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December 21, 1990

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
Manual Scram Due To Rod Pattern Control Lockup
LER 90-026

GNRO-90/00011

Attached is Licensee Event Report (LER) 90-026 which is a final report.

Yours truly,

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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)

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

TITLE (4)
Manual Scram Due To Rod Pattern Control Lockup

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 1	2 4	9 0	9 0	— 0 2 6	— 0 0					0 5 0 0 0
										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)			
2	20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10) 0 1 0	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
Bruce A. Burke / Licensing Engineer	6 0 1 4 3 7 - 6 3 1 3

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)

During a reactor startup on November 24, 1990, a manual scram was inserted following a lockup of the rod pattern control system (RPCS). The lockup was caused by multiple control rods drifting out of sequence due to the excessive differential pressure of the control rod drive (CRD) cooling water. CRD system cooling water flow was maximized to increase reactor water level. Operators were aware that an elevated CRD cooling water differential pressure could cause rods to drift.

The transient of reactor water level has been attributed to open drain valves in the main steam lines coupled with vacuum established in the main condenser. A contributing factor to the transient was the unavailability of condensate during the reactor startup sequence due to depressed condensate temperature. The startup procedure was judged to be inadequate. The startup procedure has been amended to specify main steam line drain valve lineups and the minimum hotwell temperature requirement.

Reactor control systems functioned properly; no equipment was observed as having malfunctioned. The lockup of the RPCS as a consequence of the drifting control rods occurred as designed.

NRC Form 366A (9-83)

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

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 0	— 0 2 6	— 0 0	0 2 OF 0 4

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

A. Reportable Occurrence

A manual scram was inserted on November 24, 1990 during a reactor startup. This event is reportable per 10CFR50.73(a)(2)(iv).

B. Initial Conditions

The plant was in Operational Condition 2, startup, with reactor water at approximately 238 degrees F and 10 psig.

C. Description of Occurrence

On November 24, 1990 at approximately 1209 hours, a manual scram was inserted following a lockup of the rod pattern control system (RPCS) (EIIS Code: XC). The lockup was caused by multiple control rods drifting out of sequence due to the excessive differential pressure of the control rod drive (CRD) cooling water. The lockup feature of the RPCS operated as designed, preventing control rod movements other than towards the fully inserted position. The manual scram was necessary because other changes to control rod positions were prohibited by Technical Specification 3.1.4.2.

During reactor startup with all four inboard main steam isolation valves (MSIVs) closed and the reactor water cleanup system (RWCU) discharging the major portion to the condenser, the reactor water level decreased from approximately +30 inches to +26 inches on the narrow range level instrumentation when the first MSIV was opened. Level then held steady and the other three inboard MSIVs were opened. Water level increased about 1 inch while these three MSIVs were opened.

Reactor water level appeared stable for several minutes with all four MSIVs open, but then decreased again. RWCU flow to the main condenser was secured as the level indication continued to decrease. CRD system cooling water flow was maximized with the one CRD pump in service in an attempt to increase reactor water level. Operators were aware that an elevated CRD cooling water differential pressure could cause rods to drift. The second CRD pump was started when level did not stabilize; CRD cooling water flow then caused twelve CRDs to drift out of their pre-planned position. Reactor water level stabilized at +16 inches and increased to +37 inches. The second CRD pump was removed from service after the level stabilized at +37 inches.

NRC Form 366A (9-83)

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

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 0	— 0 2 6	— 0 0	0 3 OF 0 4

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

Twelve control rods had drifted out of their pre-planned position when CRD flow stabilized reactor water level. Only six of these twelve control rods were actually out of sequence. The RPCS prevented rod movements other than toward the fully inserted position.

D. Apparent Cause:

The transient of reactor water level has been attributed to open drain valves in the main steam lines coupled with vacuum established in the main condenser. Drain lines are featured near the MSIVs, the main steam stop and control valves, and the bypass stop and control valves. When the first MSIV was opened, reactor water flashed due to the pressure decrease. The CRD cooling water flow rate from one pump was incapable of recovering reactor water level in a timely manner. RWCU discharge to the main condenser was secured to conserve reactor water inventory.

A contributing factor to the transient was the unavailability of condensate during the reactor startup sequence due to depressed condensate temperature. Startup usually has the condensate system in the long cycle cleanup configuration to achieve proper condensate temperature. Previous reactor startups have routinely used CRD water to moderate vessel water level without condensate flow and without resulting in significant transients. The condensate temperature was low due to the condensate system having been in the short cycle cleanup configuration the evening prior to reactor startup for calibration of a condensate system control valve.

The startup procedure was judged to be inadequate. Insufficient procedural requirements permitted the drain valves to be maintained open with the MSIVs open and vacuum established in the condenser. Additionally, a minimum hotwell temperature was not a prerequisite to startup.

E. Supplemental Corrective Action(s)

The startup procedure has been amended to specify main steam line drain valve lineups and the minimum hotwell temperature requirement. The isolation of main steam line drains and availability of condensate to moderate vessel level transients during startup should preclude the recurrence of this event.

NRC Form 366A (5-92)

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 5/31/95

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 0	— 0 2 6	— 0 0	0 4 OF 0 4

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

F. Safety Assessment

The lockup of the RPCS as a consequence of the drifting control rods occurred as designed. Reactor control systems functioned properly; no equipment was observed as having malfunctioned. The drifting rods were anticipated in response to operator actions to control a reactor vessel water level transient during a startup. No usage factor was incurred as a consequence of the reported occurrence. The safety of the general public was not compromised by this event.