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Palisades Nuclear Plant: 27780 Blue Star Memorial Highway, Covert, MI 49043

August 21, 1992

G B Slade
General Manager

Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT -
LICENSEE EVENT REPORT 92-035 - REACTOR TRIP RESULTING FROM A TURBINE TRIP
CAUSED BY A TURBINE MONITORING COMPUTER POWER SUPPLY.

Licensee Event Report (LER) 92-035 is attached. This event is reportable in
accordance with 10CFR50.73(a)(2)(iv) as an event that resulted in the
automatic actuation of the reactor protective system (RPS).

Gerald B Slade
General Manager

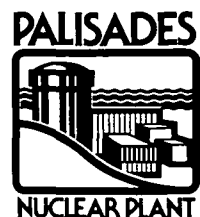
CC Administrator, Region III, USNRC
NRC Resident Inspector - Palisades

Attachment

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LICENSEE EVENT REPORT (LER)

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TITLE (4) **REACTOR TRIP RESULTING FROM A TURBINE TRIP CAUSED BY A TURBINE MONITORING COMPUTER POWER SUPPLY**

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (8)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES		
0	7	2	2	9	2	9	2	9	N/A		
0	7	2	2	9	2	9	2	9	N/A		

OPERATING MODE (9) **N**

POWER LEVEL (10) **1 | 0 | 0**

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)	<input checked="" type="checkbox"/>	50.73(a)(2)(iv)	73.71(b)
20.405(a)(1)(i)	50.36(c)(1)	<input type="checkbox"/>	50.73(a)(2)(v)	73.71(c)
20.405(a)(1)(ii)	50.36(c)(2)	<input type="checkbox"/>	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 368A)
20.405(a)(1)(iii)	50.73(a)(2)(i)	<input type="checkbox"/>	50.73(a)(2)(viii)(A)	
20.405(a)(1)(iv)	50.73(a)(2)(ii)	<input type="checkbox"/>	50.73(a)(2)(viii)(B)	
20.405(a)(1)(v)	50.73(a)(2)(iii)	<input type="checkbox"/>	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME Cris T. Hillman, Staff Licensing Engineer	TELEPHONE NUMBER AREA CODE: 6 1 6 7 6 4 - 8 9 1 3
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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)

YES If yes, complete EXPECTED SUBMISSION DATE

NO

EXPECTED SUBMISSION DATE (15)

MONTH	DAY	YEAR

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

On July 24, 1992 at 1007 hours, with the reactor operating at 100% power, the reactor tripped due to a loss of the turbine digital electrohydraulic (DEH) control system. The loss of the DEH control system resulted in a simultaneous turbine trip and automatic reactor trip. The automatic reactor trip was successfully completed with no major plant equipment problems identified. Just prior to the reactor trip, technical specifications surveillance procedure (TSSP) QO-1, "Safety Injection System Surveillance Test," was initiated.

The cause of this event was a momentary loss of power to the turbine digital electrohydraulic (DEH) system computers which caused a turbine trip. The turbine trip resulted in a reactor trip due to loss of load.

Corrective action for this event included replacing the power supply switching circuits in the turbine DEH computers with an updated version and adding an un-interruptable power supply to the turbine DEH computers. Maintenance on other plant equipment, such as the motor operated disconnect switch, is planned for the next appropriate outage.

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EVENT DESCRIPTION

On July 24, 1992 at 1007 hours, with the reactor operating at 100% power, the reactor tripped due to a loss of the turbine digital electrohydraulic (DEH) control system [TG;CPU] computers. The loss of the DEH control system resulted in a simultaneous turbine trip and automatic reactor trip. The automatic reactor trip was successfully completed with no major plant equipment problems identified.

Just prior to the reactor trip, technical specifications surveillance procedure (TSSP) QO-1, "Safety Injection System Surveillance Test," was initiated. After a short built-in time delay, a left channel SIS is initiated in accordance with the surveillance procedure. The simultaneous starting of the SIS equipment caused a short term voltage dip to the power supplies of the turbine digital electrohydraulic (DEH) system [TG;JX] computers causing them to go off line. The loss of the DEH computers resulted in a turbine trip on a loss of DEH control and a reactor trip due to loss of load. An auxiliary feedwater system actuation signal (AFAS) automatically started auxiliary feedwater (AFW) pump P-8A [BA;P] on low steam generator level. (This is an expected response in the event of a turbine trip.) The control room immediately initiated emergency operating procedures (EOPs) EOP-1, "Standard Post Trip Actions," and EOP-2, "Reactor Trip Recovery." The required actions for the EOPs were successfully completed and the procedures were exited. Plant response to the trip was adequate in that all safety systems responded normally.

This event is reportable to the NRC in accordance with 10CFR50.73(a)(2)(iv) as an event that resulted in the automatic actuation of the reactor protective system (RPS).

CAUSE OF THE EVENT

The cause of this event was a momentary loss of power to the turbine digital electrohydraulic (DEH) system computers which caused a turbine trip. The DEH computers sensed a loss of power when a voltage drop in their power supplies occurred; sensing a loss of power, the DEH computers generated a turbine trip signal. The loss of the turbine resulted in a reactor trip due to loss of load.

This event does not involve the failure of any equipment important to safety.

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ANALYSIS OF THE EVENT

Prior to the reactor trip on July 24, 1992 the plant was operating normally at 100% power. The seals on primary coolant pumps P-1B and P-1C were being closely monitored due to apparent increased seal leakage. Control rod drive mechanism (CRDM) 20 was also being closely monitored because of increased (i.e., 200°F-210°F versus a normal temperature of 150°F-180°F) temperature indication.

At the time of the reactor trip TSSP Q0-1, "Safety Injection System Surveillance Test," was in progress. TSSP Q0-1 was last successfully completed on April 13, 1992 with no unusual conditions noted; however the plant was off-line and the DEH computer system was not in-service.

The following equipment anomalies were noted during the reactor trip on July 24, 1992:

1. The turbine tripped during TSSP Q0-1.

The DEH system computers sensed a loss of power when the voltage dip occurred due to the performance of Q0-1. This resulted in the generation of a turbine trip signal from the DEH system computers. Subsequent testing with a temporary variable AC power supply in-line with the DEH computer power supplies showed that all four DEH computers are sensitive to rapid voltage transients. This testing showed that when voltage was quickly lowered and recovered, as would be seen during the performance of TSSP Q0-1 or during the line transient observed on July 1, 1992 (see LER 92-034 dated July 30, 1992), the DEH computers went off-line.

2. Main electric generator breakers 25F7 and 25H9, located in the switchyard, did not open as expected during the turbine/generator trip. The breakers, which normally open as a result of a turbine trip, opened on reverse power.

The main electrical generator motor operator disconnect switch (MOD 389) was inspected. The MOD 389 contacts were found to be not fully aligned. Because of the lack of full alignment, the position switch monitoring the MOD 389 contacts did not close. This position switch feeds logic in the generator breaker opening scheme and would result in the breaker's failing to receive the signal to open at the time of the trip.

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- The charging motor springs on Bus 1A breaker 252-102 did not re-charge when the bus transferred to start-up power.

Breaker 252-102 was inspected and the charging motor springs were not charged. The fuses for the charging motor were inspected and found to be good. After electrical loads were transferred back to station power the charging motor recharged the springs. No testing was performed on the breaker to determine the root cause for this anomaly because this would have required that Bus 1A be taken off-line and the subsequent stopping of two primary coolant pumps while the plant was in hot shutdown. Testing is planned for a future outage.

- Control room indication for turbine governor valve number 1 (CV-0570) indicated only 60% (approximately) open following the turbine trip.

Electrical maintenance inspected turbine governor valve number 1 and found a wire broken off one of the secondaries on the linear variable displacement transducer (LVDT) for the governor valve. The wire on the LVDT was re-attached and the control room valve indication showed that the valve was closed. No further problems with the valve or its indication were noted during start-up. No additional corrective action is necessary.

- High pressure feedwater heaters E-6A and E-6B relief valves lifted during post trip actions.

The relief valves on the high pressure feedwater heaters may lift following a reactor trip due to the inventory of steam in the moisture separator/reheaters and the feedwater heater itself. The steam supply control valves to feedwater heater E-6A were inspected because the relief valves lifted repeatedly following the trip. (Normally the relief valves relieve pressure just once following a trip.) CV-0597 was inspected and found to be approximately one-quarter inch open. The valve positioner was calibrated and re-tested and the valve was verified fully closed. The valve operated properly during plant re-start. No additional corrective action is necessary.

CORRECTIVE ACTION

Corrective action on the equipment anomalies noted in the Analysis section of this LER are as follows:

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1. DEH computers

The power supply switching circuits in the DPU2 and DPU52 DEH computers were replaced with an updated version. The simulated voltage transient was again conducted and the DEH computers did not drop off-line.

In addition, an un-interruptable power supply with an extended battery capacity was added which will filter the incoming voltage to the power supplies.

2. Main electric generator motor operator disconnect switch (MOD 389)

The main electrical generator motor operator disconnect switch MOD 389 was caution tagged for manual operation only until the entire drive assembly can be removed and overhauled. Repairs could not be made to the switch during this plant trip because spare parts were not available in the plant storeroom and delivery time of the vendor supplied repair parts would have delayed plant start-up. Manual operation of the switch does not compromise safe operation of the plant and is an acceptable alternate method of operation.

3. Charging motor springs on Bus 1A breaker 252-102

During the next outage when backfeed is available, breaker 252-102 will be removed for inspection.

ADDITIONAL INFORMATION

On July 1, 1992 a similar event occurred (a reactor trip resulting from the response of the DEH computers) and was reported in LER 92-034 dated July 30, 1992. At the time LER 92-034 was developed we believed that the root cause for the failure of the DEH computers was the loose cable connections to the data processing units. We now believe that the voltage transient observed on the 345 kV Argenta-Palisades switchyard tie line, which occurred immediately prior to the July 1, 1992 event, may have had the same effect on the DEH computers as observed for this event.