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An Exelon Company

December 17, 2004  
5928-04-20261

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. 2004-001-00  
"HIGH PRESSURE INJECTION PUMP SEISMIC QUALIFICATION IMPACTED  
DUE TO AN OVERSIGHT IN THE DESIGN PROCESS WHEN POWER  
SUPPLIES FOR THE AUXILIARY OIL PUMPS WERE RELOCATED"

This report is being submitted in accordance with 10 CFR 50.73 (a)(2)(i)(B) and 10 CFR 50.73(a)(2)(v). 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. 04115

JE22

### 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.	

## 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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Three Mile Island, Unit 1

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TITLE (4)

HIGH PRESSURE INJECTION PUMP SEISMIC QUALIFICATION IMPACTED DUE TO AN OVERSIGHT IN THE DESIGN PROCESS WHEN POWER SUPPLIES FOR THE AUXILIARY OIL PUMPS WERE RELOCATED

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
02	05	2003	2004	001	00	12	17	2004	FACILITY NAME	DOCKET NUMBER
									FACILITY NAME	DOCKET NUMBER

  

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)				
POWER LEVEL (10)	100	20.2201(b)	20.2203(a)(2)(v)	X	50.73(a)(2)(i)	50.73(a)(2)(viii)
		20.2203(a)(1)	20.2203(a)(3)(i)		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)	X	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)(vi)			

## LICENSEE CONTACT FOR THIS LER (12)

NAME

Adam W. Miller of TMI-1 Regulatory Assurance

TELEPHONE NUMBER (Include Area Code)

(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)

YES  
(If yes, complete EXPECTED SUBMISSION DATE)

X NO

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR

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

On October 27, 2004, it was discovered that a condition which existed for approximately 4.5 hours during February 2003 should have been reported under the following criteria: 1) a condition prohibited by Technical Specifications (10 CFR50.73 (a)(2)(i)(B)), and 2) a condition that could have prevented fulfillment of a safety function (10 CFR50.73 (a)(2)(v)). This condition involved a Make-up Pump (MU-P-1B), which was assumed operable during surveillance testing of the emergency diesel generator in the redundant train. However, unknown at the time, MU-P-1B was not operable due to seismic qualification concerns associated with its auxiliary oil pumps.

An oversight during a modification in February 1990 did not specify a spacer be installed when relocating both auxiliary oil pump breakers for MU-P-1B to different Motor Control Centers (MCC). Without the spacer, the breaker engagement with the MCC bus bars was not adequate to assure seismic qualification, thus affecting the operability of MU-P-1B. This inadequate breaker engagement condition was identified on January 22, 2004, while troubleshooting a problem with one of the MU-P-1B auxiliary oil pumps. On January 23, 2004, the spacer plates were installed on the breakers for both oil pumps, restoring MU-P-1B operability. The root causes of the event were less than adequate (LTA) human performance during the design of the modification and LTA vendor documentation. The designer incorrectly assumed that the breaker units were interchangeable. Key corrective actions include: 1) revised the appropriate maintenance procedure to verify installation of spacer in this type of application, 2) revise the drawings for the MCCs to note when spacers are needed for proper breaker engagement, and 3) revise the appropriate Corporate Configuration Control procedures to invoke the requirements of Exelon procedures for technical human performance and technical rigor.

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## EVENT DESCRIPTION

Plant Conditions before the event:

Babcock & Wilcox – Pressurized Water Reactor – 2568 MWth Core Power

Date/Time: February 5, 2003 from 2330 to February 6, 2003 0405

Power Level: 100%

Mode: Power Operations

MU-P-1B \*[BQ/P] is the normally operating Makeup (MU) Pump to provide makeup to the Reactor Coolant System (RCS) and Reactor Coolant Pump (RCP) seal injection. It is not normally selected to start on an Engineered Safeguard (ES) signal. However, it can be selected to either the "A" or "B" ES (Engineered Safeguards) Train by aligning switches, valves and breakers. MU-P-1B is the primary source for Reactor Coolant System Inventory Control and RC Pump seal integrity for Seismic Safe Shutdown.

MU-P-2B and MU-P-3B are redundant oil pumps that provide oil to the pump and motor bearings for Makeup Pump MU-P-1B. MU-P-2B is normally in standby and will start if the main oil pump MU-P-3B fails to maintain oil pressure above 5 psig.

The original plant/system design powered both MU-P-2B and MU-P-3B from 1C ES Valves Motor Control Center (MCC) \*[EB/BU]. A modification was initiated in 1988 to relocate the oil pump power supplies so that each oil pump was powered from different redundant ES Electrical Buses.

Power to MU-P-2B was moved to 1A ES Valves MCC and power to MU-P-3B was moved to 1B ES Valves MCC. There were no cubicles with spare breakers at 1A ES Valves or 1B ES Valves MCCs that could be used to power the oil pumps. Therefore, the modification to MU-P-2B and MU-P-3B power supplies removed the existing breaker units from 1C ES Valves MCC and installed them in 1A and 1B ES Valves MCCs. Use of breaker units from 1C ES Valves should have required stab spacers to be installed to properly engage the bus bars in the 1A and 1B ES Valves MCCs. However, the stab spacers were not identified in the modification and were not installed.

The 1C ES Valve MCC is an ITE Imperial MCC with 600 amp vertical bus bars. The 1A and 1B ES Valve MCCs are ITE Imperial MCCs with 300 amp vertical bus bars. A spacer is required to properly engage the stabs on the buckets to the 300 amp vertical bars. The MCC manufacturer (ITE Imperial) vendor documents do not identify the use of spacers for the breaker stabs to properly engage the bus bars. Since the vendor documentation does not identify the spacer, the designers were apparently not aware of the difference and did not include this detail in the modification package.

The finalized design and work package review did not identify the need for the spacers nor did the parts list contain the spacers. The Job Order to implement the modification was approved and issued. It did not contain any instructions on installation of the spacers nor were any spacers listed on the parts list.

The modification was declared ready for service on February 28, 1990, without knowledge that the breaker units were in a degraded condition because of inadequate stab to bus bar engagement.

The degraded condition existed from February 1990 until Engineering and Maintenance discovered that the stab spacers were missing on January 22, 2004, while troubleshooting a separate condition associated with MU-P-2B. Subsequent investigation revealed the need for stab spacers on the breaker for MU-P-3B. Without the stab spacers, the stabs engage the bus bars by approximately 1/8 inch. Engagement of approximately 3/4 inch should be provided with installation of the 5/8ths-inch stab spacer installed for breakers on MCCs with 300 amp bus bars. Engineering reviewed the as-found configuration and determined that the seismic function could not be

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assured without the spacer.

Engineering approved installation of stab spacers for MU-P-2B and MU-P-3B breakers, and this modification was completed on January 23, 2004.

Review of plant records discovered that a condition, which existed for approximately 4.5 hours during February 2003, should have been reported under the following criteria: 1) a condition prohibited by Technical Specifications (TS) (10 CFR50.73 (a)(2)(i)(B)), and 2) a condition that could have prevented fulfillment of a safety function (10 CFR50.73 (a)(2)(v)). This condition involved a Make-up Pump (MU-P-1B), which was assumed operable during surveillance testing of the emergency diesel generator in the redundant train. However, unknown at the time, MU-P-1B was not operable due to the seismic qualification concerns associated with its auxiliary oil pumps.

- TMI TS 3.7.2.c specifies that with one Emergency Diesel Generator (EDG) inoperable all required systems, subsystems, trains, components and devices that depend on the remaining operable EDG as a source of emergency power are also operable. The redundant ES-selected "B" MU pump had the seismic design inadequacy (unknown at the time) which rendered the "B" MU pump inoperable. A design defect or deviation is reportable under 50.73(a)(2)(i)(B) if, as a result, the equipment was not capable of performing its specified safety function, during and after a Safe Shutdown Earthquake (SSE). Therefore, when the "A" EDG was inoperable for monthly surveillance testing and the redundant ES-selected "B" MU pump was not operable due to the seismic design inadequacy, TS 3.7.2.c was not met for the 4.5 hour period. Accordingly, this would be reportable as a condition prohibited by Technical Specifications (10 CFR 50.73(a)(2)(i)(B)).
- The reportability review also considered the criteria of 10 CFR 50.73(a)(2)(v), event or condition that could have prevented fulfillment of a safety function. For the safety function of providing Emergency Core Cooling System (ECCS) injection post-LOCA, it was determined that this function could have been provided by the "B" MU pump aligned to the operable "B" EDG, since the SSE is not postulated in combination with the Loss of Coolant Accident (LOCA). However, the "B" MU pump would not have been capable of performing its SSE safety function due to the seismic design inadequacy. Therefore, the post-SSE safety function was lost for this 4.5-hour period. Accordingly, this condition would also be reportable as a condition that could have prevented fulfillment of a safety function (10 CFR 50.73(a)(2)(v)).

An extent of condition review was completed as part of this event. The review found another similar breaker relocation performed in 1987, which involved the Main Feedwater Isolation valves, FW-V-5A and 5B. This modification exchanged breakers for FW-V-5A and 5B from 1C ES Valves MCC with breakers from 1A and 1B ES Valves MCC, respectively. An engineering evaluation concluded that there is reasonable assurance that the stab spacers were properly installed for this modification.

#### CAUSE OF EVENT

The root causes of the event were less than adequate (LTA) human performance during the design of the modification and LTA vendor documentation. The vendor documents available did not address the spacers. The design assumed that the breaker units were interchangeable, but they were not, because they required a stab spacer for full engagement on the 300 amp bus bars. The designer should have verified that the breaker unit was acceptable for this application. The design package for the modification did not specify the stab spacers nor did it include the spacers on the parts list.

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### ANALYSIS / SAFETY SIGNIFICANCE

The plant condition evaluated for reportability involves the discovery of a 4.5-hour period starting on February 5, 2003, when all three MU pumps would have been considered inoperable or unavailable to perform the required safety function due to a combination of conditions. During this period conditions existed where:

- 1). The "B" MU pump was ES selected, and a seismic design inadequacy existed in the supporting lube oil pump power supply breakers, which would have prevented the "B" MU pump from performing its post-SSE safety function. This seismic design inadequacy was not known at the time of the condition and was discovered later.
- 2). The "C" MU pump (non-ES selected) was unavailable for all events due to cooling water system valve maintenance.
- 3). The "A" MU pump was operable (since it had two sources of off-site power), but was unavailable for a Loss of Off-Site Power (LOOP) event, since it is powered from the "A" EDG, and the "A" EDG had been declared inoperable due to routine monthly surveillance testing (4.5 hour test period).

The risk for this condition was low, because the postulated vulnerability is from the combination of a concurrent LOCA, LOOP, and seismic event, which has a very low probability of occurrence. The TMI design basis does not postulate a LOCA, LOOP, and seismic event concurrently. The applicable design basis events are: 1) a LOCA with a LOOP, and 2) a seismic event which includes a LOOP for 72 hours.

For a design basis LOCA, with LOOP, MU-P-1B would be in the single HPI train for mitigating the event. In accordance with the TMI-1 design basis analyses, a concurrent seismic event does not need to be considered, and MU-P-1B remains available for this function.

For a seismic event, which includes LOOP for 72 hours, MU-P-1B could not be considered available because of the degraded condition of its lube oil pump breakers. The "A" MU Pump was unavailable due to the postulated loss of off-site power and the "C" MU Pump was unavailable for all events. Therefore, no MU pumps would be initially available to provide the "Reactivity Control" or "RCS Inventory Control" functions as specified in the Safe Shutdown Equipment List (SSEL). Since a concurrent LOCA is not postulated, there is no immediate need for make-up capability. The Loss of Make Up/Seal Injection procedure directs operators to secure letdown for inventory control, and attempt to restore one of the MU pumps. Prior to proceeding with a cooldown from hot shutdown, the "A" EDG could have been returned from surveillance testing to power ES loads and restore MU-P-1A. RCS inventory control during this time would be bounded by the station blackout analyses. Reactor Coolant Pump seal integrity would be maintained by thermal barrier cooling. While the plant is maintained in hot shutdown conditions, long-term reactivity control is maintained without the makeup system by the control rods. There is minimal risk to delaying cooldown by a few hours in order to obtain MU capability for the cooldown.

### CORRECTIVE ACTIONS

Corrective actions that have been completed:

- Installed spacers in breaker units for MU-P-2B and MU-P-3B
- Revised E-62.1, Molded Case Circuit Breaker Testing – Thermal Magnetic Trip, and E-62.2, Molded Case Circuit Breaker Testing – Instantaneous Trip, to verify that the stabs have a spacer installed on MCCs unit connected to 300 amp vertical bars.

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Corrective actions to be completed:

- Revise the 201 series of drawings for the ITE 9600 Series MCCs (201- 039 through 073) to include the following information: buckets installed in cubicles with a 300 amp vertical bus must have 5/8" spacers installed to ensure adequate stab engagement with the vertical bus bars. Due Date: May 30, 2005
- Revise the appropriate Corporate Configuration Control procedures to invoke the requirements of Exelon procedures for technical human performance and technical rigor. Due date: August 30, 2005

PREVIOUS OCCURENCES

There were no previous events identified resulting from missing spacers. There were no previous events involving design discrepancies that resulted in a condition prohibited by Technical Specifications. One previous event, documented in LER 2002-001-00, "Vital Power Supply Failure Due to Blown Fuse," involved LTA design documents, that could have prevented fulfillment of a safety function. This event was discovered approximately 12 years after the design error occurred for MU-P-2B/3B, and therefore the corrective actions would not have reasonably prevented this event.

ADDITIONAL INFORMATION

No component failure data is included, as this event does not involve component failures.

This LER does not contain any permanent licensing commitments.

\* 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).