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

Subject: McGuire Nuclear Station, Unit 1
Docket No. 50-369
Licensee Event Report 369/2005-02, Revision 1

On June 16, 2005, McGuire Nuclear Station submitted LER 369/2005-02 Rev. 0, which concluded that Unit 1 Main Steam Isolation Valve (MSIV), 1SM-1, was likely inoperable in the past for a period longer than permitted by plant Technical Specifications. Therefore, as per the requirements of 10 CFR 50.73 (a)(2)(i)(B), this condition was reported as an operation prohibited by Technical Specifications. After further review in 2005, The cause analysis identified additional causal factors other than what was reported in LER 369/2005-02 Rev 0. Thus McGuire Nuclear Station is submitting LER 369/2005-02, Revision 1.

This event was determined to be of no significance to the health and safety of the public. There are no regulatory commitments contained in this LER.

G. R. Peterson

Attachment

IE22

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NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 06-30-2007

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose 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.

LICENSEE EVENT REPORT (LER)

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

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4. TITLE

Main Steam Isolation Valve Inoperable Due To Internal Binding.

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
04	10	2004	2005	- 002 -	01	01	18	2006	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE	4
10. POWER LEVEL	000

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 Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		
	20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		
	20.2203(a)(2)(v)	X	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)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Reza Djali, Regulatory Compliance	704-875-4228

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
B	SB	ISV	A585	YES					

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

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

Unit Status: At the time of the event, Unit 1 was in MODE 4 (Hot Shutdown) at 0 percent power.

Event Description: In April 2004, stroking of 1SM-1 ("D" Steam Generator Main Steam Isolation Valve (MSIV)) introduced valve stem scoring. This scoring was indicative of conditions which probably prevented the valve from fully closing. The inability to close renders 1SM-1 inoperable. Since the applicable Technical Specification required actions and completion times were not satisfied, this represented a Technical Specification prohibited operation reportable as per the requirements of 10 CFR 50.73 (a)(2)(i)(B). This event was not significant with respect to the health and safety of the public.

Event Cause: The most probable cause was high valve friction due to main poppet tipping and plowing of the guide rib, actuator to stem misalignment, stem side loading and abnormal packing friction.

Corrective Action: The guide ribs for 1SM-1 were repaired and returned to specifications. A new valve main poppet was installed along with an anti-vibration kit and a stem guiding system with carbon bushing and packing material which will not induce a corrosive environment. The clearance between the valve stem and cover bushing was also increased. The air assist feature has also been installed to provide additional closing margin on Unit 1 MSIVs during Refueling Outage 1EOC17.

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

BACKGROUND

Main Steam Isolation Valves [ISV](MSIV):

The Unit 1 Main Steam System [SB](SM) contains four Main Steam Isolation Valves manufactured by Atwood and Morrill Co (Model MSI-001). Each valve is located downstream of its respective Steam Generator [SG](SG) and remains open during normal power operation.

The MSIVs are designed to automatically close upon receipt of a Main Steam Line Isolation Signal to ensure the following safety functions are accomplished:

- Isolation of all four SGs to ensure that no more than one SG is affected in the event of a steam line break. This minimizes the positive reactivity effects of the break by ensuring that the Reactor Coolant System [AB](NC) does not experience excessive cooldown as a result of the increased steam flow.
- Isolation of all four SGs to ensure that no more than one SG is affected in the event of a steam line break inside containment. This minimizes the containment temperature and pressure increase.
- Isolation of the containment atmosphere from the environment in the event of a release of fission product radioactivity to the containment atmosphere as the result of a design basis accident.

McGuire Technical Specification 3.7.2 - Main Steam Isolation Valves:

The TS 3.7.2 LCO specifies that four MSIVs shall be operable in Mode 1. This LCO also states that they shall be operable in MODES 2 and 3, except when the MSIVs are closed and de-activated. TS Surveillance Requirement (TSSR) 3.7.2.1 and the TS 3.7.2 BASES indicate that an MSIV is operable when it is capable of closing in less than or equal to 8 seconds upon receipt of an isolation signal. As per TS 3.7.2, Condition A, if one MSIV is inoperable in MODE 1, the affected MSIV shall be restored to operable status within 8 hours. If the required action and associated completion time of Condition A are not met, then TS 3.7.2, Condition B, states that the respective Unit must be in MODE 2 within 6 hours. As per TS 3.7.2, Condition C, if one or more MSIVs are inoperable in MODE 2 or 3, the affected MSIV shall be closed within 8 hours and verified closed once per 7 days. If the required action and associated completion time of Condition C are not met, then TS 3.7.2, Condition D, states that the respective Unit must be in MODE 3 within 6 hours and in MODE 4 within 12 hours.

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McGuire Technical Specification (TS) 3.6.3 - Containment Isolation Valves:

The TS 3.6.3 LCO specifies that each containment isolation valve shall be operable in Modes 1, 2, 3, and 4. TSSR 3.6.3.5 and associated test acceptance criteria indicate that an MSIV is operable when it is capable of closing in less than or equal to 8 seconds upon receipt of an isolation signal. As per TS 3.6.3, Condition C, if one or more MSIVs are inoperable, each affected penetration flow path shall be isolated by the use of at least one closed and de-activated automatic valve, closed manual valve, or blind flange within 72 hours and each affected penetration flow path shall be verified to be isolated once per 31 days. If the required action and associated completion time of Condition C are not met, then TS 3.6.3, Condition F, states that the respective Unit must be in MODE 3 within 6 hours and in MODE 5 within 36 hours.

EVENT DESCRIPTION

Note: All events are shown in the approximate sequence in which they occurred. All times are approximate.

April 2004:

- On April 4, 2004, during startup from the Unit 1 EOC16 refueling outage and with Unit 1 in MODE 3, 1SM-1 ("D" SG MSIV) was hot stroke tested. No abnormalities were identified in this test. However, MSIV 1SM-7 failed to fully close during stroke testing of that valve.
- On April 6, 2004 at 1216, Unit 1 entered MODE 4 to make repairs to 1SM-7 following a failed stroke test of that valve. At 1626, Unit 1 entered MODE 5.
- On April 9 and 10, 2004, during startup following repair of 1SM-7, 1SM-1 was cold stroked with no abnormalities identified.
- Unit 1 entered MODE 4 at 0356 on April 10, 2004. Unit 1 entered MODE 3 at 1156.
- On April 27, 2004, scoring was discovered on the valve stem for 1SM-1. Subsequent investigation concluded that the scoring was most likely introduced during the stroking of 1SM-1 on April 9, 2004 or April 10, 2004. An operability assessment determined that the scoring did not render 1SM-1 inoperable.

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October 2004:

- On October 18, 2004, Unit 1 entered MODE 3 for planned repair of a leak on an instrument line associated with the "B" SG. During hot stroke testing of 1SM-1 at 1028, the valve would not fully close. 1SM-1 was subsequently declared inoperable. Unit 1 entered MODE 4 at 2153 in preparation for repairing 1SM-1.
- At 0340 on October 19, 2004, Unit 1 entered MODE 5.

November 2004:

- On November 3, 2004 at 1650, upon completion of repairs on 1SM-1, Unit 1 entered MODE 3.
- On November 4, 2004, 1SM-1 was hot stroke tested with acceptable results.
- On November 5, 2004 at 0332, 1SM-1 was declared operable.

On April 28, 2005, subsequent to discussions with the NRC, McGuire concluded that the scoring observed on the 1SM-1 valve stem in April of 2004 was indicative of conditions which probably prevented the valve from fully closing. Therefore, 1SM-1 was likely inoperable from when Unit 1 entered MODE 4 on April 10, 2004 until October 19, 2004, when Unit 1 entered a MODE in which both TS 3.6.3 and TS 3.7.2 were not applicable. Given that the applicable required actions and completion times of TS 3.6.3 and TS 3.7.2 were not satisfied during this period, this represented a condition prohibited by plant Technical Specifications reportable as per the requirements of 10 CFR 50.73 (a)(2)(i)(B). For reporting purposes, April 28, 2005 is the event discovery date.

As documented in Licensee Event Report (LER) 369/2004-02, MSIV 1SM-3 was also inoperable from April of 2004 until October of 2004. That LER identified a period during which 1SM-3 and 1SM-1 were simultaneously inoperable and reported that condition as one which could have prevented fulfillment of a safety function. However, as a result of the event being reported in LER 369/2005-02, it has been determined that the period of time that 1SM-1 and 1SM-3 were simultaneously inoperable was longer than that reported in LER 369/2004-02. Consequently, a revision to LER 369/2004-02 has been submitted.

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CAUSAL FACTORS

A cause evaluation has concluded the most probable cause for the failure of 1SM-1 to fully close was high valve friction due to main poppet tipping and plowing the guide rib, actuator to stem misalignment, stem side loading and abnormal packing friction. The sum of the above causes increased binding to the point where 1SM-1 failed to fully close.

Contributing causes were:

- The vendor failed to provide critical maintenance information regarding the clearance between the main poppet and body guide, surface finish of the guide ribs, method of inspection, and wear acceptance criteria in the original and subsequent revisions to the maintenance manual, thus the plant maintenance procedure inspection criteria were inadequate.
- Removal of an air assist to close feature in 1991 reduced the closing margin for 1SM-1. This feature was removed after vendor analysis showed that 1SM-1 would have adequate closing margin with the air assist to close feature removed. Subsequent to the 1SM-1 failure, this analysis was found to be incorrect.

CORRECTIVE ACTIONS

Completed:

- The guide ribs for 1SM-1 were repaired and returned to specifications. In addition, a new valve main poppet was installed along with an anti-vibration kit, new packing material which will not induce a corrosive environment and new stem guiding system with carbon bushing. The clearance between stem and cover bushing was also increased.
- The maintenance procedure used to perform valve maintenance on the MSIVs was revised to incorporate an improved valve actuator to valve stem alignment method.
- Dimensional analysis has been performed on the other Unit 1 MSIVs and the Unit 2 MSIVs. This analysis determined that their valve stems were not side loaded and the main valve poppet to guide rib clearances were acceptable.

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- The applicable MSIV calculations have been revised to correct deficiencies introduced as a result of the erroneous vendor analysis which supported removal of the air assist to close feature. This will help ensure adequate closing margin.
- Stronger actuator springs have been installed on all Unit 1 and 2 MSIVs to provide additional closing thrust.
- The MSIV vendor has been consulted with regard to incorporating critical maintenance parameters and inspection methods into the MSIV vendor manual.
- Revised the maintenance procedure used to perform valve maintenance on the MSIVs to incorporate critical maintenance parameters and inspection methods specified by the MSIV vendor.
- The air assist to close feature has been restored to all Unit 1 MSIVs. This will provide additional closing thrust.

Planned:

- The air assist to close feature will be restored to all Unit 2 MSIVs. This will provide additional closing thrust.

SAFETY ANALYSIS

Failure of 1SM-1 would have prevented isolation of the "D" SG. However, during the period that 1SM-1 was inoperable, there was no identified SG tube leakage.

A Westinghouse analysis specific to McGuire indicated that reactor vessel integrity would not be challenged by a loss of secondary side pressure, eliminating any Pressurized Thermal Shock (PTS) concerns for this event.

A risk assessment of this event determined that the increase in the estimated Core Damage Frequency (CDF) or Large Early Release Frequency (LERF) was insignificant. Therefore, the event described in this LER was not significant with respect to the health and safety of the public.

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ADDITIONAL INFORMATION

A review of the McGuire Nuclear Station corrective action database identified three instances, within the past three years, involving the failure of MSIVs 1SM-7 (1A SG MSIV), 1SM-3 (1C SG MSIV), and 2SM-1 (2D SG MSIV) to perform as designed during stroke testing.

The failure of 1SM-7 (not reportable) was due to binding in the stuffing box under certain thermal conditions. The failure of 1SM-3 (reference LER 369/2004-02) was attributed to improper reassembly during maintenance. The failure of 2SM-1 (reference LER 370/2005-05) was attributed to binding caused by insufficient clearance between the valve and cover bushing due to excessive corrosion growth, thermal binding as a result of differential expansion, and extrusion of packing into the clearance gap between the stem and the cover bushing.

Although the principal failure mechanism for 1SM-7, 1SM-1 and 2SM-1 are the same; i.e. increased friction, their causes are different. However, the McGuire Nuclear Station conservatively classifies the said failures as a recurring event. The failure of 1SM-1 is not classified as a recurring event of 1SM-3 failure.

The McGuire Nuclear Station has systematically approached the resolution to the above failures since the 1SM-7 failure in April of 2004. The corrective action stemming from 1SM-7 lead to a change in testing methodology which aided in the discovery of failures in 1SM-1, and 2SM-1.

Applicable Energy Industry Identification (EIIS) system and component codes are enclosed within brackets. McGuire unique system and component identifiers are contained within parentheses.