Entergy

Entergy Operations, Inc.
River Bend Station
5485 U.S. Highway 61
P. O. Box 220
St. Francisville, LA 70775
Tel 225 336 6225
Fax 225 635 5068

Rick J. King
Director
Nuclear Safety Assurance

June 9, 2003

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

Subject: River Bend Station
Docket No. 50-458
License No. NPF-47
Licensee Event Report 50-458 / 03-005-00

File Nos. G9.5, G9.25.1.3

RBG-46132
RBF1-03-0103

Ladies and Gentlemen:

In accordance with 10CFR50.73, enclosed is the subject Licensee Event Report. There are no commitments in this document.

Sincerely,

William J Trudell for

RJK/dhw
enclosure

IE22

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

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

INPO Records Center
E-Mail

Mr. Jim Calloway
Public Utility Commission of Texas
1701 N. Congress Ave.
Austin, TX 78711-3326

Mr. Prosanta Chowdhury
Program Manager – Surveillance Division
Louisiana DEQ
Office of Radiological Emergency Planning and Response
P. O. Box 82215
Baton Rouge, LA 70884-2215

NRC FORM 366 (1-2001)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
River Bend Station	050- 458	1 OF 5

TITLE (4)

Operation Greater Than Maximum Licensed Power Due to Erroneous Feedwater Flow Measurement

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER 05000
05	10	2003	2003	005	00	06	09	2003	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	1
POWER LEVEL (10)	98%

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)

	20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
	20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)
	20.2203(a)(1)		50.36(c)(1)(i)(A)		50.73(a)(2)(iv)(A)		73.71(a)(4)
	20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)
	20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)	X	OTHER Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		
	20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		
	20.2203(a)(2)(v)		50.73(a)(2)(i)(B)		50.73(a)(2)(vii)		
	20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		
	20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
J.W. Leavines, Manager - Licensing	225-381-4642

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	SJ	PE	Caldon	YES					

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
X YES (If yes, complete EXPECTED SUBMISSION DATE).		NO		08	01	2003

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

On May 10, 2003, with the plant operating at 98 percent power, information was received from the manufacturer of the station's reactor feedwater flow measurement device indicating the station had been operated in excess of maximum licensed reactor thermal power in the past. This condition is being reported in accordance with the Facility Operating License (NPF-47) as a violation of License Condition 2.C(1), "Maximum Licensed Power." The investigation of this condition is in progress. A completed root cause analysis will be provided in a supplement to this report. An evaluation has determined that adequate design margin existed to accommodate the overpower condition.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
River Bend Station	050-458	2003	- 005	- 00	2 OF 5

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

REPORTED CONDITION

On May 10, 2003, with the plant operating at 98 percent power, information was received from the manufacturer of the station's reactor feedwater flow measurement device (**PE**) indicating the station had been operated in excess of maximum licensed reactor thermal power in the past. This condition is being reported in accordance with the Facility Operating License (NPF-47) as a violation of License Condition 2.C(1), "Maximum Licensed Power."

INVESTIGATION AND CORRECTIVE ACTIONS

Reactor thermal power is calculated to assure compliance with licensed power limits and safety analysis assumptions. At the time this condition existed, River Bend was licensed at 3039 megawatts thermal (MWth), and was analyzed at 102 percent of licensed thermal power. The primary factor affecting this calculation is feedwater flow. From initial plant operation to 1996, reactor feedwater flow measurement was performed using a calibrated venturi in each of two feedwater headers supplying the reactor.

A new feedwater flow measurement device, the Leading Edge Flow Meter (LEFM) 8300, manufactured by Caldon, Inc., was installed in February 1996. This device was to be used to correct feedwater venturi flow readings in the plant process computer for the purpose of eliminating reactor heat balance conservatism caused by allowances built in to account for venturi fouling. This correction would result in maximizing plant efficiency and electrical output. The first correction factors were used on February 27, 1996, and core thermal power was adjusted accordingly, resulting in an increased output of approximately 1.5 percent of rated thermal power.

During plant operation, the correction factors were checked monthly to compare feedwater venturi flow indication and LEFM flow indication. New correction factors were calculated and installed if the difference between venturi flow and LEFM flow reached a predetermined limit or each time the plant was shut down and restarted.

During a refueling outage in March 2003, a more accurate LEFM CheckPlus™ unit was installed to replace the existing external LEFM 8300. Due to the increased accuracy of the flow input to the reactor heat balance provided by the LEFM CheckPlus™, an increase in core thermal power of an additional 1.7 percent was expected. During the subsequent startup and power ascent, the indicated feed flow data from the LEFM CheckPlus™ was reviewed against feedwater venturi data. A comparison of these flows with the external LEFM 8300 data indicates that the station has, during certain periods, been operated in excess of its licensed power limit by a maximum of 2.7 percent.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
River Bend Station	050-458	2003	- 005	- 00	3 OF 5

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

A detailed analysis was performed to determine the magnitude of the overpower condition. From the installation of the external LEFM 8300 in February 1996, until the high pressure (HP) main turbine rotor replacement in 1999, there is no indication that the 102 percent accident analysis limit was exceeded. To obtain the best estimate of reactor thermal power, main turbine first stage pressure was normalized for the period being evaluated. This estimate for the period of time from the replacement of the HP turbine rotor in 1999 to 2003 indicates the following:

- Between the HP turbine rotor replacement in 1999 and the 5 percent power uprate in October 2000, the licensed power limit was exceeded. However, there is no indication that the 102 percent accident analysis limit was exceeded during this time.

- The period from October 2000, (when new correction factors were installed following the 5 percent uprate) until April 2001, (when new correction factors were installed following a forced outage) represents the bounding case for the overpower condition. During this time, reactor power level was as apparently as high as 102.7 percent.

- From April 2001, when correction factors were changed due to a forced outage, to refueling outage number 10 (RF10) in October 2001, reactor power level was as high as 102.5 percent.

- Following RF10, the 102 percent analyzed limit was not exceeded again until January 2002, when a scheduled derate for control rod sequence exchange and turbine valve testing was performed. This condition lasted until May 2002, when correction factors were revised due to a planned outage, at which time power level decreased to less than 102 percent, but remained above the licensed power limit until January 2003, with the coastdown leading into RF11.

Based on this analysis, the reactor was operated in excess of the 102 percent accident analysis limit for approximately 15 months.

The LEFM 8300 is no longer installed in the plant. Since the installation of the more accurate LEFM CheckPlus™ device, the station has operated within the licensed power limit.

CAUSAL ANALYSIS

There are a number of variables associated with the computation of corrected flow when using the LEFM device. Investigation has not yet determined which variable or combination of variables is responsible for the erroneous flow readings which led to this condition. A completed causal analysis and corrective action plan will be provided in a supplement to this LER.

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

SAFETY SIGNIFICANCE

An analysis of this condition was performed to assess the postulated effects on fuel cladding integrity, reactor vessel integrity, primary containment integrity, and post-accident activity releases.

Fuel cladding integrity is protected by operating to a number of parameters collectively referred to as thermal limits. For River Bend, these thermal limits are average planar heat generation rate, minimum critical power ratio, and linear heat generation rate. The two percent power measurement uncertainty per 10CFR50.46 and Regulatory Guide 1.49 are already imbedded within these thermal limits so that the incremental increase over this limit of 0.7 percent of licensed power level needs to be addressed. Each thermal limit is linearly dependent upon core thermal power. As such, with the power measurement bias in place, the measure of the margin to a particular thermal limit would have been 0.7 percent less than calculated by the core monitoring system. Operating logs were reviewed for the period of operation of most concern (i.e., from the implementation of the five percent power uprate until RF11) in order to assess the impact on fuel cladding integrity. Based upon this review, it was concluded that margin to the operating limits was sufficient to accommodate the 0.7 percent overpower.

Vessel integrity is evaluated every cycle by analyzing the MSIV closure event with failure to scram on MSIV position. This event was analyzed at 102 percent thermal power, thus, the impact of an additional 0.7 percent in initial thermal power was evaluated. Operating at the slightly higher power limit would not significantly change the peak pressure attained as operation of the main steam safety / relief valves following the reactor scram is the primary means of limiting the pressure rise in the vessel. Further, the Cycle 10 and 11 reload analyses were reviewed to identify the margin to the acceptance criteria for the postulated overpressure event. There is margin in these analyses sufficient to absorb the 0.7 percent overpower condition. It is concluded that reactor vessel integrity was not challenged during the period in which the external LEFM 8300 correction factors were in-service.

The current containment analysis was performed for the 5 percent power uprate project. The 5 percent power uprate project resulted in an increase in licensed reactor power from 2894 to 3039 MWth and an increase in reactor pressure of 30 PSI. As required, the analyses were performed assuming an initial reactor power of 102 percent, thus the impact of an additional 0.7 percent power was assessed. As part of the power uprate containment analysis, evaluations at 102 percent of the pre- and post-power uprate initial conditions were performed. These evaluations indicate a small sensitivity in peak containment parameters relative to the initial conditions assumed. The effect of the 0.7 percent overpower would much smaller than the effect of the 5 percent power uprate as

the latter included an increase in reactor dome pressure. Therefore, based upon the small sensitivity, and the existing margin to containment design limits, it is concluded that containment integrity would not have been challenged during the period in question.

The post-accident radiological dose consequence evaluation is performed to assess dose consequences to individuals at the exclusion area boundary, the low population zone, and the main control room. River Bend has recently completed upgrading these evaluations to include the Alternative Source Term per 10CFR50.67 and Regulatory Guide 1.183. The associated analyses were based upon a reactor operating at 3100 megawatts thermal, which is 102 percent of the previous licensed thermal power of 3039 megawatts thermal. Therefore, the impact of an additional 0.7 percent power was evaluated. In reviewing the subject calculations, it is concluded that the source term, and therefore the dose consequences, are linear with respect to reactor power. As such, the dose consequences would be expected to increase 0.7 percent. A review of the calculations indicates that there is more than enough margin in the 10CFR50.67 acceptance criteria to accommodate the slight overpower.

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