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RBG-47507

September 26, 2014

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Subject: Licensee Event Report 50-458 / 2014-005-00
River Bend Station – Unit 1
Docket No. 50-458
License No. NPF-47

RBF1-14-0150

Dear Sir or Madam:

In accordance with 10 CFR 50.73, enclosed is the subject Licensee Event Report. This document contains no commitments. If you have any questions, please contact Mr. Joseph Clark at 225-381-4177.

Sincerely,

Eric W. Olson

EWO/dhw

Enclosure

IE22
NRR

cc: U. S. Nuclear Regulatory Commission
Region IV
1600 East Lamar Blvd.
Arlington, TX 76011-4511

NRC Sr. Resident Inspector
P. O. Box 1050
St. Francisville, LA 70775

INPO
(via ICES reporting)

Central Records Clerk
Public Utility Commission of Texas
1701 N. Congress Ave.
Austin, TX 78711-3326

Department of Environmental Quality
Office of Environmental Compliance
Radiological Emergency Planning and Response Section
Ji Young Wiley
P.O. Box 4312
Baton Rouge, LA 70821-4312

NRC FORM 366 (02-2014) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 01/31/2017

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 and Information Collections Branch (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)

(See Page 2 for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
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4. TITLE

Loss of High Pressure Core Spray / Suppression Pool Safety Functions and Operations Prohibited by Technical Specifications due to Leakage Through Pump Test Return Line

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
										05000
08	01	2014	2014	- 005	- 00	09	26	2014	FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
1	☐ 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)
10. POWER LEVEL	☐ 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)
100	☐ 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

LICENSEE CONTACT	TELEPHONE NUMBER *(Include Area Code)*
Joseph A. Clark, Manager - Regulatory Assurance	(225) 381-4177

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
n/a									

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☑ NO				

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

On August 1, 2014, at approximately 9:42 p.m. CDT, with the plant operating at 100 percent power, the high pressure core spray (HPCS) system was declared to be inoperable as a result of an engineering evaluation of an apparent leakage path through a part of the system. The evaluation determined that, should the HPCS system be initiated in response to a design basis event, the leakage path through a pump test return line to the condensate storage tank (the symptoms of which were first seen on July 12) could potentially cause the suppression pool inventory to be depleted to the extent that the pool would not support its 30-day mission time assumed in the station's accident analysis. Operators closed the HPCS pump suction valve at the suppression pool on August 1, resulting in the inoperability of the system. This event is being reported in accordance with 10 CFR 50.73(a)(2)(v) as a condition that defeated the safety function of the the HPCS system. A subsequent evaluation confirmed that, had the HPCS system actuated in response to a design basis event, the leakage through the pump test return line would have depleted the suppression pool inventory before the completion of its 30-day mission time. Regarding the suppression pool, this event constituted operations prohibited by Technical Specifications (10 CFR 50.73 (a)(2)(i)(b)), as well as a condition that defeated the safety function of the suppression pool (10 CFR 50.73 (a)(2)(v)). A blind flange was installed in the pump test return line to the condensate storage tank in order to isolate the leakage path, and the HPCS system was restored to an operable status on August 5. Repairs on the test return line isolation valves are scheduled.

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NARRATIVE

REPORTED CONDITION

On August 1, 2014, at approximately 9:42 p.m. CDT, with the plant operating at 100 percent power, the high pressure core spray system (HPCS) (BG) was declared to be inoperable as a result of an engineering evaluation of an apparent leakage path through a part of the system. The evaluation determined that, should the HPCS system be initiated in response to a design basis event, the leakage path could potentially cause the suppression pool inventory to be depleted to the extent that the pool would not support the 30-day mission time assumed in the station's accident analysis. Operators closed the HPCS pump suction valve at the suppression pool, resulting in the inoperability of the system. This event is being reported in accordance with 10 CFR 50.73(a)(2)(v) as a condition that defeated the safety function of the the HPCS system.

A subsequent evaluation has quantified the adverse effects of the test return line leakage on the ability of the suppression pool to perform its safety function. Had the HPCS system actuated as assumed in the station's accident analysis, the leakage would have depleted the pool water inventory before the completion of its 30-day mission time. (That mission time is addressed in the RBS Updated Safety Analysis Report in terms of the radiological consequences of a loss-of-coolant accident over the course of 30 days.) Given the prevailing conditions, the pool water level would have decreased to the minimum allowed by the plant design and licensing basis within approximately 18 days, and to the minimum required submergence of the emergency core cooling system pump suction strainers within approximately 21 days. With respect to the suppression pool, this event constituted operations prohibited by Technical Specifications (10 CFR 50.73 (a)(2)(b)), as well as a condition that defeated the safety function of the suppression pool (10 CFR 50.73 (a)(2)(v)).

BACKGROUND

The HPCS system suction is normally aligned to the condensate storage tank (CST). A full-flow test path can be aligned from the pump discharge back to the CST, facilitating the performance testing of the pump. The test return line contains two motor-operated isolation valves (**ISV**).

The CST is not rated for the design basis seismic event, and so is not assumed to be available under accident conditions. Safety-related instrumentation that monitors the CST for low water level automatically initiates a realignment of the HPCS pump suction from the CST to the suppression pool in the primary containment.

INVESTIGATION and IMMEDIATE ACTIONS

On July 12, 2014, operators noted an unexpected decrease in suppression pool water level of approximately 2 inches over the previous 24 hour period. Action was taken to restore the pool to normal level. The cause of the trend was not specifically known, but thought to be associated with the installation of a danger tag-out to drain the common suction line from the CST to HPCS and the reactor core isolation cooling system (RCIC) for planned work. An immediate operability evaluation determined that the suppression pool was capable of performing its function because the water level was being maintained in the required range. Between July 14 and 18, actions were taken to identify the source of the leak.

On July 21, the potential implications of leakage past the test return line isolation valves were recognized, and action was initiated to investigate sources of valve seat leakage. Due to the complexity of the system and its interrelation with the CST and the suppression pool, an evaluation was also made of the potential adverse effects on the operability of the HPCS system.

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NARRATIVE

On August 1, it was determined that the leakage through the test return line was a previously unrecognized condition that potentially compromised the 30-day mission time of the suppression pool.

The following are highlights of the troubleshooting effort:

1. The test return valves are included in the In-Service Testing (IST) Program. They have a safety function to close in order to maintain the safety-related flow path boundary. The valves are leak-tested every two years, with a criterion of equal or less than 2 gpm. This is not required to satisfy any specific surveillance requirement in LCO 3.5.1, "ECCS Operating."

2. The IST program requires that the HPCS pump deliver 5010 gpm at a differential pressure of $\geq$ 415 psid. The design capacity of the HPCS line fill pump is 50 gpm at 101 feet of head. During the troubleshooting, these parameters were not recorded, but the most recent test results indicated that both pumps are performing within specifications.

3. The periodic valve leak-rate test has an acceptance criterion of $\leq$ 2 gpm when the HPCS pump suction is aligned in suppression pool. The test return line was found to be leaking 4.47 gpm. This amount had a negligible effect on the ability of HPCS pump to perform its safety function.

With HPCS in the standby configuration and only the line fill pump running, the leakage stabilized at 1.88 gpm. This amount had a negligible effect on the ability of the pump to provide the required flow and pressure to maintain the HPCS system filled and available for injection.

4. The CST is the normal suction source for the HPCS pump. The CST suction isolation valve has a safety-related function to close when the CST inventory is depleted. This function is tested quarterly to ensure that the HPCS system can fulfill its injection requirements. The CST suction valve was suspected to be leaking due to its inability to be drained during hanging of a danger tag-out. However, this valve does not have a leakage limit and is not tested for seat leakage. The suspected leakage would not impact its ability to perform its safety functions.

IMMEDIATE ACTIONS

On August 5, engineering evaluations concluded that the HPCS system was operable with compensatory measures. The compensatory measures deemed necessary were:

1. Perform a leak rate test of the test return line after any cycling of the isolation valves in order to maintain operability margins for the HPCS system. If the leak rate doubled to 9.0 gpm, then a new operability evaluation would be required.

2. Isolate HPCS from the suppression pool by closing and disabling the pool suction valve until action to ensure the suppression pool inventory could be taken; and

3. Install a temporary modification to replace the restricting orifice in the CST test return line with a blind flange to preserve pool inventory.

The blind flange was installed in the CST test return line on August 3, and the HPCS pump was restored to an operable status on August 5.

CORRECTIVE ACTION TO PREVENT RECURRENCE

The failure mechanism of the test return line isolation valves has not been determined. Work orders have been scheduled to disassemble and repair the valves.

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NARRATIVE

SAFETY SIGNIFICANCE

The leakage rate through the test return line isolation valves has been quantified at 4.47 gpm. This diverted flow is not significant with respect to the ability of the HPCS pump to provide its design rated flow to the reactor vessel in accident conditions.

The challenge to suppression pool inventory due to the valve leakage over a 30-day period would also have negligible effect on risk, using core damage frequency as a metric. The probablistic risk assessment (PRA) mission time is 24 hours, or until the reactor and containment have reached a safe, stable condition. PRA methodology assumes that the emergency response organization provides effective mitigation of component malfunctions. PRA also credits non-safety systems and, on a probabilistic basis using industry data, off-site power recovery. With these realistic considerations, the capability to provide makeup to the suppression pool prior to 30 days could clearly be credited with high confidence.

During the time that the HPCS suppression pool suction valve was closed, the system remained available, but not technically operable, while it was aligned to the CST.

(NOTE: Energy Industry Component Identification codes are annotated as (**XX**).)