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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 174 TO FACILITY OPERATING LICENSE NO. DPR-39

AND AMENDMENT NO. 161 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

1.0 INTRODUCTION

In its letters of August 16 and October 4, 1996, Commonwealth Edison Company (ComEd, the licensee), requested an amendment to the technical specifications (TS) for the Zion Nuclear Power Station, Units 1 and 2. The proposed amendment would revise the definition of the F* distance in TS Section 4.3.1.B.4.A.11, "Steam Generator Tube Surveillance Requirements" and Bases sections 3.3.1 and 4.3.1; and would remove the footnote limiting the applicability of the F* definition. The October 4, 1996, submittal provided additional clarifying information that did not change the initial proposed no significant hazards consideration determination.

2.0 BACKGROUND

Zion, Units 1 and 2, use Westinghouse model 51 steam generators. During original fabrication, the steam generator tubes were inserted into a tubesheet and a short segment of each tube was expanded in the tubesheet to form a joint by a hard roll process. The partial-depth hard roll expansion joint restrains the tube from pulling out of the tubesheet. The original factory partial-depth expansion joint is about 1.75 inches long and is located at the lower region (close to the primary side) of the tubesheet.

The F* distance is a part of the overall F* criteria that provides an alternative to tube repair and is applicable only to the region of the steam generator tube that is inside of the tubesheet. The F* distance is measured from the bottom of the upper transition region of the hard roll down into the tubesheet. The F* criteria are based on the concept that a certain axial length (F* distance) of expanded tube in the tubesheet is needed to restrain the tube from pullout and to prevent tube leak. This length of the tube, however, must be free of defects and must be demonstrated to be sufficient to maintain structural and leakage integrity. Once the NRC approves the F* distance and associated criteria, tubes having degradation below the F* distance are allowed to remain in service. Tubes having degradation within the F* distance are required to be plugged or repaired.

The NRC had previously approved the use of F* criteria in the Zion, Units 1 and 2, TS. In a letter dated May 31, 1995, the licensee submitted a proposed F* distance and criteria for the Zion, Units 1 and 2, TS. In a letter dated September 11, 1995, the NRC approved the proposed F* distance and criteria for Zion, Units 1 and 2, TS via Amendment Nos. 168 and 155, respectively. The approved F* distance was specified to be 1.30 inches which is the sum of 1.05 inches for structural and leakage integrity and an eddy current measurement uncertainty of 0.25 inches. The licensee derived the F* distance based on a test program as described in Westinghouse WCAP-14211.

Along with the F* amendment request submitted in the May 31, 1995 letter, the licensee also proposed an alternative method for returning defective tubes in the tubesheet to service through the use of a rerolling process, which was described in Combustion Engineering report, CEN-620-P, Revision 01-P. The process creates a new hard roll joint one inch above the upper transition region of the original factory hard roll joint. After the staff approved the F* criteria in the TS, the licensee found that the mechanical tool (rolling pin) qualified for the rerolling process would create a hard roll joint shorter in length than the approved F* distance of 1.30 inches. Therefore, using the F* distance of 1.30 inches approved in the TS was not feasible for those tubes having rerolled expansion joints.

Subsequently, by a letter dated October 6, 1995, the licensee submitted a proposed amendment to modify the F* distance definition in the TS approved in Amendment Nos. 168 and 155. The licensee requested that the F* distance be changed to 1.05 inches from 1.30 inches and that the measurement uncertainty not be specified in the TS. In a supplement dated November 20, 1995, the licensee reported that during refueling outage 14 for Unit 1, a rolling pin having an effective length of 1.25 inches was used, which would satisfy the F* distance of 1.05 inches. For each new reroll joint, eddy current examination confirms the acceptability of the reroll if indications do not exist within the new roll region. In the November 20, 1995 letter, the licensee committed to revise the F* distance definition in regard to the reroll joints before Unit 2 refueling outage 14, Z2R14.

Based on the October 6 and November 20, 1995 submittals, the staff concluded that the configuration of the new hard roll joint after the rerolling has enough length to ensure adequate structural and leakage integrity for the tubes. Therefore, the proposed F* distance of 1.05 inches was determined to be acceptable as a part of F* criteria. As for the eddy current measurement uncertainty, the staff concluded that the measurement uncertainty is not required to be specified in the TS when dispositioning tubes repaired by the reroll process because the length of the new hard roll joint is determined by the well-defined physical length of the rolling pin. By a letter dated November 21, 1995, the staff approved the revised F* distance definition and associated changes via TS Amendment Nos. 172 and 159 for Zion, Unit 1 and 2, respectively.

3.0 EVALUATION

By letters dated August 16 and October 4, 1996, the licensee proposed a revision to the F* distance definition to clarify that F* will only be applied to tubes rerolled below the mid-plane of the tubesheet. The licensee also proposed to delete the footnote to TS 4.3.1.B.4.A.11 that limits the applicability of the F* distance to cycle Z1R14 and through Z1C15. The proposed F* distance in TS Section 4.3.1.B.4.A.11 reads as follows:

> "F* Distance is the length of undegraded tube required to resist pullout. The distance is measured from the bottom of the upper hard roll transition toward the bottom of the tubesheet and has been conservatively determined to be 1.05 inches. The determination of the F* Distance is satisfied by the mechanical tool (rolling pin) used to install the joint having an effective length of greater than or equal to 1.05 inches. The F* Distance is applicable only to tubes that are rerolled below the mid-plane of the tubesheet and have no degradation in the rerolled expansion joints."

The proposed Bases Section 3.3.1 and 4.3.1 reads as follows:

> "The F* Distance will be controlled by process control. For a new additional roll expansion, the requirement will be at least 1.05 inches of new hard roll. This is controlled by the length of the rolling pin used during the mechanical installation of the new hard roll joint. The distance from the original roll transition zone is also controlled by the process in that the lower end of the new roll expansion is located approximately one inch above the original factory hard roll expansion. In the case of the new roll, eddy current examination will confirm that there are no indications in the new roll region and that there is a new roll region with well defined upper and lower expansion transitions. The F* Distance is not applicable to the original factory hard roll."

The F* distance, which is the length of undegraded tube required to resist pullout, was determined to be 1.05 inches. No eddy current measurement uncertainty needs to be considered when sizing the reroll if the effective length of the rolling pin is greater than 1.05 inches, since this is the F* distance. The licensee obviated the need to provide for eddy current testing uncertainty by requiring the use of a mechanical tool (rolling pin) that was at least 1.05 inches long. Therefore, there is no need to include an eddy current measurement uncertainty in the F* Distance Definition and the proposed revisions to the F* Distance Definition and associated Bases are sufficient to maintain the structural and leakage integrity of the tubes and are acceptable. Since the F* Distance Definition is acceptable for all operating cycles, the footnote restricting use of the F* distance is no longer necessary and may be deleted.

Based on information submitted, the staff concludes that the proposed revisions to the definition for the F* distance and Bases sections are acceptable because the proposed F* criteria will maintain the structural and leakage integrity of the steam generator tubes.

4.0 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.

5.0 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 (61 FR 47968). 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.

6.0 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.

Principal Contributor: J. Tsao

Date: November 6, 1996