



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 92 TO FACILITY OPERATING LICENSE NO. DPR-39  
AND AMENDMENT NO. 82 TO FACILITY OPERATING LICENSE NO. DPR-48

COMMONWEALTH EDISON COMPANY

ZION NUCLEAR POWER STATION, UNITS 1 AND 2

DOCKET NOS. 50-295 AND 50-304

INTRODUCTION

In a letter from P. C. Le Blond to H. R. Denton dated August 19, 1985, the Commonwealth Edison Company (the licensee) proposed amendments to Facility Operating Licenses No. DPR-39 and DPR-48, Appendix A, Section 4.3.4.D-Materials Irradiation Surveillance Specimen Inspection. These changes proposed a revised withdrawal schedule for reactor vessel surveillance capsules in Zion Nuclear Power Station Units No. 1 and 2. In support of these amendments the licensee provided Westinghouse Report WCAP-10902, "Plant Specific Neutron Fluence Evaluation for Zion Units 1 and 2."

The capsule withdrawal schedules contained in Section 4.3.4.D of the Zion Technical Specification required the licensee to remove four capsules. Those withdrawal schedules were based on previous fuel loading designs and requirements of 10 CFR 50, Appendix H which were in effect on the date those schedules were approved. As a result of changes to low leakage fuel design at Zion and the capsule withdrawal requirements in 10 CFR 50, Appendix H, the licensee has proposed changes to the capsule withdrawal schedules to reflect the new lower rate of accumulation of neutron radiation. Our discussion, which follows, describes the requirements in 10 CFR 50, Appendix H for withdrawal of the surveillance capsules and the licensees proposed withdrawal schedules.

## DISCUSSION

A reactor vessel surveillance program must meet the requirements of Appendix H, 10 CFR 50, which was published in the Federal Register on May 22, 1983 and became effective on July 26, 1983. This appendix indicates that the purpose of the material surveillance program is to monitor changes in the fracture toughness properties of ferritic materials in the reactor vessel beltline. This appendix indicates that the schedule for surveillance capsules withdrawn after July 26, 1983 must meet, to the extent practical, with the requirements of ASTM E 185-82. For Zion Units 1 and 2 this specification recommends that five capsules be withdrawn from the reactor vessel. The fourth capsule is to be withdrawn when the neutron fluence for the capsule is approximately end-of-life (EOL) fluence at the reactor vessel inner wall location or 15 effective full power years (EFPY), whichever comes first. The fifth capsule is to be withdrawn when neutron fluence for the capsule is not less than once or greater than twice the peak EOL fluence or at EOL of the reactor vessel.

Each reactor vessel at Zion contained eight capsules at the time the plants went into commercial operation. Three capsules have been removed from Zion Unit 1 and tested. Two capsules have been removed from Zion Unit 2 and tested. The licensee proposes to remove and test one additional capsule (Capsule Y) from each reactor vessel and change the status of Capsule Y to "standby" status. The licensee desires to leave Capsule Y in the vessel to accumulate more neutron radiation. The staff agrees that Capsule Y should be held in the vessel to accumulate more neutron radiation. The licensee proposed to remove Capsule Y from each reactor vessel when the neutron fluence received by the capsule is predicted to reach the approximate EOL fluence at the reactor vessel inner wall. These fluence predictions are based on the fluence evaluation in Westinghouse Report WCAP-10902. The fluence predictions are based upon transport calculations using DOT discrete ordinate transport code and the sailor cross-section library. Two sets of transport calculations were performed, which utilized design basis and plant specific core power distributions, respectively. This transport methodology has been benchmarked in the Oak Ridge National Laboratory PCA facility and to Westinghouse power reactor surveillance data. The Westinghouse

report indicates that the benchmarking studies show that the fluence predictions are within  $\pm 15\%$  of measured values at the surveillance capsule. This small amount of uncertainty demonstrates the accuracy of the transport calculation. Future confirmation of this accuracy will be obtained from the scheduled withdrawal of each capsule from each unit and the Zion excore dosimetry program.

#### SUMMARY

Based on the neutron fluence calculations documented in Westinghouse Report WCAP 10902, Capsule Y should provide fracture toughness data at neutron fluence representing EOL conditions in the reactor vessel and Capsule Y should remain in the vessel to accumulate more neutron radiation. Based on this conclusion, the proposed amendments should be incorporated into the Facility Operating License Nos. DPR-39 and DPR-48. However, to be in conformance with ASTM E 185-82, the licensee must provide a revised schedule for withdrawal of one additional capsule from each reactor vessel when the neutron fluence at the capsule is not less than once or greater than twice the peak EOL neutron fluence at the inner wall of the reactor vessel. This additional capsule will more effectively monitor changes in the fracture toughness properties of ferritic materials in the reactor vessel beltline than the current schedule and will meet the withdrawal schedule requirements of ASTM E 185-82. This revised schedule should be provided within one year of receipt of this evaluation. The request for this revised schedule does not affect our conclusions about the immediate acceptability of the proposed amendments.

#### ENVIRONMENTAL CONSIDERATION

These amendments involve a change in the installation or use of the facilities components located within the restricted areas as defined in 10 CFR 20. The staff has determined that these amendments involve no significant increase in the amounts, and no significant change in the types, or any effluents 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 these amendments involve no significant hazards consideration and there has been no public comment on such finding. Accordingly, these amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR Sec 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 these amendments.

#### CONCLUSION

We have 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,
- and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Dated: January 16, 1986

#### PRINCIPAL CONTRIBUTOR:

B. Elliot