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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

COMMONWEALTH EDISON COMPANY

DRESDEN, UNIT 2

DOCKET NO. 50-237

Introduction

In a letter dated March 9, 1982, the staff informed the Commonwealth Edison Company (the licensee) of its evaluation of SEP Topic III-1 for the Dresden 2 plant. The SEP plants were generally designed and constructed during the time span from the late 1950's to late 1960's. They were designed according to codes and criteria in effect at that time; however, since then, the codes and criteria have been revised to incorporate the results of additional research. Thus, earlier plants may have been designed according to criteria and codes no longer accepted by the NRC. The purpose of SEP Topic III-1 is to compare the classification of structures, systems and components of the as-built plants to the requirements in later ASME code editions. The earlier plants were reviewed to determine whether their materials met the fracture toughness requirements in the ASME Code, Section III, 1977 Edition, Summer 1978 Addenda. The staff determined that there could be significant differences in fracture toughness requirements between the as-built Dresden 2 plant and the requirements in the later ASME code editions. In addition, the licensee was requested to determine which components could need impact testing to meet the fracture toughness requirements of the later ASME code edition.

In a letter dated July 16, 1982, the licensee determined that impact testing could be required to determine the fracture toughness of the following components:

a) Core Spray System Pump Casing,

b) Low Pressure Coolant Injection (LPCI) Pump Casing,

c) LPCI Heat Exchangers-Shell Side,

d) High Pressure Coolant Injection (HPCI) Pump Casings,

e) HPCI Piping, Fittings, and Valves with nominal pipe diameter greater than 6 inches,

f) Condensate/Feedwater System Piping from reactor vessel to outermost containment isolation valve, and

g) Main steam system piping, valves and fittings.

In Enclosure 5 to a January 19, 1983 letter, the staff indicated to the licensee that compliance with the fracture toughness requirements of later ASME code editions could be demonstrated by:

a) Providing test results that meet the ASME code requirements, or

b) determining that the component's lowest service temperature (LST) is high enough to exempt the materials from testing, or

c) determining that the components failure will not result in unacceptable consequences.

Discussion

In letters dated April 20, 1987 and January 6, 1989, the licensee provided information to demonstrate that the components identified in its July 16, 1982 letter would meet the fracture toughness requirements of the later ASME code editions.

The core spray pump casings, the LPCI pump casings and the HPCI pump casings were designated as Class B Quality Group and were constructed of carbon steel A 216, Grade WCB material. According to the ASME code, these components would be exempt from testing, if the LST exceeds 60°F. The core spray and LPCI pumps were designed for a temperature range from 60°F to 165°F, and normally operate at approximately 95°F. The HPCI pumps were designed for a temperature range from 40°F to 140°F, and normally operate at around 95°F. Although the licensee has not determined the LST, the design and normal operating temperatures for these components indicate that the materials will meet the intent of the material testing exemption requirements in the ASME code.

The shell side of the LPCI heat exchangers were designated as Class C Quality Group and were constructed of carbon steel A 212, Grade B material. According to NUREG-0577, "Potential for Low Fracture Toughness and Lamellar Tearing on PWR Steam Generator and Reactor Coolant Pump Supports", the 90% confidence upper bound NDT for this material would be 77°F. Based on later ASME code requirements for this class of components, the materials on the shell side of the LPCI heat exchangers would be exempt from testing if the LST exceeds 77°F. The licensee indicates that the operating temperature of the shell side of the LPCI heat exchanger is above 40°F.

The HPCI piping, fittings and valves were designated as Class B Quality Group and were constructed of carbon steel A106, Grade B material. For this class component, the materials are exempt from testing if the LST exceeds 150°F. The licensee indicates that the LST for these components exceeds 150°F.

The feedwater system piping from the reactor vessel to outermost containment isolation valve and main steam system piping were designated as Class A Quality Group and were constructed of A106, Grade B material. According to the later ASME code editions, Class A components are not exempted from testing. However, according to Section 6.2.1 of the Dresden Updated FSAR, the emergency core cooling system (ECCS) is designed to prevent fuel clad melting for any mechanical

failure of the primary system up to and including a break equivalent to the largest primary system piping. In addition, the licensee indicates that except for hydrotesting, the LST for these components is 150°F or greater. At 150°F, these materials will behave in a ductile fashion and will not be subject to brittle fracture. Hence, based on the LST for these components and the make-up capability of ECCS, the feedwater system piping from the reactor vessel to outermost containment isolation valve and main steam piping have adequate fracture toughness.

Conclusions

1) Based on the information provided by the licensee, all components, except for the shell side of the LPCI heat exchangers have adequate fracture toughness.

2) The materials on the shell side of the LPCI heat exchangers will have adequate fracture toughness if their LST exceeds 77°F.

Principle Reviewer: B. Elliot

Dated: May 1, 1989