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May 29, 1992

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
RPS Actuation During CRDM Changeout Activities
LER 92-006-00

GNRO-92/00064

Gentlemen:

Attached is Licensee Event Report (LER) 92-006 which is a final report.

Yours truly,

WTC/BAB/cg
attachment
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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)
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TITLE (4)
RPS Actuation During CRDM Changeout Activities

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 4	2 8	9 2	9 2	— 0 0 6	— 0 0	0 5	2 9	9 2		0 5 0 0 0
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OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 0 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
Bruce A. Burke / Licensing Engineer	AREA CODE 6 0 1 4 3 7 - 6 3 3 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	
D	I G	I M O D	G 0 8 0	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)

While attempting to uncouple a control rod drive mechanism (CRDM), water from the vessel sprayed onto nuclear instrumentation cables and connectors beneath the vessel. Actuation of the reactor protection system (RPS) ensued subsequent to the spraying. Because the plant was in a refueling outage, no control rod movement resulted from the scram signal.

Generation of the scram signal is believed to have been caused by water intrusion into a local power range monitor (LPRM) connector. It is possible that random failure of the LPRM detector occurred coincident to the CRDM activity. The failure charactistic of a randomly failed LPRM detector is similar to a failure caused by a short. Therefore, the cause of the LPRM failure is indeterminate. Immediate investigation revealed that the CRDM uncoupling tool had dimensional problems when compared to the tool's design drawings and other uncoupling tools.

Immediate corrective actions included replacing the uncoupling tool. Also, the CRDM removal procedure was revised to provide manual verification that CRDMs are uncoupled from their control rods during the early stages of CRDM withdrawal. Safety and health of the general public was not compromised by this event.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

A. Reportable Occurrence

On April 28, 1992 at approximately 0045 CST, Grand Gulf Nuclear Station (GGNS) plant operators received an alarm indicating actuation of the reactor protection system (RPS) [JC] via channel G of the average power range monitoring (APRM) system [IG]. This event is being reported pursuant to 10 CFR 50.73(a)(2)(iv).

B. Initial Conditions

The plant was in Operational Condition 5 with the reactor head removed and refueling cavity flooded. All control rods were fully inserted except six which were having their drive mechanism (CRDM) removed and replaced in accordance with GGNS Technical Specification 3.9.10.2. Fuel assemblies immediately adjacent to those six control rods had been removed from the reactor core prior to replacement of the CRDMs. A half scram condition existed in RPS Divisions 2 and 4 due to replacement of Agastat relays.

C. Description of Event

On April 27, 1992 at approximately 2300 CST, excessive undervessel leakage occurred as a result of an unsuccessful uncoupling of a control rod from its CRDM. No personnel contamination resulted from the event as contract personnel performing this maintenance activity were wearing anticontamination gear including bubble suits.

The leakage is believed to have contacted neutron monitoring system [IG] cabling located under the vessel. An RPS trip signal was received on April 28 at approximately 0045 CST. This was due to an APRM high neutron flux trip in channel G that was caused by an upscale failure of local power range monitor (LPRM) 34-19-A. Because the plant was in a refueling outage, no control rod movement resulted from the scram signal. The six CRDMs being exchanged had been isolated from their respective hydraulic control units.

D. Apparent Cause

Generation of the scram signal approximately two hours after CRDM 24-17 leakage was due to an electrical short in LPRM 34-19-A. The short is suspected to have been caused by water intrusion into the LPRM connector. A defective piece of tooling and a deficient procedure, both specifically for CRDM changeout, caused the excessive leakage. The scram signal was subsequently reset after bypassing LPRM 34-19-A.

It is possible that a random failure of the LPRM detector occurred coincident to the CRDM activity. The failure charactistic of a randomly failed LPRM detector is similar to a failure caused by an electrical short. Therefore, the cause of the LPRM failure is indeterminate.

Scheduled activities for GGNS' fifth refueling outage (RFO5) included changeout of CRDMs. This was only the second time that CRDMs have been exchanged at GGNS. At the time CRDM uncoupling work was to begin, approximately 2 feet of water was on the sub-pile floor under the vessel. The BWR 6 uncoupling tool is normally used in conjunction with the BWR 6 control rod handling equipment to uncouple CRDMs at GGNS. The BWR 6 uncoupling tool was not used due to the standing water under the vessel. Instead, the BWR 4/5 uncoupling tool was used as permitted by the procedure.

The BWR 4/5 uncoupling tool was used to uncouple six CRDMs including CRDM 24-17 from their control rods. The tool features an indication light to designate an uncoupled status. This light indicated that CRDM 24-17 was uncoupled.

Mechanical verification that CRDM 24-17 was uncoupled from the control rod was performed in accordance with the procedure. The verification includes lowering the CRDM approximately 10 inches and reinserting it approximately 6 inches.

Reactor water leaked into the undervessel area when the CRDM was reinserted. The control rod was raised off the backseat position since the control rod was still coupled to the CRDM. This created a gap between the control rod velocity limiter and the control rod guide tube. Excessive leakage is the first indication that the CRDM is still coupled. Typically, only the water trapped in the control rod drive tube leaks out after removal of the CRDM.

The leaking water sprayed onto adjacent instrument connectors and cables. Rod control and information system (RC&IS) data faults occurred simultaneously. RC&IS data faults prevented continuing work on the other five CRDMs and halted all fuel movement on the refueling bridge. The leakage was reduced by rebolting the CRDM flange to the CRDM housing. RC&IS faults were cleared and work was resumed on core alterations and CRDMs.

Investigation revealed that the BWR 4/5 uncoupling tool had dimensional problems. The BWR 4/5 tool's guide mark, which is used to space the piston tube nut 1-1/8 inches from the ring flange, was less than 1-1/16 inches from the ring flange. The reduced distance prevented the CRDM from uncoupling. Also, the reed switch used as part of the indication system was approximately 3/8 inch too high and gave a false indication of the CRDMs being uncoupled. These problems were identified when comparing the BWR 4/5 tool against another BWR 4/5 uncoupling tool, a BWR 6 uncoupling tool, and tool design drawings.

E. Corrective Actions

Immediate corrective actions included removing the defective uncoupling tool from service and securing it for repair. The CRDM removal procedure was revised to provide verification that CRDMs are uncoupled from their control rods during the early stages of CRDM withdrawal. If a problem occurs using this process, then the CRDM can be reinserted and the control rod guide tube and velocity limiter will maintain the backseat position to prevent excessive leakage of reactor water.

F. Safety Assessment

This partial loss of reactor water occurred during refueling activities with the reactor cavity flooded. All control rods were fully inserted except the six that had been withdrawn in accordance with Technical Specification 3.9.10.2. Water level in the reactor was not affected during this event.

Failure of an LPRM detector does not create an unsafe operating condition. Had a half-scram signal not been present due to outage activities on the other divisions, actuation of RPS would not have resulted from this failed detector.

Engineered safety features including emergency core cooling systems were available to supply water inventory. Safety and health of the general public were not affected by this event.

G. Additional Information

Energy Industry Identification System (EIIS) codes are identified in the text within brackets [ ].