

# AmerGen

A PECO Energy/British Energy Company

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Three Mile Island Unit 1

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March 09, 2000  
5928-00-20084

U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D.C. 20555

Dear Sir or Madam,

SUBJECT: THREE MILE ISLAND UNIT I (TMI-1)  
OPERATING LICENSE NO. DPR-50  
DOCKET NO. 50-289  
LER 98-011 SUPPLEMENT 2: THERMO-LAG FIRE BARRIERS FOUND INSTALLED  
OUTSIDE APPROVED JOINT ARRANGEMENT

This letter transmits Supplemental Licensee Event Report (LER) number 98-011-02 which updates and replaces in its entirety the previously submitted information regarding a condition which was evaluated and determined to be reportable on August 25, 1998 and reported via LER 98-011-00 on September 23, 1998 and supplemented by LER 98-011-01 dated April 12, 1999.

This LER is being submitted pursuant to 10 CFR 50.73, using the required NRC forms (attached). NRC form 366 contains an abstract that provides a brief description of the evaluated condition. For a complete understanding of the evaluated condition, refer to the text of the report provided on Form 366A.

This condition did not adversely affect the health and safety of the public. For additional information regarding this LER contact William Heysek of the TMI Regulatory Engineering Section at (717) 948-8191.

Very truly yours,



John B. Cotton  
Vice President, TMI Unit 1

JBC/ wgh

#### Attachments

cc: Administrator, Region I- Hubert J. Miller  
TMI Senior Resident Inspector- Wayne L. Schmidt  
TMI-1 Senior Project Manager- Timothy G. Colburn  
File 98107

JE22

**LICENSEE EVENT REPORT (LER)**

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

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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TITLE (4)  
**LER 98-011-02 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	1998	1998	-- 011	-- 02	03	09	2000		05000
									FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9) <b>N</b>	<b>THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)</b>										
POWER LEVEL (10) <b>100</b>	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)			<input checked="" type="checkbox"/> 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-Voluntary	
	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 <b>William Heysek, TMI Regulatory Engineer</b>								TELEPHONE NUMBER (Include Area Code) <b>(717) 948-8191</b>		

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)					EXPECTED SUBMISSION DATE (15)		
YES (If yes, complete EXPECTED SUBMISSION DATE).					MONTH	DAY	YEAR
				<input checked="" type="checkbox"/> No			

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

LER 98-011-00 as submitted on September 23, 1998 described a deficient Thermo-Lag barrier seam condition identified at the onset of the Thermo-Lag barrier upgrade project. While continuing the project, it became evident that the previously reported condition was not an isolated one. As a result of the corrective actions described in LER 98-011-00 to determine the "extent of condition", the base Thermo-Lag inspections supporting the upgrade project were expanded to include a 100% inspection of all installed Thermo-Lag fire barriers. **Tables identifying documented original construction and post construction barrier defects are included as Attachments 1 and 2.**

The inspection results and management initiated evaluations determined the root cause of the minor Thermo-Lag joint and seam problems was the failure to install the Thermo-Lag in accordance with the construction specification (Root Cause: "Required procedure / document not followed"). A contributing cause of the joint and seam deficiencies was an inadequate post installation quality verification program. While the quality verification program required inspection of all barrier configurations, it required that only a sampling inspection of the barrier joints and seams be performed. All identified barrier joint and seam deficiencies **have been corrected by direct repair or as a result of the barrier upgrade process.**

The deficient conditions are being reported per 10 CFR 50.73(a)(2)(ii).

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

I. PLANT OPERATING CONDITIONS BEFORE THE EVENT

The plant was at 100% power at the time the initial and subsequent deficient conditions were determined to be reportable and was not changed as a result of subsequent operability determinations.

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 by GPU Nuclear in its response to NRC Bulletin 92-01 and supplemental submittals made during 1992. Upon declaration of the inoperability of the Thermo-Lag fire barrier system, GPU Nuclear initiated compensatory measures in accordance with the guidance in NRC Bulletin 92-01. **TMI-1 operated under compensatory measures as described in GPU Nuclear's responses to NRC Bulletin 92-01 until the implementation of the Thermo-Lag 330-1 fire barrier corrective actions was completed.**

III. EVENT DESCRIPTION

Thermo-Lag fire barriers were installed to achieve compliance with the requirements of 10 CFR 50 Appendix R Section III.G. In response to the declaration that the Thermo-Lag fire barriers were inoperable, GPU Nuclear planned and implemented a series of modifications to restore the fire barriers to an operable status using Mecatiss (a new material). On September 25, 1998 during the project to upgrade the Thermo-Lag fire barriers with Mecatiss, a fire barrier joint was found not have the required trowel-grade material applied. CAP T1998-0713 documented the condition which was later reported by LER 98-011-00. At that time, programmatic failures were not indicated based on this single deficiency. The root cause investigation for LER 98-011-00 initiated a corrective action to determine the extent of the condition which involved expanding the base Thermo-Lag inspections of the upgrade project to include non-upgraded portions of Thermo-Lag barriers made accessible from ladders and/or scaffolding used during the upgrade project. During the course of the barrier inspections, it became evident that the condition described in LER 98-011-00 was the result of a programmatic problem rather than an isolated occurrence.

Two discrepancy categories were identified during the inspection activities. "Original construction" deficiencies were defined as those that resulted from improper installation and not identified during the installation inspections. "Post Installation" deficiencies were those involving barrier damage that occurred over time from various causes following installation.

GPU Nuclear commissioned an independent review board (IRB) to examine the nature, extent, causes, corrective actions, and implications of the Thermo-Lag deficiencies being encountered and provide recommendations to management. The IRB met on November 1, 1998 and based on their investigation, concurred with the GPU Nuclear management decision to inspect all Thermo-Lag fire barriers joints and seams.

As inspection activities continued, minor installation deficiencies were identified and documented in the site corrective action process in accordance with 10 CFR 50, Appendix B as described in the Fire Protection Program. The majority of the "original construction" Thermo-Lag deficiencies identified were short seam or joint segments that were found to be missing the Thermo-Lag trowel grade filler material. **These filler material omissions were in out of the way, hard to reach places which were equally as hard to inspect. These deficiencies therefore, went undetected until the detailed inspection recently performed. A complete listing of documented deficiencies by fire zone and barrier is contained in the attached tables.**

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**Compensatory measures associated with specific fire zones remained in place until the Thermo-Lag 330-1 fire barrier corrective actions for the zone were completed. Barrier inspection identified deficiencies provided evidence that:**

1. barrier installation activities were not in accordance with the installation design criteria and therefore the configuration was not exactly as tested,
2. the barrier construction inspection program was not thorough enough and,
3. the cyclic surveillance to inspect fire barriers was insufficient to identify these joint and seam deficiencies.

**IV. AUTOMATIC OR MANUAL INITIATED SAFETY SYSEM RESPONSES**

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

**V. FAILURES AND ERRORS**

Root Cause: Required procedure / document not followed (C6Db).

The deficient Thermo-Lag barrier joints and seams categorized as "original construction" were each examined and considered to be the result of deviation from the installation specification during barrier installation.

Contributing causes for the personnel errors during the installation and inspection of Thermo-Lag were determined to result from weak post installation inspection requirements. Inspection of completed Thermo-Lag joints and seams was based on a "sampling" methodology which in and of itself allowed a number of installation deficiencies to go undetected. Sampling based inspection may also have fostered a reduced effort by the installers to meet the installation requirements. Although not proved, the supposition appears valid since the deficiencies identified were, as a rule, located in hard to reach and inspect, congested areas.

"Post installation" damage was found to be a contributing cause of many deficiencies. Incidental damage to the joints and seams of the Thermo-Lag fire barriers was inadvertently caused by workers performing tasks in close proximity to the fire barriers. The joints and seams that were subject to incidental damage showed cracking where the barrier was bumped, stepped on or otherwise used for support. Plant personnel were generally unaware of the sensitivity of the barrier installations to incidental damage, what constituted a degraded Thermo-Lag barrier or that they should report barrier damage.

An additional contributor was the inadequate scope and rigor of the cyclic fire barrier inspection surveillance which resulted in the inability of this inspection to have previously identified these deficiencies. Since the installation of the Thermo-Lag barrier system, a refueling frequency surveillance has been performed which requires the visual inspection of each Thermo-Lag barrier to verify that it has not degraded to the point that it does not perform its intended function. The intent of this surveillance was to identify obvious physical damage that may have occurred during the cycle. Completing the surveillance in accordance with the proceduralized guidance and performance expectations contributed to the failure to identify either the "original" or "post" construction barrier deficiencies earlier.

Due to the intervening years between the installation of the Thermo-Lag barrier system in 1987 and discovery of these deficiencies, the underlying root cause can only be speculated upon and not be determined with any certainty.

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

The circuit protection requirements of components enclosed by degraded Thermo-Lag fire barriers were not satisfied, component cables relied upon for continued plant operation could have been damaged in the event of a significant fire in these fire areas. The result of such damage could be realized as a loss of power, control, or indication for components required for safe shutdown in the event of a fire.

**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.

1. LER 98-003 / CAP T1998-0071 - 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**

Completed Corrective Actions:

1. Applicable compensatory fire watches were instituted until the barriers involved were repaired. This action was taken in accordance with the "Fire Protection Program" (AP 1038, Exhibit 2) The compensatory measures committed to in 1992 were supplemented when breaches were found in areas.
2. All Thermo-Lag barriers had a 100% inspection of joints and seams to ensure compliance with the accepted installation criteria to ensure that the Thermo-Lag /Mecatiss barriers will perform their intended function.
3. Wherever joint and/or seam deficiencies were identified, trowel grade material was applied where practical and in some cases the Thermo-Lag barrier was replaced with an approved Mecatiss fire barrier configuration in accordance with approved procedures.
4. Maintenance Supervisors responsible for installation activities and all Quality Verification personnel who perform the inspections of the completed barriers were briefed on the original Thermo-Lag barrier construction deficiencies for the purpose of assuring that similar problems would not occur during the installation of Mecatiss.
5. Adequate communication of the Thermo-Lag "post installation" deficiencies with Operations, Maintenance and Radiological Controls personnel was accomplished through the Management Interface process. The sessions addressed fire barrier materials and their potential for damage, corrective actions required if damage is found or caused, steps to prevent damage, and requirements to inspect work areas to ensure no damage to barrier materials was caused.
6. Work planners have been trained to incorporate steps in the post maintenance testing section of work packages to require inspection of fire barriers that may be affected by the evolution.

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7. The scaffold control program was changed to require a post maintenance inspection prior to scaffold tear down to ensure no damage has occurred.
  8. The fire barrier inspection procedure, SP 1303-12.24 was enhanced to clarify inspection criteria and to specify the use of inspection methods and devices that will allow a more thorough inspection of the accessible barrier elements.
  9. **A training module addressing the Thermo-Lag related deficiencies and corrective actions was presented to engineering personnel through the Engineering Support Personnel training program.**
- The Energy Industry Identification System (EIS), 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).

**ATTACHMENT 1  
ORIGINAL CONSTRUCTION DEFICIENCIES**

Location	Description
<p>Auxiliary Building -AB-FZ-3</p> <p>-AB-FZ-4</p> <p>-AB-FZ-5</p> <p>-AB-FZ-7</p>	<p>Barrier 1AXC-FB04 thermal shorts at four locations missing trowel grade material (2 at ground straps at the west penetration, a unistrut gap at the East penetration, and a center support unistrut all measuring less than 1/4" width.</p> <p>Barrier 1AXC-FB01 seam above the cable tray is missing trowel grade material measuring 1/8"x2".</p> <p>Barrier 1AXC-FB02 the conduit run seams behind cable tray 614 (element 973) missing trowel grade material measuring 1/8"x6".</p> <p>Barrier 1AXC-FB02 the conduit run seam west of box 590 (element 972) missing trowel grade material measuring 1/8"x2".</p> <p>Barrier 1AXC-FB02 the conduit run on the west side of hanger 1AVC-C188 (element 969) has a 1/2" hole and a bad fit up missing trowel grade material.</p> <p>Barrier 1AXC-FB02, (element 968) 90 degree angle seam missing trowel grade material measuring 1/4"x2" from its back side.</p> <p>Barrier 1AXC-FB02, (element 962) coupling seam missing trowel grade material measuring 1/4"x3" from its back side.</p> <p>Barrier 1AXC-FB02, (element 964) radial bend missing trowel grade material from numerous seams on its back side and underneath measuring 1/4"x3" each. Three locations on the bend contain similar deficiencies.</p> <p>Barrier 1AXC-FB05 (element 129) unistrut support not filled with Kaowool or end sealed 9" of the 18" from the entity. A conduit joint had an opening approx 1/2".</p> <p>Barrier 1AXC-FB06, 1st element seam from the north wall missing trowel grade material measuring 1/4"x6" from its back side. 9. On fire Barrier 1AXC-FB06, coupling piggybacked with 1AXC-FB02, (element 973) has a 1/2" hole where trowel grade material missing.</p> <p>Barrier 1AXC-FB06, last element running with 1AXC-FB02 (element 972) missing trowel grade material from a 1/2" gap on its joint.</p> <p>Barrier 1AXC-FB05, (element 129) missing trowel grade material as identified: 6" joint on the east side; 1/4" X 3" seam on the south east middle; 1/4" X 3" seam on the south west middle; West end of the penetration has a Thermal Short missing Trowel Grade 1/4" X 1"; North west upper corner has two 1/4" X 6" Thermal Shorts with gaps and exposed stress skin; West end Unistrut Thermal Short missing fill; South east upper top seam.</p> <p>Barrier 1AXD-FB03 has 4 thermal short breaches less than 1/4" in width approx 1" long and a breach approx 3/8" x 2" long.</p> <p>Barrier 1AXD-FB01 original construction defects do not require repair since the barrier upgrade with Mecatiss "as-is". The defects found were all greater than 0.050" and greater than 0.250".</p>
<p>Control Building -CB-FA-1 (306'Elev)</p>	<p>Barrier 1CCD-FB01, several locations missing trowel grade material measuring 1/16" wide and vary in length from 1/8" to 2" long.</p> <p>Barrier 1CCD-FB01, several seams missing trowel grade material measuring less than 1/4" wide and vary in length from 1/8" to 2" long.</p> <p>Barrier 1CCD-FB02, several locations missing trowel grade material measuring 1/16" wide and vary in length from 1/4" to 2" long.</p> <p>Barrier 1CCD-FB02, seven locations missing trowel grade material measuring 1/16" wide and vary in length from 1/8" to 2" long.</p> <p>Barrier 1CCD-FB03, (element 228) thermal short missing trowel grade material approx. 3" of fillet.</p> <p>Barrier 1CCD-FB03, (element 836) thermal short where the passed through the angle iron missing trowel grade.</p> <p>Barrier 1CCD-FB04, twelve locations missing trowel grade material measuring 1/16" wide and vary in length from 1/4" to 2" long. Two holes one 1/8" in diameter the other was 1/4" in diameter.</p> <p>Barrier 1CCD-FB04, several seams missing trowel grade material measuring less than 1/4" wide and vary in length from 1/8" to 2" long.</p> <p>Barrier 1CCD-FB05, three locations missing measuring 1/16" wide and vary in length from 1/2" to 2" long.</p> <p>Barrier 1CCD-FB06, four locations missing trowel grade material measuring 1/16" wide and vary in length from 1/2" to 1" long.</p> <p>Barrier 1CCD-FB06, several seams missing trowel grade material measuring less than 1/4" wide and vary in length from 1/8" to 2" long.</p> <p>Barrier 1CCD-FB06, (element 28) seam at coupling missing Trowel Grade approx. 1" long and (element 610) seam 8" X 1/8" missing trowel grade fillet.</p> <p>Barrier 1CCD-FB06, was found with a coupling seam not filled with trowel grade material where it adjoins to 1CCD-FB04.</p> <p>Barrier 1CCD-FB08, (element 874) area on the radial bend armor cable missing preformed and trowel grade material about 3.5" long and 2" wide just under 1CCD-FB09 (element 901).</p>

**ATTACHMENT 1  
ORIGINAL CONSTRUCTION DEFICIENCIES**

Barrier 1CCD-FB08, several seams missing trowel grade material measuring less than 1/4" wide and vary in length from 1/8" to 2" long.  
 Barrier 1CCD-FB08, hole at conduit to coupling interface measuring 1/4" by 1/4" and trowel grade material missing for about 90 degrees of the interface.  
 Barrier 1CCD-FB08, seam at a coupling interface to bracket t 3" X 1/16".  
 Barrier 1CCD-FB08, conduit to support seam missing trowel grade material measuring about 1/4" X 3".  
 Barrier 1CCD-FB09, (element 141) has thermal short where Unistrut was not wrapped as part of the thermal short barrier.  
 Barrier 1CCD-FB09, several locations missing trowel grade material measuring 1/16" wide and vary in length from 1/8" to 2" long.  
 Barrier 1CCD-FB09, several seams missing trowel grade material measuring less than 1/4" wide and vary in length from 1/8" to 2" long.  
 Barrier 1CCD-FB09, seam at coupling to bracket interface missing trowel grade material measuring about 9" long varying in width about 1/16" to 1/4".  
 Barrier 1CCD-FB10, (element 911) coupling end missing trowel grade material about 1" long and 1/4" deep.  
 Barrier 1CCD-FB10, several seams missing trowel grade material measuring less than 1/4" wide and vary in length from 1/8" to 2" long.  
 Barrier 1CCD-FB10, conduit to support 1/2" X 1/8" and conduit to conduit 1/2" X 1/8" top areas missing trowel grade material.  
 Barrier 1CCD-FB11, conduit to conduit top seam missing trowel grade material measuring about 3/8" X 2".  
 Barrier 1CCD-FB12, several seams missing trowel grade material measuring less than 1/4" wide and vary in length from 1/4" to 2" long.  
 Barrier 1CCD-FB12, 1" seam missing trowel grade material measuring <1/4" X 3" and an elbow has a plug approximately 1" diameter with insufficient fill.  
 Barrier 1CCD-FB12, conduit to coupling seam trowel grade material measuring about 1/4" X 2".  
 Barrier 1CCD-FB13, several seams missing trowel grade material measuring less than 1/4" wide and vary in length from 1" to 4" long.  
 Barrier 1CCD-FB14 horizontal conduit run gap 1/2"x2" above the count room.  
 Barrier 1CCD-FB15, several radial seams missing trowel grade material measuring 1/4" in width and are 6" long.  
 Barrier 1CCD-FB17, numerous pie shaped sections missing trowel grade material on a radial bend. They measure 1/4" in width and are all about 8" long.  
 Barrier 1CCD-FB18, several seams missing trowel grade material measuring less than 1/4" wide and vary in length from 1/2" to 1" in length.  
 Barrier 1CCD-FB20, multiple breaches on elbow north end.  
 Barrier 1CCD-FB21, seam missing trowel grade material measuring 1/4" x 3".  
 Barrier 1CCD-FB22, several locations missing trowel grade material measuring 1/16" wide and vary in length from 1/4" to 2" long.  
 Barrier 1CCD-FB22 there are several locations where the seams are missing trowel grade material. All gaps are less than 1/4" wide and vary in length from 1/8" to 2" long.  
 Barrier 1CCD-FB24, several seams missing trowel grade material measuring less than 1/4" wide and vary in length from 1/8" to 2" long.

CB-FA-2B (1S 480v swgr Room (322' Elev))

Barrier 1CCE-FB02, element 299, several locations with seams splits along Thermal shorts located above the cable tray above AH-E-95A/B measuring less than 1/4" in width and varied in length from 1" to 4". Unistrut next to AH-E-95A the inner channel is missing firedam material. Barrier seam next to AH-E-95A is missing trowel grade material over its entire length (1/4"x36"). Six locations along this fire barrier have thermal shorts missing trowel grade material, measuring less than 1/4" and vary in length from 1" to 4".  
 Barrier 1CCE-FB02, element 159, west wall seam missing trowel grade material entire length(1/8"x36").  
 Barrier 1CCE-FB03, element 303, four locations seams are missing trowel grade material measuring less than 1/4" in width and vary in length from 1" to 3".  
 Barrier 1CCE-FB03, element 309, seam missing trowel grade material measuring 1/4"x 4" next to the east wall penetration.  
 Barrier 1CCE-FB10, element 362, at the penetration interface ,seam missing trowel grade material measuring 3/16"x1". Element 364 on the conduit three locations seams missing trowel grade material measuring less than 1/4" in width and each 1" in length.

**ATTACHMENT 1  
ORIGINAL CONSTRUCTION DEFICIENCIES**

<p>-CB-FA-2C (Remote S/D, Alt TSC area (322' Elev))</p> <p>-CB-FA-2D (A Inverter Room (322' Elev))</p> <p>-CB-FA-2G ('B' Battery Room (322' Elev))</p> <p>-CB-FA-3A (Control Tower 1D 4KV swgr room (322' Elev))</p> <p>-CB-FA-3B (Control Tower 1E 4KV swgr room (322' Elev))</p>	<p>Barrier 1CCE-FB03, two locations missing trowel grade material: 1- at the penetration on a seam measuring 1/4"x1" and 2- at the end of the red conduit Thermal short (entire end is missing trowel grade material)</p> <p>Barrier 1CCE-FB-04, a 1" thickness of M board found used between the ceiling penetration seal and the end of the existing TSI material vs. TSI material. <b>REPORTED VIA LER 98-006-00</b></p> <p>Barrier 1CCE-FB07, element 346, six locations along back seam, element 176 on its back seam and at hanger 1CCE-C316 for a 90 degree seam section missing trowel grade material. Discrepancies measure less than 1/4" and vary in length from 1" to 10".</p> <p>Barrier 1CCG-FB05, element 391, north of hanger 1CCG-C171 seam missing trowel grade material measuring 1/4"x1"</p> <p>Barrier 1CCG-FB05, conduit box seam between elements 401 and 402 missing trowel grade material measuring 1/4"x3".</p>
<p>Fuel Handling Building- FH-FZ-1</p>	<p>Barrier 1FHC-FB01, several seams missing trowel grade material measuring 1/8" in width and are 1" long.</p> <p>Barrier 1FHC-FB01, eight locations in the seal return cooler hallway overhead barrier missing trowel grade material measuring less than 1/4" in width and vary in length from 1" to 6".</p> <p>Barrier 1FHC-FB01, fourteen locations, in the cable tray in the seal return cooler hallway overhead, seams missing trowel grade material measuring less than 1/8" wide and vary in length from 1/8" to 1 1/2" long.</p> <p>Barrier 1FHC-FB01, at the radial bend in the cable tray in the seal return cooler hallway overhead there are 3 locations where the barrier is missing trowel grade material.</p> <p>Barrier 1FHC-FB04, has two thermal shorts on the bottom of the box missing trowel grade material along seams where TSI preformed sections abut the bos. They are both 1/8" and go all the way around the circumference of the barrier (about 6")</p> <p>Barrier 1FHC-FB05, above the change out room near the north penetration, the barrier seams are missing trowel grade material, The gaps are less than 1/4" and equal 1" in length.</p> <p>Barrier 1FHC-FB05, several seams missing trowel grade material measuring 1/8" in width and are all about 1" long.</p> <p>Barrier 1FHC-FB06, section missing trowel grade material measuring 1/8"x2" and a split seam 1/8" wide and intermittent for about 2 feet also that is missing trowel grade.</p> <p>Barrier 1FHC-FB06, two thermal shorts less than 1/4" diameter and 12" from the entity.</p> <p>Barrier 1FHC-FB06, tray support Elevation 111-111 area missing trowel grade material inside one Unistrut and on an outside seam on the West side of the tray support.</p> <p>Barrier 1FHC-FB06 at junction to barrier 1FHC-FB15, seam missing trowel grade material measuring about 5" long and 1/2" to 1/4" taper. <b>REPORTED VIA LER 98-011-00</b></p> <p>Barrier 1FHC-FB06, (element 457) has a unistrut that was not filled as part of the thermal short protection.</p> <p>Barrier 1FHC-FB06, 2 tray supports not sealed, a void extended from 2 to 9 inches on the inside of the unistrut or seam around outer edge between the unistrut and Thermo-Lag.</p> <p>Barrier 1FHC-FB06, element 452 unistrut not sealed (two openings 1"x 1/8" and about 1/4"x 1/8") missing trowel grade material also outer seam missing trowel grade material approximately 4" along seams.</p> <p>Barrier 1FHC-FB06, section missing trowel grade material measuring 1/8"x2" and a split seam 1/8" wide and intermittent seam gap about 2 feet also missing trowel grade material at interface with 1FHC-FB14.</p> <p>Barrier 1FHC-FB07, seam missing trowel grade material measuring 1/4" in width and is 8" long.</p> <p>Barrier 1FHC-FB08, several seams missing trowel grade material measuring 1/8" in width and are all about 1" long.</p>

**ATTACHMENT 1  
ORIGINAL CONSTRUCTION DEFICIENCIES**

<p>Fuel Handling Building- FH-FZ-2</p> <p>FH-FZ-5</p> <p>FH-FZ-6 (Chiller Room)</p>	<p>Barrier 1FHC-FB13 box 524 element 164 has a number of breaches two on the top west seam, top north seam open for most of its length and top south seam open intermittently for its length.</p> <p>Barrier 1FHC-FB14, seam missing trowel grade material along South bottom edge for a length of about 18".</p> <p>Barrier 1FHC-FB15, area missing trowel grade material measuring 1/2" x 3" and a thermal short at unistrut on East side.</p> <p>Barrier 1FHC-FB15, several seams missing trowel grade material. All gaps are less than 1/4" wide and they vary in length from 1/4" to 2" long.</p> <p>Barrier 1FHC-FB16, area missing trowel grade material measuring 1/2" x 4".</p> <p>Barrier 1FHC-FB16, element 168 penetration box has Thermal Short on the North end of the box protruding out of the cable tray has missing trowel grade material along a seam approx. 4" long by &lt; 1/4" width.</p> <p>Barrier 1FHC-FB16, seam missing trowel grade material measuring about 1/2" X 18" in length.</p> <p>Barrier 1FHC-FB18, seam missing trowel grade material along North bottom edge for a length of about 12".</p> <p>Barrier 1FHC-FB20, support not wrapped in accordance with original design (trowel grade fillet not present and not buttered).</p> <p>Barrier 1FHC-FB20, several seams missing trowel grade material measuring less than 1/4" wide and vary in length from 1/2" to 4".</p> <p>Incorrect duct ( 4" conduit ) in the overhead protected by Thermo-Lag fire barrier material. <b>REPORTED VIA LER 98-003-00</b></p> <p><b>Barrier 1CCD-FB23 trowel grade material was missing from the seam less than 1/4" wide by approximately 1" long.</b></p> <p>Barrier 1AXC-FB03 4 thermal short breaches (in the overhead) less than 1/4" in width by approximately 1" long and a breach of approximately 3/8" x 2" long on the barrier.</p> <p>Barrier 1CCC-FB01, element 12, several locations top seam is missing trowel grade material measuring 1/4" wide and the lengths vary from 1" to 3".</p> <p>Barrier 1CCC-FB02, element 13, seam missing trowel grade material measuring 1/16"x6". Numerous thermal shorts missing trowel grade material measuring less than 1/4" in width and vary in length from 1/2" to 4".</p> <p>Barrier 1CCC-FB05, element 16, two thermal shorts missing trowel grade material measuring 1/8"x1".</p> <p>Barrier 1CCC-FB06, two top seams missing trowel grade material. Both measure 1/8"x1 1/2" in size, however this barrier is not in the appendix R scope and does not require to be operable for safe shutdown concerns.</p> <p>Barrier 1CCC-FB07, element 220, top seam missing trowel grade material measuring less than 1/4" with length varying from 1" to 3".</p>
<p>Screen House Fire Area- ISPH-FZ-1 (South Bay)</p> <p>ISPH-FZ- 2 (North Bay)</p>	<p>Barrier 1SHD-FB01 at the top and bottom of the box the conduit was missing trowel grade material.</p> <p><b>Barrier 1SHD-FB03, element 76, where the element meets the bottom of the box (element 75) the back side seam is missing trowel grade material measuring 1/4" wide and 4" long.</b></p> <p>Barrier 1SHD-FB05, two locations missing trowel grade material measuring less than 1/8" in width and vary in length from 1/2" to 1".</p> <p>Barrier 1SHD-FB05, element 80, two locations missing trowel grade material measuring less than 1/8" in width and vary in length from 1/2" to 1".</p> <p>Barrier 1SHD-FB05, element 571, six locations missing trowel grade material measuring less than 1/4" in width and vary in length from 1" to 6"</p> <p>Barrier 1SHD-FB06, element 517, 3 locations missing trowel grade material measuring less than 1/8" in width and vary in length from 1/4" to 8".</p> <p>Barrier 1SHD-FB06, four locations missing trowel grade material measuring less than 1/8" in width and vary in length from 1/8" to 1"</p> <p>Barrier 1SHD-FB06, element 518 two locations missing trowel grade material measuring less than 1/8" in width and vary in length from 1/8" to 1".</p> <p><b>Barrier 1SHD-FB06, element 519, there are 5 locations in the barrier that have missing trowel grade material all gaps are less than 1/8" in width and vary in length from 1/8" to 1".</b></p> <p>Barrier 1SHD-FB06, element 83, three locations missing trowel grade material measuring less than 1/4" in width and vary in length from 1" to 6".</p>

**ATTACHMENT 1  
ORIGINAL CONSTRUCTION DEFICIENCIES**

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**ATTACHMENT 2  
POST CONSTRUCTION DEFICIENCIES**

Location	Description
<p>Auxiliary Building -AB-FZ-3</p> <p>-AB-FZ-4</p> <p>-AB-FZ-5</p> <p>-AB-FZ-7 (306' AB closed cycle cooling pump area)</p>	<p>Barrier 1AXC-FB04 cable tray has numerous cracks, 1/4" in width along the banding and cover Barrier 1AXC-FB09 conduit at east penetration shows signs of post installation separation. These also are less than 1/4" width,</p> <p>Barrier 1AXC-FB01 on the radial bend as it exits box 590, the TSI seam is split for about 2". Barrier 1AXC-FB02 a thermal short associated with a grounding strap has broken 360 degrees where it interfaces with the barrier. the gap is 1/8" completely around the thermal short. Barrier 1AXC-FB05 Penetration element 129 has numerous discrepancies: two Thermal Shorts with split seams on the bottom that are about 1/8" X 9" each, 1/4" hole rubbed in the north west bottom corner, two Thermal shorts with split seams along the Reactor Building wall on the north side about 1/8" X 9" each, below and along the Reactor Building wall are three Thermal shorts with split seams about 1/8" X 6" each. Barrier 1AXC-FB05 had a missing fillet for about 1" and a support on a thermal short was degraded where the conduit joins the support. Barrier 1AXC-FB07 on MU-V-14A Thermo-Lag has an opening about 5/8" diameter to the sealite on Element 187 on the under-side near where the sealite meets the conduit and 3 other indications of slight damage. Barrier 1AXC-FB10, elements 194 to 197, has multiple small (&lt;1/4" wide by &lt;3" long, and a hole about 1" square in an elbow) breaches to the entity along its entire length. Barrier 1AXC-FB10 was found degraded with numerous cracks. Two cracks were open enough to allow penetration of the barrier.</p> <p>Barrier 1AXC-FB01 ground cable thermal short at a coupling was pulled away during Mecatiss work in the area. This will be repaired with an MPF-60 Mecatiss dry fit installation which is in progress. The opening is less than 1/4" width Barrier 1AXC-FB03 TSI was found to be 1" thick and does not need Mecatiss upgrade. Barrier has a 6" long crack, 1/2" deep and &gt;0.050" but &lt;0.250" wide. The defect requires repair for a stand alone TSI barrier.</p> <p>Barrier 1AXD-FB01 has a number of minor defects all &gt;0.050" but &lt;0.250" wide. The barrier is qualified for upgrade with Mecatiss under BA 417109 "as-is". Although these items would require repair in a stand alone Thermo-Lag configuration, they are qualified by fire testing without repair for Thermo-Lag covered with Mecatiss. Barrier 1AXD-FB01 at T5431 support has 3 seams all less than 3" X 1/32", and a support to tray seam approx. 9" X 1/32" not completely filled with Trowel Grade material. P1001 Unistrut Support to Trays 597, &amp; 183 is missing the Thermo-Lag inside the Unistrut and the south seam was not fully filled with Trowel Grade. Both sides of the P1001 Unistrut inside the South Tray support are missing the Trowel Grade fill.</p>
<p>Control Building -CB-FA-1 (306'Elev)</p> <p>CB-FA-2B (1S 480v swgr Room (322' Elev))</p>	<p>Barrier 1CCD-FB02 element 19 has a 1" seam crack that appears to be degradation. Barrier 1CCD-FB03 element 226 there is about a 1" crack and element 229 there is a 1" seam split both indications appear to be degradation. Barrier 1CCD-FB06 element 264 there is a 1" seam split and element 273 splice box corner has a 3" crack and element 610 top left hand seam an 18" long crack. All indications appear to be degradation. Barrier 1CCD-FB11 Angle Iron support was cut about 2" from exterior of element 671 Barrier 1CCD-FB13 has a minor crack &lt;1/8" in width and conforms to the dry fit criteria for repair. Barrier 1CCD-FB14 element 727, there is a 1" square section of TSI missing on an incidental thermal short. Barrier 1CCD-FB14 has a hole about 3/8" by 1" to the armor cable and a facial crack at a conduit seam. Barrier 1CCD-FB16 there are several locations where the seams are missing trowel grade material. All gaps are less than 1/4" wide and vary in length from 1/8" to 2" long. Barrier 1CCD-FB19 has a degraded area at a vertical to horizontal joint.</p> <p>Barrier 1CCE-FB02 element 299 there appears to have been work on AH-E-95A which caused damage to TSI thermal shorts to this barrier. On the hanger next to AH-E-95A there is a section 4" long where the TSI appears to have been completely broken off and not replaced. Also on 20/EP 95A TSI there were cracks (1/8"x1") that appear to have been caused by the same work.</p>

**ATTACHMENT 2  
POST CONSTRUCTION DEFICIENCIES**

<p>-CB-FA-2C (Remote S/D, Alt TSC area (322' Elev))</p> <p>-CB-FA-2D (A Inverter Room (322' Elev))</p> <p>-CB-FA-2E (1B Inverter Room)</p> <p>-CB-FA-2G ('B' Battery Room (322' Elev))</p> <p>-CB-FA-3A (Control Tower 1D 4KV swgr room (322' Elev))</p> <p>-CB-FA-3B (Control Tower 1E 4KV swgr room (322' Elev))</p>	<p>Barrier 1CCE-FB07 there were several locations (4) with seams splits along the back seam of the barrier. All of these splits were less than 1/4" in width and varied in length from 1" to 4".</p> <p>Barrier 1CCG-FB01 elements 378, 379, and 380 there are several locations on the backside of the seams that are split and need trowel grade material applied.</p> <p>Barrier 1CCG-FB01 has a number of joint cracks located above tray 41 with a maximum width of 1/8".</p> <p>Barrier 1CCG-FB05 element 391, there were several locations where the seam split, causing the trowel grade material to be insufficient along the back seam. The size of the split is 1/8" to 1/4" in width intermittently along a 5' length of the barrier.</p> <p>Barrier 1CCG-FB05 element 393 there is a seam split on the backside of the barrier measuring 1/8"x3".</p> <p>Barrier 1CCG-FB03 element 386, a 1/8"x1" seam was missing trowel grade material.</p>
<p>Fuel Handling Building- FH-FZ-1</p>	<p>Barrier 1FHC-FB02 Tray has a full depth crack across the top from 1/8" to 3/16" wide at a joint. There is no Tray cover on this tray.</p> <p>Barrier 1FHC-FB02 seams were breached.</p> <p>Barrier 1FHC-FB03 element 48 has a hole in the top which was used for installation of foam seal at the end of the cable tray.</p> <p>Barrier 1FHC-FB04 found to have a hole at the top of the unistrut at the top end of a barrier.</p> <p>Barrier 1FHC-FB04 Tray has a joint crack along the joint at the top cover of the Thermo-Lag for approx one; foot.</p> <p>Barrier 1FHC-FB06 element 456 tray has a seam that previously was coated with Trowel Grade Material, which has degraded over time leaving an opening 1/2" X 1/4" and 2 openings that are about 1/4" X 1/8".</p> <p>Barrier 1FHC-FB06 has a one inch thermal short on a cable tray support on element 456.</p> <p>Barrier 1FHC-FB06 has a thermal short identified; a 1/16" X 18" long crack that runs horizontally at a seam.</p> <p>Barrier 1FHC-FB06 tray Thermo-Lag had a gap approximately 6' long and 1/8" wide where the lower board separated from the side at a joint that penetrated the barrier.</p> <p>Barrier 1FHC-FB06 in the North End of the Neutralizing Tank room of the 281' Fuel Handling Building was discovered to have a 1" X 1/8" gap on the side seam where trowel mix had separated.</p> <p>Barrier 1FHC-FB07 has a seam opening located under some structural steel South side of Element 460, and a hole in the TSI barrier with mineral wool exposed at the North side of Element 939, next to this hole there is a crack at the barrier/wall interface.</p> <p>Barrier 1FHC-FB10 has two locations where trowel grade mix joins preformed sections on a radial bend, that the armored cables are not completely encapsulated.</p> <p>Barrier 1FHC-FB11 has a thermal short armor cable (RE-180B) without Thermo-Lag applied, 18" criteria and there was a hole where the armor cable entered the entity. The ground cable protruding from the penetration has a seam cracked approx 9" on both sides.</p> <p>Barrier 1FHC-FB13 element 164 has 9 thermal shorts at west end seams resulting from shrinkage degradation.</p> <p>Barrier 1FHC-FB15 was damaged on the lower right hand corner during inspection.</p>

