Entergy Operations

Entergy Operations, Inc.
P.O. Box 756
Port Gibson, MS 39150
Tel 601-437-6409

W. T. Cottle
Vice President
Operations
Grand Gulf Nuclear Station

July 10, 1991

U.S. Nuclear Regulatory Commission
Mail Station P1-137
Washington, D.C. 20555

Attention: Document Control Desk

SUBJECT: Grand Gulf Nuclear Station
Unit 1
Docket No. 50-416
License No. NPF-29
Reactor Scram Due to Loss of Feedwater
LER 91-004-00

GNRO-91/00124

Gentlemen:

Attached is Licensee Event Report (LER) 91-004-00 which is a final report.

Yours truly,

for

WTC/RR/cg
attachment

cc: Mr. D. C. Hintz (w/a)
Mr. R. B. McGehee (w/a)
Mr. N. S. Reynolds (w/a)
Mr. H. L. Thomas (w/o)
Mr. J. L. Mathis (w/a)
Mr. F. W. Titus (w/a)

Mr. Stewart D. Ebneter (w/a)
Regional Administrator
U.S. Nuclear Regulatory Commission
Region II
101 Marietta St., N.W., Suite 2900
Atlanta, Georgia 30323

Mr. L. L. Kintner, Project Manager (w/a)
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Stop 11D21
Washington, D.C. 20555

NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Grand Gulf Nuclear Station	0 5 0 0 0 4 1 6	1 OF 0 3

TITLE (4)

Reactor Scram Due To Loss of Feedwater

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)
											0 5 0 0 0
0 6	1 1	9 1	9 1	–	0 0 4	– 0 0	0 7	1 0	9 1		0 5 0 0 0

OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
1	20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10) 0 3 5	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
Riley Ruffin / Licensing Specialist	AREA CODE 6 0 1 4 3 7 – 2 1 6 7

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	
X	S D	V C	B 0 4 5	Y							

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)

On June 11, 1991, a controlled shutdown was in progress for maintenance on the mechanical seals for both reactor recirculation water pumps. In accordance with approved plant procedures, the reactor recirculation water pumps were shifted from fast to slow speed. This caused a swell in reactor water level which resulted in a decrease in feedwater and condensate flow. The condensate system flow rate decreased to the minimum flow setpoint, but the minimum flow valve failed to respond to the low flow condition. The failure resulted in a loss of feedwater and a subsequent automatic reactor scram.

The failure is attributed to a failed pneumatic relay inside the valve positioner. The most probable cause for the relay failure is excessive vibration experienced during minimum flow conditions. The positioner was replaced and retested satisfactorily. An evaluation will be performed to determine methods or modifications to preclude valve failure due to vibration. In the interim, a task will be implemented to perform a functional test and a visual inspection of the positioner prior to controlled shutdowns and start-ups. Additionally, a task will be generated to replace the valve's positioner each refueling outage until a more suitable resolution is determined. Based on reviews of the event, all safety systems functioned as designed. The reactor water remained at least 140 inches above the top of the active fuel during the transient.

NRC Form 366A
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Grand Gulf Nuclear Station	0 5 0 0 0 4 1 6	9 1	— 0 0 4	— 0 0	0 2 OF 0 3

TEXT (If more space is required, use additional NRC Form 366A's) (17)

A. Reportable Occurrence

On June 11, 1991 at approximately 1840 hours, an automatic Reactor Protection System (RPS; EIIS Code: JC) actuation occurred due to a low reactor water level condition. This occurrence is reportable pursuant to 10CFR50.73(a)(2)(iv).

B. Initial Condition

A controlled shutdown was in progress for maintenance on the mechanical seals for both Reactor Recirculation Water (Recirc.) Pumps (EIIS Code: AD). Two condensate pumps, two booster pumps and one feed pump were supplying makeup water to the vessel. Both recirc pumps were operating in fast speed with the recirc flow control valves at their minimum positions, prior to the transient. The plant was in Operational Condition 1 at approximately 35 percent reactor power at the time of occurrence.

C. Description of Occurrence

On June 11, 1991, operations was performing a controlled shutdown in accordance with plant Integrated Operating Instructions (IOI). The shutdown was scheduled to perform maintenance on the mechanical seals on both recirc pumps.

In accordance with the IOI, Operations personnel shifted both recirc pumps to slow speed. The down-shift of the recirc pumps caused a level increase as sensed by vessel narrow range level instrumentation. Due to the Feedwater Level Control System (EIIS Code: JB), the Feedwater System (FW; EIIS Code: SJ) decreased feedwater flow to the vessel resulting in a corresponding decrease in the flow rate of the Condensate System (EIIS Code: SD). The flow rate decreased to the minimum flow rate setpoint which generates an open signal to the condensate pump minimum flow valve (F504). The F504 valve did not respond to the open demand. Therefore, no flow was established in the minimum flow line. Concurrent with a low flow condition as sensed by the condensate pump minimum flow instrumentation, a 25 second timer started to allow time for a flow rate greater than the minimum flow setpoint to be established. The minimum flow rate remained less than the minimum flow setpoint which resulted in a trip signal being transmitted to all running condensate pumps. The Condensate Booster Pumps also tripped due to a low minimum flow signal. The FW pump tripped as a result of low suction pressure due to the decrease in condensate header pressure.

NRC FORM 366A
(9-83)

*U.S.GPO:1986-0-624-538/45

Reactor Core Isolation Cooling (RCIC; EIIS Code: BN) along with a second Control Rod Drive Pump (CRD; EIIS Code: AA) were manually started in an attempt to restore vessel water level. The water level continued to decrease and a low water level condition caused an automatic RPS actuation. The loss of FW caused vessel level to decrease to an approximate level of -24 inches as indicated by the General Electric Transient Analysis Recording System (GETARS).

The condensate and FW Systems were restarted and provided makeup flow to the vessel. The FW System restored the vessel water level to approximately 38 inches as indicated by GETARS.

D. Apparent Cause

A subsequent investigation revealed that the failure of the condensate pump minimum flow control valve positioner (Bailey Model No. AP4-12100) caused the loss of FW. Upon examining the positioner, it was discovered that a failed pneumatic relay, which routes air pressure to the appropriate side of the valve actuator piston, prevented the valve from responding to the open demand.

The most probable cause, as determined by plant personnel, of the relay failure is attributed to excessive vibration during minimum flow conditions. The vibration seems to be inherent to the present design of the minimum flow portion of the condensate system.

E. Subsequent Corrective Actions

The positioner was replaced and retested satisfactorily.

An evaluation is being performed to determine methods or modifications which would preclude valve failure due to vibration encountered during minimum flow conditions. In the interim, a task will be implemented to perform a function test (i.e., stroke the positioner) and a visual inspection of the positioner prior to controlled shutdowns and start-ups. This task is scheduled to be implemented by August 1, 1991. Additionally, a repetitive task will be generated, for initial implementation in RF05, to replace the minimum flow valve's positioner each refueling outage until a more suitable resolution is determined.

F. Safety Assessment

Based on review of the event, all safety systems functioned as designed. The reactor water level remained at least 140 inches above the top of active fuel during the transient.