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SOUTHERN COMPANY

January 7, 2014

Docket Nos.: 50-366 NL-13-2612

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Edwin I. Hatch Nuclear Plant
Licensee Event Report 2013-005, Revision 1
Main Steam Isolation Valve Failed to Close During Surveillance Test

Ladies and Gentlemen:

In accordance with the requirements of 10 CFR 50.73(a)(2)(i)(B), Southern Nuclear Operating Company hereby submits the enclosed Licensee Event Report.

This letter contains no NRC commitments. If you have any questions, please contact Greg Johnson at (912) 537-5784.

Respectfully submitted,

David Vineyard
Site Vice President

sb/CRP

Enclosures: LER 2013-005, Revision 1

cc: Southern Nuclear Operating Company
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Edwin I. Hatch Nuclear Plant

Licensee Event Report 2013-005, Revision 1

Main Steam Isolation Valve Failed to Close During Surveillance Test

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

Estimated burden per response to comply with this mandatory collection request: 80 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 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resources@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)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Edwin I. Hatch Nuclear Plant Unit 2	05000 366	1 OF 4

4. TITLE
Main Steam Isolation Valve Failed to Close During Surveillance Test

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
09	13	2013	2013	- 005 -	01	01	08	2014	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE
Mode 1

10. POWER LEVEL
100

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

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☒ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☐ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Edwin I. Hatch / Steven Tipps – Licensing Supervisor	912-537-5880

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	Yes					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

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

On September 13, 2013 at 1438 EDT, with the unit in Mode 1 at 100 percent power, the Unit 2 'D' outboard main steam isolation valve (MSIV) failed to move during surveillance testing that involved partial closure testing of the valve. Based on previous operating experience this test result typically indicated a problem with a solenoid used for partial valve closure testing and was not indicative of a problem with the MSIV. A plan was made to cycle the MSIV to the "closed" position and return it to the "open" position during a planned power reduction on September 14, 2013. If the failure was indeed due to the test solenoid, the affected MSIV would function as expected after the power reduction.

At 1105 EDT on September 14, 2013, following power reduction to approximately 65 percent power, the 'D' outboard MSIV failed to close using its control switch. Actions were taken to isolate the MSIV penetration as required by Technical Specifications. Maintenance activities were completed and the MSIV underwent rigorous testing with successful results to confirm the operability of the 'D' outboard MSIV.

PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor
Energy Industry Identification System code (ISV) is associated with the MSIV described in this report.

DESCRIPTION OF EVENT

On September 13, 2013 at 1438 EDT, with the unit in Mode 1 at 100 percent power, the Unit 2 'D' outboard MSIV failed to move during the partial closure surveillance test. Based on previous operating experience this test result typically indicated a problem with a solenoid used solely for partial valve closure testing and was not considered a problem with the MSIV. The performance of this surveillance test was scheduled to be performed in conjunction with a planned power reduction to allow the MSIV to be fully cycled if necessary to determine if it was functioning properly. At 1105 EDT on September 14, 2013, following the planned power reduction to approximately 65 percent power, a troubleshooting plan was implemented to verify the "partial close" push button was sending the proper signal to the valve solenoid. A continuity check was completed to ensure the solenoids and wiring were not damaged and that the solenoids were energizing appropriately. Troubleshooting was completed with no anomalies noted in the electrical circuit. During the initial attempt to fully cycle the 'D' outboard MSIV, it failed to close during testing when using its control switch as part of the "fast closure" method for testing the MSIV. Actions were then taken to isolate the penetration associated with this MSIV as required by Technical Specification 3.6.1.3. A decision was made to shut the unit down and cold shutdown was achieved on September 16, 2013. The valve remained open until a pressure of approximately 140 psi was applied on top of the air cylinder piston to assist valve closure. The remaining MSIVs operated as expected and closed without assistance.

The Unit 2 shutdown allowed the needed access to support continued troubleshooting of the valve. A visual inspection of the valve revealed some rubbing between the lower spring plate and yoke rod, but no further anomalies with the upper structure were observed. Detailed measurements were taken of the upper structure indicating some misalignment of the actuator and valve stem was present, but the alignment was determined to be within procedure tolerances. The actuator was subsequently removed and disassembled with no evidence of severe binding or malfunction. No foreign material was observed. The valve was unpacked and the stem inspected with no galling, scoring or abnormal wear conditions noted. The valve was repacked and the upper structure was replaced with new components. The lower spring plate and several spacer rings were reused after passing inspection. An Air Operated Valve flow scan was performed with no anomalies noted regarding its seating forces or seating characteristics. The valve passed a Local Leak Rate Test (LLRT) with a leakage rate of 18 standard cubic feet per hour, well below the acceptance criteria of 52.1 standard cubic feet per hour.

A "partial closure" test was successfully performed for this valve after the upper structure was replaced, and operability testing of the valve was completed prior to startup which included stroking the valve to confirm it met required valve closure time acceptance criteria. When the valve returned to near operating temperatures, the "partial closure" test failed; however, a successful "fast closure" test confirmed its isolation capability. Based on this subsequent "partial closure" test failure, the root cause team included consideration of thermal growth and vendor tolerances as possible contributors to the failure of the valve. All Unit 2 MSIVs were tested successfully after the Unit 2 shutdown. A

rigorous test plan was established and is in effect to demonstrate continued reliability of the valve.

CAUSE OF EVENT

The direct cause of the event was found to be thermal or mechanical locking of valve internals. It was determined that upper valve body bore-to-poppet total clearances were outside of original equipment manufacturer (OEM) recommendations and this caused the valve to be in a non-fault tolerant configuration. Because of the reduced tolerance, 1) scale buildup, 2) misalignment (cocking of the disk), or 3) minor valve abnormalities could act collectively to cause interference to valve movement. Additionally, thermal gradient or material defects between the valve body and poppet can further reduce clearances. Vendor literature indicated clearances equal to or less than 0.016 inches made similar valves in the industry susceptible to thermal binding. The smallest poppet to bore clearance measured on the 2D outboard MSIV was 0.016 inches.

Plant history indicates that flow induced vibration has resulted in MSIV backseat degradation due to impact loads. The resulting mushroom effect reduces the gap between valve stem and backseat and can damage the valve stem, interfering with valve movement and contributing to thermal or mechanical locking.

REPORTABILITY ANALYSIS And SAFETY ASSESSMENT

The 'D' MSIV failed to pass the "partial closure" surveillance test with the unit at 100 percent power. As previously discussed, Hatch operating experience with previous test failures using the "partial closure" test method were found to be caused by a failure of a test solenoid. After making a planned power reduction shift management performed the surveillance procedure to cycle the valve closed in order to demonstrate the isolation capability of the MSIV with the expectation that the "fast close" test would be successful. Instead the MSIV failed to close via the "fast close" method. If either test had been successful, operability would have been confirmed and Technical Specifications surveillance requirements would have been satisfied. Since the failure of the "fast close" test occurred nearly 24 hours following the "partial closure" test, this failure served as firm evidence that the MSIV had been inoperable at least since the time of the "partial closure" test. Since there was firm evidence that the valve was inoperable for a time frame longer than the completion time of 8 hours to isolate the penetration as required by the Technical Specifications, this condition is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by Technical Specification 3.6.1.3, which states "Each PCIV, except reactor building-to-suppression chamber vacuum breakers, shall be OPERABLE.

Since the redundant MSIV in that penetration remained operable throughout this event, isolation capability of the penetration and thereby its safety function was maintained. Based on this information this event was determined to have very low safety significance.

CORRECTIVE ACTIONS

Valve maintenance was performed as well as a successful LLRT. A slow closure test was successfully performed for this valve after the upper structure was replaced. A successful flow scan was performed. Further, operability testing of valve, including stroking the valve to confirm it met required valve closure acceptance criteria, was completed prior to startup. When the valve returned to near operating temperatures, another test failure was experienced while performing the partial closure test. Based on this subsequent event, the root cause team included the consideration of

thermal growth and vendor tolerances as possible contributors to the initial failure of the valve. All Unit 2 MSIVs were successfully tested after the Unit 2 shutdown. A rigorous test plan is in effect and ongoing to demonstrate continued reliability of the valves.

The valve was determined to be capable of performing its intended safety function based on (1) the confirmation that the test and control circuits were properly working, (2) the confirmation that the pneumatic and hydraulic control systems were functioning properly, (3) the confirmation that the mechanical alignment was within procedural tolerances, (4) the absence of galling or scoring on the valve stem, (5) the replacement of components in the upper structure and reconditioning of the lower stem plate bushings, (6) the performance of a successful flow scan and LLRT, (7) the successful stroking of the valve within its Technical Specification acceptance criteria, and (8) the implementation of compensatory measures included in the associated operability determination.

Based on the preceding information, as well as the successful completion of two "partial closure" and one "fast closure" tests of the valve after reaching thermal equilibrium, there is reasonable assurance the valve can continue to perform its safety function.

Final corrective actions include a design change package that will replace the bonnet, poppet and piston-disk assembly for 2B21F028D by March 2015. The change package will also re-establish the internal clearances within the body of the valve and remove the requirement for the valve to sit upon its backseat. Since the valve is currently operable and considered reliable based on the previous actions taken, the results achieved and the compensatory measures that are in place ensure continued operability in the interim.

ADDITIONAL INFORMATION

Other Systems Affected: None
Failed Components Information:

Master Parts List Number:	2B21F028D	EIIS System Code: SB
Manufacturer: Edward Valves		Reportable to Epix: Yes
Model Number: Fig 1612 JMMNTY		Root Cause Code: X
Type: Flite Flow Stop Valve		EIIS Component Code: ISV
Manufacturer Code: E095		

Commitment Information: This report does not create any new permanent licensing commitments.

Previous Similar Events: A review of LERs and Corrective Action Program documents did not reveal any events similar to those discussed in this report within the last three years.