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December 18, 1990

Dr. Thomas E. Murley, Director  
U.S. Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

ATTN: Document Control Desk

Subject: Quad Cities Nuclear Power Station Unit 1  
Application for Amendment to Facility  
Operating License DPR-29 Appendix A,  
Technical Specifications  
NRC Docket No. 50-254

Dr. Murley:

Pursuant to 10 CFR 50.90, Commonwealth Edison proposes to amend Appendix A, Technical Specifications of Facility Operating License DPR-29. The proposed amendment reflects a proposed modification to the fast acting solenoid valves which initiate rapid closure of the turbine control valves. The new design for the fast acting solenoid valve utilizes a pressure switch (in lieu of a limit switch) to initiate a reactor scram. As a result, the pressure switch requires periodic calibration and has a setpoint for actuation of the reactor scram.

The proposed amendment request is provided as follows:

1. Attachment 1 provides the Safety Evaluation and Environmental Assessment for the amendment request.
2. Attachment 2 provides a summary of the changes.
3. Attachment 3 provides the marked-up Technical Specification pages with the requested changes.
4. Attachment 4 describes Commonwealth Edison's evaluation pursuant to 10 CFR 50.92 (c).
5. Attachment 5 provides an overview of the operation of the Electro-Hydraulic Control (EHC) system to assist in the Staff's review of the proposed amendment.

Commonwealth Edison respectfully requests the Staff's immediate attention for review and approval of this proposed Technical Specification amendment. Quad Cities Unit 1 is currently in a Refueling Outage which is scheduled to be completed on January 21, 1991. Some delays have been encountered and the start-up may be delayed by several days. Commonwealth Edison will ensure your Staff is made aware of any revisions to the startup date.

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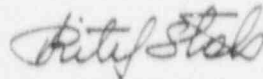
Commonwealth Edison regrets the limited review period. This work was added to the outage schedule after existing valves failed during surveillance testing which occurred in August, 1990. (Normally, the scope of the outage is finalized at least six months prior to the start date.) The station decided to implement the recommendation contained in a General Electric Technical Information Letter (TIL) which recommends the use of the Parker-Hannifan Valves. The TIL did not indicate that the fast acting solenoid valves have pressure ports (in lieu of limit switches) and, therefore, the need for the Technical Specification change was not identified. When the vendor drawings arrived on site and the design change was being prepared, the Technical Specification change was identified. Consideration to defer the design change to the next unit outage was given, however, the Station determined that the implementation of this design change was essential due to the recent failures. Also, the station committed to Region III management that the fast acting solenoid valves would be replaced during this outage.

This proposed amendment has been reviewed and approved by Commonwealth Edison's on-site and off-site review in accordance with Company procedures.

Commonwealth Edison is notifying the State of Illinois of this application for amendment by transmitting a copy of this letter and its attachments to the designated State Official.

Please direct any questions concerning this submittal to R. Stols at (708) 515-7283.

Very Truly Yours,



Rita Stols  
Nuclear Licensing Administrator

Attachments: 1) Safety Evaluation and Environmental Assessment  
2) Summary of Proposed Changes  
3) Marked-up Technical Specification Pages  
4) Evaluation of Significant Hazards Consideration  
5) Operation of the Electro-Hydraulic Control (EHC) System

Enclosure: (1) General Electric Setpoint Calculation, EDE-40-1190  
dated November 16, 1990

Figure (1) Steam Control Valves Nos. 1 through 4 (Fluid Flow Diagram)

cc: A.B. Davis Region III Administrator  
L.N. Olshan, Project Manager  
T. Taylor, Senior Resident Inspector  
Illinois Department of Nuclear Safety

## ATTACHMENT 1

### SAFETY EVALUATION AND ENVIRONMENTAL ASSESSMENT FOR THE AMENDMENT REQUEST

#### Introduction

Current Technical Specification Table 4.1-2 "Scram Instrument Calibration/Minimum Calibration Frequencies for Reactor Protection Instrument Channels" does not require calibration of the Turbine Control Valve Fast Closure Scram. The basis for not requiring calibration of these instrument channels is found in Section 4.1.A Surveillance Requirements Bases (page 3.1/4.1-10). The bases indicate that the device associated with the Turbine Control Valve Fast Closure Scram is a simple on-off switch and, therefore, calibration is not applicable. Table 4.1-1 "Scram Instrumentation and Logic System Function Tests" requires a functional test of the turbine control valve fast closure. Technical Specification Table 3.1-3, "Reactor Protection System (SCRAM) Instrumentation Requirements Run Mode" defines the turbine control valve fast closure scram setpoint as greater than 40% turbine/generator mismatch. Finally, Technical Specification 2.1.F defines that the actuation of the turbine control valve fast closure scram occurs upon actuation of the fast acting solenoid valves.

As a result of a proposed design change to the turbine fast acting solenoid valves (FASV), which changes the simple on-off switch to a pressure sensor, calibration of the device will be required. Table 4.1-2 will, therefore, be revised to require that the Fast Acting Solenoid Valve pressure switch be calibrated every Refueling Outage. Also, Page 3.1/4.1-10 of the Technical Specifications will be revised to delete the description of the turbine control valve fast closure scram device as a simple on-off switch. Finally, Table 3.1-3 and Section 2.1.F will be revised to accurately define the trip level setting of the turbine control valve fast closure scram to greater than 460 psig Electro-Hydraulic Control (EHC) oil pressure. The requirement for the functional test (as defined Table 4.1-1) remains unchanged. In addition, appropriate sections to the Bases are provided to reflect the new design of the fast acting solenoid valves.

#### Background

The fast acting solenoid valves are activated when a generator load reject occurs, thereby, causing the control valves to fast close. (Note: Additional information on the operation of the Electro-Hydraulic Control System is provided in Attachment 5). The primary purpose of the fast acting solenoid valves is to protect the turbine from overspeed when the load is suddenly removed. The actuation of the fast acting solenoid valves (which results in fast closure of the control valves) inputs to the Reactor Protection System to provide a reactor scram. The purpose 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 due to a load reject and subsequent failure of the bypass valves.

## ATTACHMENT 1 (CONTINUED)

The existing plant design for the fast acting solenoid valves provides a Reactor Protection System Scram signal through the use of simple limit switches. On May 28, 1990, during a routine surveillance, the fast acting solenoid valve for the Unit One #2 valve failed to actuate; consequently, the control valves did not close rapidly and no input to the RPS occurred. The cause of the fast acting solenoid failure was a stuck plunger inside the fast acting solenoid valve. The Unit One #1, #2, and #3 control valves failed to actuate on July 15, 1990. Again, the control valves did not fast close and no RPS signal was generated. The cause of the failures was again the stuck plunger. As an interim measure, the Unit 1 fast acting solenoid valves were replaced with "like-for-like" solenoid valves on August 11, 1990.

In response to the equipment failures, Quad Cities Station investigated alternative designs to the existing fast acting solenoid valves. The Station selected the Parker Hannifan fast acting solenoid valves in response to a General Electric recommendation. The Parker-Hannifan fast acting solenoid valves have a pressure port for a separate pressure switch. This pressure switch senses decreasing EHC fluid pressure and initiates a scram signal. The decreasing EHC fluid pressure causes the turbine control valves to close in a rapid manner. The pressure switch will require periodic calibration. The new fast acting solenoid valves have a "wet-armature" (i.e., the solenoid armature is immersed in hydraulic fluid). The new fast acting solenoid valves are also absent of pins and bayonet-type joints which have failed in the current design. Also, the new design has been used on General Electric turbines since 1976. The use of the new fast acting solenoid valve design (with pressure switch), therefore, provides for a more reliable operation. Attachment 5 provides an overview of the Electro-Hydraulic Control Operation.

### **Table 4.1-2**

Current Technical Specification Table 4.1-2 does not require calibration of the turbine control valve fast closure scram. The current design provides a limit switch to actuate the reactor scram and, therefore, as specified Technical Specification bases 4.1.A (Page 3.1/4.1-10), only functional tests are required.

As a result of the design change from the limit switch to the pressure switch, calibration will be required. The proposed calibration frequency is once every Refueling Outage (typically, a Refueling Outage occurs every 18 months). The proposed frequency is consistent with the guidance contained in the proposed revision 4 to NUREG-0123, "General Electric Standard Technical Specifications" (which is the latest revision in use) and is consistent with Technical Specifications for boiling water reactor plants that were licensed in the 1980's. This calibration frequency is also consistent with the calculations for the allowable and nominal setpoints. Calculation EDE-40-1190 dated November 16, 1990 (Enclosure 1), which was performed by General Electric in support of this design change, assumes an instrument drift of  $\pm 104$  psig for an eighteen (18) month period. The calibration frequency is, therefore, supported by setpoint calculations as well as current NRC philosophy.

### Section 2.1.F and Table 3.1-3

Table 3.1-3 "Reactor Protection System (SCRAM) Instrumentation Requirements Run Mode" provides the trip level setting for the turbine control valve fast closure. The current specification defines the trip level setting greater than 40% turbine/generator mismatch. The proposed amendment revises the trip level setting to be greater than 460 psig (EHC fluid pressure).

A power/load unbalance system, which senses the generator load and compares it to the thermal power (turbine first stage pressure), is provided in the turbine system design. When a mismatch of greater than forty percent (40%) is sensed, the power/load unbalance relay will energize the fast acting solenoid valves on the turbine control valves which causes the control valves to rapidly close by decreasing EHC fluid pressure. This power/load mismatch relay (which actuates the fast acting solenoid) prevents any damage to the turbine by initiating a fast closure of the control valves. (See Figure 1) In order to protect the reactor (specifically, the MCPR safety limit), a scram signal is generated to anticipate the rapid increase in reactor pressure and neutron flux due to the fast closure of the turbine control valves and subsequent failure of the bypass valves. The trip level setting for the pressure sensor which inputs to the reactor protection system is, therefore, more accurately reflected by the EHC fluid pressure (which causes the control valves to close rapidly) and not the 40% mismatch of the turbine and generator. This definition of the trip level setting is consistent with the General Electric Standard Technical Specifications.

The trip level setting for the new pressure switch was calculated by General Electric. The setpoint calculation was performed utilizing General Electric methodology contained in NEDC-31336 "General Electric Instrument Setpoint Methodology" dated October, 1986. The setpoint calculation can be found in Enclosure 1. Based on design documents, General Electric defined the lower bound for the setpoint calculation to be 400 psig. This lower bound value ensures that the trip signal will be generated within 30 milliseconds after the start of the control valve fast closure. Through the methodology contained in NEDC 31336, the allowable value (Technical Specification value) was determined to be equal to or greater than 460 psig. In addition, General Electric recommended a nominal trip setpoint of 590 psig to be consistent with an eighteen (18) month (refueling cycle) calibration period. The nominal setpoint will be procedurally controlled.

### Environmental Impact Assessment

The proposed revision to the Technical Specification reflects the modification to the fast acting solenoid valves with a more reliable design. The use of a pressure switch to initiate the Reactor Protection System is common throughout the industry. The pressure switch will be calibrated every Refueling Outage to ensure its reliability.



ATTACHMENT 1 (CONTINUED)

Also, the calculation performed for the trip setpoint ensures that the RPS is actuated in sufficient time to prevent a violation of the minimum critical power ratio (MCPR). The use of the pressure switch will not result in increased environmental consequences and does not involve irreversible consequences beyond those already accepted by the NRC in the Final Environmental Statement.