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Dresden Nuclear Power Station
R. R. #1
Morris, Illinois 60450
November 6, 1972

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Mr. A. Giambusso
Deputy Director for Reactor Projects
Directorate of Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

SUBJECT: LICENSE DPR-19, DRESDEN NUCLEAR POWER STATION, UNIT #2, SECTION 6.6.C.1 OF THE TECHNICAL SPECIFICATIONS.

Dear Mr. Giambusso:

This is to report a condition relating to the operation of the unit, in which, on October 8, 1972, it was determined during routine surveillance testing, that the #3 turbine control valve fast-acting solenoid would not actuate. This would have prevented de-energization of load reject scram relay 590-121C of the reactor protection system, had it been required, contrary to the requirements of Table 3.1.1 of the Technical Specifications.

PROBLEM AND INVESTIGATION

The Unit #2 reactor was critical and electrical load was 380 MWe at approximately 0030 on October 8, 1972. Preparations were being made to conduct the weekly turbine valve surveillance test.

At 0045, the #3 Main Stop Valve/Control Valve test button was depressed to exercise the #3 control valve. It was observed that the control valve went fully closed at the normal smooth speed, rather than fast closing the last 10% of travel. Also, the associated half scram which should result from actuation of the fast acting solenoid did not occur.

The valve should close from 100% to 10% open at the normal speed and then close from 10% open to fully closed at the fast speed. When the valve reaches the 10% open position it actuates a limit switch which energizes a fast acting solenoid valve. The solenoid valve shifts to initiate control valve fast closure. The fast acting solenoid valve also actuates a micro switch which operates relay 590-121C in the reactor protection system.

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COPY SENT REGION

Fuse 590-725C was pulled to intentionally de-energize relay 590-121C and meet the requirements of Table 3.1.1 of the Technical Specifications.

Investigation was then conducted to determine the cause of the failure. The control valve position switch, which energizes the fast acting solenoid, for testing, was checked out satisfactorily.

The fast acting solenoid valve was stroked manually, actuating the microswitch. The valve was free to move and the microswitch operated properly, de-energizing relay 590-121C.

However, it was noted that the valve kept driving back into the solenoid. This indicated that the solenoid was not receiving its proper signal.

The cause of the malfunction was found to be a broken wire at the amphenol connector to the solenoid. The wire broke because of improper connector fastening to the solenoid body. The solid shell straight plug was attached directly to the body of the solenoid. The straight plug should have been attached to the solid threaded backshell; the backshell would then be attached to solenoid body. This arrangement permits the coupling ring to spin freely (see attached drawing for amphenol nomenclature).

However, since the straight plug was attached to the solenoid, the coupling ring could not be properly attached to the recepticle shell. In order to thread the coupling ring to the recepticle shell, it was necessary to loosen the straight plug.

Because of this, the straight plug vibrated itself free from the solenoid body. These vibrations caused the threads on the plug to become deformed. Once the straight plug worked itself free, the wires of the solenoid were hanging from the solenoid supporting the weight of the amphenol connector and cable. The weight of the connector and the cable caused one of the wires to snap. This snapped wire in turn prevented the solenoid from receiving the signal to fast close the control valve.

The generator load reject (which actuates the fast acting solenoid and results in control valve fast closure) scram is an anticipatory scram. Its purpose is to prevent a reactor scram caused by high neutron flux. Without generator load reject scram capability, the rapid pressurization caused by the control valve fast closure (about 100 psi/sec) would reduce the void content of the core and produce a sharp neutron flux spike. This spike would reach about 11.4 times the initial power level before the high neutron flux scram shuts down the reactor. With the anticipatory scram, the neutron flux peaks at about 3.75 times the full power.

Proper operation of the other three control valves was verified at the time of the surveillance test. Therefore, if a turbine generator load reject signal was received, the other three valves would still fast

close and the reactor would scram. Also the pressure spike would be greatly reduced, since the #3 control valve would stay open, allowing pressure to be released to the turbine.

CORRECTIVE ACTION

The amphenol connector was repaired and attached properly to the solenoid. The threaded backshell was attached. Loctite, a thread compound, was applied to all threaded fittings of the connector. The Loctite was applied to insure that the threaded fittings would not vibrate loose.

All amphenol connectors were checked to insure proper connection to the solenoids of the turbine valves. No similar discrepancies were noted.

It is now planned to apply Loctite to all threaded fittings of all the amphenol connectors for the Units 2 & 3 turbine valves, at this time Unit 3 fittings will be checked.

The #3 control valve was operated satisfactorily at 1020 on October 8, 1972. Fuse 590-725C was reinstalled. Unit load was raised at 1027 on October 8, 1972.

W. P. Worden
Superintendent
Dresden Nuclear Power Station

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AMPHENOL CONNECTOR