Commonwealth Edison
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Downers Grove, Illinois 60515

April 18, 1991

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

ATTN: Document Control Desk

Subject: Quad Cities Nuclear Power Station Unit 2
Application for Amendment to Facility
Operating License DPR-30 Appendix A,
Technical Specifications
NRC Docket No. 50-265

Dr. Murley:

Pursuant to 10 CFR 50.90, Commonwealth Edison proposes to amend Appendix A, Technical Specifications of Facility Operating License DPR-30. 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.

This modification is scheduled to be implemented during the next Refueling Outage which is currently scheduled to begin on September 14, 1991. Commonwealth Edison, therefore, respectfully requests the NRC's approval of this proposed amendment prior to the start of the Refueling Outage. Commonwealth Edison will ensure that the Project Manager is appraised of any schedule changes to the start date of the Refueling Outage.

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

To the best of my knowledge and belief, the statements contained are true and correct. In some respect these statements are not based on my personal knowledge, but obtained information furnished by other Commonwealth Edison employees, contract employees and consultants. Such information has been reviewed in accordance with company practice, and I believe it to be reliable.

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 Caiculation, 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

" OFFICIAL SEAL "
SANDRA C. LARA
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 6/25/94

Signed before me on this 18th day of April, 1991, by [signature].
Notary Public

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 3.1/4.1-7). 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 3.1/4.1-7 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.

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 3.1/4.1-7), 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 ±104 psig for an eighteen (18) month period. The calibration frequency is, therefore, supported by setpoint calculations as well as current NRC philosophy.

The use of this pressure switch in lieu of a position switch has been reliable. Quad Cities Station personnel surveyed five (5) non-Edison facilities to inquire if substantial drift has been experienced with the pressure switch. Each facility responded that they had not experienced excessive drift and four (4) plants provided some data to support their findings. The data provided is summarized as follows:

Instrument Drift Range	Number of Instruments in Drift Range
0-25 psig	8
26-50 psig	1
51-75 psig	2
76-100 psig	4
101-130 psig	1
>130 psig	0

It should be noted that although a setpoint drift of ±104 psig (for an 18 month period) was used in the General Electric calculation, the final determination of 590 psig as the nominal setpoint allows for a drift of ±130 psig. Finally, the analytical limit of 400 psig (which ensures that the trip signal will be generated within 30 milliseconds after the start of control valve fast closure) provides additional margin.

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.

Page 3 of the General Electric calculation states that the calibration of the setpoint is accomplished using a Heise pressure gauge (0-1000 psig) with an accuracy of ±0.1% of full scale (±1 psig). In lieu of using a 0-1000 psig, a pressure gauge (0-2000) with an accuracy of ±0.2% of full scale (±4 psig) will be used to calibrate the pressure switch.

The change in the pressure gauge does not affect the proposed Technical Specification setpoint for the pressure switch. The calculation identifies a calibration accuracy for the pressure switch of 1% of full range (±30 psig); therefore, the use of a pressure gauge with an accuracy of ±0.2% of full scale (±4 psig) is bounded by the calculation.

The change in the pressure gauge also does not affect the proposed nominal setpoint. The use of a pressure gauge with an accuracy to ±4 psig, coupled with a 2 psig calibration and reading uncertainty, changes the required limit (RL) term from 520.03 psig to 520.21 psig. A RL value of 540 psig is utilized in the calculation to meet the value for ninety percent (90%) probability for LER avoidance.

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.

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.

ATTACHMENT 2

SUMMARY OF THE PROPOSED CHANGE TO APPENDIX A

TECHNICAL SPECIFICATIONS QUAD CITIES

UNIT 2 (DPR-30)

Page 1.1/2.1-2a

Delete "Turbine control valve fast closure scram shall initiate upon actuation of the fast closure solenoid valves which trip the turbine control valves"

Add "The scram for ... due to actuation of the fast acting solenoid valve shall be ≥ 460 psig EHC fluid pressure."

Repaginated.

Page 1.1/2.1-3

Repaginated.

Page 1.1/2.1-10

Add "The trip setpoint of ≥ 460 psig EHC fluid pressure was developed to ensure that the pressure switch is actuated prior to the closure of the trubine control valves (at approximately 400 psig EHC fluid pressure) yet assure that the system is not actuated unnecessarily due to EHC system pressure transients which may cause EHC system pressure to momentarily decrease."

Correct punctuation in Bases Section 2.1.J.

Repaginate.

Page 1.1/2.1-11

Correct punctuation in References.

Page 3.1/4.1-5

Correct punctuation in Bases Section 4.1.A.

Add a new paragraph:

"The turbine control valve fast acting solenoid valve pressure switches directly measure the trip oil pressure that causes the turbine control valves to close in a rapid manner. The reactor scram setpoint was developed in accordance with NEDC 31336, "General Electric Instrument Setpoint Methodology" dated October, 1986. As part of the calculation, a calibration period is inputted to achieve a nominal trip point and an allowable setpoint (Technical Specification value). The nominal setpoint is procedurally controlled. BAsed on the calculation input, the calibration period is defined to be every Refuelding Outage."

Repaginate.

Page 3.1/4.1-6

Correct spelling. Replace "on" with "one"

Correct spelling. Replace "predicated" with "predicted"

Correct spelling. Replace "wity" with "with"

Add "the". Should be: "checks of the flow inputs"

Should be: APRMs instead of APRM's

Repaginate.

Page 3.1/4.1-7

Delete: "turbine control valve fast closure,"

Add to reference section: "3. NEDC 31336, "General Electric Instrument Setpoint Methodology" dated October, 1986".

Repaginate.

Page 3.1/4.1-10

Change "≥40% turbine/generator load mismatch" to "≥460 psig"

Add "Valve trip system oil pressure low" to the trip function description.

Page 3.1/4.1-11

Replace existing note [10] with: "Trip is indicative of turbine control valve fast closure (due to low EHC fluid pressure) as a result of fast acting solenoid actuation."

Add additional level reference information to Note [8]: "1 inch on the water level instrumentation is ≥ 504" above vessel zero. (See Bases 3.2)."

Repaginate.

Page 3.1/4.1-14

Add to Table 4.1-2: "Turbine control valve fast closure, A, Pressure source, Refueling Outage".

Repaginate.