GULF STATES UTILITIES COMPANY

RIVER BEND STATION POST OFFICE BOX 220 ST FRANCISVILLE, LOUISIANA 70775

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January 11, 1991
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U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Gentlemen:

River Bend Station - Unit 1
Docket No. 50-458

Please find enclosed Licensee Event Report No. 90-047 for River Bend Station - Unit 1. This report is being submitted pursuant to 10CFR50.73.

Sincerely,

W. H. Odell
Manager-Oversight
River Bend Nuclear Group

DRE/PDG/GAB/DCH/DEJ/pg

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NRC FORM 366 (6-89) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED OMB NO. 3150-0104
EXPIRES 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
RIVER BEND STATION	0 5 0 0 0 4 5 8	1 OF 0 4

TITLE (4) Reactor Scram During Turbine Valve Testing Due to a Low Pressure Transient in the Electro-Hydraulic Trip Syster

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 NAMES	DOCKET NUMBER(S)
1 2	1 2	9 0	9 0	0 4 7	0 0	0 1	1 9	9 1		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 8 0	20.402(b)	20.405(c)	X 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)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		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
	AREA CODE
L. A. England, Director-Nuclear Licensing	5 0 4 3 8 1 - 4 1 4 5

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 fifteen single-space typewritten lines) (16)

At 0032 hours on 12/12/90, while performing turbine overspeed protection weekly operability testing (STP-110-0101), a reactor scram occurred as a result of a turbine control valve (TCV) fast closure signal. At the time of the scram, the reactor was at a reduced power of 80 percent to perform the subject testing. The cause of the turbine control valve fast closure signal was due to a low electro-hydraulic trip system (ETS) pressure transient that occurred during scheduled surveillance testing of the combined intercept valves (CIVs).

Corrective actions included the installation of orifices on all ETS supply ports to the TCVs, turbine stop valves (TSVs), and CIVs. In addition, a transmitter was installed on the turbine front standard to verify ETS pressure.

All systems responded to the reactor scram per design. The RPS responded correctly to the TCV fast closure in anticipation of the loss of the turbine generator. Reactor water level at no time reached a level requiring the use of alternate sources of water injection to make up for lost inventory. Therefore, the reactor was not placed in a condition which threatened the health and safety of the public.

REPORTED CONDITION

At 0032 hours on 12/12/90, with the reactor in Operational Condition 1 (Power Operation), while performing turbine overspeed protection weekly operability testing (STP-110-0101), a reactor scram occurred as a result of a turbine control valve (TCV) (*SCV*) fast closure signal. At the time of the scram, the reactor was at a reduced power of 80 percent to perform the subject testing. This report is submitted pursuant to 10CFR50.73(a)(2)(iv) to document the reactor scram.

INVESTIGATION

At the time of the scram, the #2 combined intercept valve (CIV) (*V*) was being tested when a TCV fast closure signal was generated due to a low ETS pressure transient. The fast closure signal generates a reactor protection signal (RPS) (*JE*) trip which caused the reactor shutdown. Prior to this scram personnel had been briefed on the potential risk associated with this test. This risk had been determined as a result of the effects seen five days before when the test was attempted at a similar power level. During the test, the #2 CIV closed unexpectedly when the #1 CIV was reopened after being tested.

The following actions were taken by GSU prior to the testing on 12/12/90:

- A thorough review of nuclear industry experience and corrective actions taken for a previous reactor scram on April 7, 1990 (LER 90-014). This scram also occurred due to a low ETS pressure transient during turbine testing.

- Extensive testing and maintenance on the system during the third refueling outage to implement corrective actions resulting from the previous scram.

- Additional precautions such as briefing of control room personnel, presence of additional operators and engineering support, and a slight boost in EHC pressure in preparation for the testing.

GSU's investigation has revealed that the transient pressure signal is generated as a result of the tested CIV reopening following a test. Analysis indicates that on a test closure of a CIV, the re-energization of the fast acting solenoid after releasing the test pushbutton causes the under-disk dump volume in the valve control pac to suddenly refill. This refilling causes a hydraulic pressure transient of several hundred pounds. In some instances, the pressure transient was severe enough to allow adjacent CIV disk dumps to unseat causing the ETS transient signal to degrade to the point that a

turbine control valve fast closure signal was generated. Consultations with General Electric revealed an industrial problem on some large steam turbine generator (LSTG) systems with a valve control pac shutoff valve, different than that installed at River Bend, as contributing to severe ETS pressure transients sufficient to trip units off-line as a result of CIV testing. Though the shutoff valve model was cited as the contributor to the GE described problem, the corrective action taken in the GE engineering change notice (ECN) T352-415, to install orifices in the ETS supply line, is also applicable to River Bend, since the same scenario as described in the ECN is generated. There are strong indications that air intrusion into the CIV disk dump volume is the cause of the severe pressure transients. Research has shown a direct correlation between transient low ETS pressure signals during CIV testing and previous maintenance that opened up the ETS system to air (i.e., replacement of solenoid valves). As corrective action to prevent recurrence, the orifices recommended in the GE ECN were installed under modification request (MR) 90-0149.

Following the scram, the drop in reactor pressure (about 200 psig in 6 seconds) resulted in substantial reactor water level swell. The rising water level caused a high reactor water level 8 trip in the reactor approximately 15 seconds after the scram. The high water level trip initiated a trip of the operating feedpumps and the main turbine. Before a feedpump (*P*) (feedpump C) could be restored (less than one minute after the pump trip), water level had dropped from the high level of + 55 inches to approximately - 14 inches normal water level. Prompt and effective operator intervention resulted in rapid restoration of normal reactor feedpumps (*P*) and prevented a challenge to emergency injection systems.

The transient response for this event and earlier transient events were studied in depth to determine why the level 8 trip signal was reached as rapidly as it was. The feedwater control system is designed such that when a typical reactor scram transient occurs, the master control output generates a timed step jump to compensate for the predicted reactor level shrink and still avoid reaching a level 8 trip as a result of that compensation. In the subject transient, the feed-level control system responded as designed. The turbine control valves (TCVs) and turbine stop valves (TSVs) (*PCV*) reopened within seconds after the scram from 80 percent power. The opening of TCVs/TSVs resulted in a fairly rapid RPV depressurization (about 200 psig in 6 seconds), causing significant reactor level swell. The swell combined with feed-level restoration from setpoint-setdown with all feed regulating valves in automatic allowed the level 8 trip to occur. The reopening of the turbine valves prevented any safety relief valves (SRVs) (*RV*) from reaching their relief setpoints. The maximum reactor pressure was approximately 1070 psig.

A similar event was reported in LER 90-014. This was the scram on 4/07/90 during turbine valve testing due to a low pressure transient.

CORRECTIVE ACTION

Operations personnel entered the appropriate abnormal operating procedure for a reactor scram and subsequently completed all immediate and subsequent actions required. Feedwater was restored shortly after the high water level trip and reactor level was returned to a normal shutdown level.

1) Orifices were installed on all ETS supply ports to the turbine control, stop valves, and the CIVs. Subsequent testing with the orifices installed noted a marked difference in the ETS pressure transient generated as a result of turbine valve testing.

2) If the spool pieces on the CIV fast acting solenoids stick, it is possible that excessive flow could occur from the ETS system to the hydraulic sump. Since the problems occurred on the CIVs, RBS has changed out the fast acting solenoids on CIVs 1, 2, and 3. (CIV 4 fast acting solenoid was changed out following a previous scram on April 7, 1990.)

3) The testing procedure, STP-110-0101 has been changed to require monitoring of specific parameters during testing, as an interim measure. The parameters to be monitored are the ETS pressure at the turbine front standard using a transmitter and CIV position using a recorder. Strict acceptance criteria have been established to ensure ETS pressure drops do not exceed a specified amount during weekly testing.

SAFETY ASSESSMENT

All systems responded to the reactor scram per design. The RPS responded correctly to the TCV fast closure in anticipation of the loss of the turbine generator. Reactor water level at no time reached a level requiring the use of alternate sources of water injection to make up for lost inventory. Therefore, the reactor was not placed in a condition which threatened the health and safety of the public.

NOTE: Energy Industry Identification System Codes are identified in the text as (*XX*).