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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 47 TO FACILITY OPERATING LICENSE NO. NPF-37,

AMENDMENT NO. 47 TO FACILITY OPERATING LICENSE NO. NPF-66,

AMENDMENT NO. 36 TO FACILITY OPERATING LICENSE NO. NPF-72,

AND AMENDMENT NO. 36 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 March 17, 1989, as supplemented by letters dated August 25, 1989, March 12, 1990 and June 10, 1991, Commonwealth Edison Company (CECo, the licensee) submitted a Technical Specification (TS) amendment request to discontinue the performance of the venting surveillance required by TS 4.5.2.b for the Emergency Core Cooling System (ECCS) piping inside containment. The change is requested for the purpose of reducing radiation exposure in accordance with as-low-as reasonably achievable (ALARA) guidelines without reducing the safe operation of the ECCS equipment.

2.0 DISCUSSION

CECo's submittal proposes to modify the existing TS 4.5.2.b venting surveillance by eliminating the requirement to vent the ECCS discharge piping vent valve locations by stating that only venting of the ECCS pump casing and the discharge piping high points outside containment for Byron Unit 1 and Braidwood Unit 1 is required. The change will only effect the conduct of the surveillance on Byron Unit 1 and Braidwood Unit 1.

Elimination of the surveillance requirement is anticipated to reduce the annual radiation exposure to site personnel by approximately 0.6 person rem which represents 0.5% of the total non-outage dosage.

3.0 EVALUATION

The purpose of the surveillance is to demonstrate operability of the ECCS by verifying the piping is full. Any trapped air or gas is vented to prevent a water hammer event when the system is actuated. Water hammer was generically addressed and resolved in March 1984 with the publication of NUREG-0927,

"Evaluation of Water Hammer in Nuclear Power Plants - Technical Findings Relevant to Unresolved Safety Issue (USI) A-1." The staff is satisfied with the resolution, particularly as it relates to pressurized water reactors and the emergency core cooling systems. The proposed request is encompassed by the resolution of USI A-1.

Specific to this submittal, additional water hammer analysis was performed by the licensee. A voided volume was assumed in the residual heat removal discharge piping; however, it should be noted that the probability of this voided volume existing was not considered. The analysis demonstrated that with a completely voided discharge line, the resultant forces on the pipe supports were below design capacities. Also assuming a voided volume of 19.54 ft^3, which represents the largest volume between the two high vent points inside containment, the resultant forces on the supports were below the design capacities. Therefore, if air is trapped as a result of not venting the ECCS piping inside containment, the system is capable of withstanding the resulting water hammer event.

However, the Illinois Department of Nuclear Safety (IDNS) had concerns regarding the consequences with the proposed change to the venting surveillance. An analysis performed by IDNS determined the maximum pressure peak as a function of voided pipe volume. The analysis indicated that when a relatively small void volume exists (approaching the zero limit), the peak pressures experienced by the piping during a water hammer event are similar to those caused by the sudden opening of valves, pump startups, etc., and are of no concern. However, the worst case scenario is represented by a voided volume of approximately 12 ft^3. At this volume, the peak pressure was calculated to exceed 600 psig, the setpoint of the discharge relief valve. A loss of low head ECCS capability or an intersystem loss of coolant accident may result if the relief valve opens and fails to reseat once the pressure is relieved.

In general, the calculations and analytical methods used in determining the effects of water hammer are uncertain in nature due to computer code limitations. Therefore, the accuracy of the IDNS study was not evaluated by the staff. However, to resolve the concern raised by IDNS, the staff reviewed the likelihood of air intrusion in the piping system and the adequacy of licensee controls to ensure a water filled system. Consideration was given to maintenance practices, operational experience, and procedural controls.

Interviews with operations personnel and review of the surveillance documentation by the licensee concluded that essentially no air had been detected during the surveillance activity. Operational experience since licensing has indicated that air intrusion during normal operation is highly unlikely. Therefore, venting of the ECCS piping outside containment is sufficient to remove trapped air. In addition, the venting procedure requires notification of shift management for further investigation if air is detected during the surveillance.

The refueling water storage tank (RWST) is maintained at an elevation higher than the discharge piping and essentially acts as a keep-fill system. The

RWST level could be below the discharge piping during the refueling mode; however, subsequent lineups and outage activities provide assurance that any air is removed.

Procedures which require a fill and vent after maintenance and prior to the startup of a pump minimize the amount of air introduced to the system during maintenance activities. In addition, the monthly required venting of the piping outside containment would remove trapped air resulting from an inadequate fill and vent operation.

The staff concludes that adequate controls have been implemented and provide assurance that air intrusion is unlikely. Therefore, elimination of the requirement to vent the ECCS piping inside containment does not constitute a safety concern.

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

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact has been prepared and published in the Federal Register on June 16, 1992 (57 FR 26878).

Accordingly, based upon the environmental assessment, the Commission has determined that the issuance of this amendment will not have a significant effect on the quality of the human environment.

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: Ann Marie Bongiovanni

Date: June 22, 1992