ENTERGY

Entergy Operations, Inc.
River Bend Station
5485 U.S. Highway 61
P.O. Box 220
St. Francisville, LA 70775
Tel 504 336 6225
Fax 504 635 5068

James J. Fisicaro
Director
Nuclear Safety

February 1, 1996

U.S. Nuclear Regulatory Commission
Document Control Desk
Mail Stop P1-37
Washington, D.C. 20555

Subject: River Bend Station - Unit 1
Docket No. 50-458
License No. NPF-47
Licensee Event Report 50-458/96-001-00
File Nos. G9.5, G9.25.1.3

RBG-42415
RBF1-96-0023

Gentlemen:

In accordance with 10CFR50.73, enclosed is the subject report.

Sincerely,

JW Leavines for
JJ Fisicaro

JJF/SVD/kvm
enclosure

IE22
1/1

cc: U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011

NRC Sr. Resident Inspector
P. O. Box 1051
St. Francisville, LA 70775

INPO Records Center
700 Galleria Parkway
Atlanta, GA 30339-3064

Mr. C. R. Oberg
Public Utility Commission of Texas
7800 Shoal Creek Blvd., Suite 400 North
Austin, TX 78757

Louisiana Department of Environmental Quality
Radiation Protection Division
P.O. Box 82135
Baton Rouge, LA 70884-2135
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	01 of 04

TITLE (4)
MANUAL REACTOR SCRAM DUE TO HIGH TURBINE VIBRATION

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
01	04	96	96	001	00	01	31	96	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)							
			20.402(b)		20.405(c)	x	50.73(a)(2)(iv)		73.71(b)
POWER LEVEL (10)	19%		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)		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)
D. 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 SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE)	x	NO				

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

On January 4, 1996, with the plant in Mode 1 (Power Operation) and reducing power for refueling outage 6 (RF-06), vibration levels on main turbine bearings 5 and 6 increased. To prevent damage to the main turbine due to high vibration, the reactor was manually scrammed and the turbine was manually tripped.

The most probable cause of the event was determined to be the tight clearance between the rotor and the stationary parts of the Low Pressure (LP) Turbine 'B'. The tight clearance is intended to improve turbine efficiency, but has resulted in the turbine rotor being more sensitive to the temperature changes caused by plant power maneuvering and removal of the moisture separator reheaters (MSR) from operation. Contributing causes include some aspects of the MSR operation such as the inability of the high load /low load valves to provide the desired ramp control of MSR heating steam and sticking of one of the MSR level control valves. Corrective actions include modifying the high load /low load valves to provide better control of MSR heating steam and reworking the MSR level control valve.

During the event all safety systems functioned as designed and the turbine vibration remained within the acceptable limits. The event was, therefore, not safety significant.

Reported Condition

On January 4, 1996, with the plant in Mode 1 (Power Operation) and reducing power for a planned shutdown for RF-06, vibration levels LP turbine 'B' bearings 5 and 6 increased. To prevent potential main turbine (*TRB*) damage due to high vibration, the reactor was manually scrammed and the turbine manually tripped. This report is submitted pursuant to 10CFR50.73 (a)(2)(iv) to document an event requiring manual reactor scram.

Investigation

On January 4, 1996, with the plant at approximately 19% generator power and decreasing for planned shutdown for refueling outage, increasing vibrations were noted on LP Turbine 'B' bearings 5 and 6. The vibration increased from approximately 7 mils to the trip setpoint of 10 mils over a period of approximately 10 minutes. The reactor was manually scrammed at approximately 1816 hours and the turbine was manually tripped approximately a minute later to prevent turbine damage due to high vibration. As the main turbine coasted down following the trip, maximum vibrations on bearings 5 and 6 reached 13.9 mils and 14.1 mils, respectively.

Both low pressure turbine rotors had been replaced during refueling outage 5 (RF-05). The new rotors have a tighter clearance between the rotor and the stationary parts of the turbine. The tight clearance is intended to provide better turbine efficiency but has resulted in the rotor being more sensitive to the temperature changes caused by plant power maneuvering and removal of the moisture separator reheaters (MSR)(*MSR*) from service.

During power reduction, shortly after plant power was reduced by downshifting the reactor recirculation pump to slow speed, MSR #1's shellside normal level control valve failed to control its drain tank level. The valve was sticking during operation. As a result, the maximum differential temperature between LP turbine inlets was 23 deg F, about two minutes after the reactor recirculation pump downshift. Once the level was recovered in the MSR #1 shellside drain tank about two minutes later, this differential temperature was only about 8 deg F. It remained at 8 deg F from that point on until the reactor was scrammed and the turbine was tripped. This 23 deg F temperature differential could have caused a rub to initiate between the rotor and the stationary parts of the LP turbine, thereby resulting in the increased vibration. The level control valve was reworked during RF-06.

Turbine overspeed testing was to be performed during the power reduction for RF-06. This testing is performed at less than 10% power. In the low power operation region (<20%), however, the turbine is susceptible to vibration due to changes in the inlet steam temperatures. This is probably due to significantly low steam flow through the turbine. At low steam flows, the amount of superheat being produced can be greatly changed by small changes in the MSR operation. The plant's limited (10%) steam bypass capability requires the low power operation during such testing. The extent of impact of the limited steam bypass capability on the turbine vibration will be evaluated.

A similar event had occurred on October 28, 1994 at River Bend Station (LER 94-028). In this event turbine vibration had increased at approximately 40% plant power, while preparing to downshift reactor recirculation pumps, when shutting down for replacing the recirculation pump seals. Higher rotor sensitivity to temperature changes during MSR removal from service was determined to be the cause of the event. To limit the rotor temperature changes, the plant power range for removing and placing in service of MSRs was expanded from 35%–65% to 15% –90%. This change apparently has reduced susceptibility of the turbine to develop a rub due to rapid temperature changes. The high turbine vibration was experienced at a much lower power (19%) in RF-06 compared to the event in 1994 (at 40% power). In addition, the modification of the internals of the high load /low load valves (*FCV*) was recommended for better control of the MSR heating steam in the investigation of this event. This modification was scheduled for installation in RF-06 and is currently being installed.

Root Causes

The most probable cause of the event was determined to be tight clearance between the Low Pressure Turbine 'B' rotor and its stationary parts. The tight clearance has resulted in increased rotor sensitivity to changes in temperature caused by power maneuvering and MSR removal from service.

Contributing causes include some aspects of the MSR operation such as the inability of the high load /low load valves to provide the desired ramp control of the MSR heating steam and sticking of the MSR level control valve.

Corrective Actions

MSR operation is being improved to reduce the temperature changes resulting from removal and returning to service of MSRs. The high load /low load valves are being modified to provide the desired ramp control of the MSR heating steam. The sticking level control valve for MSR#1 has been reworked. The effect of the plant's limited steam bypass capability on turbine vibration will be evaluated.

Safety Assessment

Investigation of this event concluded that all safety systems functioned as designed and the turbine vibration remained within acceptable limits. It is concluded that the event was not safety significant.

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