



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D. C. 20555

June 26, 1992

MEMORANDUM FOR: All NRR Project Managers

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

SUBJECT: MPA X-201, NRC BULLETIN NO. 92-01, FAILURE OF THERMO-LAG 330 FIRE BARRIER SYSTEM TO MAINTAIN CABLING IN WIDE CABLE TRAYS AND SMALL CONDUITS FREE FROM FIRE DAMAGE.

On June 24, 1992, NRC Bulletin 92-01 (Enclosure 1) was sent to all operating reactor licensees and holders of construction permits. The bulletin requests that licensees promptly identify and implement compensatory measures, as appropriate, to address the failure of Thermo-Lag 330 fire barrier system to maintain cabling free from fire damage.

Specifically, the bulletin requires all holders of operating licenses, immediately upon receipt of the bulletin, to: (1) determine which plant areas contain Thermo-Lag fire barrier systems installed on small conduits or wide trays; and (2) implement compensatory measures, such as fire watches, in accordance with plant procedures, consistent with those which would be implemented by either plant technical specifications or an operating license condition for an inoperable fire barrier. In addition, licensees, within 30 days after receiving the bulletin, must provide a written notification stating whether they have Thermo-Lag 330 fire barrier systems in their facilities and whether they have taken the requested actions and describing the measures they plan to take to restore fire barrier operability.

Licensees who cannot implement established compensatory measures in accordance with the bulletin for specific cases (e.g., high radiation areas, etc.) should provide verbal notification and document the reasons in a docketed letter which provides the basis and proposed alternatives to achieve an equivalent level of protection. These letters are to be forwarded by licensees without delay and should provide enough detail for the staff to make a determination of acceptability. The specific cases will be evaluated individually by the lead technical reviewers. In these instances, a Temporary Waiver of Compliance (TWOC) may be warranted and will be evaluated in accordance with established procedures. Project managers should coordinate activities associated with the request for a TWOC as well as assuring that the reviewers receive a copy of the letter. A copy should also be provided to the lead project manager.

An individual TAC No. for MPA X-201 has been established for each plant (Enclosure 2). Other instructions on how the MPA can be closed out will be provided at a later date. The technical contacts for this MPA are

Contact:
A. S. Masciantonio, NRR
504-1337

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RETURN TO REGULATORY CENTRAL FILES

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Ralph Architzel (504-2804) and Pat Madden (504-2854) in the Plant Systems Branch. The lead project manager is Armand Masciantonio (504-1337) in Project Directorate III-1.

Enclosure 3, Thermo-Lag Questions and Answers, was developed by the Plant Systems Branch for the Office of Public Affairs. It is included solely as additional background information for the project manager's personal use.

Original signed by

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

Enclosures:

1. NRC Bulletin 92-01
2. List of Tac Nos.
3. Thermo-Lag Questions and Answers

cc w/enclosures:

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DATE	6/25/92	6/25/92	6/25/92	6/25/92	6/25/92

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DATE	6/26/92

OMB No.: 3150-0012
NRCB 92-01UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

June 24, 1992

NRC BULLETIN NO. 92-01: FAILURE OF THERMO-LAG 330 FIRE BARRIER SYSTEM TO
MAINTAIN CABLING IN WIDE CABLE TRAYS AND SMALL
CONDUITS FREE FROM FIRE DAMAGEAddressees

For Action:

All holders of operating licenses for nuclear power reactors.

For Information:

All holders of construction permits for nuclear power reactors.

Purpose

This bulletin notifies you of failures in fire endurance testing associated with the Thermo-Lag 330 fire barrier system that is installed to protect safe shutdown capability, requests all operating reactor licensees to take the recommended actions, and requires that these licensees provide the U.S. Nuclear Regulatory Commission (NRC) with a written response describing the actions taken associated with this bulletin.

Background

On August 6, 1991, the NRC issued Information Notice (IN) 91-47, "Failure of Thermo-Lag Fire Barrier Material To Pass Fire Endurance Test," which provided information on the fire endurance tests performed by the Gulf States Utilities Company on Thermo-Lag 330 fire barrier systems installed on wide aluminum cable trays and the associated failures. On December 6, 1991, the NRC issued Information Notice 91-79, "Deficiencies In The Procedures For Installing Thermo-Lag Fire Barrier Material," which provided information on deficiencies in procedures that the vendor (Thermal Science, Inc.) provided for installing Thermo-Lag 330 fire barrier material. As a result of on-going concerns associated with the indeterminate qualifications of Thermo-Lag 330 fire barrier installations, on June 23, 1992, the NRC issued Information Notice 92-46, "Thermo-Lag Fire Barrier Material Special Review Team Final Report Findings, Current Fire Endurance Testing, and Ampacity Calculation Errors."

Description of Circumstances

Upon reviewing INs 91-47 and 91-79, Texas Utilities (TU) Electric instituted a fire endurance testing program to qualify its Thermo-Lag 330 electrical

raceway fire barrier systems for its Comanche Peak Steam Electric Station. The testing was performed during the weeks of June 15 and June 22, 1992.

TU Electric's test program consisted of a series of 1-hour fire endurance tests (using the ASTM-E119 Standard Time Temperature Curve) on a variety of cable tray and conduit "mock-ups." TU Electric designed these "mock-ups" or test articles to duplicate existing installed plant configurations. Plant personnel used stock material to construct the test articles. The Thermo-Lag fire barrier installation on the test articles was performed in accordance with TU Electric's Thermo-Lag installation procedures. These procedures were developed from the vendor's recommended installation procedures.

The Thermo-Lag fire barrier systems for the TU Electric test articles were constructed using pre-formed 1-hour Thermo-Lag 330 panels and conduit shapes. The joints and seams were constructed by pre-buttering seams and joints with trowel grade Thermo-Lag 330-1 and holding the assembly together with stainless steel banding.

On June 17, 1992, the first test article was tested. This article consisted of a junction box with a 3/4-, 1-, and 5-inch conduit entering and exiting through the junction box. Throughout the 1-hour fire endurance test, the cabling routed inside the conduits was monitored in accordance with the American Nuclear Insurer's criteria for low voltage circuit integrity and continuity. Throughout the test, none of the cables experienced a failure in circuit integrity. The licensee noted that the thermocouple temperature on the inside cover of the junction box on the unexposed side reached 539 °F and that hot spots (temperatures on the cable in excess of 500 °F) on the 3/4-inch conduit and the 1-inch conduit developed. On June 18, 1992, the cables were pulled from the test article. There were no visible signs of thermal degradation on the cables routed in the 5-inch conduit. The cable inside the 3/4-inch conduit was thermally damaged in two locations and cable in the 1-inch conduit was damaged in one location.

On June 18, 1992, TU Electric performed a 1-hour fire endurance test on a 12-inch wide tray configuration. Preliminary test result information indicated that the configuration passed the test satisfactorily. Throughout the fire endurance test, the thermocouple temperatures on the cables inside the test article were less than 325 °F.

On June 19, 1992, a 30-inch wide ladder back tray configuration was tested. At 17 minutes into the test, the Thermo-Lag 330 panel on the bottom of the test article began to sag. At 18 minutes, the joint at the interface between the tray support and the tray showed signs of weakening and separation. The internal temperatures within areas of the test article showed signs of exceeding 325 °F at 25 minutes. The joint fully separated in 41 minutes resulting in cable circuit integrity failure and fire damage to the cables.

Discussion

Section 50.48(a) of Title 10 of the Code of Federal Regulations (10 CFR 50.48(a)) requires that each operating nuclear power plant have a fire

protection plan that satisfies Appendix A to 10 CFR Part 50, General Design Criteria (GDC) 3, "Fire Protection." GDC 3 requires 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. In 10 CFR 50.48(b), the NRC states that Appendix R to 10 CFR Part 50 establishes fire protection features required to satisfy Criterion 3 of Appendix A to 10 CFR Part 50 for certain generic issues for nuclear power plants licensed to operate prior to January 1, 1979. Sections III.G, III.J, and III.O of Appendix R are applicable to nuclear power plants licensed to operate prior to January 1, 1979. In 10 CFR 50.48(e), the NRC requires that all plants licensed to operate after January 1, 1979, shall complete all fire protection modifications needed to satisfy Criterion 3 to Appendix A of 10 CFR Part 50 in accordance with the provisions of their operating licenses.

NRC-approved plant fire protection programs as referenced by the Plant Operating License Conditions and Appendix R to 10 CFR Part 50, Section III G.1.a, "Fire Protection of Safe Shutdown Capability," require one train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control stations to be free from fire damage.

To ensure that electrical cabling and components are free from fire damage, Section III G.2 of Appendix R requires the separation of safe shutdown trains by separation of cables and equipment and associated circuits of redundant trains by a fire barrier having a 3-hour rating or enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a 1-hour rating. In addition to providing the 1-hour barrier, fire detection and an automatic fire suppression system shall be installed in the fire area.

Under fire conditions, the thermal degradation of an electrical raceway fire barrier system, such as the Thermo-Lag system, could lead to both trains of safe shutdown systems being damaged by fire. This may significantly affect the plant's ability to achieve and maintain hot standby/shutdown conditions.

The NRC considered the failures of the recent Thermo-Lag fire barrier fire endurance testing and has determined that the 1- and 3-hour pre-formed assemblies installed on small conduit and wide cable trays (wider than 14 inches) do not provide the level of safety as required by NRC requirements.

Requested Actions

All holders of operating licenses for nuclear power reactors, immediately upon receiving this bulletin, are requested to take the following actions:

1. For those plants that use either 1- or 3-hour pre-formed Thermo-Lag 330 panels and conduit shapes, identify the areas of the plant which have Thermo-Lag 330 fire barrier material installed and determine the plant areas which use this material for protecting either small diameter conduit or wide trays (widths greater than 14 inches) that provide safe shutdown capability.

2. In those plant areas in which Thermo-Lag fire barriers are used to protect wide cable trays, small conduits, or both, the licensee should implement, in accordance with plant procedures, the appropriate compensatory measures, such as fire watches, consistent with those which would be implemented by either the plant technical specifications or the operating license for an inoperable fire barrier.
3. Each licensee, within 30 days of receiving this bulletin, is required to provide a written notification stating whether it has or does not have Thermo-Lag 330 fire barrier systems installed in its facilities. Each licensee who has installed Thermo-Lag 330 fire barriers is required to inform the NRC, in writing, whether it has taken the above actions and is required to describe the measures being taken to ensure or restore fire barrier operability.

Backfit Discussion

These types of fire barriers are currently installed at operating power reactor sites and are required to meet either a condition of a plant's operating license or the requirements of Section III.G of Appendix R to 10 CFR Part 50. The actions requested by this bulletin do not represent a new staff position but are considered necessary to bring licensees into compliance with existing NRC rules and regulations where these test results are relevant. Therefore, this bulletin is being issued as a compliance backfit under the terms of 50.109(a)(4). In addition, pursuant to the Charter of the Committee to Review Generic Requirements (CRGR), this bulletin is being issued as an immediately effective action (10 CFR 50.109(a)(6)). This bulletin is being issued with the knowledge of the CRGR.

Address the required written reports to the U. S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555, under oath or affirmation under the provisions of Section 182a, Atomic Energy Act of 1954, as amended and 10 CFR 50.54(f). In addition, submit a copy to the appropriate regional administrator.

This request is covered by Office of Management and Budget Clearance Number 3150-0012, which expires June 30, 1994. The estimated average number of burden hours is 60 person hours for each licensee response, including those needed to assess the new recommendations, search data sources, gather and analyze the data, and prepare the required letters. This estimate of the average number of burden hours pertains only to the identified response-related matters and does not include the time needed to implement the requested action. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Information and Records Management Branch, Division of Information Support Services, Office of Information Resources Management, U. S. Nuclear Regulatory Commission, Washington, D.C. 20555, and to the Paperwork Reduction Project (3150-0011), Office of Information and Regulatory Affairs, NE08-3019, Office of Management and Budget, Washington, D.C. 20503.

Although no specific response is required with respect to the following information, the following information would assist the NRC in evaluating the cost of complying with this bulletin:

- (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 requested reports and documentation;
- (3) the additional short-term costs incurred to address the inspection findings such as the costs of the corrective actions or the costs of down time; and
- (4) an estimate of the additional long-term costs that will be incurred as a result of implementing commitments such as the estimated costs of conducting future inspections or increased maintenance.

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

Charles E. Rossi
Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical contacts: Ralph Architzel, NRR
(301) 504-2804

Patrick Madden, NRR
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Attachment:
List of Recently Issued NRC Bulletins

LIST OF RECENTLY ISSUED
 NRC BULLETINS

Bulletin No.	Subject	Date of Issuance	Issued to
91-01	Reporting Loss of Criticality Safety Controls	10/18/91	All fuel cycle and uranium fuel research and development licensees.
89-01, Supp. 2	Failure of Westinghouse Steam Generator Tube Mechanical Plugs	06/28/91	All holders of OLs or CPs for PWRs.
89-01, Supp. 1	Failure of Westinghouse Steam Generator Tube Mechanical Plugs	11/14/90	All holders of OLs or CPs for PWRs.
90-02	Loss of Thermal Margin Caused by Channel Box Bow	03/20/90	All holders of OLs or CPs for BWRs.
90-01	Loss of Fill-Oil in Transmitters Manufactured by Rosemount	03/09/90	All holders of OLs or CPs for nuclear power reactors.
89-03	Potential Loss of Required Shutdown Margin During Refueling Operations	11/21/89	All holders of OLs or CPs for PWRs.
88-10, Supp. 1	Nonconforming Molded-Case Circuit Breakers	08/03/89	All holders of OLs or CPs for nuclear power reactors.
89-02	Stress Corrosion Cracking of High-Hardness Type 410 Stainless Steel Internal Preloaded Bolting in Anchor Darling Model S350W Swing Check Valves or Valves of Similar Design	07/19/89	All holders of OLs or CPs for nuclear power reactors.
89-01	Failure of Westinghouse Steam Generator Tube Mechanical Plugs	05/15/89	All holders of OLs or CPs for PWRs.

OL = Operating License
 CP = Constructor Permit

Page No. 1
06/25/92MULTI-PLANT ACTION (MPA) X-201
PLANT LIST

(1) TAC NUMBER	(2) DOCKET NUMBER	(3) PLANT NAME	(4) LEAD PM	(5) RITS INIT	(6) EXCEPTIO PA NUMBE
M 83839	50-313	ARKANSAS 1	ALEXION	TWA	
M 83840	50-368	ARKANSAS 2	PETERSON	SGJ	
M 1	50-334	BEAVER VALLEY 1	DEAGAZIO	ABD	
M 2	50-412	BEAVER VALLEY 2	DEAGAZIO	ABD	
M 3	50-438	BELLEFONTE 1	THADANI	MBT	1111
M 4	50-439	BELLEFONTE 2	THADANI	MBT	1111
M 5	50-155	BIG ROCK POINT	STRANSKY	R4S	
M 6	50-456	BRAIDWOOD 1	PULCIFER	FPV	
M 7	50-457	BRAIDWOOD 2	PULCIFER	RPV	
M 8	50-259	BROWNS FERRY 1	ROSS	THR	
M 9	50-260	BROWNS FERRY 2	ROSS	THR	
M 83850	50-296	BROWNS FERRY 3	ROSS	THR	
M 1	50-325	BRUNSWICK 1	LE	NAL	
M 2	50-324	BRUNSWICK 2	LE	NAL	
M 3	50-454	BYRON 1	HSIA	APH	
M 4	50-455	BYRON 2	HSIA	APH	
M 5	50-483	CALLAWAY 1	WHARTON	BRW	
M 6	50-317	CALVERT CLIFFS 1	MCDONALD	DGM	
M 7	50-318	CALVERT CLIFFS 2	MCDONALD	DGM	
M 8	50-413	CATAWBA 1	MARTIN	REM	
M 9	50-414	CATAWBA 2	MARTIN	REM	
M 83860	50-461	CLINTON	GODY	AOG	
M 1	50-445	COMANCHE PEAK 1	BERGMAN	TKB	
M 2	50-446	COMANCHE PEAK 2	HOLIAN	BMH	1111
M 3	50-315	COOK 1	STANG	SEJ	
M 4	50-316	COOK 2	STANG	SEJ	
M 5	50-292	COOPER	BEVIN	RBB	
M 6	50-302	CRYSTAL RIVER 3	SILVER	HAS	
M 7	50-346	DAVIS BESSE	HOPKINS	JSH	
M 8	50-275	DIABLO CANYON 1	ROOD	HAR	
M 9	50-323	DIABLO CANYON 2	ROOD	HAR	
M 83870	50-237	DRESDEN 2	SIEGEL	XBS	
M 1	50-249	DRESDEN 3	SIEGEL	XBS	
M 2	50-331	DUANE ARNOLD	SHIRAKI	CSE	
M 3	50-348	FARLEY 1	HOFFMAN	STH	
M 4	50-364	FARLEY 2	HOFFMAN	STH	
M 5	50-341	FERMI 2	COLBURN	TGC	
M 6	50-333	FITZPATRICK	MCCABE	B2M	
M 7	50-285	FORT CALHOUN 1	BLOOM	S4B	
M 8	50-244	GINNA	JOHNSON	AGJ	
M 9	50-416	GRAND GULF 1	O'CONNOR	PWO	
M 83880	50-213	HADDAM NECK	WANG	ADW	
M 1	50-400	HARRIS 1	MOZAFARI	BRM	
M 2	50-321	HATCH 1	JABBOUR	KNJ	
M 83983	50-366	HATCH 2	JABBOUR	KNJ	

MULTI-PLANT ACTION (MPA) X-201
PLANT LIST

(1) TAC NUMBER	(2) DOCKET NUMBER	(3) PLANT NAME	(4) LEAD PM	(5) RITS INIT	(6) EXCEPTIO PA NUMBE
M 83884	50-354	HOPE CREEK	DUMBEK	SFD	
M 5	50-247	INDIAN POINT 2	WILLIAMS	MAW	
M 6	50-286	INDIAN POINT 3	CONCICELLA	NKC	
M 7	50-305	KEWAUNEE	HANSEN	A3H	
M 8	50-373	LASALLE 1	SIEGEL	XBS	
M 9	50-374	LASALLE 2	SIEGEL	XBS	
M 83890	50-352	LIMERICK 1	CLARK	RJC	
M 1	50-353	LIMERICK 2	CLARK	RJC	
M 2	50-309	MAINE YANKEE	TROTTIER	EHT	
M 3	50-369	MCGUIRE 1	REED	TGR	
M 4	50-370	MCGUIRE 2	REED	TGR	
M 5	50-245	MILLSTONE 1	JAFFE	DHJ	
M 6	50-336	MILLSTONE 2	VISSING	GSV	
M 7	50-423	MILLSTONE 3	ROONEY	VLR	
M 8	50-263	MONTICELLO	LONG	WAL	
M 9	50-220	NINE MILE POINT 1	MENNING	J8M	
M 83900	50-410	NINE MILE POINT 2	MENNING	J8M	
M 1	50-338	NORTH ANNA 1	ENGLE	LBE	
M 2	50-339	NORTH ANNA 2	ENGLE	LBE	
M 3	50-269	OCONEE 1	WIENS	LHW	
M 4	50-270	OCONEE 2	WIENS	LHW	
M 5	50-287	OCONEE 3	WIENS	LHW	
M 6	50-219	OYSTER CREEK	DROMERICK	AID	
M 7	50-255	PALISADES	MASCIANTONIO	ACM	
M 8	50-528	PALO VERDE 1	TRAMMELL	CMT	
M 9	50-529	PALO VERDE 2	TRAMMELL	CMT	
M 83910	50-530	PALO VERDE 3	TRAMMELL	CMT	
M 1	50-277	PEACH BOTTOM 2	SHEA	J8S	
M 2	50-278	PEACH BOTTOM 3	SHEA	J8S	
M 3	50-440	PERRY 1	HALL	JRH	
M 4	50-293	PILGRIM 1	EATON	RCE	
M 5	50-266	POINT BEACH 1	SAMWORTH	RBS	
M 6	50-301	POINT BEACH 2	SAMWORTH	RBS	
M 7	50-282	PRAIRIE ISLAND 1	LONG	WAL	
M 8	50-306	PRAIRIE ISLAND 2	LONG	WAL	
M 9	50-254	QUAD CITIES 1	OLSHAN	LNO	
M 83920	50-265	QUAD CITIES 2	OLSHAN	LNO	
M 1	50-458	RIVER BEND 1	PICKETT	DLP	
M 2	50-261	ROBINSON 2	LO	RHL	
M 3	50-335	SAINT LUCIE 1	NORRIS	JAN	
M 4	50-389	SAINT LUCIE 2	NORRIS	JAN	
M 5	50-272	SALEM 1	STONE	JTF	
M 6	50-311	SALEM 2	STONE	JTF	
M 7	50-206	SAN ONOFRE 1	KALMAN	GCK	
M 83924	50-361	SAN ONOFRE 2	KOKAJKO	LHK	

MULTI-PLANT ACTION (MPA) X-201
PLANT LIST

(1) TAC NUMBER	(2) DOCKET NUMBER	(3) PLANT NAME	(4) LEAD PM	(5) RITS INIT	(6) EXCEPTION PA NUMBER
M 83929	50-362	SAN ONOFRE 3	KOKAJKO	LHK	
M 83930	50-443	SEABROOK 1	EDISON	GEE	
M 7	50-327	SEQUOYAH 1	LABARGE	DWL	
M 2	50-328	SEQUOYAH 2	LABARGE	DWL	
M 3	50-498	SOUTH TEXAS 1	DICK	GFD	
M 4	50-499	SOUTH TEXAS 2	DICK	GFD	
M 5	50-395	SUMMER 1	WUNDER	GGW	
M 6	50-280	SURRY 1	BUCKLEY	BCB	
M 7	50-281	SURRY 2	BUCKLEY	BCB	
M 8	50-387	SUSQUEHANNA 1	PALEIGH	FJR	
M 9	50-388	SUSQUEHANNA 2	RALEIGH	FJR	
M 83940	50-289	THREE MILE ISLAND 1	HERNAN	RHH	
M 1	50-344	TROJAN	KOKAJKO	LHK	
M 2	50-250	TURKEY POINT 3	AULUCK	RCA	
M 3	50-251	TURKEY POINT 4	AULUCK	RCA	
M 4	50-271	VERMONT YANKEE	FAIRTILE	MBF	
M 5	50-424	VOGTLE 1	HOOD	DSH	
M 6	50-425	VOGTLE 2	HOOD	DSH	
M 7	50-382	WATERFORD	WIGGINTON	DXW	
M 8	50-390	WATTS BAR 1	TAM	PST	1111
M 9	50-391	WATTS BAR 2	TAM	PST	1111
M 83950	50-397	WNP 2	ENG	PFE	
M 1	50-482	WOLF CREEK	RECKLEY	WNR	
M 2	50-295	ZION 1	HICKMAN	ZZY	
M 83953	50-304	ZION 2	HICKMAN	ZZY	

THERMO-LAG
QUESTIONS AND ANSWERS

1. Is there any immediate danger to the safety of nuclear power plants because of the Thermo-Lag problem that has been identified?

The licensee actions in response to the bulletin will be primarily to establish fire watches in areas where they determine Thermo-Lag exists. This provides an equivalent level of safety.

The barriers will provide some level of fire protection.

Plants are equipped with other passive and active fire protection features which contribute to early fire detection and suppression.

2. What is the Thermo-Lag 330 fire barrier system?

Thermo-Lag 330 is a fire barrier manufactured and supplied by Thermal Science, Incorporated (vendor), St. Louis, Missouri, that is used by NRC licensees to satisfy the our requirements for protecting equipment needed to shutdown the plant in the event of a fire. Thermo-Lag is manufactured with fire endurance ratings of 1 hour and 3 hours.

3. How many plants use Thermo-Lag barriers?

The vendor has informed us that at least 50 nuclear power stations (NRC estimates 80 plants) use Thermo-Lag. The amount of Thermo-Lag used at each plant may vary.

4. What level of fire resistance does the NRC require for fire barriers?

The NRC has conservatively selected 3-hours as the minimum fire resistance rating for fire barriers used to separate redundant safe shutdown systems. One-hour barriers with automatic fire detection and suppression systems are considered equivalent to 3-hour barriers.

In an actual fire situation, the fire resistance required of a barrier depends on the expected severity of the fire to which it may be exposed. Typical nuclear plant fire loads are not great enough to produce a fire approaching the severity of a test fire. In addition, an actual nuclear power plant fire would have a much slower temperature rise than the test fire. In large open volumes, such as most nuclear plant fire areas, a fully developed fire may occur in one part of the area, but it is not probable that the entire volume (fire area) would become fully involved by fire. Unless a fire reaches this stage, it is not likely to present a credible challenge to any nuclear power plant fire barrier.

5. What are the NRC's concerns regarding Thermo-Lag fire barriers?

Recent fire endurance testing of wide cable tray and small conduit configurations have demonstrated that they fail sooner than previously thought. This has necessitated the issuance of NRC Bulletin 92-01.

6. What actions has the NRC taken?

Current actions include the issuance of NRC Bulletin 92-01 to all licensee notifying them of the recent Thermo-Lag fire endurance test failures on small conduits and wide trays. In addition, the NRC is scheduled to meet on July 7 1992, with industry to discuss Thermo-Lag fire barrier issues.

Past actions included:

- Established NRR Special Review Team in July 1991.
- Issued IN 91-47, "Failure of Thermo-Lag Fire Barrier Material To Pass Fire Endurance Test," August 6, 1991.
- Issued IN 91-79, "Deficiencies in the Procedures for Installing Thermo-Lag Fire Barrier Materials," December 6, 1991.
- Prepared a proposed generic letter.
- Met with NUMARC on February 19, 1992.
- Information Notice 92-46, "Thermo-Lag Fire Barrier Material Special Review Team Final Findings, Current Fire Endurance Tests, and Ampacity Calculation Errors," June 23, 1992

7. How long has the NRC known about this problem and what actions has the agency taken?

Testing conducted beginning the week of June 15, 1992 resulted in failures of fire barrier systems enclosing wide cable trays and small conduits.

River Bend Station first reported installation problems with Thermo-Lag to the NRC in 1987. The test failure of Thermo-Lag was reported in December 1989. These reports were reviewed by the NRC by our routine processes. The issues were not considered to be applicable to other plants until the spring of 1991, following the receipt of some allegations and an NRC site visit to River Bend Station. Since that time, three information notices have been issued and a meeting was held with the industry to discuss potential problems with Thermo-Lag.

8. Why did it take so long for the NRC to take action on this issue?

Upon receiving actual test failure data the NRC acted immediately.

Previously, the NRC did not consider the River Bend reports applicable to the rest of the industry until the spring of 1991. Previous information was considered to only involve specific problems at River Bend. We will certainly go back and review our handling of the previous issues for lessons learned.

9. Why weren't these issues found by NRC inspectors?

Similar problems have been found at other facilities over the last 10 years. However, the identification of these types of problems would not be normally expected by our inspectors. This engineering area is very specialized. In addition, the installation problems are difficult to identify when the fire barrier is already installed.

10. What will the licensees have to do to correct the problem?

The immediate problem is addressed by establishing compensatory fire watches where suspect Thermo-Lag is installed. The actions to correct the Thermo-Lag fire barrier discrepancies may range from minor repairs, to complete replacement of some barriers.

11. Why is the Inspector General's Office involved with the investigation?

An OIG/OI Investigative team has been formed to look into the matters involving Thermo-Lag. I cannot address any specifics of the investigation since it still ongoing.

12. Is it true that NRC officials favored Thermo-Lag over other products?

The Inspector General would review these types of issues and I cannot address the question.

13. Why were allegations overlooked or ignored by the NRC?

That type of issue would be under the responsibility of the Inspector General. The NRC does have a formal tracking program to ensure review of all allegations received.

14. What electrical systems does Thermo-Lag protect and what kind of material is used in Thermo-Lag?

Thermo-Lag is used to protect electrical cables used for equipment that would be needed to shut down the plant in the event of a fire.

Thermo-Lag is referred to as a subliming material, and the content of the material is proprietary information.

15. Is the problem with Thermo-Lag mainly in the improper installation of the material or is the quality of the material also under question?

The NRC has concerns regarding both the installation of the material and the ability of the material to provide an adequate fire barrier, even if it is installed in accordance with the vendor's recommendations.

16. - Other than problems associated with fire endurance are there other concerns the NRC may have with Thermo-Lag fire barriers?

Yes, in addition to the fire endurance concerns the NRC has identified concerns with installation of the various design configurations and with cable ampacity. These include:

- Ampacity derating factors for the Thermo-Lag 330 fire barrier system are indeterminate.
- 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 installed Thermo-Lag fire barrier configurations.
- Some licensees have not adequately reviewed their installed fire barrier configurations to ensure that they either replicate the tested configurations or provide an equivalent level of protection.