UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 78 TO FACILITY OPERATING LICENSE NO. NPF-37, AMENDMENT NO. 78 TO FACILITY OPERATING LICENSE NO. NPF-66, AMENDMENT NO. 70 TO FACILITY OPERATING LICENSE NO. NPF-72, AND AMENDMENT NO. 70 TO FACILITY OPERATING LICENSE NO. NPF-77

COMMONWEALTH EDISON COMPANY

BYRON STATION, UNIT NOS. 1 AND 2

BRAIDWOOD STATION, UNIT NOS. 1 AND 2

DOCKET NOS. STN 50-454, STN 50-455, STN 50-456 AND STN 50-457

1.0 INTRODUCTION

By letter dated September 14, 1995, as supplemented November 8, 1995, Commonwealth Edison Company (ComEd or the licensee) submitted a request for changes to the Technical Specifications (TS) for Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2. The proposed changes would revise TS Section 5.3.1, Fuel Assemblies, to allow use of an alternate zirconium based fuel cladding, ZIRLO, for Byron and Braidwood and permit limited substitution of fuel rods with ZIRLO filler rods.

In addition, a proposed change to Specification 5.3.1 clarifies that reload fuel shall be similar in physical design to the initial core loading or previous cycle loading and an editorial change to Specification 5.4.1.a is proposed to reflect the fact that the Final Safety Analysis Report (FSAR) has been replaced with the Updated Final Safety Analysis Report (UFSAR).

The November 8, 1995, letter provided clarifying information that did not change the scope of the September 14, 1995, application and the initial proposed no significant hazards consideration determination.

2.0 EVALUATION

Byron and Braidwood TS 5.3.1 requires fuel rods to be clad with Zircaloy-4. Fuel rods may be substituted by filler rods consisting of Zircaloy-4 or stainless steel, or by vacancies if justified by a cycle-specific reload analysis. ComEd proposes to revise TS 5.3.1 to allow fuel rods to be clad with ZIRLO. The proposed change would also allow fuel rods to be substituted by filler rods consisting of ZIRLO if justified by a cycle-specific reload analysis. The licensee has stated this change is consistent with 10 CFR 50.44 and 10 CFR 50.46 and with NRC-approved Topical Report, WCAP-13060,

"Westinghouse Fuel Assembly Reconstitution Evaluation Methodology," which meets the intent of Supplement 1 of Generic Letter (GL) 90-02, "Alternative Requirements for Fuel Assemblies in the Design Features Section of Technical Specifications." In addition, NUREG-1431, "Standard Technical Specifications for Westinghouse Plants," specifically includes ZIRLO as an acceptable cladding material.

In Federal Register, Volume 57, Number 169, dated August 31, 1992, the United States Nuclear Regulatory Commission published amended regulations to reduce regulatory burden on nuclear licensees. The amended regulations revised the acceptance criteria in 10 CFR 50.44 and 10 CFR 50.46 relating to evaluations of emergency core cooling systems and combustible gas control applicable to Zircaloy clad fuel to include ZIRLO clad fuel as an acceptable alternative. The change in the regulation eliminated the need for the licensees to obtain an exemption in order to use fuel cladding material not presently addressed in the regulations. The amended regulation also noted that the revision to include ZIRLO as an acceptable zirconium based cladding material along with Zircaloy does not reduce the protection of the public health or safety.

As a basis for the approval request, ComEd referenced a staff Safety Evaluation (SE) addressed to Westinghouse, dated July 1, 1991, titled, "Acceptance for Referencing of Topical Report WCAP-12610, 'Vantage+ Fuel Assembly Reference Core Report' (TAC No. 77258)." This SE and a later one dated October 9, 1991, approved the use of the Vantage+ fuel design, i.e., ZIRLO clad fuel, described in WCAP-12610 and found it acceptable up to a rod-average burnup level of 60,000 MWD/MTU. The WCAP-12610 report supports the following conclusions:

1. The mechanical design bases and limits for the ZIRLO clad fuel assembly design are the same as those for the previously licensed Zircaloy-4 clad fuel assembly design, except those for clad corrosion.

2. The neutronic evaluations have shown that ZIRLO clad fuel nuclear design bases are satisfied and that key safety parameter limits are applicable. The nuclear design models and methods accurately describe the behavior of ZIRLO clad fuel.

3. The thermal and hydraulic design basis for the ZIRLO clad fuel is unchanged.

4. The methods and computer codes used in the analysis of the non-loss-of-coolant accident (LOCA) licensing basis events are valid for ZIRLO clad fuel and all licensing basis criteria will be met.

5. The large break LOCA evaluation model was modified to reflect the behavior of the ZIRLO clad material during a LOCA. It is concluded that the revised evaluation model satisfies the intent of 10 CFR 50.46 and Appendix K of 10 CFR Part 50. There is no significant impact on typical large break LOCA analysis results for the ZIRLO model revisions.

In addition, the licensee evaluated the bounding large break LOCA rod heatup cases for Byron and Braidwood and concluded that all acceptance criteria were satisfied, including those in 10 CFR 50.46.

The licensee also evaluated the effect of ZIRLO on a locked rotor transient at Byron and Braidwood and concluded that the effect of ZIRLO need not be considered in the transient analysis since departure from nucleate boiling will not be reached.

The licensee's analysis of the rod control cluster assembly (RCCA) ejection event at hot full power and hot zero power demonstrated that any consequential damage to the core or the reactor coolant system would not prevent long-term core cooling and that off site dose would remain within the guidelines of 10 CFR Part 100. This conclusion is consistent with the findings in the WCAP-12610 report which contains the results of sensitivity analyses performed by Westinghouse that showed the impact of ZIRLO on RCCA ejection event analyses results in an insignificant change in both the fraction of fuel melted at the hot spot as well as the peak fuel stored energy.

WCAP-13060 delineates the methodology used to evaluate applicable design criteria associated with reconstituted fuel assemblies that have solid filler rods replacing uranium filled fuel rods. The licensee has stated that evaluations and analyses of fuel assembly reconstitution will be performed on a cycle-specific basis whenever reconstituted fuel assemblies are used in the reactor core.

The staff has reviewed the licensee's submittal and has concluded that the use of ZIRLO fuel cladding and limited substitution of fuel rods by ZIRLO filler rods is acceptable, based on the above information and the fact that ComEd's submittal is consistent with the STSs, the amended regulations, and references the staff-approved WCAP-12610 (the reference core design report for a fuel assembly design using ZIRLO clad fuel rods).

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. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of 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 the amendments involve no significant hazards consideration, and there has been no public comment on such finding (60 FR 54716). 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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Date: December 19, 1995