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June 4, 1997

U.S. Nuclear Regulatory Commission
Document Control Desk, OP1-17
Washington, D.C. 20555

Subject: River Bend Station - Unit 1
Docket No. 50-458
License No. NPF-47
Licensee Event Report 50-458/96-007-02
File Nos. G9.5, G9.25.1.3

RBG-43894
RBF1-97-0157

Ladies and Gentlemen:

In accordance with 10CFR50.73, Licensee Event Report (LER) 96-007-02 is enclosed.

Licensee Event Report 96-007-00 was submitted on March 14, 1996, reporting a condition with the River Bend Station Containment Airlocks, and revision 1 was submitted on October 18, 1996. During subsequent corrective actions which included, in part, accelerated performance testing, a similar condition was identified. LER revision 96-007-02 provides additional information concerning this condition. The revised text is identified with a bar in the margins.

Sincerely,

Rick J. King

RJK/JPO/kvm
enclosure

IE22

cc: U. S. Nuclear Regulatory Commission
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ATTN: Administrator

NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
River Bend Station	05000-458	1 of 4

TITLE (4)
Containment Airlock Pneumatic System Ball Valve Failure Due to Debris Internal to the System

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	05000
02	14	96	96	007	02	06	04	97	FACILITY NAME N/A	DOCKET NUMBER 05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more (11)							
POWER LEVEL (10)	46.5%		20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
			20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)
			20.405(a)(1)(ii)		50.36(c)(2)	x	50.73(a)(2)(vii)		OTHER
			20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)	(Specify in abstract below and in text, NRC Form 366A)	
			20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		
			20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
David N. Lorfing, Supervisor - Nuclear Licensing	504-381-4157

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE)	x	NO	SUBMISSION DATE (15)			

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On February 14, 1996, with the plant in operational Mode 1, River Bend engineering determined a single condition contributed to the failure of Surveillance Test Procedure (STP) 057-7203, "Containment Personnel Airlock Door Seal Air System Leak Rate Test" for each of the four inflatable seal pneumatic systems of the 171 foot reactor building personnel airlock (*AL*). On March 24 and December 3 through 12, 1996, with the plant at 100% power, STP-057-7203 was re-performed as part of corrective actions for the previous condition, identifying failures. This report is being submitted pursuant 10CFR50.73(a)(2)(vii).

The single condition for the prior condition was determined to be entrained debris internal to the pneumatic system. This debris adhering to lubricant applied to the ball valve and check valve seating surfaces resulted in leakage beyond an acceptable limit. The surveillance test will be performed on a more frequent basis. The primary cause of the March 24, 1996, condition was premature failure of the air lock ball valve seats. This resulted from less than adequate inspection criteria for the ball valve components which caused subsequent seat failure. Corrective actions included, in part, replacement of the parts. The December, 1996, ball valve leakage was due to entrained debris, lack of correct ball valve seat compression, and lack of appropriate lubrication. The corrective actions included inspecting, lubricating, and properly torquing the ball valves. In addition, a design modification is planned to install new stainless steel accumulators to minimize rust particulate contamination.

These conditions are not safety significant. Engineering analysis concluded the pneumatic system was capable of supplying sufficient seal pressure, for both conditions, to maintain containment integrity for 30 days post design basis accident (DBA).

Reported Condition:

On February 14, 1996, with the plant in Mode 1, River Bend engineering determined that a single condition caused the failure of Surveillance Test Procedure (STP) 057-7203, "Containment Personnel Airlock Door Seal Air System Leak Rate Test" for each of the four inflatable seal pneumatic systems on the reactor building containment personnel airlock (*AL*). Engineering investigation found that debris in the system adhered to excess lubricant on the ball valve and check valve seating surfaces, eventually causing air leakage beyond the specified limits. This condition was reported as a single condition that caused two independent trains to become inoperable in a single system designed to control the release of radioactive material pursuant 10CFR50.73(a)(2)(vii). Corrective actions initiated subsequent to the identification of this condition, in part, included accelerated performance of STP-057-7203. On March 24, 1996, during this accelerated testing, an additional condition was identified. The accelerated testing schedule was continued and additional conditions were subsequently identified December 3 through 12, 1996.

Investigation:

The primary containment at River Bend Station is equipped with two double door airlocks that provide personnel access to the primary containment. The airlocks are designed to limit the release of radioactive material to the environment during normal operation and through a range of transients and accidents up to and including postulated design basis accidents (DBA's). Each airlock door has two inflatable seals maintained at pressure by a separate pneumatic system. The purpose of the pneumatic system is to ensure an adequate supply of air is available to the containment airlock door seals for a period of 30 days following a DBA. Only one seal pneumatic system per airlock is needed to accomplish this requirement.

Surveillance Test Procedure (STP) 057-7203, "Containment Personnel Airlock Door Seal Air System Leak Rate Test" was being performed between December 7, 1995, and December 13, 1995, to confirm the Technical Specification operability of the personnel airlock pneumatic system.

On December 7, 1995, both airlock seal pneumatic systems on the 171 foot containment airlock inner door failed their surveillance tests. The pressure drop exceeded the Technical Specification allowable value for leakage. Investigation found the upper and lower accumulator ball valves were leaking. The seats were replaced and during retest the upper air accumulator check valve was found leaking. The check valve elastomers were replaced and the surveillance tests were re-performed successfully. On December 11,1995, both airlock seal pneumatic systems on the 171 foot containment airlock outer door failed their surveillance tests. The pressure drop exceeded the Technical Specification allowable value for leakage. Investigation found the upper and lower ball valves and upper air accumulator check valve leaking. The ball valve seats and check valve's elastomers were replaced and during retest the lower air accumulator check valve was found leaking. The elastomers were replaced on this valve also and the surveillance tests were re-performed successfully.

Engineering performed an investigation in order to determine the root cause or causes of the failures. Inspection of the failed parts found minor scratches on the seating surfaces and particles adhering to the lubricant residue on all seating surfaces of the valves. The particles were analyzed to determine size and general composition. It was concluded that the debris adhering to the lubricant had been entrained by air movement within the system's pneumatic piping, then captured by residual lubricant on the ball and check valve seating surfaces. This debris caused scratches to the ball valve's seats and accumulated on the check valve's seats allowing the valves to leak beyond an acceptable limit.

On March 24, 1996, during accelerated performance of STP-057-7203 an additional test failure occurred. Subsequent investigation identified that the condition was due to premature failure of the air lock ball valve seats. This resulted from less than adequate inspection criteria for the ball valve components. During previous rework of the air lock ball valves, minor scratches were identified on the ball. At that time, the seats were replaced and the balls were reinstalled without rework. Subsequently, the as-left test was successfully completed. The investigation determined that the scratches remaining on the ball accelerated valve seat and ball wear resulting in premature failure.

On December 3 through 12, 1996, during accelerated performance of STP-057-7203 additional as-found test failures of the Containment Airlock seal air systems occurred. Investigations identified that the condition was due to premature failure of the air lock ball valve seats. This resulted from entrained debris and inadequate torquing requirements for the ball valve body to bonnet bolting. Inadequate ball valve seat compression appears to have contributed to the previous occurrences of excessive ball valve seat leakage in December 1995 and March 1996. Following maintenance the tests were completed successfully.

Root Cause:

Based on physical evidences the single condition is determined to be entrained debris internal to the pneumatic system which adhered to valve's seating surfaces resulting in an unacceptable leakage rate. Engineering evaluated the potential sources of the debris. The potential sources included the pneumatic system accumulators, fragments internal to the seal left from the manufacturing process, and debris introduced during system maintenance or modifications. It was concluded that the debris was most likely introduced into the pneumatic system as a result of system modifications performed in refuel outage (RF) 5.

Subsequent to the identification of the March 24, 1996 test failure, an engineering investigation determined that the condition was due to premature failure of the air lock ball valve seats. This resulted from less than adequate inspection criteria for the ball valve components. Engineering evaluation determined the December, 1996, ball valve leakage was due to entrained debris, lack of correct ball valve seat compression, and lack of appropriate lubrication.

Corrective Action:

The failed valves soft parts were replaced. The surveillance tests (STP) 057-7203 were re-performed satisfactorily for all seal pneumatic systems allowing the airlock doors to be returned to an operable status. Subsequently, concurrence was obtained from the vendor to cease lubricating the valve's soft parts and the site's lubrication manual was changed accordingly. The ball valve and check valve soft parts that have been in service through cycle 6 and passed the most recent leakage test have been scheduled to be replaced. Additionally, each air accumulator will be examined for signs of contaminates. The surveillance test frequency was modified so the test is performed more often until operating experience proves reliable operation of the system. A maintenance task will be developed to replace the check and ball valve's soft parts on a regular basis. The existing cleanliness requirements delineated in Station Operating Procedure, ADM-0081 (Cleanliness Control) for air systems were reviewed by engineering and determined to be adequate to provide an effective barrier to future incidents of entrained debris. However; the importance of foreign material exclusion on the air system was stressed with Mechanical Maintenance repairmen. The PM task being developed to replace the ball and check valve soft parts will include a reference to the requirements specified in ADM-0081.

For the recent (March 1996) condition, key corrective actions are as follows:

- The non-conforming air lock ball valve discs not previously replaced were replaced.
- The applicable preventive maintenance task procedures were revised to include the appropriate inspection criteria including part replacement, if necessary.

For the December 1996 condition, completed corrective actions include inspecting, lubricating, and properly torquing the containment airlock ball valves. In addition, a design modification is planned to install new stainless steel accumulators on the four containment airlock doors to minimize rust particulate contamination.

Safety Assessment:

The design basis requires at least one of four containment seals per airlock remain pressurized to a minimum pressure sufficient to maintain containment integrity for 30 days post DBA. The design minimum pressure required to inflate the seals to assure a leak-tight boundary is known. The actual leakage rates determined from surveillance test performances was used to calculate seal pressure after 30 days. The engineering analyses determined adequate margin was available for the identified conditions to ensure containment integrity for 30 days post DBA.

Note: Energy Industry Identification Codes are indicated in the text as (*XX*)