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Grand Gulf Nuclear Station

June 16, 1995

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
Update to Reactor Scram Due Inadvertent Actuation of Backup Scram Valve
LER 95-004-01

GNRO-95/00067

Gentlemen:

Attached is Licensee Event Report (LER) 95-004-01 which is a final report.

Yours truly,

CRH/RR/
attachment LER 95-004-01
cc: Mr. J. E. Tedrow(w/a)
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NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

LICENSEE EVENT REPORT (LER)

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TITLE (4)
Update to Reactor Scram Due To Inadvertent Actuation Of Backup Scram Valve

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 NAME	DOCKET NUMBER
									N/A	05000
03	16	95	95	004	01	06	16	95	FACILITY NAME: N/A	DOCKET NUMBER: 05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more (11)									
POWER LEVEL (10)	100		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		
			20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in abstract below and in text, NRC Form 366A)		
			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 (Include Area Code)
Riley Ruffin / Licensing Specialist	601-437-2167

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 15 single-spaced typewritten lines) (16)

A reactor scram occurred on March 16, 1995, while plant maintenance personnel were performing a semiannual surveillance on the neutron monitoring system. All control rods inserted fully and vessel level was maintained with the reactor feedwater system.

Causes of the event were determined to be a ground fault on the minimum flow valve for the Reactor Core Isolation Cooling System (RCIC) and a ground on a backup scram valve solenoid. The ground on the solenoid was due to liquid in the solenoid housing. The performance of the surveillance coupled with the two grounds resulted in the inadvertent actuation of the backup scram valve.

Immediate corrective actions included reworking the ground on the RCIC valve, replacing the backup scram valve solenoid and the sealing of the conduit going to the solenoid to prevent moisture intrusion. A Material Nonconformance Report was initiated to address the presence of liquid in the solenoid housing.

The interim actions taken as a result of the November 1994 scram did not prevent recurrence of inadvertent actuation of a backup scram valve due to ground faults on the DC bus.

A ground detection circuit is presently being redesigned to provide annunciation in the control room of the ungrounded Class 1E DC buses. This will support prompt identification and removal of identified grounds. In the interim, increased ground detection checks utilizing the local ground detection meters are being performed by maintenance and operations personnel.

This incident did not impair the ability of any system to perform its intended safety function. The health and safety of the public were not compromised as a result of this event.

NRC FORM 366A (5-92) U.S. NUCLEAR REGULATORY COMMISSION

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ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

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

A. Reportable Occurrence

A reactor scram occurred on March 16, 1995, during the performance of semiannual surveillance 06-IC-1C51-SA-0001, Average Power Range Monitor Calibration. The scram was initiated by the reactor protection system (RPS) [JC] as an indirect result of performing the surveillance. This event is an engineered safety feature (ESF) actuation, and is being reported pursuant to 10 CFR 50.73(a)(2)(iv).

B. Initial Condition

The plant was in Operational Condition 1 at 100 percent power with reactor pressure at approximately 1034 psig and steam temperature at 530 degrees F. The semiannual Average Power Range Monitor (APRM) [IG] calibration for the Division 2 RPS channel 'B' was in progress at the time of the event. The calibration was being performed using approved plant procedures.

C. Description of Occurrence

On March 16, 1995, maintenance personnel were in the process of performing the semiannual calibration for the Div. 2 APRM channels. This calibration surveillance, places a planned trip signal on the Div. 2 RPS trip system. While conducting the calibration for the 'B' channel, the expected Div. 2 trip occurred as specified in plant procedures.

Approximately fifty seconds following the Div. 2 RPS trip signal, an alarm annunciated indicating a low pressure condition in the scram pilot valve air header. As the header pressure decreased, reactor control rods began to drift. Drifting rods resulted in a shrink in vessel level. The Div. 1 Reactor level instrumentation sensed the decrease in vessel water level and generated a low level trip signal. With the existing trip signal from the surveillance and the low water level condition (+ 11.4 inches), an automatic reactor scram occurred.

The plant was stabilized in accordance with approved plant procedures. Plant personnel took manual control of vessel level. Vessel level increased to approximately +51.5 inches as indicated by control room level instrumentation. Vessel level was maintained using the feedwater startup level control system [SJ]. No actuations of emergency core cooling systems (ECCS) were required during this transient.

D. Investigation Results

Immediate investigation of the event revealed that the loss of pressure in the scram pilot valve air header was the result of backup scram valve 1C11F110A opening. 1C11F110A, a direct acting solenoid valve powered by the Class 1E 125 VDC system [EJ], opened shortly following the Div. 2 scram signal that was initiated in accordance with the APRM surveillance. The backup scram valve should not have been affected by performance of any portion of this surveillance. The incident investigation identified a grounded lead on the Reactor Core Isolation Cooling System (RCIC) [BN] minimum flow valve and liquid in the backup scram valve solenoid housing.

The ground on the RCIC valve was due to a wire that had been pinched during the course of maintenance that had occurred a week prior. Even though surveillances had been performed since the valve maintenance that would have resulted in a possible actuation of the F110A, no adverse consequences had been noted. Initial troubleshooting following the scram did not reveal any grounds associated with F110A's solenoid which would have caused the valve to open. Further troubleshooting using a megger (~ 250 VDC) determined that the solenoid was shorted to ground. Upon opening the solenoid valve housing, personnel discovered that the housing contained liquid which provided a current path to ground. Therefore, F110A opened due to a ground that occurred while the APRM surveillance was in progress.

Subsequent reviews concluded that the interim actions taken following the November 1994 scram were ineffective in preventing this subsequent incident. Each of the two events involved a pinched wire which in conjunction with a second ground caused a ground fault on the 11DA bus. The investigation into the November event identified that the work practices which led to the pinched wire were less than adequate. However, major efforts were not directed at this particular contributor due to the wire being pinched on or before October 1990 which was before our current maintenance program . Since the work processes had been changed to caution personnel of the potential of pinching wire, it was assumed that this occurrence was an isolated case. Plant procedures already cautioned personnel to use care in order to prevent pinched wires. As a result, no additional training was performed to address pinched wires nor was formal information disseminated to maintenance personnel to heighten their awareness of the potential for pinching wires when installing covers on DC equipment.

Since it was recognized that grounds could develop on the DC system by mechanisms other than pinched wires, the primary corrective action following the November scram was to design and install ground detection circuitry that would give control room annunciation when a ground is detected. This would allow early detection and elimination of system ground faults. The design was being developed at the time of the second scram.

The interim methods used to detect grounds faults on the DC bus may not have been adequate to detect the ground which had been placed on the bus by the pinched wire at the E51F019 valve. Following the maintenance for the E51F019 valve, a ground detection test was performed. However, no ground fault was observed on the panel.

E. Corrective Actions

The ground that was identified on the RCIC valve was eliminated and the valve was returned to service.

All craft personnel in electrical maintenance received additional information on the importance of maintaining DC systems free from ground faults.

The solenoid for the F110A was replaced. The conduit going to the F110A solenoid housing was sealed to prevent moisture intrusion. (The F110A solenoid is normally deenergized; therefore, sealing the conduit would not result in overheating the valve.) A Material Nonconformance Report was initiated to identify the source the presence of liquid in the solenoid housing. Even though the actual source of the liquid has not been identified, actions were taken to prevent coil failure due to moisture intrusion . The disposition of the nonconformance report required that the non-molded coils for the backup scram valve solenoids be replaced with hermetically sealed coils. These coils are not susceptible to moisture intrusion.

A Refueling Outage task will be generated to test this isolated portion of circuitry until final resolution is implemented.

A ground detection circuit is presently being designed to enhance monitoring of the ungrounded Class 1E DC buses. This will support prompt identification and removal of identified grounds. In the interim, increased ground detection checks utilizing the local ground detection meters are being performed by maintenance and operations personnel.

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F. Safety Assessment

This incident did not impair the ability of any system to perform its safety function. Minimum water level in the reactor vessel was recorded at -20 inches narrow range which corresponds to approximately 147 inches above the top of active fuel. ECCS were available to perform their safety function. However, they were not required to operate during the plant transient. No safety relief valves actuated. The health and safety of the public were not compromised as a result of this event.

G. Additional Information

On November 1, 1994, a similar event occurred (as reported in LER 94-011, dated 12/01/94) while plant maintenance personnel were performing a quarterly surveillance on the reactor protection system.

Causes of the event were determined to be a recent modification to the ground detection circuit for the Div. 1 125 VDC system, in conjunction with a ground fault on the Div. 1 backup scram solenoid valve. The fault was found to be on the negative pole lead of the solenoid located at its pigtail condulet. The modification of the ground detection circuit was determined to increase the sensitivity of system components to ground faults which could result in inadvertent actuations. While the ground detection system modification had focused on the safety design basis, it failed to consider potential operational impact of ground faults.

Immediate corrective action included repairing the ground fault on the negative pole lead for the valve's coil. Also, the continuous monitoring ground detection circuit of the 125 VDC ground detection system was eliminated to preclude similar adverse consequences. Local periodic monitoring for system grounds was not affected by eliminating the continuous monitoring circuit. Long term corrective actions will include modification of continuous monitoring circuits in all Class 1E DC ground detection systems such that ground can be promptly identified and eliminated.

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

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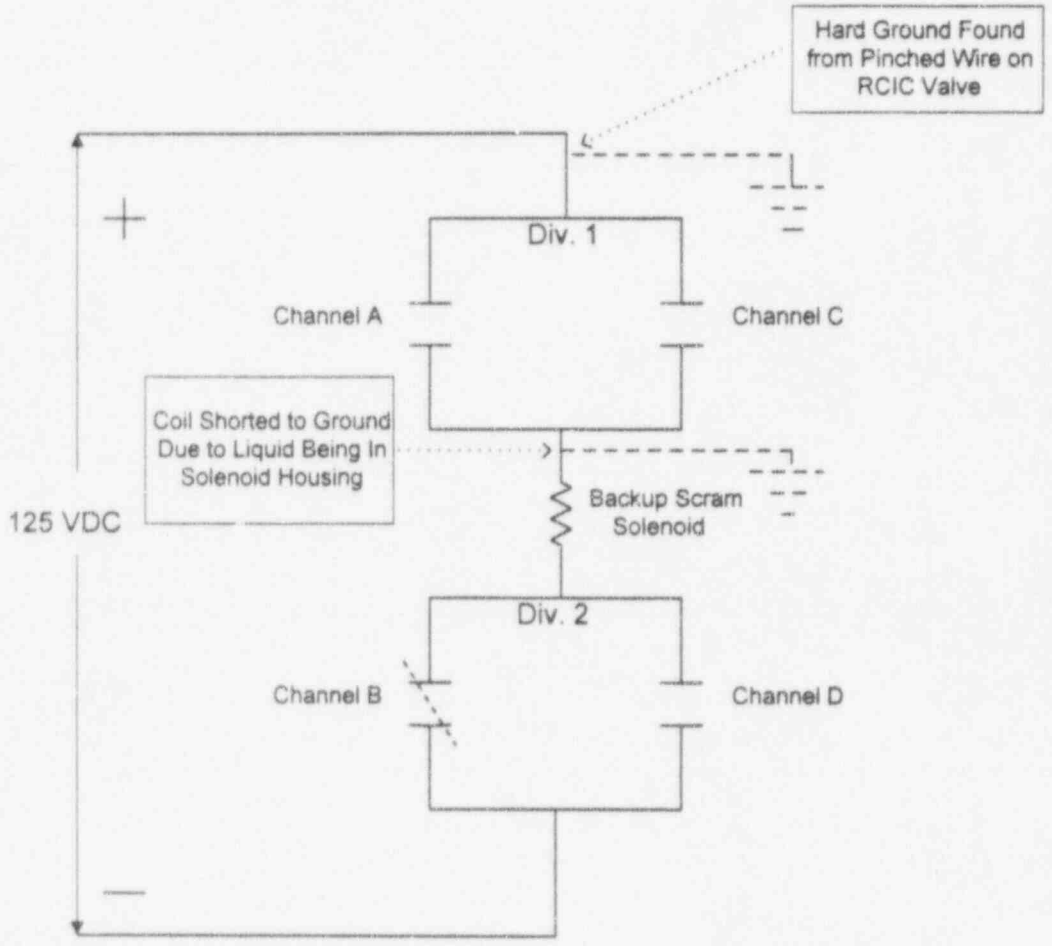
Scram Backup Valve
Relay Logic



- Ground on Positive Leg of 'A' Battery Due To Pinched Wire in E51F019 (RCIC Min Flow Valve To Suppression Pool) Circuit.
- C11F110A Solenoid Coil Grounded to Housing Through Liquid.
- C71K14B Contact Closed Due to Division 2 Surveillance.