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March 31, 1993

W. T. Cottle

Vice President

Operations

Grand Gulf Nuclear Station

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 to Low Primary Water Tank
Level Signal
LER 92-017-01

GNRO-93/00041

Gentlemen:

Attached is Licensee Event Report (LER) 92-017-01 which is an interim report.

Yours truly,

WTC/RR/
attachment
cc:

Mr. R. H. Bernhard (w/a)
Mr. D. C. Hintz (w/a)
Mr. R. B. McGehee (w/a)
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Handwritten note: 11/22/93

NRC Form 365
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/86

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Grand Gulf Nuclear Station	05000416	1 OF 05

TITLE (4)

Reactor Scram Due to Low Primary Water Tank Level Signal

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
08	04	92	92	017	0	01	03	31	93
								DOCKET NUMBER (5)	
								05000416	

OPERATING MODE (9)	POWER LEVEL (10)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)									
		20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)						
		20.406(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)						
		20.406(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vi)	OTHER (Specify in Abstract below and in Text, NRC Form 365a)						
		20.406(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(vii)(A)							
		20.406(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(vii)(B)							
20.406(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(viii)									
20.406(a)(1)(vi)	50.73(a)(2)(iv)	50.73(a)(2)(ix)									

LICENSEE CONTACT FOR THIS LER (12)		TELEPHONE NUMBER
NAME	AREA CODE	
Riley Ruffin / Licensing Specialist	601	437-12167

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
<input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input type="checkbox"/> NO		06	30	93

ABSTRACT (Limit to 1400 spaces - i.e., approximately fifteen single-space typewritten lines) (16)

On August 4, 1992, the reactor scrambled due to a fast closure of the main turbine stop valves. The fast closure of the stop valves occurred as a result of a main generator trip which was caused by a low primary cooling water tank level signal. The erroneous signal was generated due to perturbations in the Primary Water level sensing circuitry. The perturbations in the Primary Water level sensing circuit was caused by the operation of a 24 Vdc battery ground detection circuit. Tests performed during the investigation confirmed that noise spikes were generated on the Primary Water level instrument loop upon operation of this battery's ground detection circuit. Following the scram, vessel level decreased to approximately 1 inch, which is approximately 167 inches above the top of active fuel. Steam dome pressure increased to approximately 1111 pounds per square inch. Two main steam safety relief valves operated to relieve vessel pressure. Level was restored to approximately 47 inches by the feedwater system. This event did not compromise the safety of the public. An update report will be submitted by June 30, 1993.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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EXPIRES: 8/31/88

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Grand Gulf Nuclear Station	0 5 0 0 0 4 1 6	9 2	— 0 1 7	— 0 1	0 2	OF	0 5

TEXT (If more space is required, use additional NRC Form 265A's) (17)

A. Reportable Occurrence

On August 4, 1992, a valid Reactor Protection System (RPS) [JC] actuation occurred which resulted in a reactor scram. The actuation signal was generated due to a fast closure of the main turbine stop valves. The occurrence is being reported pursuant to 10 CFR 50.73(a)(2)(iv).

B. Initial Conditions

The plant was in Operating Condition 1, with reactor power at 100 percent. Two licensed operator trainees were in the vicinity of the 11DH distribution panel and had observed a ground on the bus when the ground detection push button was depressed. The ground was observed at approximately the same time as the occurrence.

C. Description of Occurrence

On August 4, 1992, two trainees were in the plant to review a "Three Wire" battery system. The trainees entered the J and H (24 Vdc) battery room with the intention to perform a ground check on the system.

Upon reaching the 11DH distribution panel, the trainees verified all voltage indications were indicating normal values. This was in accordance with approved plant procedures. With the ground transfer switch in position 1, the ground test was performed and no abnormal readings were observed. However when the ground test was performed with the ground transfer switch in position 2, a ground was observed. At this time, control room personnel observed several alarms associated with the Electronic Generator Protection (EGP), along with the reactor scram annunciator.

DC Bus 11DH provides power to the EGP cabinet 1H13P829/JC09 which provides power to the primary water (PW) [TJ] tank level switches 1N43N104 and 1N43N105. Performing the ground detection test on the 11DH bus caused perturbations in the level sensing circuitry and resulted in a low primary water tank level signal. The low water level signal caused a turbine trip which resulted in reactor scram due to fast closure of the main turbine stop valves.

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TEXT (If more space is required, use additional NRC Form 386A's) (17)

Following the scram, reactor vessel level decreased to approximately 1 inch (167 inches above TAF), as indicated by the General Electric Transient Analysis Recorder. Steam dome pressure increased to approximately 1111 pounds per square inch during the occurrence. Two main steam safety relief valves operated to relieve vessel pressure. Vessel water level was restored by the feedwater system [SJ] to approximately 47 inches. The plant was stabilized in accordance with plant procedures.

A temporary modification was installed to bypass the low PW tank level generator trip until an investigation could be performed and corrective actions taken.

D. Apparent Cause

The cause of the RPS actuation was determined to be an inadvertent low PW tank water level signal that resulted in a main generator trip.

A subsequent investigation revealed the following:

The PW tank level pre-amp probe is a capacitor probe that is referenced to the PW tank, which is grounded. The water in the tank acts as a dielectric for this capacitor. As the water level changes, the capacitance of this probe also changes which generates a corresponding level signal.

The ground detection circuit for the ungrounded ± 24 Vdc battery, 11DH, is designed with a switchable high resistance path to ground from the battery's three poles. The high resistance ground supports the function of the ground detection circuit. As a result of both the pre-amp capacitor probe and the battery's ground detection circuit referenced to ground, there exist a high resistance ground loop between the PW tank level pre-amp capacitor probe and battery 11DH.

During Refueling Outage Five, the original level transmitters were replaced. Due to the original transmitters experiencing drift problems and being obsolete, vendor recommended replacement transmitters were installed. The original transmitters employed DC to DC converters on their input. This DC to DC converter provided isolation between the grounded PW tank level capacitor probe and the designed ground on the battery's ground detection circuit.

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TEXT (If more space is required, use additional NRC Form 386A's) (17)

Therefore operation of the ground detection circuit, prior to replacement of the original transmitters, did not affect the PW level pre-amp circuit.

The newly installed transmitters do not use a DC to DC converter on their input. Therefore, the designed ground on the battery's ground detect circuit is not isolated from the grounded PW tank level pre-amp probe which creates a ground loop, of which the PW level pre-amp circuit is within. The operation of the ground detection circuit "opens" and "closes" this ground loop and caused perturbations in the pre-amp circuit which resulted in the generation of a false low level signal. Tests performed during the investigation confirmed that noise spikes are generated on the level instrument loop upon disturbance of this ground loop.

E. Supplemental Corrective Action

A Minor Change Package (MCP) is scheduled to be implemented during the next refueling outage. This MCP will install a DC to DC converter between the 24 Vdc power supply and the PW tank level transmitters. This will provide isolation between the pre-amp probe and the ground on the battery's ground detection circuit; therefore eliminating disturbances on the reference of the capacitor probe's pre-amp due to operation of the battery's ground detection circuit.

Even though GGNS has determined the scram mechanism, we feel that the cause of the installation of an incompatible component has not been completely addressed. Therefore investigation of this occurrence will be continued. The results of this investigation will be reported in supplemental report. The update report is scheduled to be submitted by June 30, 1993.

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TEXT (If more space is required, use additional NRC Form 305A's) (17)

F. Safety Assessment

The occurrence did not compromise the safety of the public at anytime. The actuation of RPS did not inhibit the function of any safety systems or components. Proper operation was observed for all required safety systems during this event. Following the scram, vessel level decreased to a minimum of 1 inch as indicated by the General Electric Transient Analysis Recorder System. This level was approximately 167 inches above the top of active fuel.

G. Additional Information

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