



**CENTERIOR
ENERGY**

PERRY NUCLEAR POWER PLANT

10 CENTER ROAD
PERRY, OHIO 44081
(216) 259-3737

Mail Address:
PO. BOX 97
PERRY, OHIO 44081

Robert A. Stratman
VICE PRESIDENT - NUCLEAR

February 19, 1993
PY-CEI/NRR-1612 L

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

Perry Nuclear Power Plant
Docket No. 50-440
LER 93-003

Dear Sir:

Enclosed is Licensee Event Report (LER) 93-003 for the Perry Nuclear Power Plant which involves Main Steam Line (MSL) penetration leakage in excess of the Technical Specification allowable limits.

The required submittal date for LER 93-003 was Saturday, February 13, 1993, with the next working day falling on Tuesday, February 16, 1993. It was previously anticipated that the MSL testing and repairs would be completed prior to the required submittal date. However, due to unexpected delays, an extension of the due date was requested. The Perry NRC Resident Inspector and NRC Region III office were notified of the delay on February 16 and the due date was extended to February 19, 1993.

Sincerely,

Frank R. Stead for
Robert A. Stratman

RAS:RWG:ss

Enclosure: LER 93-003

cc: NRC Project Manager
NRC Resident Inspector
NRC Region III

220086

Operating Companies
Cleveland Electric Illuminating
Toledo Edison

9302240238 930219
PDR ADOCK 05000440
S PDR

Handwritten signature/initials

LICENSEE EVENT REPORT (LER)

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

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.

FACILITY NAME (1)

Perry Nuclear Power Plant, Unit 1

DOCKET NUMBER (2)

05000 440

PAGE (3)

1 OF 5

TITLE (4) Local Leak Rate Test Results Exceed Allowable Primary Containment Leakage For Main Steam Lines A, B, and D

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
01	14	93	93	003	00	02	19	93		05000
OPERATING MODE (9) 5			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more) (11)							
POWER LEVEL (10) 0			20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)	
			20.405(a)(1)(i)		50.36(c)(1)		X 50.73(a)(2)(v)		73.71(c)	
			20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER	
			20.405(a)(1)(iii)		X 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: Ron W. Gaston, Compliance Engineer, Ext. 5004
 TELEPHONE NUMBER (include Area Code): (216) 259-3737

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRCDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRCDS
0	SB	ISV	A585	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

<input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
			03	31	93

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

During the period January 13 - 14, 1993, Local Leak Rate Testing (LLRT) of the four Main Steam Line (MSL) penetrations was performed to satisfy a previous commitment regarding mid-cycle testing. Three of the four MSLs tested were found to have leakage in excess of the Technical Specification limit of 25 standard cubic feet per hour (scfh).

At approximately 1100 on January 12, while raising reactor vessel level for normal shutdown evolutions, water was noted leaking from the lagging at the bottom of the inboard Main Steam Isolation Valves (MSIVs). It was subsequently determined that the six MSIVs which were modified during the last refueling outage (RF03) had indications of leakage around the body to bonnet flange. Preliminary investigation results have attributed the cause to gaskets relaxation which resulted from insufficient tensioning of the bonnet flange studs during reassembly of the valves in RF03, combined with non-optimally sized gasket being installed. Additional troubleshooting is in progress to identify the source of penetration leakage which occurred after the replacing the gaskets in the MSIVs which had previously experienced flange leakage. Final LLRTs have been completed for the A, C and D MSLs. A supplemental report will be issued to document any additional actions required, pending the results of the remaining activities involving the B MSL.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Perry Nuclear Power Plant, Unit 1	05000 440	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 5
		93	003	00	

TEXT (if more space is required, use additional copies of NRC Form 365A) (17)

I. Introduction

On January 9, 1993 the plant shutdown for a scheduled maintenance outage to investigate a suspected leaking fuel assembly. On January 12, 1993, water was noted leaking from the flange area on the inboard Main Steam Isolation Valves (MSIVs) [ISV]. On January 14, 1993 local leak rate testing confirmed that the leakage from Main Steam Lines A, B, and D exceeded the acceptance of Technical Specification 3.6.1.2(c). A four-hour NRC notification was made to report each test failure pursuant to the requirements of 10CFR50.72. These events are additionally being reported to satisfy the corresponding requirements of 10CFR50.73.

At the time of the local leak rate test the plant was in Operation Condition 5 (Refueling) with the reactor pressure vessel at atmospheric pressure.

II. Description

At approximately 1100 on January 12, 1993, while reactor vessel level was being raised for normal shutdown evolutions, water was noted leaking from the lagging at the bottom of three inboard MSIVs. It was later determined that all six of the MSIVs which were modified during the last refueling outage (RF03) had indications of leakage in the vicinity of the body to bonnet flange. Local Leak Rate Testing (LLRT) performed on January 14, 1993 quantified the "as found" leakage rates to be as follows:

<u>Main Steam Line</u>	<u>Leakage Rate</u>
MSL A	12.94 SLM or 27.43 scfh
MSL B	78.93 SLM or 167.33 scfh
MSL C	3.11 SLM or 6.59 scfh
MSL D	197.42 SLM or 418.53 scfh

As indicated above, the leakage rates for MSL's A, B and D exceeded the Technical Specification limit of 25 standard cubic feet per hour (scfh) or 11.79 standard liters per minute (SLM).

Upon identification of water leakage from the MSIVs on January 12, 1993, a Perry Incident Response Team (IRT) was formed to investigate potential causes for the leaks. The combined water leakage from the three inboard MSIVs (in the Drywell) was initially determined to be approximately 1/2 gallon per minute (gpm) with the reactor vessel at 0 psig. An initial assessment of the insulation in the area of the leaks indicated that the water marks on the insulation appeared to be from recent rather than past wetting of the insulation. Additionally, the insulation in the wetted areas was not torn. There was no evidence that any substantial body to bonnet steam leakage occurred during plant operation.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (3)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Perry Nuclear Power Plant, Unit 1	05000 440	93	003	00	3 OF 5

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

A review of sump levels, temperature data and radiation monitor history was performed to attempt to correlate these indications with any trends observed during the last operating cycle. The valve leakage from the flange area was assumed to have been negligible during plant operation based on the above observations.

Additional testing was performed to estimate the contribution of the body to bonnet leakage to the total "as-found" leakage for the respective penetrations. Although the body to bonnet leakage could not be quantified directly, the testing showed the flanges to be the primary leakage path for the respective penetrations.

III. Cause Analysis

The Incident Response Team, referred to previously, evaluated a series of possible causes for the MSIV body to bonnet leakage and MSL penetration LLRT failures. The potential contributors evaluated included defective gaskets, improper gasket installation, improper gasket sizing, inadequate stud pre-load, seating surface flaws, and the tensioning pattern used during reassembly of the affected MSIVs. A troubleshooting plan was developed and implemented to validate the potential causal factors.

It was determined that the body to bonnet leakage for the affected MSIVs was the result of a combination of factors which included non-optimal gasket filler material, incorrect gasket dimensional sizing, an inadequate tensioning procedure used during previous valve reassembly, and a lack of metal to metal contact on the valve body to cover plate gap.

The spiral wound gaskets (Flexitallic Flexite-Super) that were used in four of the six valves which failed their LLRTs, contained filler material that was not the best available for high temperature applications. A review of the gasket dimensions obtained from existing stock revealed that, allowing for manufactured tolerances, the gaskets used previously may not have been optimally sized for their application, potentially resulting in insufficient crush of the gaskets after tensioning.

The retaining nuts for the bonnet flange studs on the MSIVs had been tightened using manual torque wrenches prior to the modifications performed on the valves during RF03. During RF03 hydraulically operated tensioners were used to accomplish this task during post modification valve reassembly. The procedure used at that time for tensioning of the studs did not specify a required number of tensioning passes to minimize the effects of relaxation; nor did it specify that there be no gap present in the flange area after tensioning. These requirements were later determined to be critical for maintaining the sealing integrity of the valve body after reassembly.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (INBB 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.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Perry Nuclear Power Plant, Unit 1	05000440	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 5
		93	003	00	

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

IV. Safety Analysis

Primary containment integrity ensures that the release of radioactive materials from the containment atmosphere will be restricted to those leakage paths and associated leakage rates at the peak pressure of 11.31 psig assumed in the Perry Updated Safety Analysis Report (USAR) accident analysis, thereby limiting the site boundary radiation doses to within the limits of 10CFR100. The design basis analysis of the leakage resulting from a loss of coolant accident (LOCA), as presented in the USAR, was re-evaluated to address the effects of the increased leakage from the failed MSL penetrations. The calculated figures from this conservative re-evaluation demonstrated that the resulting whole body and thyroid doses at the site boundary would remain below the 10CFR100 limits of 25 rem and 300 rem respectively. The corresponding calculated Control Room whole body doses also remained well below the 10CFR50, Appendix A General Design Criteria (GDC) - 19 limit of 5 rem. The Standard Review Plan (NUREG-0800) provides additional NRC guidance for the Control Room inhalation dose limit of 30 rem. The re-calculated inhalation dose value exceeded this limit by approximately 11 percent.

Realistic Control Room exposures can be shown to be a factor of 10E(+4) lower than those based on the conservative design basis assumptions. The design basis analysis incorporates the airborne activity associated with fuel damage resulting from a LOCA. For the realistic analysis, the availability of the Emergency Core Cooling Systems to mitigate core damage is assumed in accordance with the guidelines of 10CFR50, Appendix K. Therefore, realistic exposures from a postulated LOCA event would be significantly below the calculated design limits. Additionally, established plant procedures for protection of Control Room personnel will ensure that potential exposures are minimized. These factors greatly reduce the safety significance of this event.

V. Similar Events

Five previous LERs have been submitted to report MSL penetration leak rate test failures. These events were reported in LERs 87-51, 87-67, 89-06, 90-25 and 92-06. In each of these instances, seat leakage from the MSIVs or leakage from other MSL boundary isolation valves was determined to be the cause. Prior to the third refueling outage (RF03) the majority of the corrective maintenance performed involved the lapping of seating surfaces. A modification was performed during RF03 for the six MSIVs in MSLs A, B, and D which had exhibited excessive seat leakage during testing. The respective MSIVs were successfully tested following modification and repair.

The recent MSL penetration failures were primarily attributed to MSIV body to bonnet flange leakage, which had not previously been experienced.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Perry Nuclear Power Plant, Unit 1	05000 440	93	- 003 -	00	5 OF 5

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

VI. Corrective Actions

To address the concerns involving inadequate tensioning of the flanges, a new tensioning procedure was developed and incorporated into the work instructions during the recent troubleshooting and repair of the MSIVs. These instructions also included a requirement to ensure metal-to-metal contact on the bonnet flange after tensioning. The revised torquing/tensioning requirements, including the requirement for metal-to-metal contact, will be incorporated into the permanent MSIV maintenance instruction.

The MSIV flange gaskets for the penetrations which failed their LLRT were replaced with Flexitallic, Flexicarb gaskets which were determined to be more suitable for the application. The purchase specification for replacement gaskets has been revised to ensure that proper dimensions and material properties of the gaskets are maintained.

Leakage identified as originating from valve seats was repaired by machining or lapping the seating surfaces as necessary. The A and D Main Steam Line penetrations have achieved acceptable post-maintenance LLRT results. Troubleshooting and repair activities are currently in progress to restore the B MSL. A supplemental report will be issued to document any additional information and required actions, pending the results of the remaining activities involving MSL B.

Energy Industry Identification System Codes are identified in the text as [XX].