

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

August 13, 2012

10 CFR 50.73

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

> Browns Ferry Nuclear Plant, Unit 2 Facility Operating License No. DPR-52 NRC Docket No. 50-260

Subject: Licensee Event Report 50-260/2012-002-00

The enclosed Licensee Event Report provides details of the High Pressure Coolant Injection System rendered inoperable. The Tennessee Valley Authority is submitting this report in accordance with 10 CFR 50.73(a)(2)(v)(B), 10 CFR 50.73(a)(2)(v)(D), and 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 50-260/2012-002-00 – High Pressure Coolant Injection System Rendered Inoperable Due to an Inoperable Primary Containment Isolation Valve

cc (w/ Enclosure):

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

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ENCLOSURE

Browns Ferry Nuclear Plant Unit 2

Licensee Event Report 50-260/2012-002-00

High Pressure Coolant Injection System Rendered Inoperable Due to an Inoperable Primary Containment Isolation Valve

See Attached

	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																	
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and the valve was determined to be Operable. On June 12, 2012, based on advice from Engineering, Operations personnel requested a Prompt Determination of Operability.																		
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NRC FORM 366A (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

CONTINUATION SHEET									
FACILITY NAME (1)	DOCKET (2)	1	LER NUMBER (6	PAGE (3)					
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Browns Ferry Nuclear Plant, Unit 2	05000260	2012	002	00	2 of 8				

NARRATIVE

I. PLANT CONDITION(S)

At the time of the event, Browns Ferry Nuclear Plant (BFN), Unit 2, was in Mode 1 at approximately 100 percent rated thermal power.

II. DESCRIPTION OF EVENT

A. Event

On June 7, 2012, at approximately 1305 hours Central Daylight Time (CDT), during performance of surveillance procedure 2-SR-3.5.1.7, HPCI Main and Booster Pump Set Developed Head and Flow Rate Test at Rated Reactor Pressure, a steam leak was identified on flow control valve [FCV], 2-FCV-073-0081, High Pressure Coolant Injection (HPCI) [BJ] steam line warm-up valve. A BFN, Unit 2, Senior Reactor Operator (SRO) evaluated the condition and concluded that Operability was maintained.

On June 12, 2012, the BFN Appendix J Engineer became aware of the steam leak on valve BFN-2-FCV-73-81 and advised Operations of the need for an Operability Determination to be performed. Operations subsequently requested a Prompt Operability Determination from Engineering for the steam leak on valve 2-FCV-073-0081.

On June 13, 2012, at approximately 1700 hours CDT, it was determined that valve 2-FCV-073-0081, a double disc gate valve, was not capable of performing its intended primary containment isolation valve (PCIV) function. The basis for this determination was the discovery that the steam leak was coming from a leak sealant injection port in the valve packing area on 2-FCV-073-0081 that resulted from a missing adapter. Due to the position of the adapter port on the valve bonnet and the configuration of the valve in the primary containment isolation position, i.e. closed, a leak path from the primary containment to the secondary containment was available. Using the peak accident primary containment pressure of 50.6 psig and the dimensions of the leak sealant injection port opening, the leak rate was estimated to exceed the specified maximum allowable primary containment leak rate of $1.0 L_a$. As a result, June 13, 2012, is considered the discovery date for reporting this event.

The BFN, Unit 2, Technical Specification (TS) Limiting Condition for Operation (LCO) 3.6.1.3 requires each PCIV, except reactor building-to-suppression chamber vacuum breakers, to be Operable in Modes 1, 2, and 3, and when associated instrumentation is required to be Operable per TS LCO 3.3.6.1, Primary Containment Isolation Instrumentation. With one or more penetration flow paths with one PCIV inoperable except due to main steam isolation valve leakage not within limits, TS 3.6.1.3 Required Action A.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, blind flange, or check valve with flow through the valve secured within 4 hours. TS 3.6.1.3 Required Action A.2 requires that the affected penetration flow path to be verified to

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NARRATIVE	,					
В.	be isolated once per 31 days for the penetration flow path canner Actions E.1 and E.2 require the Mode 4 in 36 hours. To meet T PCIV, HPCI inboard steam isol June 13, 2012, at approximate System inoperable. As a result entered for the inoperable HPCI Additionally, since the HPCI states since at least June 7, 2012, BF without isolating the affected p The BFN, Unit 2, TS LCO 3.5. (ECCS) ([BJ][BO][BM]) injection Depressurization System (ADS Operable in Mode 1, and in More required to be Operable with re 150 pound-force per square in TS 3.5.1 Required Action C.1 in System [BN] to be immediately Required Action C.2 requires to 14 days. On June 13, 2012, at that the RCIC System was Oppion On June 15, 2012, following su 2-FCV-073-0081, Operations p 2-FCV-073-0081 is closed, dea TS 3.6.1.3 Required Action A.3 Inoperable Structures, Comp The inoperable component tha 2-FCV-073-0081.	ot be isolated e unit to be p FS LCO 3.6.1 ation valve, 2 ly 1745 hours t, TS 3.5.1, E CI System. eam line ward N, Unit 2, op enetration. 1 requires ea on/spray subs S)[SB] function bactor steam ch gauge (ps requires that v verified Ope hat the HPCI t approximate erable by add uccessful leal bersonnel ret activated, and 1.	d within 4 laced in .3 Requ 2-FCV-0 s CDT, re c CCS-0 m up flow berated la ch Emer system a n of six s dome pl ig). With Reactor erable by System ely 1745 ministrati k sealan urned the d leak se	hours, TS 3 Mode 3 in 12 ired Action A 73-0002, was endering the berating, Red w control val- onger than a gency Core nd the Auton safety/relief HPCI and Al ressure less in the HPCI S Core Isolation administration is restored to hours CDT, ve means. t injection for e HPCI Syste- aled. This control to that Control to that Control	8.6.1.3 Requi 2 hours and i 1 for an inop s closed on BFN, Unit 2, quired Action we had been llowed by the Cooling Syst natic valves to be DS valves are than or equa System inope on Cooling (Five means ar to Operable s Operations v r valve em to service configuration	red n perable HPCI s were leaking e TS em e not l to rable, RCIC) nd status in verified e. Valve satisfies
C.						
	June 7, 2012, at 1305 hours C	g performance of surveillance dure 2-SR-3.5.1.7, a steam leak was fied on valve 2-FCV-073-0081.				
	June 7, 2012, at 2041 hours C	Oj va	berability Ive 2-FC	Determinati	conducted an ion for the lea 1 and determ erability.	ak on

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NARRATIVE									
June 12, 2012	Op Pro 2-F Op req	The BFN Appendix J Engineer advised Operations personnel of the need for a Prompt Operability Determination on valve 2-FCV-073-0081 to be performed. Operations personnel subsequently requested an Operability Determination from Engineering.							
June 13, 2012, at 1700 hours	per una Op Re 2-F in-l	Site engineering notified Operations personnel that valve 2-FCV-073-0081 was unable to perform its PCIV function. Operations personnel entered TS 3.6.1.3 Required Action A.1 due to inoperable valve 2-FCV-073-0081. This action required in-line valve 2-FCV-073-0002 to be closed and deactivated within 4 hours. In-line valve 2-FCV-073-002 was closed and deactivated, as required by TS 3.6.1.3 Required Action A.1, rendering the HPCI System inoperable. As a result, the HPCI System was declared inoperable and TS 3.5.1 Required Action C.1 was entered. The BFN reported the event to the NRC.							
June 13, 2012, at 1745 hours	and Re Sys Sys								
June 13, 2012, at 2318 hours	s CDT The								
June 15, 2012, at 0230 hour	of v per	/alve 2-F	uccessful lea CV-073-008 eturned the H	1, Opera	tions				
D. Other Systems or Seconda									

D. Other Systems or Secondary Functions Affected

There were no other systems or secondary functions affected by this event.

E. Method of Discovery

This event was discovered during the satisfactory performance of surveillance procedure 2-SR-3.5.1.7.

F. Operator Actions

Operations personnel verified that the RCIC System was Operable by administrative means, removed the HPCI System from service by closing 2-FCV-073-0002 from the Main Control Room [NA], declared the HPCI System inoperable, and entered TS 3.5.1 Condition C.

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NARRATIVE

G. Safety System Responses

There were no safety system responses to this event.

III. CAUSE OF THE EVENT

A. Immediate Cause

The immediate cause was an open hole in the side of the bonnet (stuffing box) of valve 2-FCV-073-0081 that resulted from a missing leak sealant injection port adapter.

B. Root Cause

The root cause was inadequate work instructions for configuration control to ensure the final plant configuration matched the required configuration documented in an Engineering Document Change (EDC).

IV. ANALYSIS OF THE EVENT

The Tennessee Valley Authority (TVA) is submitting this report in accordance with 10 CFR 50.73(a)(2)(v)(B) and (D), any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to remove residual heat and mitigate the consequences of an accident; and 10 CFR 50.73(a)(2)(i)(B), any operation or condition which was prohibited by the plant's Technical Specifications.

During the Spring 2009 refueling outage for BFN, Unit 2, the old leak sealant was removed and new packing was installed in order to remove a Temporary Alteration Control Form (TACF) on valve 2-FCV-073-0081. During these maintenance activities, the leak sealant injection adapter was removed and never replaced on the valve bonnet. An EDC was implemented to allow the leak sealant adapter [LOV], 2-LOV-073-0581, to remain on the valve bonnet.

During the Spring 2011 refueling outage for BFN, Unit 2, maintenance personnel documented in the applicable work order that there was an open hole on the side of the valve bonnet of 2-FCV-073-0081 and notified their supervisor. In addition, during the performance of BFN, Unit 2, operating instruction 2-OI-73, Operating Instruction for the HPCI System, during this refueling outage, it was found that the leak sealant adapter was not located on valve 2-FCV-073-0081 as required by an EDC. There was no leak present from the leak sealant injection port in the valve packing area during either of these times. On April 4, 2011, during this refueling outage, a service request was written to document the missing leak sealant adapter and the loss of plant configuration control. Engineering performed an evaluation and concluded that the valve was fully functional.

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	erry Nuclear Plant, Unit 2	05000260	2012	002	00	6 of 8				
ARATIVE	On June 7, 2012, at approxima procedure 2-SR-3.5.1.7, a stea Unit 2, SRO evaluated the con On June 12, 2012, the BFN Ap Operability Determination to be Prompt Operability Determinat 2-FCV-073-0081. On June 13, 2012, at approxim 2-FCV-073-0081 was not capa inadequate work instructions for requirements in work orders of injection adapter, which was co EDC, was reinstalled on the 2- result, the leak sealant injection bonnet which resulted in a stea the valve was not capable of p inoperable in accordance with PCIV, the HPCI inboard steam	am leak was ident idition and conclu- opendix J Engines e performed. Open tion from Engines hately 1700 hours able of performing or configuration con- r maintenance pro- onsidered a perm FCV-073-0081 va- n adapter was rep- am leak from the performing its inten- TS 3.6.1.3. To m	ified on ded that er advise erations ring for t CDT, it its inter ontrol, th ocedures anent pi alve duri moved a remainir nded PC eet TS 3	valve, 2-FCV Operability ed Operation subsequentl he steam lea was determined ded PCIV function to ensure the ece of plant ng maintena nd never rep of hole. It was IV function a 8.6.1.3 Action	V-073-0081. was maintair s of the need y requested ak on valve ned that valve ned that valve verification hat a leak se equipment b ince activities blaced on the is determine and was decl ns for an inop	A BFN, ned. d for an a ve to valant y an s. As a e valve d that lared perable				
	rendering the BFN, Unit 2, HPCI System inoperable. As a result, TS LCO 3.5.1 Actions were entered. <u>Extent of Condition</u> The extent of condition was considered to be valves with known steam leaks that are also classified as PCIVs. It has been determined that there are currently six other PCIVs									
	in the plant with leaks identified with work orders. None of the existing leaks identified are from a missing leak sealant injection port adapter and Engineering and Operations found that operability was maintained for each of these six valves. Work Orders are in place to correct each leak in accordance with the Work Management System.									
	Extent of Cause									
	The extent of cause includes a which do not contain verificatio configuration. TVA will review EDCs to ensure they include a maintenance or modifications	on that the final co existing works or a requirement for	onfigurat ders plai verificati	ion matches nned to imple on that com	the required ement TACF conents affect	l s and/or cted by				
V.	ASSESSMENT OF SAFETY	CONSEQUENCE	s							
	The consequences of the action packing of flow control value 2 being declared inoperable due	-FCV-073-0081.	This ste	am leak resi	ulted in the v	alve				

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	function. This resulted in the c requirements and rendered the				cordance wi	th TS			
	The HPCI System permits the reactor vessel water inventory System continues to operate u which Low Pressure Coolant In operation can maintain core co scrams upon receipt of a low-w HPCI System starts when the or if high pressure exists in the	until the reactor ventil the rea	vessel is essel pres ration or of Coolan or a high es a pres	depressuriz ssure is belo Core Spray t Accident c -drywell-pre selected heig	ed. The HP ow the press (CS) [BM] s occurs, the re essure signal	CI ure at ystem eactor I. The			
Despite the reduction in defense-in-depth due to the inoperability of the HPCI Syster redundant systems such as the ADS, the CS System, and the Residual Heat Rem System remained Operable, as allowed by the TS, to respond to postulated accide and maintain safe shutdown capability. In addition, as required by TS 3.5.1, Requ Action C.1, Operations verified that the RCIC System was Operable.									
	With respect to the PCIV function, with one PCIV inoperable (i.e., 2-FCV-073-0081), the inboard steam isolation valve (i.e., 2-FCV-073-0002) is capable of performing the primary containment isolation function. A review of operations logs, from the time period when the steam leak from valve 2-FCV-073-0081 was present, indicated that valve 2-FCV-073-0002 was Operable and capable of maintaining primary containment leakage through the associated penetration within the limits when BFN, Unit 2, was in Mode 1, 2, or 3. As a result, there was no loss of the primary containment isolation safety function during this time period.								
	the health a	nd							
VI.	CORRECTIVE ACTIONS - The corrective actions are being managed by TVA's corrective action program.								
	A. Immediate Corrective Actions								
	On June 15, 2012, a TACF was electrically disabled in installed, the valve was inje System was returned to se	the closed positied the closed posities the closed position of the closed with sealand the closed position of the	on, a lea	k sealant in	jection adapt	ter was			
	B. Corrective Actions to Pre	event Recurrenc	<u>e</u>						

1. Review existing work orders planned to implement TACFs and/or EDCs to ensure they include a requirement for verification that components affected by maintenance or modifications activities have been returned to the required configuration.

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NARRATIVE

2. Revise procedure NPG-SPP-07.6, NPG Work Control Planning Procedure, to specifically require that work orders include verification that components affected by maintenance or modifications activities have been returned to the required configuration.

VII. ADDITIONAL INFORMATION

A. Failed Components

The failed component was flow control valve 2-FCV-073-0081. This component was manufactured by Anchor Darling/Flowserve with a manufacturer serial number of E125T-3-1.

B. Previous Similar Events

A search was performed on the BFN LER data base for the past five years. Similar LER 50-296/2007-004-00, Manual Isolation of HPCI Due to a Steam Leak, was identified. This event was similar in that the HPCI System was isolated due to a leak. However, the cause of this event was a through wall leak in the valve and not the failure to maintain the valve in the required configuration.

A search was performed on BFN corrective action program. Problem Evaluation Reports (PERs) 134495,147819, 228565, 252382, and 550072 were identified.

C. Additional Information

The corrective action document for this report is PER 566687.

D. Safety System Functional Failure Consideration

In accordance with NEI 99-02, this event is considered a safety system functional failure because it could have prevented fulfillment of the HPCI System safety functions to remove residual heat and to mitigate the consequences of an accident.

E. Scram With Complications Consideration

This condition did not include a scram.

VIII. COMMITMENTS

There are no commitments.