UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 115 TO FACILITY OPERATING LICENSE NO. DPR-19

AND AMENDMENT NO. 112 TO FACILITY OPERATING LICENSE NO. DPR-25

COMMONWEALTH EDISON COMPANY

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3

DOCKET NOS. 50-237 AND 50-249

1.0 INTRODUCTION

By letter dated October 14, 1991, Commonwealth Edison Company (CECo, the licensee) proposed changes to the Technical Specifications (TS) for the Dresden Nuclear Power Station, Units 2 and 3. Additional clarifying information that did not change the initial proposed no significant hazards consideration determination was submitted by letter dated February 6, 1992. The proposed changes reflect a modification to the fast acting solenoid valves which initiate rapid closure of the turbine control valves. The new design uses a pressure switch, rather than a limit switch, to initiate a reactor scram.

2.0 EVALUATION

The staff evaluated the licensee's submittal in four distinct areas:

a. Pressure switch vs. limit switch function - the new design must not change the original intent of the function.

b. Setpoint calculation - the calculation has to be developed using well developed standards.

c. Surveillance interval - the calibration interval must be consistent with the design and the setpoint calculation.

d. Technical Specification changes - the proposed Technical Specifications must reflect the new design.

The objective of the turbine control fast acting solenoid valves is to protect the turbine from overspeed when the load is suddenly removed. The logic to determine the load reduction is the load control unit of the Electro-Hydraulic Control System. The load unbalance signal activates relays which send a signal to the turbine fast acting solenoid valves. Actuation of the fast acting solenoid valves inputs to the Reactor Protection System to provide a reactor scram. The objective of the scram is to anticipate the rapid increase in the pressure and neutron flux which may result from the fast closure of the turbine control valves and subsequent failure of the turbine steam bypass valves.

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The original design used a limit switch off the fast acting solenoid valves to initiate a reactor scram. The limit switch is a simple on-off status indicator that changes status depending on the position of the fast acting solenoid valves. There is no periodic calibration of the on-off devices and there is no setpoint calculations associated with the limit switch. In response to General Electric Technical Information Letter 848, Dresden replaced the original equipment fast acting solenoid valves in 1984. The replacement fast acting solenoid valves are manufactured by Parker-Hannifan and have been used with good results since 1976. The function of the replacement solenoid valves remains the same. However, the reactor scram is initiated by a pressure switch instead of a limit switch.

The replacement valves introduced a new failure mode due to the tubing which connects the pressure switch to the solenoid valve. Rupture of the tubing would initiate a reactor scram. However, this is a conservative action. The industry use of the pressure switch as input to the Reactor Protection System has proven more reliable than the existing limit switch. Therefore, the function of the pressure switch to replace the original limit switch is acceptable.

The replacement fast acting solenoid valves require a determination of the pressure setpoint. General Electric, in its generic instrument setpoint methodology (NEDC-31336, October 1986), addressed the Turbine Control Valve Fast Closure. The licensee has followed the General Electric methodology. The staff is presently reviewing the General Electric generic setpoint methodology, but has not completed the review. Consequently, the Quad Cities setpoint calculation, which is also applicable to Dresden, has been reviewed on an individual basis. The on-going General Electric methodology evaluation has been found acceptable for this particular setpoint calculation. Accordingly, the Quad Cities calculation was reviewed for consistency with the General Electric generic setpoint calculation and a TS amendment was issued for Quad Cities on February 21, 1991, which utilized this methodology for the fast acting solenoid valve setpoints.

The pressure switches directly measure the trip oil pressure that causes the turbine control valves to close in a rapid manner. This oil pressure is normally about 1500 to 1600 psig, and the control valve does not start to close until the pressure drops to 400 psig. It is considered possible in normal operations for the pressure to drop to 740 psig due to transients. Therefore, the analytical limit is 400 psig, and the operational limit is 740 psig.

The instrument accuracy of the pressure switch is two percent of full scale. Accuracy is conservatively estimated to be one percent of full range. Full scale is 3000 psig. The instrument drift for a six-month interval is equal to the instrument accuracy. Drift is assumed to be random and calculated to be ±104 psig for an 18-month refueling outage.

Using the above data and the methodology of NEDC-31336, General Electric performed the pressure setpoint calculation. The setpoint calculation determined the allowable value or TS value of 460 psig and the nominal trip

setpoint of 590 psig. The staff concludes that the setpoint calculation is consistent with the General Electric setpoint methodology and, therefore, is acceptable.

The proposed fast acting solenoid valves are designed for the pressure switch to be actuated within 30 milliseconds of the time the control valves begin to close. This time is consistent with the design values used in the reload licensing calculations to analyze the turbine generator load rejection without bypass valve transient. Recent fast acting solenoid valve pressure switch response time testing at Dresden provides assurance that switch actuation will occur within the 30 millisecond response time assumed in this transient. Therefore, this modification does not involve a reduction in the margin of safety as previously determined.

Although data from other plants indicate the drift assumed is conservative, during recent fast acting solenoid valve pressure switch calibrations at Dresden Station, pressure switch drift has been observed. In some cases, this drift has resulted in the pressure switch setpoint being below the analytical limit (less than 400 psig) presented in the setpoint calculation. The analytical limit is conservatively defined as the electro-hydraulic control fluid pressure at which the pressure switch must trip in order to ensure that a reactor protection system trip signal will be generated within 30 milliseconds after the start of control valve fast closure (which is consistent with the pressure switch response time assumed in the turbine generator load rejection event analysis). General Electric testing experience has known that the electro-hydraulic control trip system fluid pressure decreases from approximately 1600 psig to 0 psig in 10 milliseconds or less.

The response time testing performed at Dresden measured the time difference between initiation of control valve movement and actuation of the fast acting solenoid valve pressure switch following initiation of a fast closure signal to a control valve. The testing was performed with the control valves initially in the full open position, which ensured that the results would bound the expected response times during normal plant operation. The response time testing was performed at various pressure switch setpoints (from the nominal trip setpoint of 590 psig to 120 psig), and the results indicated that pressure switch actuation occurred within 30 milliseconds of control valve movement; thereby confirming that pressure switch setpoint drift had insignificant impact with respect to the pressure switch response time assumed in the turbine generator load rejection event analysis. These results are attributed to the rapid decrease of the electro-hydraulic fluid pressure, which is sensed by the pressure switch, during the turbine generator load rejection event. Additional information was provided by CECo in a letter dated February 6, 1992, which confirmed that the electro-hydraulic control trip system fluid pressure decreases from 1600 psig to 0 psig in approximately 10 milliseconds or less which is less than the 30 milliseconds assumed in the analysis.

In the February 6, 1992 letter, CECo also stated that with the fast acting solenoid valve pressure switches set at 120 psig, repressurization was detected following disc dump valve repositioning. Although the testing

demonstrated the scram function would not be impaired, since repressurization occurred too late to affect turbine control valve fast closure, setting the pressure switch TS value at 460 psig prevents this phenomenon from occurring except where more than normally expected drift has occurred. Since pressure switch response time testing has confirmed that setpoint drift has an insignificant impact with respect to pressure switch response time assumed in the turbine generator load rejection event, drifting of the pressure switch setpoint below the analytical limit has no adverse consequences and the 460 psig pressure switch setpoint proposed by CECO, therefore, remains acceptable.

The proposed calibration frequency is every refueling outage. This proposed frequency is consistent with the guidance in NUREG-0123, "General Electric Standard Technical Specifications," Revision 4. This interval is also consistent with TS for BWR plants licensed in the 1980s. General Electric used the 18-month interval in the pressure setpoint calculation. This frequency is used by General Electric in its generic setpoint methodology (NEDC-31336). Therefore, the staff concludes that the surveillance interval for the turbine control valve fast closure is acceptable.

The proposed TS change revises Table 4.1.2 to require that the fast acting solenoid valves pressure switch be calibrated every refueling outage. Page 3/4.1-7 of the TS is revised to delete the description of the turbine control valve fast closure scram device as a simple on-off switch. Table 3.1.1 and Section 2.1.F are revised to accurately define the trip level setting of the turbine control valve fast closure scram to greater than 460 psig electro-hydraulic control oil pressure. In addition, the appropriate sections to the Bases are provided to reflect the new design of the fast acting solenoid valves. Therefore, the staff concludes that the proposed TS changes reflect the new design of the turbine control fast acting solenoid valves.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Illinois State official was notified of the proposed issuance of the amendments. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and change surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluent that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (56 FR 60114). Accordingly, the amendments meet the eligibility

criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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