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January 17, 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 RFP "A" Trip
LER 90-029

GNRO-91/00013

Gentlemen:

Attached is Licensee Event Report (LER) 90-029 which is a final report.

Yours truly,

WTC/RR/cg
attachment

cc: Mr. D. C. Hintz (w/a)
Mr. R. B. McGehee (w/a)
Mr. N. S. Reynolds (w/a)
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NRC Form 366 (9-83)

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

LICENSEE EVENT REPORT (LER)

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Grand Gulf Nuclear Staton - Unit 1	0 5 0 0 0 4 1 6	1 OF 0 4

TITLE (4)
Reactor Scram Due To RFP "A" Trip

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 8	9 0	9 0	0 2 9	0 0	0 1	1 7	9 1	NA	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 1 7	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
Riley Ruffin / Licensing Specialist	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	MANUFAC TURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFAC TURER	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)

On December 18, 1990, during a controlled shutdown, a Reactor Protection System actuation occurred resulting in an automatic plant shutdown. The actuation occurred due to low reactor water level which was caused by a Reactor Feedwater Pump trip.

The high discharge pressure trip of the feedwater pump was a result of the interaction between the startup level control system and the master feedwater control system.

The investigation, which followed the scram, identified the air supply valve for the startup level control valve not being fully open and the 'A' electric automatic positioner's high speed stop limit switch for the Reactor Feedpump Turbine not being properly set. The combined effect of these problems are the most probable cause of the event.

All safety systems performed as designed during the transient. The minimum water level reached was -25 inches as indicated on the wide range level instrumentation. The minimum level was approximately 142 inches above the top of active fuel.

NRC Form 366A
(9-83)

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

A. Reportable Occurrence

On December 18, 1990, during a controlled shutdown, a Reactor Protection System (EIIS Code: JC) actuation occurred due to low reactor water level. The actuation resulted in an automatic reactor shutdown. The occurrence is reportable pursuant to 10CFR50.73(a)(2)(iv).

B. Initial Conditions

The plant was in Operational Condition 1 at approximately 17 percent power at the time of the occurrence.

C. Description of Occurrence

On December 18, 1990, plant personnel were performing a controlled reactor shutdown due to high vibration on the 'B' Reactor Recirculation Water Pump (EIIS Code: AD). While at 17 percent power, operations personnel observed the reactor vessel water level cycling between 25 and 35 inches as indicated on the narrow range level instrumentation. Plant personnel, being instructed by Plant Operating Instructions, transferred the feedwater system (EIIS Code: SJ; FW) to the Startup Level Controller. As the feedwater flowpath was transferred from the normal flow path to the startup level control flow path, the master level controller, responded to a decrease in vessel level, by raising the speed of the 'A' Reactor Feedwater Pump Turbine (RFPT) in an attempt to restore vessel level.

The startup level control flowpath, being more restrictive to flow than the normal flowpath, caused the 'A' RFPT to run at a higher speed than normal in order to restore vessel level. The startup level control valve closed partially, during this evolution, causing the Reactor Feed Pump (RFP) flow to decrease below the minimum flow controller setpoint resulting in the opening of the minimum flow valve which caused a subsequent decrease in vessel level. The RFPT continued to increase speed, in response to the level decrease, until the RFPT tripped on high RFP discharge pressure. Subsequent to the trip of the RFPT, Reactor Core Isolation Cooling System (EIIS Code: BN; RCIC) was manually initiated in an attempt to restore vessel water level. Vessel level continued to decrease until the reactor scrammed on low water level (+11.4). Following the scram, the 'A' RFP was recovered and it along with RCIC provided makeup water to the vessel. The level was increased to approximately 50 inches.

D. Apparent Cause

Each RFP is driven by an individual steam turbine. The speed of the turbine is controlled by the control valve position, which is determined by the control valve operating mechanism (CVOM). The CVOM receives signals from the FW control system via an electric automatic positioner (EAP).

The high speed stop limit for the 'A' RFPT EAP controller was not properly set. This resulted in an increased stroke of the EAP actuator and a 22 percent increase in dynamic gain which caused the pump flow to decrease below the minimum flow controller setpoint; therefore, opening the minimum flow valve. The interaction of the master level controller and the minimum flow controller resulted in repeated cycling of reactor vessel level between 25 and 35 inches and FW suction flow to cycle between 0 and 4.25 Mlbm/hr. Even though the flow perturbation did not cause the RPS actuation, it was a major contributing factor in the occurrence.

The investigation which followed the scram identified problems with the start up level control valve. The air supply valve for the control valve was not full open restricting air flow to the valve. Also, a small air leak was found in the control valve positioner. These problems, in combination with the high differential pressure and high flow rate through the valve are the most probable cause for the partial closure of the startup level control valve during the event.

E. Supplemental Corrective Actions

Plant personnel took as found data on the high and low speed stops on the 'A' and 'B' RFPT vs the speed setting piston position. The 'B' high and low speed stops were verified in their proper positions. The high speed stop limit switch on the 'A' RFPT was repositioned in accordance with the vendor manual and the EAP actuator was recalibrated.

The FW controllers (i.e., master level controller, RFPT 'A' setpoint controller and 'A' EAP controller) were tested and no abnormal conditions were identified.

The air supply valve for the startup level control valve was placed in the full open position. The positioner on the startup level control valve also had a small air leak and was replaced.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

The startup level control valve was tested and the valve performed as expected. At approximately 17 percent reactor power during the plant restart, the 'A' RFPT was tested satisfactorily.

The procedure used to calibrate and tune the EAP controllers will be changed to add instructions to set the high speed stop limit switches to the speed setting piston positions. This change will be incorporated prior to Refueling Outage 5.

F. Safety Assessment

All safety systems performed as designed during the transient. The minimum water level reached was -25 inches as indicated on the wide range level instrumentation. The minimum level was approximately 142 inches above the top of active fuel. The High Pressure Core Spray System was available if vessel level had decreased to its initiation setpoint (-41.6 inches).

NRC FORM 366A
(9-83)

* U.S.GPO: 1988-0-624-538/455