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February 6, 1994  
C311-94-2005

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

Dear Sir:

Three Mile Island Nuclear Station, Unit 1 (TMI-1)  
Operating Licensing No. DPR-50  
Docket No. 50-289  
LER 93-008-01

This letter transmits Licensee Event Report (LER) No. 93-008-01. Laboratory test reports indicate that a Pressurizer Code Safety Valve (PCSV) may have been outside of the Technical Specification limits during Cycle 9 operation due to an inadequate test procedure. This supplement provides the results from testing the other PCSV which was in service during Cycle 9.

The laboratory test procedure has been upgraded. Pressurizer Code Safety Valves currently installed have been tested in accordance with the revised testing program. Public health and safety were not affected.

The abstract provides a brief description of the event. For a complete understanding of the event, refer to the text of the report.

Sincerely,

T. G. Broughton  
Vice President and Director, TMI-1

MRK

150004

Attachment

cc: Region I Administrator  
TMI-1 Senior Project Manager  
TMI Senior Resident Inspector

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PDR ADDCK 05000289  
S PDR

GPU Nuclear Corporation is a subsidiary of the General Public Utilities Corporation

LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) **THREE MILE ISLAND, UNIT 1** DOCKET NUMBER (2) **050002189** PAGE (3) **1 OF 7**

TITLE (4) **PRESSURIZER CODE SAFETY VALVE SETPOINTS OUTSIDE TOLERANCE DURING PLANT OPERATION DUE TO INADEQUATE TEST PROCEDURE**

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 NAMES		DOCKET NUMBER(S)
11	03	93	93	008	01	01	31	94			050000
											050000

OPERATING MODE (9) **N** THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)

20.402(b)	<input type="checkbox"/>	20.405(c)	<input type="checkbox"/>	50.73(a)(2)(vi)	<input type="checkbox"/>	73.71(b)	<input type="checkbox"/>
20.405(a)(1)(i)	<input type="checkbox"/>	50.36(c)(1)	<input type="checkbox"/>	50.73(a)(2)(v)	<input type="checkbox"/>	73.71(c)	<input type="checkbox"/>
20.405(a)(1)(ii)	<input type="checkbox"/>	50.36(c)(2)	<input type="checkbox"/>	50.73(a)(2)(vii)	<input type="checkbox"/>	OTHER (Specify in Abstract below and in Text, NRC Form 366A)	<input type="checkbox"/>
20.405(a)(1)(iii)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	X	50.73(a)(2)(i)	<input type="checkbox"/>		<input type="checkbox"/>
20.405(a)(1)(iv)	<input type="checkbox"/>	50.73(a)(2)(iii)	<input type="checkbox"/>	50.73(a)(2)(viii)(A)	<input type="checkbox"/>		<input type="checkbox"/>
20.405(a)(1)(v)	<input type="checkbox"/>	50.73(a)(2)(ii)	<input type="checkbox"/>	50.73(a)(2)(viii)(B)	<input type="checkbox"/>		<input type="checkbox"/>
20.405(a)(1)(vi)	<input type="checkbox"/>	50.73(a)(2)(iii)	<input type="checkbox"/>	50.73(a)(2)(ix)	<input type="checkbox"/>		<input type="checkbox"/>

LICENSEE CONTACT FOR THIS LER (12)

NAME **M. R. Knight, TMI-1 Licensing Engineer** TELEPHONE NUMBER **717 948-8554**

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC
D	A	B	R	V					
			D	2	4	3	YES		

SUPPLEMENTAL REPORT EXPECTED (14)

YES (i.e., complete EXPECTED SUBMISSION DATE)  NO

EXPECTED SUBMISSION DATE (15)

MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

PRESSURIZER CODE SAFETY VALVE SETPOINTS OUTSIDE TOLERANCE DURING PLANT OPERATION DUE TO INADEQUATE TEST PROCEDURE

On November 3, 1993 TMI-1 was at 100% power at the beginning of Operating Cycle 10 when GPU Nuclear received the vendor test report that a Pressurizer Code Safety Valve (PCSV), which had been in operation during Cycle 9, tested at pressures above the maximum valve lift setpoint required by Technical Specifications (TS). Investigations described in NRC Information Notice 91-74 have concluded that the previous vendor test procedure could introduce setpoint errors. Therefore, the setpoint may have been outside the required TS tolerance during the last fuel cycle (November 14, 1991 through September 10, 1993). This event is reportable under 50.73.a.2.i.B, as an operation or condition prohibited by the plant's TS. Reanalysis shows that Reactor Coolant System pressure would not have exceeded the safety limit if the most limiting pressure transient had occurred. The test procedure has been revised. Spare Pressurizer Code Safety Valves (PCSVs), whose actuation setpoints had previously been set using the revised test procedure, were installed prior to the startup for Cycle 10. The "As found" test results for the other PCSV in service during Cycle 9 were below the 2500 psig setpoint.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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

PRESSURIZER CODE SAFETY VALVE SETPOINTS OUTSIDE TOLERANCE  
DURING PLANT OPERATION DUE TO INADEQUATE TEST PROCEDURE

I. Plant Operating Conditions before Event:

TMI-1 was operating at 100% power at the beginning of Operating Cycle 10.

II. Status of Structures, Components, or Systems that were Inoperable at the Start of the Event and that Contributed to the Event:

None.

III. Background:

The Reactor Coolant System (RCS) serves as a barrier to prevent radionuclides in the reactor coolant from reaching the atmosphere. Establishing a system pressure limit helps to assure the integrity of the RCS. The design pressure of the RCS is 2500 psig. The maximum transient pressure of the RCS Pressure Vessel as specified by the American Society of Mechanical Engineers (ASME) Code, Section III, Article 9, Winter, 1968 is 110 percent of design pressure. The maximum transient pressure of the RCS piping, valves, and fittings as specified by ANSI Section B31.7 is 110 percent of design pressure. Thus, a safety limit of 2750 psig has been established for the RCS. Before initial plant operation the RCS was hydrostatically tested at 3125 psig.

Normal RCS pressure control is by the Pressurizer steam cushion in conjunction with Pressurizer spray, the Power-Operated Relief Valve (PORV) and Pressurizer heaters. The RCS is protected from overpressure by the Reactor Protection System features such as the RCS high pressure reactor trip, the PORV, and the two Pressurizer Code Safety Valves (PCSVs). In the absence of these other protective features, it is unlikely that the PCSVs will ever lift during operation. RCS pressure setpoints for these features are as follows:

Pressurizer Code Safety Valves	2500 psig
Pilot (Electromatic) Operated Relief Valve (PORV) lifts	2450 psig
Reactor trips on high RCS pressure	2355 psig
RCS High pressure alarm	2255 psig
Pressurizer Spray valve opens	2205 psig

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The PCSVs [AB/RV]<sup>1</sup> protect the RCS against overpressurization during transients and accidents which involve a mismatch between the primary plant heat source and the secondary plant heat sink. Effluent from the PORV and PCSVs discharges to the Reactor Coolant Drain Tank (RCDT).

Technical Specification (TS) 3.1.1.3 requires that both PCSVs be operable with a lift setting of 2500 psig plus or minus 1 percent whenever the reactor is critical. When the reactor is subcritical one PCSV must be operable if all RCS openings are closed.

TMI-1 has four Model 31739A PCSVs manufactured by Dresser Industries with two in service during operation. GPU Nuclear uses the services of vendors to perform PCSV testing. Tests are performed at Wyle Laboratories, with a Dresser representative present, in accordance with GPU Nuclear Specification and Wyle procedures. During plant operation two of the four valves are installed on the Pressurizer as PCSVs (tagged RC-RV-1A and RC-RV-1B) and the other two valves are spares. Hence the individual valves "rotate" through their assignment as PCSVs on a once per fuel cycle basis between tests. Although TMI-1 TS Table 4.1-2 requires that only one of the two installed valves be tested each refueling interval, due to Code requirements and current operating schedules, both valves are removed at the end of each operating cycle, sent out for testing, and the two valves which had been tested and stored at the site since the previous cycle are installed on the pressurizer.

During startup following the 10R Outage in October 1993, one of the installed Pressurizer Code Safety Valves began leaking. Therefore, in order to ensure that a spare was available at the site, only one of the two valves that had been operating during Cycle 9 was sent out for testing and the other valve (BL-08897) was retained at the site as a spare.

IV. Event Description:

On November 3, 1993 GPU Nuclear received the test report from Wyle Laboratories with the results of "as found" setpoint testing for PCSV bearing Serial Number (S/N) BR-06613. This valve had been installed on the Pressurizer as RC-RV-1B during Cycle 9 operation from November 14, 1991 through September 10, 1993 and was sent to Wyle Laboratories for testing during the Cycle 10 Refueling (10R) Outage. The test report shows that the valve was lifted several times before making adjustments. The highest lift pressure recorded (2617 psig) was 4.7

<sup>1</sup> The Energy Industry Identification System (EIIS), 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).

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ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 600 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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percent above the TS setpoint, (3.7 percent higher than the TS allowable lift pressure of 2500 psig plus 1 percent).

Based on problems with Pressurizer Code Safety Valve setpoints at the Duke Power Company, Catawba and Oconee<sup>2</sup> Nuclear Stations, the NRC issued Information Notice (IN) 91-74, "Pressurizer Safety Valve Setpoints," dated November 25, 1991 which notified licensees that the procedures used by Wyle Laboratories in the past may have resulted in out-of-tolerance setpoints after the valve has been returned to the plant for installation. This was due to the practice of setting setpoints first and then checking for leakage. If leakage was present the valve seat would undergo a "jack and lap" process to stop the leakage. This process involves partial disassembly of the valve while maintaining the spring pressure in order to polish the valve seats. After the "jack and lap" process, the vendor was not checking the setpoint again before returning the valve to the plant owner.

TMI-1's evaluation of the IEN at the time concluded that none of the four code safety valves at TMI-1 was affected by this information. Because of either a miscommunication or a misinterpretation, this conclusion was incorrect. Recent re-evaluation shows that both BR-06613 and BL-08897 (installed during Cycle 9 Operation) were tested before the vendor revised its procedures to include a setpoint check after any "jack and lap" process was performed on the valve seat.

The basis for our belief that TMI-1 valves would not have undergone the "jack and lap" process without a subsequent setpoint test is that TMI-1's Specification (SP) 1101-12-103, (Revision 0, 1/87) Section 4.3.1.3 states: "If refurbishment is required, the valve shall exhibit an "as Left" setpoint pressure verification of 2500 plus or minus 1 percent for three consecutive actuations using saturated steam." Therefore, the action GPU Nuclear found necessary, upon review of IN 91-74, was to delete the requirement for a gaseous nitrogen seat leakage test which was found to subject the valve to then regarded as unnecessary work on the valve seat with the sole purpose of passing the nitrogen test. Discussions with Wyle at that time dealt primarily with the acceptability of deleting the nitrogen seat leakage test. These discussions did not reveal that TMI-1 valves had not been receiving a setpoint test after "jack and lap." Further review of the Wyle Laboratories Test Reports on BR-06613 and BL-08897 (dated 3/89 and 2/90) revealed that the test sequence did not include a setpoint check after "jack and lap."

Dresser representatives have previously stated that the "jack and lap"

<sup>2</sup> Oconee Nuclear Station LER 270/92-02, dated March 25, 1992.

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process could adversely affect the valve setpoint. Because valve BR-06613 was subjected to the improper sequence of testing described above and the "as found" setpoint of the valve was found to be higher than 2500  $\mu$ ig plus or minus 1 percent at the completion of Cycle 9 operation, GPU Nuclear concludes that this out-of-tolerance setpoint condition could have existed during Cycle 9 when valve BR-06613 was installed on the pressurizer as RC-RV-1B. This event is reportable under 50.73.a.2.i.B, as an operation or condition prohibited by the plant's TS.

The root cause of this event is defective procedures used by Wyle Laboratories, in the past, to test the PCSVs. As a result of their experiences with code safety valve setpoint shifts resulting from the "jack and lap" process as described in IN 91-74, Wyle has informed us that their test procedures have been changed. Dresser representatives have also informed us that their policy has changed such that neither Wyle nor Dresser would release a PCSV without a setpoint test following the "jack and lap" process. The TMI-1 PCSV Specification, (SP 1101-12-103) will be revised to clarify Section 4.3.1.3 to ensure that the statement cannot be interpreted to allow the release of a Code Safety Valve without a setpoint test following the "jack and lap" process.

Review of Pressurizer Code Safety Valve history from Cycle 9 operation to the present shows the following, in addition to the above:

- S/N BR-06612 is presently installed for Cycle 10 operation. This valve was tested using the revised test procedures which ensure that setpoint testing is performed after work which could affect the setpoint, including the "jack and lap" process.
- S/N BL-08898 was a spare valve during cycle 9 operation after having been tested using the revised Wyle Laboratories test procedures. This valve was installed at the beginning of Cycle 10 operation. Because this valve leaked the plant was shutdown and this valve was replaced by BR-06613 which had been received back from Wyle after tests using the revised test procedures.
- S/N BR-06613 (the subject of this LER) was installed during Cycle 9 operation. This valve has been returned to TMI-1 from Wyle, having been tested using the revised test procedures and installed in place of valve S/N BL-08898 (the leaking valve) for the remainder of Cycle 10 operation.
- S/N BL-08897 was the other valve in operation during Cycle 9. The Wyle test reports indicate that this valve was also subjected to the same improper sequence of testing. This valve was removed from the pressurizer during the 10R Outage and shipped to Wyle for testing. During the "As found" test of S/N BL-08897 conducted at Wyle

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Laboratories on December 15, 1993 the valve lifted at 244J psig.

GPU Nuclear concludes that the valves currently installed during Cycle 10 (BR-06612 and BR-06613) were set correctly using the revised test procedure.

V. Component Failure Data:

The component which failed TS test requirements was a Model 31739A Code Safety Valve manufactured by Dresser Industries.

VI. Automatic or Manually Initiated Safety System Responses:

No safety system responses occurred or were required to occur.

VII. Assessment of the Safety Consequences and Implications of the Event:

There were no safety consequences associated with a Pressurizer Code Safety Valve Setpoint of 2617 psig. The safety limit of 2750 psig (110% of design pressure) represents the maximum transient pressure allowable in the RCS under the ASME Code Section III.

The most limiting RCS overpressure transient in the TMI-1 FSAR is the startup accident, represented by an uncontrolled reactivity addition due to rod withdrawal from hot zero power. GPU Nuclear has reanalyzed this event assuming one PCSV opens at 2625 psig and the other valve does not open. The analysis was performed using conservative FSAR assumptions. The results show that the peak pressure does not exceed the safety limit of 2750 psig.

Additionally, there were no safety consequences associated with the PCSV "as found" setpoint lower than the specified 2500 psig setpoint. No transients occurred during the operating cycle that approached 2440 psig. If a transient had occurred to challenge the PCSV with its setpoint low, the PORV (set at 2450 psig) would not have had the opportunity to reduce pressure and thereby prevent the PCSV from lifting. In such a case, the possibility of a transient challenging the PCSV would be greater. The only potential safety consequences of lifting the PCSV would be the unlikely event that it might fail to close. The loss of coolant associated with a PCSV stuck open is bounded by the safety analysis.

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VIII. Previous Events of a Similar Nature:

There have been no previous LERs related to PCSV setpoint "as found" tests outside the TS plus or minus 1 percent tolerance. A review of TMI-1 history for PCSV "as found" test results from 1988 shows that a considerable number of these tests (around 50 percent) have been higher than 1 percent above the 2500 psig setpoint. This event is the first occurrence of an "as found" test result greater than 3 percent<sup>3</sup> above the 2500 psig setpoint.

IX. Corrective Actions Planned:

Although we understand that Wyle Labs has instituted a change to their test procedures that will preclude a code safety valve to be released without a setpoint test following the "jack and lap" process, GPU Nuclear will revise the TMI-1 Pressurizer Code Safety Valve Specification, (SP 1101-12-103) to clarify Section 2.1.3 to ensure that this statement in our specification can not be interpreted to allow the release of a Code Safety Valve without a setpoint test following the "jack and lap" process. This and other improvements which are being considered will be incorporated into TMI-1 SP 1101-12-103 prior to PCSV testing following Cycle 10 operation, which is scheduled to end in September 1995.

<sup>3</sup> The ASME Code, which is referenced in the bases of the TS, has been revised in OM-1 to allow a larger band of setpoint tolerance (3 percent).