



Serial: RNP-RA/10-0051

JUN 28 2010

Attn: Document Control Desk
United States Nuclear Regulatory Commission
Washington, DC 20555-0001

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23

LICENSEE EVENT REPORT NO. 2010-003-00
POTENTIAL LOSS OF RESIDUAL HEAT REMOVAL SYSTEM
SAFETY FUNCTION IN MODES 3 AND 4 DUE TO VOID FORMATION

Ladies and Gentlemen:

The attached Licensee Event Report is submitted in accordance with the requirements of 10 CFR 50.73. Should you have any questions regarding this matter, please contact Mr. C. A. Castell at (843) 857-1626.

Sincerely,

A handwritten signature in cursive script that reads "W Scott Saunders".

W. Scott Saunders
Plant General Manager
H. B. Robinson Steam Electric Plant, Unit No. 2

WSS/ahv

Attachment

c: L. A. Reyes, NRC, Region II
T. J. Orf, NRC, NRR
NRC Resident Inspector

Progress Energy Carolinas, Inc.
Robinson Nuclear Plant
3581 West Entrance Road
Hartsville, SC 29550

Handwritten initials "JE22" above the letters "NRC".

LICENSEE EVENT REPORT (LER)

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

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 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.

1. FACILITY NAME

H. B. Robinson Steam Electric Plant, Unit No. 2

2. DOCKET NUMBER

05000261

3. PAGE

1 OF 3

4. TITLE

Potential Loss of Residual Heat Removal System Safety Function In Modes 3 and 4 Due To Void Formation

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	29	2010	2010	003	00	06	28	2010		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE 6	<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)
10. POWER LEVEL 0%	<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 checked="" 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 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
Ashley Valone

TELEPHONE NUMBER (Include Area Code)
843-857-1256

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

YES (If yes, complete 15. EXPECTED SUBMISSION DATE)

NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

On April 29, 2010, with H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, shutdown in Mode 6 during Refueling Outage 26, it was determined that there was a potential for operating in an unanalyzed condition due to a loss of the safety function of the Residual Heat Removal (RHR) system. HBRSEP, Unit No. 2, determined that under certain conditions flashing or water hammer could occur in the RHR system during Modes 3 and 4. The resulting steam voids could prevent the RHR system from fulfilling its safety function during the injection and recirculation phase of a Loss of Coolant Accident (LOCA). This condition could have prevented the fulfillment of the safety function that is needed to remove residual heat in Modes 3 and 4 and is reportable under 10 CFR 50.73(a)(2)(i)(B), 10 CFR 50.73(a)(2)(ii)(B), and 10 CFR 50.73(a)(2)(v)(B).

The cause of this condition has been determined to be deficiencies in the original plant design and system operating guidance provided by Westinghouse. A contributing cause identified that HBRSEP, Unit. No. 2, did not perform an adequate review of Westinghouse Nuclear Safety Advisory Letter NSAL-93-004.

Corrective actions are in progress to revise the applicable operating procedures to maintain the Technical Specifications required operability of RHR and ECCS functions. These revisions are expected to be completed prior to entry into Mode 4, during restart from the current refueling outage (RO-26).

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

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H. B. Robinson Steam Electric Plant, Unit No. 2	05000261	YEAR	SEQUENTIAL NUMBER	REV. NO.	2 OF 3
		2010	- 003	- 00	

NARRATIVE

I. DESCRIPTION OF EVENT

On April 29, 2010, with H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, shutdown in Mode 6 during Refueling Outage 26 (RO-26), it was determined that there was a potential for operating in an unanalyzed condition due to steam void formation in the Residual Heat Removal (RHR) [BP] system. Under certain conditions steam voids and/or water hammer could occur in the RHR system during Modes 3 and 4. The resulting steam voids or water hammer could prevent the RHR system, which also performs as the low head portion of the Emergency Core Cooling System (ECCS) [BQ], from fulfilling its safety function during the injection and recirculation phase of a Loss of Coolant Accident (LOCA).

The steam voiding or water hammer conditions could prevent the safety function of the system and is reportable under 10 CFR 50.73(a)(2)(i)(B), "Any operation or condition which was prohibited by the plant Technical Specifications," 10 CFR 50.73(a)(2)(ii)(B), "The nuclear power plant being in an unanalyzed condition that significantly degraded plant safety," and 10 CFR 50.73(a)(2)(v)(B), "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."

II. CAUSE OF EVENT

The cause of this event was determined to be deficiencies in the original plant design and system operating guidance provided by the system designer, Westinghouse Electric Corporation. These deficiencies allowed conditions to exist where steam flashing could occur in the RHR shutdown cooling piping and pump suction if the RHR system had to be transitioned to the ECCS mode for injection and recirculation from the shutdown cooling alignment in Mode 4 or after transitioning to Mode 3.

A contributing cause to the event is that HBRSEP, Unit No. 2, did not perform an adequate review of Westinghouse Nuclear Safety Advisory Letter NSAL-93-004, which addressed the operation of the RHR pumps in the ECCS modes in Modes 3 and 4 and provided guidance for preventing the formation of voids in the shutdown cooling piping. The conditions addressed by the NSAL-93-004 were not fully investigated. Therefore, the recommendations were not incorporated into plant operating procedures.

In addition, NSAL-93-004 did not address the most limiting condition, which is alignment to the ECCS sump. This condition was subsequently addressed in Westinghouse NSAL-09-008, "Presence of Vapor in Emergency Core Cooling System/Residual Heat Removal System in Modes 3/4 Loss-of-Coolant Accident Conditions."

III. ANALYSIS OF EVENT

This event was investigated in accordance with the HBRSEP, Unit No. 2, Corrective Action Program (CAP) and documented in Significant Adverse Nuclear Condition Report 367186. This reportable event and the associated significant adverse condition investigation were reviewed by the Plant Nuclear Safety Committee on June 25, 2010.

**LICENSEE EVENT REPORT (LER)
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NARRATIVE

Potential Loss of RHR due to Steam Voiding or Water Hammer

During plant shutdown when transitioning from Mode 3 to Mode 4, procedures allow RHR to be placed in service with Reactor Coolant System (RCS) [AB] Hot Leg temperature as high as 350 degrees Fahrenheit. When in Mode 4, with RHR is in service for shutdown cooling with RCS Hot Leg temperature above 240 degrees, if RHR was placed in ECCS Mode some fluid in the RHR pump suction piping could flash to steam due to the piping pressure dropping to Refueling Water Storage Tank (RWST) pressure, which would be below the saturation pressure for the RHR suction piping fluid temperature.

In addition, when placing RHR into the ECCS mode in preparation for entry into Mode 3, procedures required running RHR using the heat-up line to force cool the system. However, not all of the suction piping (approximately 100 ft) from the RCS Hot Leg can be forced cooled by the heat up line to a temperature below the saturation temperature of 240 degrees at the RWST static head. Either of the above could result in water hammer conditions in RHR piping.

Ultrasonic testing for voids during the RO-25 following ECCS alignment did not identify voids in the RHR suction and discharge piping. The potential operability impact is limited to Modes 3 and 4 during plant heat up and plant cool down.

IV. CORRECTIVE ACTIONS

Corrective actions are in progress to revise the applicable operating procedures to maintain the Technical Specifications required operability of RHR and ECCS functions. These changes are expected to be completed prior to entry into Mode 4, during restart from the current refueling outage (RO-26).

The cause of the inadequate review of NSAL-93-004 was determined to be historical and no further corrective action is required.

V. ADDITIONAL INFORMATION

Previous Similar Events:

Previous similar events have not been identified at HBRSEP, Unit No. 2.