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August 14, 2013

Docket Nos.: 50-364

NL-13-1526

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

Joseph M. Farley Nuclear Plant – Unit 2
Licensee Event Report 2012-001-01
TDAFW Orifice Plate Thickness Results in Condition Prohibited by
Technical Specifications

Ladies and Gentlemen:

In accordance with the requirements of 10CFR50.73(a)(2)(i)(B), 10CFR50.73(a)(2)(ii)(B) and 10CFR50.73(a)(2)(v)(D) Southern Nuclear Operating Company hereby submits the enclosed Licensee Event Report. This report is a supplement to LER 2012-001-00 submitted November 7, 2012. This letter contains no NRC commitments. If you have any questions, please contact Bill Arens at (334) 814-4765.

Sincerely,

A handwritten signature in cursive script that reads "T. Lynch".

T. A. Lynch
Vice President – Farley

TAL/LBH/lac

Enclosure: Unit 2 Licensee Event Report 2012-001-01

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cc: Southern Nuclear Operating Company

Mr. S. E. Kuczynski, Chairman, President & CEO

Mr. D. G. Bost, Executive Vice President & Chief Nuclear Officer

Mr. B. L. Ivey, Vice President – Regulatory Affairs

Mr. B. J. Adams, Vice President – Fleet Operations

Mr. C. R. Pierce, Director – Regulatory Affairs

Mr. J. G. Horn, Regulatory Affairs Manager – Farley

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U. S. Nuclear Regulatory Commission

Mr. V. M. McCree, Regional Administrator

Mr. R. E. Martin, NRR Project Manager – Farley

Mr. P. K. Niebaum, Senior Resident – Farley

**Joseph M. Farley Nuclear Plant – Unit 2
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Enclosure

Unit 2 Licensee Event Report 2012-001-01

LICENSEE EVENT REPORT (LER)

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 FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@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.

1. FACILITY NAME Joseph M. Farley Nuclear Plant, Unit 2	2. DOCKET NUMBER 05000 364	3. PAGE 1 OF 4
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4. TITLE
TDAFW Pump Orifice Plate Thickness Results in Condition Prohibited by Technical Specifications

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	12	2012	2012	- 001 -	01	08	14	2013	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: <i>(Check all that apply)</i>			
10. POWER LEVEL 100	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)	
<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER	
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A	

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME J.M. Farley Nuclear Plant, Bill Arens – Licensing Supervisor	TELEPHONE NUMBER (Include Area Code) (334) 814-4765
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13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR

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

On September 12, 2012, while Unit 2 was in Mode 1 at approximately 100% power, an external inspection of the Unit 2 Turbine Driven Auxiliary Feedwater (TDAFW) Pump flow orifice plates [OR] identified the thickness to be 1/8 inch versus 1/2 inch as specified in design drawings. An evaluation of this condition was unable to provide assurance of orifice plate geometry and integrity under design maximum flow conditions. As a result, the Unit 2 TDAFW Pump [P] was declared INOPERABLE and Technical Specification 3.7.5 condition B was entered. Temporary Modification SNC429958 was subsequently implemented to limit the maximum pressure drop across the orifice plates to an acceptable level by restricting the open movement of the TDAFW flow control valves. This allowed the restoration of the TDAFW Pump to OPERABLE status within the time limit of Technical Specification 3.7.5 condition B. A review of maintenance history has determined that prior to initial plant operation, design changes were issued in 1977 and 1978 to replace originally installed 1/8 inch orifice plates with 1/2 inch orifice plates. For unknown reasons these design changes for orifice plate replacement were not implemented. Since the 1/8 inch orifice plates have been in place for the life of the plant, this represents a condition prohibited by Technical Specifications and is reportable under 10CFR50.73(a)(2)(i)(B). This condition is additionally reportable under 10CFR50.73(a)(2)(ii)(B) and 10CFR50.73(a)(2)(v)(D).

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NARRATIVE

Westinghouse -- Pressurized Water Reactor

Description of Event

As a result of the 2011 Component Design Basis Inspection (CDBI), Plant Farley received a Licensee Identified Violation (LIV 364/2011010-005) for the actual bore size of the Unit 1 Motor Driven Auxiliary Feed Water (MDAFW) system discharge flow orifice (FO2861A) [OR] deviating from the nominal bore size specified in the design drawing by 0.03125 inches and exceeding the assumed hydraulic analysis maximum bore size by 0.0156 inches. To address this condition, the Unit 1 MDAFW and Turbine Driven Auxiliary Feed Water (TDAFW) flow orifices were replaced during the spring 2012 Unit 1 refueling outage to reduce the bore size to within tolerance and provide additional margin in the AFW flow analyses. Inspection of the replaced orifice plates revealed they were in good condition, of adequate thickness, and had experienced insignificant erosion.

In order to similarly restore the Unit 2 Auxiliary Feed Water (AFW) flow orifices to design specifications and provide additional margin in the Unit 2 AFW flow analysis, the Unit 2 MDAFW and TDAFW flow orifice plates were replaced during the 2013 spring U2 refueling outage. On July 27, 2012, as part of planning for the Unit 2 MDAFW orifice replacements, walk-downs of two of the three Unit 2 MDAFW flow orifice plates were conducted. These inspections identified that although the engraved bore size information matched the design drawings, the flow orifice thickness was 1/8 inch instead of 1/2 inch as design drawings specified. A subsequent evaluation of the orifice plate thickness determined that the Unit 2 MDAFW flow orifices were degraded but operable.

To address extent of condition concerns regarding the discovery of non-conforming Unit 2 MDAFW orifice plate thicknesses, an inspection of the Unit 2 TDAFW flow orifice plates was conducted. On September 12, 2012 at 0614 while Unit 2 was in Mode 1 at approximately 100% power, an external inspection of the Unit 2 TDAFW flow orifice plates determined the plate thickness to be 1/8 inch versus 1/2 inch as specified in design drawings. Based on analysis, the 1/8 inch thick TDAFW orifice plates could not be assured of maintaining proper geometry and integrity when subjected to the pressure drop across the plate under maximum design TDAFW flow conditions, and therefore the operability of the Unit 2 TDAFW system might not be supported. As a result of this analysis, the Unit 2 TDAFW Pump was declared inoperable at 0614 on September 12, 2012 and Technical Specification 3.7.5 Condition B was entered. Implementation of Temporary Modification SNC429958 to limit TDAFW orifice flow, thereby reducing the pressure drop to an acceptable level, by restricting the open movement of TDAFW flow control valves was completed at 1534 on September 12, 2012. This action allowed restoration of the TDAFW Pump to OPERABLE status within the time limit of Technical Specification 3.7.5 condition B. Unit 2 remained in Mode 1 at 100% power for the duration from the time of discovery of the non-conformance (0614 on September 12, 2012) until the restoration of operability (1534 on September 12, 2012). There were no other inoperable structures, systems, or components during this time period that contributed to the event.

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Since the 1/8 inch orifice plates have been in place for the life of the plant, this represents a condition prohibited by Technical Specifications and is reportable under 10CFR50.73(a)(2)(i)(B). This condition is additionally reportable as an unanalyzed condition that degraded plant safety under 10CFR50.73(a)(2)(ii)(B) and as a condition that could have prevented the fulfillment of a safety function under 10CFR50.73(a)(2)(v)(D).

During the spring 2013 refueling outage, all Unit 2 TDAFW 1/8 inch flow orifice plates were replaced with orifice plates of design thickness. The removed orifice plates were inspected and were all found to be intact, of proper bore size, and in good condition with the exception of noticeable deformation (bulging) of the plates. These findings were not inconsistent with the previous deterministic and risk-based assessments that were performed. No further inspections or testing will be conducted.

Cause of Event

The inadequate orifice plate thickness is considered a latent construction issue. Two design changes were issued during original plant construction that required installation of adequately sized flow orifices. For undetermined reasons, the replacement of the 1/8 inch thick orifice plates as required by the design changes did not occur. Therefore, the direct cause of the event was the failure to correctly implement these two design changes during plant construction. Research of plant construction documentation was unable to identify reasons for the failure to implement the design changes.

Safety Assessment

An Engineering analysis of design basis events with an assumed failure of the installed 1/8 inch thick TDAFW flow orifice plates has determined that during a main steam line break or a main feed water line break event with successful injection from both MDAFW pumps, there would be adequate AFW flow to the intact steam generators. It can be noted however that under these conditions, the TDAFW Pump would operate in a run-out condition, and if one of the two MDAFW Pumps were out of service or failed during either of these two events, then minimum required flow would not be achieved. This analysis of potential impact on TDAFW pump flow does not consider the ability of the control room operator to modulate TDAFW pump speed and TDAFW flow control valve position to avoid or mitigate runout if necessary. No other design basis accidents were impacted by the non-conforming Unit 2 TDAFW orifice plates.

Additionally, SNC Risk Informed Engineering (RIE) conducted a risk evaluation of the impact at Farley Unit 2 of secondary side break (i.e. main steam line break and main feedwater line break) events. The evaluation assumed failure of the TDAFW pump due to run-out for these events. It was further assumed that successful mitigation required injection flow from 2 of 2 MDAFW pumps. The current Farley Unit 2 average risk model (Revision 9, Version 2) that considers only hazards from internal events and internal flooding was used. Based on the results of this risk evaluation, it was concluded that the potential increase in risk resulting from the smaller plate thickness is considered "very small" in accordance with the acceptance

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guidelines in Regulatory Guide 1.174 for increases in core damage frequency (CDF) and large early release frequency (LERF) (i.e., less than 1E-06 and 1E-07 per reactor year, respectively).

The non-conformance to design specifications of the Unit 2 TDAFW orifice plates with respect to plate thickness had no actual adverse effect on the safety and health of the public since there has been no occurrence of accident conditions involving a main steam line break or a main feed water line break.

During the spring 2013 refueling outage, all Unit 2 TDAFW 1/8 inch flow orifice plates were replaced with orifice plates of design thickness. The removed orifice plates were inspected and were all found to be intact, of proper bore size, and in good condition with the exception of noticeable deformation (bulging) of the plates. These findings were not inconsistent with the previous deterministic and risk-based assessments that were performed. As a result, no further changes to the safety assessment are necessary.

Corrective Action

To restore the Unit 2 TDAFW Pump to operable status Temporary Modification SNC429958 was implemented within the time limit of Technical Specification 3.7.5 condition B to limit the maximum TDAFW orifice through-flow and resultant pressure differential across the orifice plate to an acceptable value.

To restore the Unit 2 TDAFW flow orifices to within design specifications, the orifice plates were replaced with plates meeting design thickness criterion during the Unit 2 spring 2013 refueling outage. The Unit 2 MDAFW flow orifice plates (whose non-conformance to design specifications did not make the motor driven sub-system inoperable) were likewise replaced with plates meeting design thickness criterion during the Unit 2 spring 2013 refueling outage.

Industry Operating Experience (OE) on the event has been issued.

Additional Information

No similar events were discovered.