



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

SAFETY EVALUATION BY OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO PROPOSAL FOR AN INSERVICE INSPECTION

PROGRAM ON REACTOR VESSEL CLOSURE STUDS

COMMONWEALTH EDISON COMPANY

DRESDEN NUCLEAR POWER STATION, UNIT 3

DOCKET NO. 50-249

1.0 INTRODUCTION

Commonwealth Edison Company (CECo) discovered stress corrosion cracking in two reactor vessel closure studs at Dresden Unit 2 during a routine inservice inspection (ISI) in 1988. The root cause analysis proposed the cause of cracking was the exposure of overly hard studs that are pretensioned and exposed to a high oxygen, moist environment for several weeks after each outage between the time of pretensioning and full power operation. CECo has proposed an enhanced inservice inspection program (ISI) on the closure studs that exceed the requirements of ASME Section XI. This ISI program on the closure studs also exceeds the recommendations by General Electric Nuclear Energy (GE) Rapid Information Communication Services Information Letter (RICIL) 055, "Reactor Pressure Vessel Head Stud Cracking," dated February 1, 1991. The program further utilizes parts of Regulatory Guide 1.65, "Materials and Inspections for Reactor Vessel Closure Studs."

2.0 DISCUSSION

CECo has proposed an ISI plan that exceeds the requirements of the ASME Code in order to:

1. Provide data on incipient stud cracking;
2. allow for additional metallurgical evaluation of cracking mechanisms and potential embrittlement phenomena if additional cracked studs are discovered and removed; and,
3. provide a correlation between enhanced end shot ultrasonic testing (UT), bore UT, and fluorescent magnetic particle testing (MT) results.

The ASME Code, Section XI, Table IWB-2500-1, requires a volumetric inspection of the reactor vessel closure studs if left in place or a surface and volumetric inspection if the closure studs are removed from the flange during each inspection interval. There is not a requirement to remove the closure studs from the flange and the studs are not normally removed from boiling water reactors (BWR) with the exception of the four cattle chute studs. However, Regulatory Guide 1.65 recommends the removal of the closure studs followed by surface examination during each inspection interval. IWB-2430 requires that

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additional examinations be conducted during the current outage if the inspection conducted according to IWB-2500-1 shows indications exceeding the acceptance standards of Table IWB-3410-1. If the expanded sample produces additional indications, IWB-2430 requires that all parts of similar design, size and function be examined during the current outage.

The ASME Code, Section XI only requires normal sensitivity end shot UT and the RICIL only recommends enhanced end shot UT of five studs. The proposed ISI program exceeds the requirements of the ASME Code and exceeds the recommendations of RICIL 055.

CECo is proposing 100% enhanced end shot UT of the closure studs followed by bore probe UT sizing of any indications. In addition, CECO is proposing to remove up to 16 of the closure studs and to conduct a surface examination of these studs using wet MT. It may not be possible to remove 16 studs without damaging the studs since they have not been removed for approximately 20 years. If less than 16 studs are removed, those studs will be examined using MT. CECO is requesting relief from the ASME Code Section XI requirements for sample expansion if the MT examination reveals crack indications. CECO is requesting relief from the expanded sample requirement because expansion of the sample would result in increased manrem exposure, UT is being conducted on 100% of the closure studs, and MT is not required in ASME Code Section XI for closure studs that are not removed from the flange.

CECo has not completed the structural margin assessment for the closure studs; but, CECO expects the results to be available during September, 1991. The structural margin assessment will be based on a fracture mechanics analysis and fracture toughness data generated using an actual low toughness closure stud from Dresden Unit 2. If the critical flaw size is below the minimum detectable size using enhanced end shot UT, CECO has proposed an expanded sample using bore probe UT.

3.0 CONCLUSION

Based on a review of the information provided, the staff has concluded that there is reasonable assurance that the proposed ISI plan will assure that the Code structural margins will be satisfied. This conclusion may change when the fracture mechanics analysis is completed and submitted to the NRC staff for review.

Pursuant to 10 CFR 50.55a(a)(3)(ii) and 10 CFR 50.55a(g)(6)(i) the staff concludes that granting such relief for one refueling outage will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

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