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 20, 2001

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 / 01-001-00

File Nos. G9.5, G9.25.1.3

RBG-45754
RBF1-01-0121

Ladies and Gentlemen:

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

Sincerely,

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

Louisiana Department of Environmental Quality
Office of Environmental Compliance
Surveillance Division
P. O. Box 82215
Baton Rouge, LA 70884-2215
Attn: Mr. Prosanta Chowdhury

NRC FORM 366 (1-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 6-30-2001

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@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 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 reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
River Bend Station	05000 458	1 OF 3

TITLE (4)

Unplanned Reactor Scram During Turbine Control Valve Testing

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
04	21	2001	2001	– 001 –	00	06	20	2001	FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9)	1
POWER LEVEL (10)	58%

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)	X 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)	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

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 April 21, 2001, at approximately 2:54pm, a reactor scram occurred during scheduled testing of the main turbine control valves. The plant was at approximately 58 percent rated power at the time of the scram. The scram was an automatic response to high reactor steam pressure resulting from an unanticipated closure of the main turbine control valves. Plant systems responded normally following the scram. Thirteen reactor safety-relief valves opened following the turbine trip, which is an anticipated response to this transient. Operators implemented the appropriate response procedures, and promptly stabilized the plant systems. This event is being reported in accordance with 10CFR50.73(a)(2)(iv)(A) as an event that resulted in the automatic actuation of the reactor protection system.

Subsequent troubleshooting and testing did not positively identify the root cause for the turbine trip. The most likely cause was determined to be a turbine speed signal error generated by rotor dynamics of the high pressure turbine during the testing of control valve no. 1.

This event was of very low significance. A main turbine trip while at power is an analyzed event, and all plant systems responded normally.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
River Bend Station	05000-458	2001	- 001 -	00	2 OF 3

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

REPORTED CONDITION

On April 21, 2001, at approximately 2:54pm, a reactor scram occurred during scheduled testing of the main turbine (**TRB**) control valves (**SCV**). The plant was at approximately 58 percent rated power at the time of the scram. The scram was an automatic response to high reactor steam pressure resulting from an unanticipated closure of the main turbine control valves. Plant systems responded normally following the scram. Thirteen reactor safety-relief valves (**RV**) opened following the turbine trip, which is an anticipated response to this transient. Operators implemented the appropriate response procedures, and promptly stabilized the plant systems. This event is being reported in accordance with 10CFR50.73(a)(2)(iv) as an event that resulted in the automatic actuation of the reactor protection system.

At the time of the event, the plant was being returned to full power operation following a planned outage to repair an electrical fault in the reactor recirculation pump "A" motor terminals. The power ascent was stopped at 58 percent power to perform required main turbine valve testing.

When turbine control valve no. 1 was tested, it began to close as expected. The other three control valves began to open to maintain a constant reactor steam pressure. Both turbine bypass valves also opened. Just before control valve no. 1 reached the 90 percent closed position, the other three control valves began to close unexpectedly. Steam pressure quickly reached the setpoint of the automatic reactor protection circuitry, and the scram signal was initiated.

INVESTIGATION AND CORRECTIVE ACTIONS

An investigation team was assembled to collect and analyze information, and to develop a troubleshooting plan. The highlights of the team's activities were as follows.

- Documentation from previous turbine control valve tests was reviewed to gain information on any anomalies that occurred. Variables such as reactor power, steam plant configuration, and high pressure turbine design were considered as potential contributing factors.

- Recent modifications to the turbine and control valves were reviewed. In July 1999, the turbine control system was modified to modulate the control valves in the "partial arc admission" mode. In April 2000, the high pressure turbine nozzle blocks were replaced to increase the steam flow area.

  The potential contributing effect of operating in the "partial arc admission" mode has been previously seen in another event. INPO Significant Event Report 91-04 details an event at Salem 1 in which a main turbine trip occurred during turbine governor valve testing. The cause of the trip was determined to have been damage to the speed sensors caused by rotor movement (no damage was done to the sensors in River Bend's turbine). The rotor was displaced radially by asymmetric loading that resulted from the combination of governor valve positions that occurred during the test. This event was relevant in that the Salem 1 unit was operating in the partial arc admission mode. However, the test at Salem 1 was performed at a power level lower than specified in their procedure. There is no corresponding lower limit on initial power levels in River Bend's procedure.

- Data recorded by the plant computer was analyzed to isolate any anomalous indications in the turbine valve control circuitry. No significant abnormal indications were noted elsewhere in this data.

- Prior to the event, the speed sensor circuitry was not monitored by the plant computer, so historical data from that signal was not available to the team for analysis. A modification was installed prior to restarting the reactor to link this signal into the plant computer.

A troubleshooting and restart plan was developed. The initial phase of troubleshooting was performed with the reactor shutdown and the turbine on the turning gear. Specific signals in the control circuitry were simulated to attempt to duplicate the system response.

In the second phase, testing was conducted using the plant's training simulator. The simulator responded as designed, and no closure signal went to the control valves.

When no malfunction that could have caused the turbine trip was positively identified in the first two phases, the third phase was implemented. After a detailed briefing and discussion of operating experience, reactor power was raised to approximately 15 percent to test the turbine control valves. This power level allows operation while remaining within the capacity of the turbine bypass valves. Recorders were connected to monitor numerous parameters in the electro-hydraulic control system and associated computer points. The turbine valve test procedure was successfully conducted at this power with the generator output breakers open. No anomalies were noted with turbine speed error, generator load reference, or any of the other monitored parameters. The plant was then returned to full power operation.

The information gathered in the troubleshooting phases was used in a formal Kepner-Tregoe problem analysis technique. This effort led to the determination that rotor dynamics of the high pressure turbine during testing of control valve number 1 likely affected the speed pickup signals. This generated a speed error signal, causing an erratic steam flow reference signal and a subsequent closure signal to the control valves.

The phenomenon of asymmetrical loading caused by combinations of control valve position is being assessed to develop better guidance on conduct of the test procedure. There are no Technical Specification requirements to conduct control valve testing. Therefore, the tests have been suspended until the next refueling outage in September 2001.

PREVIOUS OCCURRENCE EVALUATION

A review of the three unplanned turbine trips that occurred since January 1994 indicates that there were no previous occurrences of the postulated failure in that period. Before this event, the control valve test had been successfully performed five times since January 2000.

SAFETY SIGNIFICANCE

This event was of very low safety significance. A main turbine trip while at power is an analyzed event, and the plant systems responded as designed.

(NOTE: Energy Industry Identification codes are annotated in the text as (**XXX**).)