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United States Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop O-P1-17
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Subject: **Docket No. 50-333**
LICENSEE EVENT REPORT: LER-00-015-02 (DER-00-05158)

Containment Leakage Rate Exceeds Authorized Limits

Dear Sir:

Revision 2 of this report provides an update of corrective actions planned to improve MSIV performance.

There are no commitments contained in this report.

Questions concerning this report may be addressed to Mr. John Hoddy at (315) 349-6538.

Very truly yours,

T. A. SULLIVAN

TAS:JH:jrh
Enclosure

cc: USNRC, Region 1
USNRC, Project Directorate
USNRC Resident Inspector
INPO Records Center

IE22

NRC FORM 366 (7-2001)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

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LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
James A. FitzPatrick Nuclear Power Plant	05000 333	1 OF 7

4. TITLE

Containment Leakage Rate Exceeds Authorized Limits

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	05000
10	18	00	00	– 015 –	02	07	01	2002	FACILITY NAME: N/A	DOCKET NUMBER: 05000

9. OPERATING MODE	N
10. POWER LEVEL	0

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

	20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
	20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)
	20.2203(a)(1)		50.36(c)(1)(i)(A)		50.73(a)(2)(iv)(A)		73.71(a)(4)
	20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)
	20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER
	20.2203(a)(2)(iii)		50.46(a)(3)(ii)	X	50.73(a)(2)(v)(C)		Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		
	20.2203(a)(2)(v)		50.73(a)(2)(i)(B)		50.73(a)(2)(vii)		
	20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		
	20.2203(a)(3)(i)	X	50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Mr. John Hoddy, Sr. Regulatory Compliance Specialist	315-349-6538

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	SB	ISV	E095	Y					

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

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

On October 18, 2000, following completion of Local Leak Rate Testing (LLRT) of valves 29AOV-80D (inboard) and 29AOV-86D (outboard) Main Steam System isolation valves (MSIVs), it was determined that the Primary Containment Type B and Type C as-found running total minimum-pathway leakage rate had exceeded the maximum allowable limit of 320 standard liters per minute (SLM) specified in Technical Specifications (TS) Section 6.20. When leak tested in combination (applied test pressure between the inboard and outboard MSIV), test results demonstrated seat leakage in excess of 320 SLM. At the time of the testing, the mode switch was in the REFUEL position while the plant was conducting Refuel Outage 14.

The excessive leakage rate of inboard MSIV 29AOV-80D was attributed to valve disc to seat misalignment. The excessive leakage rate of outboard MSIV 29AOV-86D was attributed to seat scoring in the valve seat area, as a result of debris caught between the sealing surfaces.

The failed valves were repaired and retested satisfactorily prior to plant startup. An equipment failure evaluation was performed for the valves that failed testing. An operability review was performed to support operation through the remainder of the operating cycle. Additional valve modifications and improvements, and improved outage work management controls are being planned to enhance MSIV performance and test accuracy.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
James A. FitzPatrick Nuclear Power Plant	05000333	00	015	02	2 OF 7

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

EIIS Codes in [ ]

Event Description

The plant entered Refuel Outage 14 on October 6, 2000. Type C Local Leak Rate Testing (LLRT) activities on the Primary Containment [NH] penetrations and isolation valves commenced shortly after plant cooldown in accordance with Technical Specifications (TS) Section 6.20, "Primary Containment Leakage Rate Testing Program". On October 18, 2000, following completion of LLRTs of the Main Steam System [SB] Main Steam isolation valves (MSIVs) 29AOV-80D (inboard) and 29AOV-86D (outboard), it was determined that the Primary Containment Type B and Type C running total minimum pathway leakage rate had exceeded the maximum allowable limit of 320 standard liters per minute (SLM) specified in the Technical Specifications (TS). When leak tested, test results demonstrated gross seat leakage.

TS Section 6.20.A requires that peak Primary Containment internal pressure for the design basis loss of coolant accident (Pa) is 45 pounds per square inch gauge (psig). The maximum allowable Primary Containment leakage rate (La) at Pa shall be 1.5 percent of Primary Containment air weight per day. The maximum TS allowable leakage per day equates to 320 standard liters per minute (SLM).

Test methods for the combined test of the MSIVs require that pressure be applied between the inboard MSIV and the outboard MSIV. For the individual test of outboard valve 29AOV-86D, the Main Steam Line upstream of inboard MSIV is filled with water. During the fill evolution, excessive water leakage occurred past the valve seat of 29AOV-80D. Due to this excessive leakage through inboard MSIV, the "D" inboard MSIV was classified as having gross leakage. Inboard valve leakage was due to the inboard valve disc assembly not being properly aligned with the valve seat.

After draining the inboard Main Steam Line, combined testing of the inboard and outboard MSIVs indicated leakage exceeding the ability of the test equipment to achieve test pressure. The test volume could not be pressurized by the leak rate monitor, which has a 400 SLM maximum flow rate. Leakage observed at vents located upstream of the inboard valve and downstream of the outboard valve indicated excess leakage through both valves. This resulted in declaring the outboard valve as having gross seat leakage. Combined leakage of the inboard and outboard MSIVs was in excess of 400 SLM.

Cause of Event

The excessive leakage rate of inboard MSIV 29AOV-80D was attributed to valve disc to seat misalignment. The excessive leakage rate of outboard MSIV 29AOV-86D was attributed to seat scoring in the valve seat area, as a result of debris caught between the sealing surfaces. No foreign material was found, however, it is believed the debris was washed across the seat during stroking evolutions.

Previous valve failure evaluations identified the need for valve modifications/enhancements, due in part to LLRT methodology and valve orientation. Improvements to valves 29AOV-80D and 29AOV-86D are identified in the corrective actions. The cause and corrective actions for LLRT failures that significantly contributed to Primary Containment leakage during Refuel Outage 14 are identified in Table 1 of this report.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
James A. FitzPatrick Nuclear Power Plant	05000333	00	015	02	3 OF 7

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

Analysis of the Event

This report is being submitted in accordance with 10 CFR 50.73(a)(2)(ii), "Any event or condition that resulted in the nuclear power plant, including its principal safety barriers, being seriously degraded," and in accordance with 10 CFR 50.73 (a)(2)(v), "Any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to: (C) Control the release of radioactive material."

The Primary Containment System has the capability to limit leakage during any of the postulated design basis accidents for which it is assumed to be functional such that offsite doses do not exceed the guideline values set forth in 10 CFR 100. Compliance with 10 CFR 50, Appendix J provides assurance that the Primary Containment including those systems which penetrate the Primary Containment do not exceed the allowable leakage rate specified in the TS.

Immediate actions were not required as the plant was in a shutdown condition and Work Orders were already in place to repair the valves. All MSIVs that exceeded the TS leak rate limit were rebuilt and successfully tested prior to startup from the Refuel Outage.

An upper bound on the leak rate through 29AOV-80D and 29AOV-86D could not be determined; therefore the potential dose consequences of this event could not be precisely quantified. A level 2 Probabilistic Risk Assessment was conducted to quantify/evaluate the safety significance of this event. This analysis determined that the change to Large Early Release Frequency (LERF) relative to the base case was 9.82 E-8 per reactor year. Therefore, this event is considered to have a low safety significance.

Extent of Condition

At the conclusion of LLRTs, it was identified that as-found leakage rates for MSIVs 29AOV-80B, 29AOV-86B and 29AOV-86C had exceeded the Technical Specifications (TS Section 4.7.A.2.b, Surveillance Requirements, "Primary Containment") leakage rate acceptance criteria of =/< 11.5 scfh (5.422 SLM) per valve when tested at =/> 25 psig. Therefore, valves 29AOV-80B and 29AOV-86B were also considered significant contributors to exceeding the maximum allowable Primary Containment leakage rate (La) of 320 SLM.

Other LLRT failures were evaluated. No additional penetration failures were identified during Refuel Outage 14 that significantly contributed to Primary Containment leakage.

Corrective Actions

1. Work Requests (WRs) were generated and repair activities were completed on MSIVs 29AOV-80B, 29AOV-80D, 29AOV-86B, 29AOV-86C and 29AOV-86D. Additionally, modification work, consisting of MSIV improvements/enhancements, based on previous valve failure evaluations and valve vendor recommendations, were completed on the following MSIVs:

   - 29AOV-80D - Installation of guide pads to the valve body to control valve disc to valve body clearance and improve valve disc to seat alignment, and installation of a new ring/spacer configuration to aid in improving stem alignment and reduce stem galling.

   - 29AOV-86D - Installation of hardened washers on valve bonnet to reduce torque transfer losses and eliminate bonnet leakage, installation of hardened washers on both ends of the live load spring to reduce torque losses for added packing pressure for better control of packing leakage, and installation of a new ring/spacer configuration to reduce stem galling. Additionally, a rebuilt/certified actuator was installed and the spring pack between the actuator and valve was rebuilt with new yoke guides and bronze bushings to reduce closing friction loads. The valve seat was refurbished.

2. An operability review was performed to support operation through the remainder of the operating cycle, given the previous MSIV performance history and repair activities. This conclusion was supported by an independent evaluation performed by the NSSS vendor.

3. Outage management work controls will be established to assure that the LLRT plan is followed. This will prevent failures, such as that for 29AOV-80B, which resulted from water being washed over the valve seat. **(Scheduled to be Completed 10/05/02)**

4. End-of-cycle LLRT testing will be performed early in RO15 to assess the effectiveness of modifications previously performed on those valves (29AOV-80B, 29AOV-80D, 29AOV-86D) which are currently fitted with upgrades planned for the remaining MSIVs. Test results will provide an accurate indication of the effectiveness of ongoing MSIV improvement efforts in addressing end of cycle failures of MSIV's to pass LLRT testing.

5. Additional valve modifications and improvements are planned to be installed during RO15 for specific MSIVs to enhance performance (See Tables 1 and 2). Since the planned actions incorporate all applicable LLRT failure corrective actions, where planned activities require valve disassembly, regularly scheduled periodic LLRT testing will be completed only after work completion and prior to start up from RO15. **(Scheduled to be Completed Before Startup from RO15)**

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
James A. FitzPatrick Nuclear Power Plant	05000333	00	015	02	5 OF 7

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

Additional Information (cont'd)

A. Previous Similar Events:

LER 98-013 and LER 96-012 reported Primary Containment accumulated leakage in excess of maximum allowed by the TS.

B. Failed Components:

Component: **29AOV-80B, 80D, 86B, 86C, and 86D**
Main Steam Line Inboard and Outboard
Main Steam Isolation Valves
Manufacturer: Edward Valves, Inc.
Model: 1612 JMMNY
Type: 1250 psi, 24 inch, Globe (flite-flow)

C. Applicability to NEI 99-02, Rev. 0, "Regulatory Assessment Performance Indicator Guideline."

This event is considered a safety system functional failure in the context of NEI 99-02, Rev. 0.

Table 1 - Corrective Actions Scheduled for RO15 for MSIVs Failing LLRT During RO14

Component	Effect	Failure Mode	Failure Mechanism (see notes below)	Additional Valve Improvements and Modifications
29AOV-80B	Internal Leakage	Loss of Sealing Integrity	Improper Operation, Particle Accumulation	No further corrective action is required (RO 14 action is considered effective). As a long-term enhancement, however, hardened washers will be installed above and below packing liveload (29AOV-80B and 29AOV-80D).
29AOV-80D	Internal Leakage	Loss of Sealing Integrity	Out of Alignment	
29AOV-86D	Internal Leakage	Loss of Sealing Integrity	Scored Seat	
29AOV-86B	External Leakage	Loss of Pre-load (Packing)	Improper Design, Improper Assembly, Mechanical Cycling	Replace disc stem, disc as needed, and change stellite junk ring to carbon steel junk ring spacer. Install hardened body/bonnet stud washers and packing liveload washers.
29AOV-86C	External Leakage	Loss of Pre-load (Packing)	Improper Design, Improper Assembly, Mechanical Cycling	

Notes:

Improper Operation: Valve was cycled open prior to completing LLRT, causing particulate laden water to wash over the valve seat due to the abnormal system line-up.

Particle Accumulation: Particles on the seating surfaces prevented full metal to metal contact, thereby causing an air test failure.

Out of Alignment: Caused by valve being in a 30 degree off vertical position; actuator and spring force insufficient to ensure full metal to metal contact in seating surfaces without additional guiding.

Scored Seat: Caused by debris traveling across seating surfaces, driven either by fluid motion over seat or by valve disc motion. Further analysis was not performed, as the material that scored the seat was not found when the valve was disassembled.

Improper Design: Stem is guided at packing gland junk ring (stellite interface with 17-4 pH stainless steel stem); cycling the valve over time causes scoring, which removes packing material and reduces packing preload; increased scoring can lead to galling.

Improper Assembly: Involved the sequencing of the packing replacement. An upgraded sequence has been developed.

Mechanical Cycling: With stem scoring and low packing pre-load, mechanical cycling provided the sliding force needed to degrade the packing pre-load to a failure condition.

Table 2 - Additional MSIV Modifications and Improvements Scheduled for RO15

Component	Valve Improvements and Modifications
29-AOV-80A	Addition of hardened washers to body/bonnet joint and packing liveloads. Replace Stellite junk ring with carbon steel spacer. Installation of additional weld-in body guides. Installation of bronze spring flange bushings. Replacement of stem and disc as needed. Installation of upgraded spring pack (heavier springs).
29-AOV-80C	Addition of hardened washers to body/bonnet joint and packing liveloads. Replace Stellite junk ring with carbon steel spacer. Installation of bronze spring dividers and spring flange bushings. Replacement of stem and disc with upgraded design.
29-AOV-86A	Addition of hardened washers to body/bonnet joint and packing liveloads. Replace Stellite junk ring with carbon steel spacer. Installation of additional weld-in body guides as needed. Installation of bronze spring flange bushings.