 CFR § 50.59 evaluations to evaluate and justify operations for fire barriers which cannot be verified.