

AmerGen Energy Company, LLC  
Three Mile Island Unit 1  
Route 441 South, P.O. Box 480  
Middletown, PA 17057

Telephone: 717-948-8000

An Exelon Company

June 23, 2005  
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10 CFR 50.73

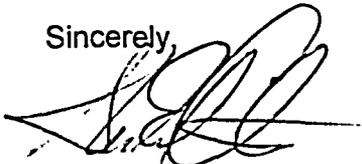
U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D.C. 20555

THREE MILE ISLAND NUCLEAR STATION, UNIT 1 (TMI-1)  
OPERATING LICENSE NO. DPR-50  
DOCKET NO. 50-289

SUBJECT: LICENSEE EVENT REPORT (LER) NO. 2005-002-00  
"SAFE SHUTDOWN ANALYSIS FOR CONTROL BUILDING FIRE AREA 1 WAS  
DISCOVERED TO HAVE FLAWS IN THE FIRE MITIGATION STRATEGY DUE  
TO INSUFFICIENT TECHNICAL RIGOR"

This report is being submitted in accordance with 10 CFR 50.73 (a)(2)(ii)(B). For additional information regarding this LER contact Adam Miller of TMI Unit 1 Regulatory Assurance at (717) 948-8128.

Sincerely,



Glen E. Chick  
Plant Manager

GEC/awm

ATTACHMENT: List of Regulatory Commitments

cc: TMI Senior Resident Inspector  
Administrator, Region I  
TMI-1 Senior Project Manager  
File No. 05042

IE22

## SUMMARY OF AMERGEN ENERGY CO. L.L.C. COMMITMENTS

The following table identifies commitments made in this document by AmerGen Energy Co. L.L.C. (AmerGen). Any other actions discussed in the submittal represent intended or planned actions by AmerGen. They are described to the NRC for the NRC's information and are not regulatory commitments.

COMMITMENT	COMMITTED DATE OR "OUTAGE"
No regulatory commitments are being made in this submittal.	N/A

**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.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Three Mile Island, Unit 1	05000289	1 OF 4

**SAFE SHUTDOWN ANALYSIS FOR CONTROL BUILDING FIRE AREA 1 WAS DISCOVERED TO HAVE FLAWS IN THE FIRE MITIGATION STRATEGY DUE TO INSUFFICIENT TECHNICAL RIGOR**

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	
04	27	2005	2005	002	00	06	23	2005			
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)									
N		20.2201(b)			20.2203(a)(2)(v)			50.73(a)(2)(i)		50.73(a)(2)(viii)	
POWER LEVEL (10)		20.2203(a)(1)			20.2203(a)(3)(i)			X 50.73(a)(2)(ii)		50.73(a)(2)(x)	
100		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	TELEPHONE NUMBER (Include Area Code)
Adam W. Miller of TMI-1 Regulatory Assurance	(717) 948-8128

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

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)		
YES	NO	MONTH	DAY	YEAR		
(If yes, complete EXPECTED SUBMISSION DATE)	X					

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

On April 27, 2005, a previously unidentified error associated with an Appendix R fire scenario involving multiple high impedance faults (MHIF), in the 306' elevation of the Control Building, was identified. An engineering evaluation has determined that the operations procedure for recovery of vital power for instrumentation and control, following a postulated fire/MHIF scenario in this area, would not be successful. The original evaluation of this fire/MHIF concern (in the 1987 timeframe) considered this event to be very improbable and incorrectly assumed that the recovery of vital power following a bus trip would be successful. The historical procedure incorrectly assumed that DC power (which is assumed lost in the fire) was not required to restart the necessary electrical recovery equipment.

The root cause is determined to be insufficient technical rigor applied in the technical analysis of the MHIF strategy and in the older procedure review process. The corrective action to address the root cause is addressed by IR 213719, which included establishing Exelon technical human factors procedure, HU-AA-1212.

This condition was determined to meet the following reporting criterion: the nuclear power plant being in an unanalyzed condition that significantly degraded plant safety (10 CFR 50.73 (a)(2)(ii)(B)).

	<b>DOCKET (2)</b>	<b>LER NUMBER (6)</b>			<b>PAGE (3)</b>
		<b>YEAR</b>	<b>SEQUENTIAL NUMBER</b>	<b>REVISION NUMBER</b>	
	05000289	2005	002	00	2 OF 4

**EVENT DESCRIPTION**

Plant Conditions before the event:

Babcock & Wilcox – Pressurized Water Reactor – 2568 MWth Core Power  
 Date/Time: April 27, 2005/approximately 1300 hours  
 Power Level: 100% steady state power prior to and during the event  
 Mode: Power Operations

On April 27, 2005, a previously unidentified error associated with an Appendix R fire scenario involving multiple high impedance faults (MHIF), in the 306' elevation of the Control Building, was identified. An engineering evaluation has determined that the operations procedure for recovery of vital power for instrumentation and control, following a postulated fire/MHIF scenario in this area, would not be successful. The original evaluation of this fire/MHIF concern (in the 1987 timeframe) considered this event to be very improbable and incorrectly assumed that the recovery of vital power following a bus trip would be successful. The historical procedure incorrectly assumed that DC power (which is assumed lost in the fire) was not required to restart the necessary electrical recovery equipment.

Safe shutdown analysis of fire in the 306' elevation of the Control Building (CB-FA-1) assumes all A train Engineered Safeguards (ES) power (AC, DC, and 125 Volt Vital AC) is lost, since these power supplies have unprotected cables in this fire zone. This area contains both Train A and Train B ES power for control and indication. Train B power must be protected from the effects of a fire in this area to the extent that safe shutdown components depend on B Train electrical power. The cables for the DC and AC to Inverters \*[EK/INVT] B and D (both in Train B) go through this area. The AC cables to Inverters B and D are protected from fire, but the DC cables are not protected from fire.

A fire in CB-FA-1 could cause loss of indication and control needed to maintain the plant in a safe shutdown condition. The AC source to the Inverters could be lost by trip of 1B ES Motor Control Center (MCC) \*[EK/MCC] due to Multiple High Impedance Faults (MHIF) on unprotected cables fed from 1B ES MCC.

The safe shutdown analysis didn't identify that a loss of all four vital buses could occur until B and D vital buses are recovered. The loss of control and indication was not addressed in the 1987 timeframe. There is no documentation acknowledging the condition.

In addition, procedure 1104-45P, "Fire Mitigation (Supplement to 1202-31[Fire])," actions for recovering the vital instrument buses were found deficient. The procedure directed the operator to re-energize 1B ES MCC with the inverters connected to the MCC. Restarting the inverters on the AC source may blow fuses or damage the inverters.

This potential loss of safe shutdown functions was reported to the NRC on 5/3/05. The report was made under 10 CFR 50.72(b)(3)(ii)(B) as an unanalyzed condition which could cause loss of safe shutdown functions from the control room and the remote shutdown panel.

1104-45P instructs shutting down the reactor, loading B Train ES buses on the Diesel Generator \*[EK/DG] then opening the breakers of unprotected DC circuits to protect the B battery, which include the B and D inverter feeds. The inverters continue to operate on AC unless AC is lost. If 1B ES MCC is lost due to MHIF, the Inverters B and D trip and control and indication are lost in the Control Room and at the Remote Shutdown Panel.

Interruption in the 480 VAC feed to the Inverters must be assumed since 1B ES Motor Control Center could trip due to Multiple High Impedance Faults (MHIF). The inverters would trip because the switches providing DC feed to the inverters have been opened. Trip of 1B ES MCC would cause loss of 1B and 1D inverters. 1A and 1C Inverters are not available because A Train power is not protected. Loss of all four inverters would leave the

	<b>DOCKET (2)</b>	<b>LER NUMBER (6)</b>			<b>PAGE (3)</b>
		<b>YEAR</b>	<b>SEQUENTIAL NUMBER</b>	<b>REVISION NUMBER</b>	
	05000289	2005	002	00	3 OF 4

control room and remote shutdown panels without needed indication and control.

The procedure that opens the DC feed to Inverter 1B and 1D was implemented on December 23, 1988. The procedure was implemented instead of a modification to protect the DC Cables in CB-FA-1.

### CAUSE OF EVENT

The decision to implement a procedure solution to resolve the Appendix R MHIF trip of the 1B ES MCC feeder breaker and DC fault concerns for a fire in area CB-FA-1 was flawed because it did not address the consequences of the loss of Control Room and Remote Shutdown indication and controls resulting from the MHIF trip of 1B ES MCC feeder breaker.

#### Root Cause:

Insufficient technical rigor applied in the technical analysis of the MHIF strategy and in the procedure review process.

### ANALYSIS / SAFETY SIGNIFICANCE

The consequence of the deficiency, if the event were to occur, is that the procedures previously in effect were not adequate for reaching safe shutdown. Required instrumentation and control would be lost due to 1B ES MCC trip. Overall plant risk is low due to the low probability of a MHIF event, and due to the existence of fire detection and sprinkler systems, and low fire loading in the affected area. The risk has been addressed by the addition of a fire watch that reduces the probability of damage due to fire and the interim procedure that takes post-fire preemptive action to isolate unprotected circuits.

The assessment of low overall risk of MHIF events is consistent with the risk informed approach in NRC Regulatory Issue Summary (RIS) 2004-03. In RIS 2004-03, the NRC states "Multiple high-impedance faults are considered of very low likelihood."

Although overall risk is low, the requirement to address MHIF remains in effect and the corrective actions are directed to achieving compliance.

### CORRECTIVE ACTIONS

#### **Immediate and Short Term Actions:**

1. Established 1 hour roving fire watch
2. Implemented an interim change to procedure 1104-45P, IC 18035, that takes post-fire preemptive action to isolate unprotected circuits.

#### **Long Term Corrective Actions:**

1. The corrective action to prevent recurrence has been addressed previously within our corrective action process via IR 213719. The Exelon technical human factors procedure, HU-AA-1212, has been established.
2. Install a modification to provide continuous power to vital bus B and D during an Appendix R fire scenario in area CB-FA-1.

	<b>DOCKET (2)</b>	<b>LER NUMBER (6)</b>			<b>PAGE (3)</b>
		<b>YEAR</b>	<b>SEQUENTIAL NUMBER</b>	<b>REVISION NUMBER</b>	
	05000289	2005	002	00	4 OF 4

3. Re-evaluate MHIF events in all fire zones for similar problems and resolve by a combination of procedure changes, design changes, and/or design analysis.

**PREVIOUS OCCURENCES**

There were no previous events reported at TMI related to the plant being in an unanalyzed condition related to Appendix R fire protection issues.

**ADDITIONAL INFORMATION**

A preliminary review was conducted of those fire mitigation procedures, which describe the action to recover a bus that has failed due to a MHIF event. This preliminary review did not identify any additional MHIF problems. A more comprehensive evaluation, described in the "Long Term Corrective Actions" above, is in progress.

\* 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).