

NRC FORM 366 (5-92)		U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95						
LICENSEE EVENT REPORT (LER)											
(See reverse for required number of digits/characters for each block)											
FACILITY NAME (1) Limerick Generating Station, Unit 1					DOCKET NUMBER (2) 05000 352		PAGE (3) 1 OF 4				
TITLE (4) Loose Speed Signal Cable Connector Renders the Single Train High Pressure Coolant Injection System Inoperable											
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	
09	25	96	96	-- 018 --	01	02	03	97	FACILITY NAME	DOCKET NUMBER	
										05000	
										05000	
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)									
1		20.402(b)			20.405(c)			50.73(a)(2)(iv)			73.71(b)
POWER LEVEL (10)		20.405(a)(1)(i)			50.36(c)(1)			X 50.73(a)(2)(v)			73.71(c)
100		20.405(a)(1)(ii)			50.36(c)(2)			50.73(a)(2)(vii)			OTHER
		20.405(a)(1)(iii)			50.73(a)(2)(i)			50.73(a)(2)(viii)(A)			(Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iv)			50.73(a)(2)(ii)			50.73(a)(2)(viii)(B)			
		20.405(a)(1)(v)			50.73(a)(2)(iii)			50.73(a)(2)(x)			
LICENSEE CONTACT FOR THIS LER (12)											
NAME J. L. Kantner, Manager - Experience Assessment, LGS								TELEPHONE NUMBER (Include Area Code) (610) 718-3400			
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)											
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		
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)											
<p>At 1104 hours on 09/25/96, during performance of a surveillance test, the High Pressure Coolant Injection (HPCI) system shutdown on an overspeed condition and restarted, cycling several times until the operators tripped the system. The HPCI system was then declared inoperable. A loss of the HPCI turbine speed signal caused the turbine control problem. Manual control of the HPCI system was also not fully available. This resulted in the inoperability of a single train safety system. A loose speed sensor connection was tightened and at 2100 hours, the HPCI system was declared operable after satisfactory completion of a surveillance test. There was no accident requiring HPCI system injection and sufficient Emergency Core Cooling Systems were operable to mitigate the consequences of an accident. The speed sensor connector was replaced 1/2/97. Analysis determined that the connector mechanically failed. The failure was caused by personnel error during maintenance performed in February, 1996. Completed corrective actions include repair of the connector, review of the other unit, and procedure revisions. Ongoing actions include review of this event with appropriate station personnel and review of precautions regarding these style connectors.</p>											

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LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), 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.

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

Unit Conditions Prior to the Event:

Unit 1 was in Operational Condition 1 (Power Operation) at 100% power level. There were no systems, structures or components inoperable that contributed to the event.

Description of the Event:

At 1104 hours on September 25, 1996, licensed Operations personnel were performing Surveillance Test (ST) procedure ST-6-055-230-1, "HPCI Pump, Valve and Flow Test." When the High Pressure Coolant Injection (HPCI, EIIS:BJ) system was started, the operators observed valve motion and an increase in HPCI Pump discharge pressure but the HPCI turbine speed still indicated zero (0) rpms. The HPCI turbine shutdown on an overspeed condition, automatically restarted at the turbine overspeed reset point, and shutdown again on an overspeed condition. This cycling occurred several times until the operators tripped the system. The HPCI system was then declared inoperable.

Maintenance/Instrumentation and Controls (I&C) personnel determined that a loose speed sensor connector at the HPCI Turbine caused the loss of turbine speed signal and Main Control Room (MCR) speed indication. The connector was tightened and maintenance and engineering personnel determined that the connector could still perform its intended function. Operations personnel declared the HPCI System operable at 2100 hours following successful completion of the ST procedure. An evaluation was performed and concluded that the connector was capable of performing its design function provided that the connector is re-connected and tight.

A four hour notification was made to the NRC at 1448 hours on September 25, 1996, in accordance with the requirements of 10CFR50.72(b)(2)(iii)(D) since this event resulted in a condition which alone could have prevented the HPCI system from fulfilling its intended safety function to mitigate the consequences of an accident. This report is being submitted in accordance with the requirements of 10CFR50.73(a)(2)(v)(D).

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Analysis:

The consequences of this event were minimal in that no radioactive material was released to the environment as a result of the HPCI system being inoperable. Additionally, an accident condition did not occur during the time period in which the HPCI system was inoperable, and therefore, the HPCI system was not called upon to perform its intended safety injection function. Sufficient Emergency Core Cooling Systems and the Reactor Core Isolation Cooling (RCIC, EIIS:BN) system were available to ensure safe shutdown of the reactor, and to mitigate the consequences of an accident if the HPCI System was not available. If the HPCI system had been required to operate, HPCI flow would have oscillated above and below its design flow (corresponding to overspeed and reset). Additionally, manual control of the HPCI system was not fully available without the HPCI turbine speed indication. The HPCI system was restored expeditiously by Maintenance/I&C and Operations personnel. The overspeed shutdown and automatic restart of the HPCI turbine occurred as expected to a loss of speed signal feedback in the control system.

HPCI system operability was restored at 2100 on September 25, 1996, when the speed connector was properly tightened. Analysis of the connector upon removal on January 2, 1997, indicated that it had retained sufficient integrity to support system operability from the time it was tightened on September 25, 1996 to its replacement on January 2, 1997.

Cause of the Event:

The loss of speed signal to the HPCI control logic was caused by improper reconnection of the speed sensor connection (personnel error) in February 1996 during a routine turbine inspection. The improper connection caused a mechanical failure of the speed sensor connector plug. Subsequent vibration from HPCI turbine operation ultimately caused an electrical discontinuity. The exact cause of the improper reconnection could not be determined. The probable cause was misalignment of the connector as it was tightened.

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Interviews with the technicians involved with the February 1996 maintenance indicated that no difficulties were noticed reconnecting the speed sensor connector, nor were any tools used to assist tightening the connection. The connection seemed to them to be properly made. Satisfactory post-maintenance testing in February 1996 confirmed the adequacy of the connection at that time. The technicians also conveyed their understanding that these style connectors must be hand-tightened.

Existing procedural guidance for maintenance involving these style connectors was deemed to be adequate. Based on a review of the simplicity of the connector, no special instructions or training are necessary. Use of this style connector is addressed by standard technician training and is considered skill of the craft.

Corrective Actions:

The following corrective actions have been completed. The connector was replaced on January 2, 1997. The connector continuity checks described in revision 0 to this LER were not required to be performed since the connector was replaced before the next HPCI system operation. The common HPCI Turbine maintenance procedures that disturb the speed sensor connection have been revised to include a caution statement regarding proper assembly of the connection.

Ongoing and future corrective actions include evaluation of the HPCI speed connection for possible design change and dissemination of information, to station personnel who work with these style and similar connectors, about this event and proper cannon plug connector manipulation techniques.

Previous Similar Occurrence:

None