Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609-2000

January 22, 2013

10 CFR 50.73

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

Browns Ferry Nuclear Plant, Unit 1
Facility Operating License No. DPR-33
NRC Docket No. 50-259

Subject: **Licensee Event Report 50-259/2012-010-00**

The enclosed Licensee Event Report provides details of a primary containment isolation valve being inoperable for longer than allowed by the Browns Ferry Nuclear Plant's Technical Specifications. The Tennessee Valley Authority is submitting this report in accordance with Title 10 of the Code of Federal Regulations (10 CFR) 50.73(a)(2)(i)(B).

There are no new regulatory commitments contained in this letter. Should you have any questions concerning this submittal, please contact J. E. Emens, Jr., Nuclear Site Licensing Manager, at (256) 729-2636.

Respectfully,

K. J. Polson
Vice President

Enclosure: Licensee Event Report 50-259/2012-010-00 – Primary Containment Isolation Valve Inoperable for Longer than Allowed by the Technical Specifications

cc: See Page 2

IE22
NRR

cc (w/ Enclosure):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Browns Ferry Nuclear Plant

ENCLOSURE

Browns Ferry Nuclear Plant
Unit 1

Licensee Event Report 50-259/2012-010-00

Primary Containment Isolation Valve Inoperable for Longer than Allowed by the Technical Specifications

---

See Enclosed

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 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.

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Browns Ferry Nuclear Plant Unit 1	05000259	1 of 7

4. TITLE: Primary Containment Isolation Valve Inoperable for Longer than Allowed by the 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
									N/A	05000
11	22	2012	2012	- 010 -	00	01	22	2013	FACILITY NAME N/A	DOCKET NUMBER 05000

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

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Mark Acker, Licensing Engineer	256-729-7533

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
D	AD	V	M090	Y					

14. SUPPLEMENTAL REPORT EXPECTED

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

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR
N/A	N/A	N/A

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

On November 22, 2012, at 0600 Central Standard Time, during a Browns Ferry Nuclear Plant (BFN), Unit 1, refueling outage, Sense Line A3 Excess Flow Check Valve, 1-ECKV-068-0065B, failed to meet the acceptance criteria of surveillance 1-SR-3.6.1.3.8(4), Instrument Line Excess Flow Check Valve Operability Test. Further troubleshooting identified the failure resulted from the valve being incorrectly installed in a reverse orientation in the system. The valve was originally installed in a reverse orientation on October 15, 2006.

This configuration would not have reduced flow downstream of the check valve in the event of a sensing line rupture outside of primary containment. The check valve was replaced and installed in its correct orientation, followed by successful the completion of the surveillance, on November 27, 2012.

The root cause of the condition was identified to be Mechanical Corrective Instruction MCI-0-000-CKV002, Maintenance of Marotta Instrument Line Check Valves, does not contain a step to ensure the valve was installed correctly, or an independent step to verify correct installation.

The corrective actions to prevent recurrence are to revise MCI-0-000-CKV002 to include steps to ensure proper installation of check valves, include steps to independently verify installation, and to review and revise, as necessary, BFN mechanical maintenance check valve procedures to ensure adequate direction for correct installation of check valves.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Browns Ferry Nuclear Plant, Unit 1	05000259	2012	-- 010	-- 00	2 of 7

NARRATIVE

I. PLANT CONDITION(S)

At the time of discovery, Browns Ferry Nuclear Plant (BFN), Unit 1, was in Mode 4 at zero percent rated thermal power during a refueling outage.

II. DESCRIPTION OF EVENT

A. Event:

On November 22, 2012, at 0600 Central Standard Time (CST), during a BFN, Unit 1, refueling outage, Sense Line A3 Excess Flow Check Valve (EFCV) [CKV], 1-ECKV-068-0065B, failed to meet the acceptance criteria of surveillance 1-SR-3.6.1.3.8(4), Instrument Line Excess Flow Check Valve Operability Test. The valve was replaced and retested. Again, the valve failed to pass the surveillance requirement.

Further troubleshooting identified both failures resulted from the valve being incorrectly installed in a reverse orientation in the system. The valve was originally installed in a reverse orientation on October 15, 2006. Prior to BFN, Unit 1, restart, procedure 1-SR-3.6.1.3.8(4) was performed on March 19, 2007, and acceptance criteria was documented as being satisfied for this valve.

This configuration would not have reduced flow downstream of the check valve in the event of a sensing line rupture outside of primary containment. The check valve was replaced and installed in its correct orientation on November 23, 2012. The surveillance was successfully completed on November 27, 2012. Due to this condition, 1-ECKV-068-0065B was inoperable from October 15, 2006, until November 27, 2012.

B. Inoperable Structures, Components, or Systems that Contributed to the Event:

There were no inoperable structures, components, or systems that contributed to this event.

C. Dates and Approximate Times of Major Occurrences:

October 15, 2006	Check valve 1-ECKV-068-0065B installed.
March 19, 2007, 0430 Central Daylight Time (CDT)	Check valve 1-ECKV-068-0065B initially failed 1-SR-3.6.1.3.8(4). Test engineer reperformed test and signed off acceptance criteria.
November 22, 2012, 0600 CST	Surveillance 1-SR-3.6.1.3.8(4) was performed on 1-ECKV-068-0065B. Valve failed acceptance criteria.
November 22, 2012	Check valve 1-ECKV-068-0065B was replaced. The new check valve was installed in the same orientation as the previous valve.

NARRATIVE

November 22, 2012, 2235 CST	Surveillance 1-SR-3.6.1.3.8(4) was performed on 1-ECKV-068-0065B. Valve failed acceptance criteria.
November 23, 2012	Check valve 1-ECKV-068-0065B was determined to be installed in a reverse orientation and was replaced under WO 112971469.
November 27, 2012	Check valve 1-ECKV-068-0065 passed the acceptance criteria in 1-SR-3.6.1.3.8(4).

D. Other Systems or Secondary Functions Affected

There were no other systems or secondary functions affected.

E. Method of Discovery

On November 22, 2012, at 0600 CST, during a BFN, Unit 1, refueling outage, Sense Line A3 EFCV, 1-ECKV-068-0065B, failed to meet the acceptance criteria of surveillance 1-SR-3.6.1.3.8(4), Instrument Line Excess Flow Check Valve Operability Test.

F. Operator Actions

There were no operator actions.

G. Safety System Responses

There were no safety system responses.

III. CAUSE OF THE EVENT

A. Immediate Cause

The immediate cause was determined to be the incorrect installation of the check valve in a reverse orientation.

B. Root Cause

The root cause of the condition was identified to be inadequate procedural guidance in Mechanical Corrective Instruction MCI-0-000-CKV002, Maintenance of Marotta Instrument Line Check Valves. Procedure MCI-0-000-CKV002 does not contain a step to ensure the valve was installed correctly, or an independent step to verify correct installation.

C. Contributing Factors

There were no contributing factors.

IV. ANALYSIS OF THE EVENT

The TVA is submitting this report in accordance with 10 CFR 50.73(a)(2)(i)(B), as any operation or condition which was prohibited by the plant's Technical Specifications.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Browns Ferry Nuclear Plant, Unit 1	05000259	2012	-- 010	-- 00	4 of 7

NARRATIVE

The BFN, Unit 1, Technical Specifications (TS) Limiting Condition for Operation (LCO) 3.6.1.3 requires that each Primary Containment Isolation Valve (PCIV) be Operable in reactor Modes 1, 2, and 3, and when the associated instrumentation is required to be Operable per LCO 3.3.6.1, "Primary Containment Isolation Instrumentation." Since 1-ECKV-068-0065B was inoperable in an applicable Mode, the unit should have been in Condition C of TS 3.6.1.3. The TS 3.6.1.3 Required Action C.1 requires the affected penetration flow path to be isolated by use of at least one closed and de-activated automatic valve, closed manual valve, or blind flange within 12 hours for EFCVs. The TS 3.6.1.3 Required Action C.2 requires verification, once per 31 days, that the affected penetration flow path is isolated. If Required Actions and associated Completion Times for Condition C are not met, then Condition E is entered and requires the unit be in Mode 3 (Hot Shutdown) within 12 hours and in Mode 4 (Cold Shutdown) within 36 hours. Because 1-ECKV-068-0065B was inoperable from October 15, 2006, until November 27, 2012, BFN operated with an inoperable PCIV for longer than allowed by the TS.

Check valve 1-ECKV-068-0065B is normally open to allow process indication downstream to monitor system parameters. A sensing line rupture downstream of the check valve would cause the check valve to seat due to excess differential pressure and substantially reduce the leak. With the valve installed in a reverse orientation, process parameters were still accurately monitored because the valve would not reduce flow. In the event of a sensing line rupture downstream of the check valve, the valve would have failed to perform its function.

Check valve 1-ECKV-068-0065B was installed on October 15, 2006, in preparation for the BFN, Unit 1 restart. The valve was installed in accordance with MCI-0-000-CKV002, Maintenance of Marotta Instrument Line Check Valves. Since work order history shows that this is the last time the valve had been worked on prior to the November 22, 2012, failure, it is evident that the check valve was incorrectly installed in a reverse orientation at that time. Due to the design of Marotta instrument line check valves, it is possible to install the check valve in a reverse orientation. The work instruction does not require the technician to ensure the valve is installed with the correct orientation, nor does it require the installation to be independently verified. This was determined to be the root cause of the event.

Surveillance 1-SR-3.6.1.3.8 is required to be performed on a representative sample of EFCVs once per 24 months such that each EFCV is tested at least once per 120 months. The surveillance is divided into 5 representative samples and the surveillance procedures are numbered 1-SR-3.6.1.3.8(1) through 1-SR-3.6.1.3.8(5). Prior to BFN, Unit 1, restart, all BFN, Unit 1, EFCV were tested. During the BFN, Unit 1, restart EFCV testing, on March 19, 2007, 1-ECKV-068-0065B was tested by a technician in accordance with 1-SR-3.6.1.3.8(4). The valve initially failed the test. A test engineer reperformed the test and incorrectly indicated that, while the valve did not perform as the other EFCVs that were tested, the results were still acceptable. The surveillance was not performed again until November 22, 2012.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Browns Ferry Nuclear Plant, Unit 1	05000259	2012	-- 010	-- 00	5 of 7

NARRATIVE

On November 22, 2012, 1-ECKV-068-0065B failed to meet the acceptance criteria of surveillance procedure 1-SR-3.6.1.3.8(4). The valve was replaced in the same orientation it was found and retested. Again, the valve failed to pass the surveillance requirement. Both failures resulted from the valve being installed in a reverse orientation in the system.

A review of completed surveillance procedures 1-SR-3.6.1.3.8(1) through 1-SR-3.6.1.3.8(5), performed during the BFN, Unit 1, restart, was conducted to determine if the test engineer who signed off on the incorrectly installed valve also signed off on any other valves. It was determined that during this time period, the test engineer in question only signed off on the acceptance criteria in 1-SR-3.6.1.3.8(4) for 1-ECKV-068-0065B. Therefore, the incorrect installation of 1-ECKV-068-0065B was not discovered on March 19, 2007, due to an isolated human performance error made by the test engineer.

Extent of Condition

The extent of condition covers check valves that were installed incorrectly. If additional instrument line check valves or other check valves installed at BFN were also installed in a reverse orientation or with another installation defect, it is likely that surveillances such as 1-SR-3.6.1.3.8(4) would identify this condition. The population of BFN, Unit 1, EFCVs, not tested since 2007, will be tested during the next BFN, Unit 1, refueling outage scheduled for Fall 2014.

Extent of Cause

The extent of cause covers procedures that perform maintenance on check valves. The root cause identified inadequacies in MCI-0-000-CKV002. The corrective action to prevent recurrence is to revise MCI-0-000-CKV002. Mechanical maintenance identified seven additional procedures that perform maintenance on check valves. These seven procedures will be evaluated to ensure direction is adequate for correct installation of check valves.

V. ASSESSMENT OF SAFETY CONSEQUENCES

The safety consequences of a failure of an EFCV associated with an instrument line break are not significant and have been previously evaluated by General Electric (GE) and reviewed and accepted by the Nuclear Regulatory Commission (NRC) for the BFN in support of a revision of the Technical Specifications Surveillance Requirements for EFCVs.

The purpose of EFCVs installed in boiling water reactor instrument lines, which penetrate the primary containment boundary, is to limit the release of fluid in the event of an instrument line break. At BFN, EFCVs are not required to close in response to a containment isolation signal and are not postulated to operate under post-Loss-of-Coolant-Accident (LOCA) conditions. At BFN, EFCVs are not needed to mitigate the consequences of an accident because an instrument line break coincident with a design basis LOCA would be of a sufficiently low probability to be outside the design basis.

NARRATIVE

The radiological consequences evaluated by BFN for an instrument line break do not credit the EFCVs for isolating the break. The evaluation assumes a discharge of reactor water through an instrument line with a 1/4 inch orifice during the detection of the instrument line break and subsequent reactor pressure vessel (RPV) cool down and depressurization sequence. For a radiological material release directly to the secondary containment with the primary containment initially intact, a failure of an EFCV would be bounded by the Main Steam Line Break Analysis of BFN Updated Final Safety Analysis Report, Section 14.6, "Analysis of Design Basis Accidents - Uprated."

The operational impact of an EFCV failing to close during the rupture of an instrument line connected to the RPV boundary is based on environmental effects of a steam release in the vicinity of the instrument racks. The environmental impact of the failure of instrument lines connected to the RPV pressure boundary is the released steam into the reactor building. The magnitude of a release through an instrument line would be within the pressure control capacity of reactor building ventilation systems and that the integrity and functional performance of secondary containment following an instrument line break would be met. The BFN analysis confirmed that an instrument line rupture outside primary containment will not result in over pressurizing secondary containment. The separation of instrument lines and equipment in the reactor building is expected to minimize the operational impact of an instrument line break on other equipment due to jet impingement. The BFN analysis assumes plant shutdown and cool down occur after the line break.

Because the failure of an EFCV associated with an instrument line break has been analyzed and its consequences have been found to be radiologically bounded and environmentally manageable, TVA concludes that there was no significant reduction in the protection of the public as a result of this event.

VI. CORRECTIVE ACTIONS - The corrective actions are being managed by TVA's corrective action program.

A. Immediate Corrective Actions

Sense Line A3 EFCV, 1-ECKV-068-0065B, was replaced and passed acceptance criteria of 1-SR-3.6.1.3.8(4) on November 27, 2012.

B. Corrective Actions to Prevent Recurrence

1. Revise MCI-0-000-CKV002, Maintenance of Marotta Instrument Line Check Valves to include steps to ensure proper installation of check valves and to independently verify installation.
2. Review and revise, as necessary, BFN mechanical maintenance check valve procedures to ensure adequate direction for correct installation of check valves.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Browns Ferry Nuclear Plant, Unit 1	05000259	2012	-- 010	-- 00	7 of 7

NARRATIVE

VII. ADDITIONAL INFORMATION

A. Failed Components

The failed component was Sense Line A3 EFCV, 1-ECKV-068-0065B, on the Reactor Recirculation System [AD]. The EFCV was manufactured by Marotta Scientific Controls, Inc.

B. Previous Similar Events

A search of LERs for BFN, Units 1, 2, and 3, for approximately the past five years identified LER 50-296/2010-003-02, Multiple Test Failures of EFCVs. The Corrective Actions (CA) for LER 50-296/2010-003-02 included the following.

1. Consider replacing each of the instrument line EFCVs with an orifice.
2. Initiate frequency revision in Maximo to administratively revise each Unit's SR-3.6.1.3.8 series to change performance frequency from 120 months to 72 months.
3. Trend performances of each Unit's SR-3.6.1.3.8 series over the next three cycles.

The first CA was presented to the Change Control Board (CCB). The CCB did not approve replacing EFCVs with an orifice. The second CA has been implemented, and the third CA is still in progress.

A search on similar conditions of Problem Evaluation Reports (PERs) for BFN, Units 1, 2, and 3, for approximately the past five years identified PERs 222850, 241921, and 646463.

C. Additional Information

The corrective action document for this report is PER 646600.

D. Safety System Functional Failure Consideration:

In accordance with NEI 99-02, this issue is not considered a safety system functional failure.

E. Scram With Complications Consideration:

This condition did not include a reactor scram.

VIII. COMMITMENTS

There are no commitments.