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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 61 TO FACILITY OPERATING LICENSE NO. DPR-29

COMMONWEALTH EDISON COMPANY

AND

IOWA-ILLINOIS GAS AND ELECTRIC COMPANY

QUAD CITIES NUCLEAR POWER STATION, UNIT NO. 1
DOCKET NO. 50-254

Introduction

By letter dated September 2, 1980 (Ref. 1), and supplemented by letter dated October 3, 1980 (Ref. 2), Commonwealth Edison Company (CECo or the licensee), proposed an amendment to Quad Cities Unit 1 Appendix A, Technical Specifications. CECo has proposed the amendment to support its review of future reloads for Quad Cities Unit 1 under the provisions of 10 CFR 50.59.

Our approval is only for the proposed amendment and does not constitute approval of future reloads under the provisions of 10 CFR 50.59.

Evaluation

Safety Limit Minimum Critical Power Ratio (SLMCPR)

This change provides SLMCPR values in the Technical Specifications for all currently approved core loadings. With retrofit 8x8 fuel in the core the SLMCPR limit is specified as 1.07. Without retrofit 8x8 fuel, the SLMCPR is 1.06. These limits have previously been found to be acceptable for this use in Reference 3 and on this basis the proposed change is acceptable.

Rod Drop Accident (RDA) Design Limit

The RDA design limit has been modified from 1.3%Δ maximum rod worth to 280 cal/gm peak fuel enthalpy rise. The 280 cal/gm design limit is acceptable per Standard Review Plan NUREG 75-087. Also, the power level below which the rod worth minimizer is required was increased from 10% to 20% of rated power. This is conservative by comparison to the previous specification, is consistent with reactor safety analyses, and is acceptable.

Maximum Average Planar Linear Heat Generation Rate (MAPLHGR)

New MAPLHGR curves reflecting the improved flooding characteristics of retrofit 8x8 fuel have been proposed by the licensee. Curves for 8x8, 8x8 retrofit, and 7x7 fuel of the various enrichments anticipated for future Quad Cities 1 reloads and extending to burnups of 40,000 MWd/t have been proposed (References 1 and 4).

The new curves are based on an assumed fuel loading with 156 retrofit assemblies. Any reload with fewer such assemblies will be nonconservative with respect to the analyzed case and therefore outside the scope of this approval.

Based on our previous approval of MAPLHGR curves reflecting 8x8 retrofit fuel reflood characteristics (Reference 5) and extension of burnup to 40,000 MWd/t (Reference 6), the licensee's proposed changes are acceptable.

Power Peaking

The licensee has proposed to adjust the Average Power Range Monitor (APRM) amplifier gain based on the Maximum Fraction of Limiting Power Density (MFLPD). Such an adjustment would be made in the event of operation with a MFLPD greater than the Fraction of Rated Power (FRP), with the objective of preventing the fuel cladding integrity safety limits from being exceeded during anticipated operational transients. This adjustment will be applied above 25% rated thermal power which is consistent with the LHGR surveillance requirements and the Standard Technical Specifications.

Previously this objective has been met by reducing the APRM trip settings through multiplication by the ratio of the Limiting Total Peaking Factor (LTPF) to the Total Peaking Factor (TPF). Such a reduction in set points is required in the event of operation with TPF>LTPF.

We have concluded that the maximum reactor power which could be attained during anticipated operational transients with the proposed APRM gain adjustment would be no greater than would be attained with the current procedure for adjusting APRM setpoints. This conclusion is based on the equivalence of the ratio FRP/MFLPD to the ratio LTPF/TPF, and can be explained as follows.

The LTPF can be expressed as the design linear heat generation rate divided by the plant rated thermal power per unit length of fuel rod. In a similar manner the TPF can be expressed as the maximum linear heat generation rate divided by the plant operating power per unit length of fuel rod. From these definitions it is easily determined that the ratio LTPF/TPF is the ratio of the design linear heat generation rate to the maximum linear heat generation rate times the fraction of rated thermal power, or 1/MFLPD*FRP. Thus FRP/MFLPD and LTPF/TPF are equivalent.

However, instead of multiplying the APRM set points by FRP/MFLPD the same result can be achieved by multiplying the APRM reading by MFLPD/FRP to get a gain-adjusted APRM reading. If the reactor is operating in a steady state mode the APRM reading (before gain adjustment) is equal to FRP. Therefore by adjusting the gain until the APRM reading is equal to MFLPD, the APRM reading has effectively been multiplied by MFLPD/FRP as required.

To summarize, the proposed formulation does not involve a reduction in margin to the trip point, and eliminates the need for different limits for different fuel types. In addition adjusting the APRM gain is much easier than changing the APRM trip setting, so that there is less chance for human error.

Reactor Protection System (RPS) Delay Time

The licensee has proposed to change the RPS delay time from 100 to 50 msec (time from opening of the sensor contact up to and including the opening of the trip actuator contacts). This change stems from an inconsistency which has existed between the Technical Specification value of 100 msec and the 50 msec value assumed by General Electric in the licensing analysis. The licensee has confirmed that the procedures used for determining RPS delay time are consistent with the General Electric use and definition of a 50 msec delay time in the licensing analysis. The staff has confirmed that the licensee has in place the capability for demonstrating compliance with the more restrictive specification. The proposed change is acceptable.

Typographical Corrections and Clarification of Bases

The remaining changes fall into the category of typographical corrections and clarification of bases and do not, as such, represent a significant safety concern.

Environmental Consideration

We have determined that the amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and pursuant to 10 CFR Section 51.5(d)(4) that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the amendment

does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: December 5, 1980

References

1. Letter from R. F. Janecek (CECo) to Director of Nuclear Reactor Regulation (USNRC), dated September 2, 1980.

2. Letter from R. F. Janecek (CECo) to Director of Division of Licensing (USNRC), dated October 3, 1980.

3. Letter from D. G. Eisenhut (USNRC) to R. Gridley (GE) dated May 12, 1978.

4. "Loss-of-Coolant Accident Analysis Report for Dresden Units 2, 3, and Quad Cities Units 1, 2 Nuclear Power Station," NEDO-24146A, dated April 1979.

5. Letter from D. L. Ziemann (NRC) to Cordell Reed (CECo), dated April 24, 1979.

6. Letter from T. A. Ippolito (NRC) to D. L. Peoples (CECo), dated December 28, 1979.