

**LICENSEE EVENT REPORT (LER)**

(See reverse for required number of digits/characters for each block)

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FACILITY NAME (1)

Three Mile Island, Unit 1

DOCKET NUMBER (2)

05000289

PAGE (3)

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TITLE (4)

LER 98-011-00 Thermo-Lag Fire Barrier Found Installed Outside Approved Joint Design Arrangement

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
08	25	98	98	-- 011	-- 00	09	23	98		05000
OPERATING MODE (9)		N		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)						
POWER LEVEL (10)		100%		20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
				20.2203(a)(1)		20.2203(a)(3)(i)		X 50.73(a)(2)(ii)		50.73(a)(2)(x)
				20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
				20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		OTHER
				20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
				20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

**LICENSEE CONTACT FOR THIS LER (12)**

NAME

William G. Heysek, TMI Licensing Engineer

TELEPHONE NUMBER (Include Area Code)

717-948-8191

**COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
A				N					

**SUPPLEMENTAL REPORT EXPECTED (14)**

YES

(If yes, complete EXPECTED SUBMISSION DATE).

N NO

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR

**ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)**

At approximately 1335 on August 25, 1998, while TMI-1 was operating at 100% power, preparations were being made to continue work involved with the upgrade of Thermo-Lag fire barriers installed to achieve compliance with 10 CFR 50 Appendix R Section III. G. While working in Fire Area FH-FZ-1, on the 231' elevation of the Fuel Handling Building, personnel using an inspection mirror identified an opening approximately 1/4" to 1/2" wide over the length of a joint between two abutted Thermo-Lag barrier elements. It was apparent that the approved design configuration had not been achieved due to the lack of an application of trowel grade Thermo-Lag material to seal the joint between the abutted barrier elements. The condition of the Thermo-Lag barrier joint was reviewed and found not to be consistent with that required of a "rated" fire barrier configuration and was determined to be reportable later that day.

The cause of the failure to properly protect the junction box containing the instrumentation cabling was determined to be personnel error. The error occurred during the installation of the Thermo-Lag barrier system around the junction box and transition tray in 1987 when the panel joint between the abutting Thermo-Lag elements was not properly sealed.

The event is being reported per 10 CFR 50.73(a)(2)(ii).

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I. PLANT OPERATING CONDITIONS BEFORE THE EVENT

The plant was at 100% power at the time the condition was determined to be reportable and was not changed as a result of that determination.

II. STATUS OF STRUCTURES, COMPONENTS OR SYSTEMS THAT WERE INOPERABLE AT THE START OF THE EVENT AND THAT CONTRIBUTED TO THE EVENT.

The TMI-1 Thermo-Lag fire barrier system was reported as inoperable in GPU Nuclear's response to NRC Bulletin 92-01 and its supplements in submittals made by the company in 1992.

III. EVENT DESCRIPTION

The Thermo-Lag Barriers were installed to achieve compliance with 10 CFR 50 Appendix R Section III.G requirements. During preparatory work associated with the upgrade of Thermo-Lag fire barrier 1FHC-FB06 in the 281' elevation of the Fuel Handling Building [ND] on August 25, 1998 workers identified a 1/4" to 1/2" wide opening in the joint between the Thermo-Lag barrier (element 167) enclosing a junction box (component 1FHC-FB15) and the barrier (element 926) protecting a 12" x 12" x 6.5" cable tray abutting the junction box enclosure. The transition tray connects the junction box to a Thermo-Lag (element 925) protected 18" x 6" cable tray (component 1FHC-FB06). The as-found configuration indicated that the barrier was not installed in a manner that provided the required "rated" fire barrier. In response to the identified deficiency, the Plant Review Group met that same day and determined the condition to be reportable.

IV. AUTOMATIC OR MANUAL INITIATED SAFETY SYSTEM RESPONSES

Since there was no physical plant event involved with the item being reported herein, there were no safety system response, automatic or manual.

V. FAILURES AND ERRORS

The deficient joint configuration at the intersection of the Thermo-Lag fire barrier elements at the junction box and the 12" x 12" x 6.5" cable tray was examined and is considered to be the result of personnel error during barrier installation. Due to the intervening years between the installation of the Thermo-Lag barrier system in 1987 and discovery of the deficiency, the underlying cause of the personnel error can only be speculated upon and not be determined with any certainty.

The engineering, installation process training, field installation, and Quality Control (QC) inspection of the Thermo-Lag project in 1987 was provided by contracted firms. The best information available indicates that the contractor personnel installing the original Thermo-Lag fire barriers understood how to properly install the Thermo-Lag material as the rest of the junction box and the cable tray joints were all properly constructed. The defective fire barrier in this instance was the result of faulty installation and the failure of the QC inspector to identify the defect.

The fire barriers in question were installed in an area approximately 12' above the floor 281' elevation in the Fuel Handling Building. This area is congested with cable trays, Reactor Building wall penetrations, and piping. The deficient joint could not be seen without the aid of an inspection mirror. The installer either failed to apply the trowel grade mix on this portion of the Thermo-Lag joint or the trowel grade had been

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applied to the piece and it was knocked off while being fitted into position. In addition, the QC inspector failed to identify the deficiency during the final inspection of the finished barrier joint.

Since the Thermo-Lag barrier system was installed, a refueling frequency surveillance has been performed to visually inspect each Thermo-Lag barrier to verify that it has not degraded to the point that it does not perform its intended function. The procedure specifies that the entire barrier be inspected with the exception of inaccessible sections. Procedurally, the option exists to identify inaccessible sections and document the inability to inspect that section on the surveillance data sheets. Performing the surveillance in accordance with the current procedure guidance and performance expectations contributed to the failure to identify the deficient barrier joint earlier.

VI. ASSESSMENT OF THE SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT

TMI-1 was outside the design basis for mitigation of the consequences of a fire as a result of the deficient fire barrier joint arrangement from March 1987 until August 26, 1998. In the event of a significant fire in Fire Zone FH-FZ-1, the instrument cables relied upon for continued plant operation could have been damaged resulting in the loss of indication of instrumentation required for safe shutdown.

Without the "rated" Thermo-Lag fire barrier enclosing the junction box and transition cable tray, the required fire protection capability for instrumentation cabling routed through the transition cable tray and junction box was not satisfied. The cables are associated with the following devices: A & B Steam Generator Outlet Pressure [SB/PI], Pressurizer Level (Temp. Comp.) [AB/LI], Steam Generator B Pressure (Train B) [SB/PI], Steam Generator B Level (Full Range, Train B) [SB/LI], and Pressurizer Temperature [AB/TI].

Although a fire could have disabled the instrument cables, no fire occurred during the period the barrier was degraded by the open joint. While considered inoperable, this fire barrier would have provided a measure of fire protection based upon consideration of the limited size of the opening. In addition the fire loading in this area is low and is predominately a result of the cables themselves. Since ionization fire detectors [IC/DET] and a sprinkler system [IC/KP] protect this area, a fire would have been identified in its early stages by the detector system. Upon detection, the fire brigade would respond with hand held extinguishing equipment and the fire service sprinkler system would initiate, if as a result of the fire, temperatures of at least 165 °F were present in the area of a detector head. Either or both of these actions would most likely have prevented the cables from becoming damaged as a result of fire.

Additionally, the fire mitigation procedure for a fire in Fire Area FH-FZ-1 directs Operations to immediately dispatch an operator to the remote shutdown panel and establish communications with the Control Room. This individual, under direction from the Control Room, will then provide immediate corrective action. The procedure directs the Control Room, for a serious fire such as in a cable tray in a safety related area of the plant, to commence plant shutdown prior to significant equipment loss that could challenge the plant's safe shutdown design capability.

No significant safety consequences would be expected to have resulted in the event a fire had occurred in Fire Zone FH-FZ-1 during the period that the instrument cables were not protected by an approved barrier joint configuration.

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VII. PREVIOUS EVENTS OF A SIMILAR NATURE

Two previous events associated with an original Thermo-Lag installation deficiency have been documented. Both were identified as a result of the detailed walk-downs being performed during the Thermo-Lag fire barrier upgrade project. Based on the relative small number and the nature of the deficiencies identified with the original installation, a programmatic failure is not indicated.

1. LER 98-003 / CAP T1998-0071 / MNCR 980071 - Fire barrier missing on NI-11 circuit. Barrier installed on the wrong conduit due to the use of an incorrect drawing.
2. LER 98-006 / CAP T1998-0489 - Unapproved material (M-board) used in a fire barrier penetration and 1" of trowel grade fill material missing from back side of joint.

VIII. CORRECTIVE ACTIONS

Immediate Completed Corrective Action

1. A continuous fire watch was initiated immediately upon discovery of the deficiency for the area containing the deficient barrier joint: an increase from the normal shiftly to continuous coverage. This action was taken because at the time the condition was found, fire detection system surveillance testing was in progress for this area: the area fire detection equipment was out of service. Following satisfactory completion of the fire detection testing and the return to a condition where an operational ionization detection system was in service in the area, the fire watch was reduced to an hourly frequency (the detection system also has operability requirements defined in the Fire Protection Program).
2. Trowel grade Thermo-Lag was installed in the void and on the outer edge of the Thermo-Lag panels in keeping with design on August 25, 1998. The barrier was restored to its design basis configuration on August 26, 1998 following an inspection (following a 24 hour material cure time) that insured that no cracks had developed during drying process. This action restored the plant to the design basis condition described in the TMI-1 Fire Hazards Analysis Report as modified by an exemption from 10 CFR 50 Appendix R, granted by NRC letter dated August 19, 1997. Fire watch tours were returned to shiftly frequency.

Long Term Corrective Action

1. The event will be reviewed with Maintenance Supervisors responsible for installation activities involved with the fire barrier upgrade project and all Quality Verification personnel inspecting the completed barriers in order to continue to raise their level of awareness with regard to recognition of Thermo-Lag installation problems and assure that similar problems do not occur with the installation of Mecatiss. This action will be completed by October 16, 1998.
2. The fire barrier inspection procedure, SP 1303-12.24 will be revised to use inspection methods and devices that will allow a closer inspection of the accessible barrier elements. The procedure revision will be issued prior to the start of the next inspection.

IX. VOLUNTARY ENHANCEMENT

GPU Nuclear does not believe that a programmatic configuration problem exists with the Thermo-Lag installation program at this time. Inspection results attributable to the Thermo-Lag fire barrier up-grade

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program will continue to be evaluated as inspections are completed. As a voluntary enhancement in the areas that remain to be upgraded, the scope of inspection has been increased beyond Thermo-Lag elements to be covered with Mecatiss to include those Thermo-Lag fire barrier elements which are accessible from the scaffolding used to perform the upgrade activities.

\*The Energy Industry Identification System (EIIIS), System Identification (SI) and Component Function Identification (CFI) Codes are included in brackets, "[SI/CFI]", where applicable, as required by 10 CFR 50.73(b)(2)(ii)(F).