



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

ENCLOSURE

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

DUKE POWER PROPOSAL FOR THE USE OF

AUTOMATIC WELDING FOR STEAM GENERATOR TUBE PLUGS

OCONEE NUCLEAR STATION, UNIT 1

DOCKET NO. 50-269

1.0 INTRODUCTION

In a letter dated August 23, 1991, Duke Power Company (DPC) proposed the repair of a large number of steam generator tube plugs which had shown indications of cracking during eddy current inspections. The proposed method of repair, developed by Babcock and Wilcox Nuclear Services (BWNS), employs an automatic welding process to insert and weld plugs into the steam generator tubes in question. Qualification of the weld procedure and operators, was performed according to the requirements of the 1989 Edition of Section XI of the ASME Code. Stress and fatigue analyses of the plugs as well as sizing of the fillet welds were to the requirements of the 1989 edition of Section III of the ASME Code. This code edition has not yet been approved by the NRC and the licensee proposes to use the requirements of the later edition of the code to install the welded plugs in the steam generator tubes containing the cracked plugs.

The staff has reviewed and evaluated the licensee's proposed repair and documented its findings in the following paragraphs.

2.0 EVALUATION

During the operational life of a steam generator tube, a leak or degradation of the tube may require that it be plugged. In the past, explosively welded plugs have been used as a means to effectively seal off a tube. In the case of the Oconee plant, the licensee has determined that a number of plugs contain cracks. An eddy current test performed on the steam generator plugs detected the cracks. Duke Power Company, in conjunction with BWNS has proposed the use of an Inconel 690 plug welded in place using an Inconel 82 fillet weld deposited by a robotic welder. This robot would mill an area at the end of the tube into the cladding and tube sheet. The plug would then be inserted, and a fillet weld deposited around the circumference of the plug.

A stress analysis and a fatigue analysis of the Inconel 690 plug and the Inconel 82 fillet weld was submitted by a letter dated September 6, 1991 from the BWNS to the NRC staff that shows that the plugging system is adequate as designed. The NRC staff has reviewed the stress analysis and fatigue analysis and concurs with the licensee's conclusions. The approval by the NRC of the use of the ASME Code, Section III and Section XI, 1989 ed., is limited to this

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specific application and does not constitute precedent or establish approval on a broader basis. The licensee may want to consider plugging tubes explosively welded with plugs of Inconel 600 that do not currently show crack indications. Although these plugs are not presently a safety concern, these plugs may be expected to crack in the future. Since the robotics will be in place to install the Inconel 690 plugs in the tubes containing cracked plugs, it may be beneficial to install the new plugs at this time rather than to wait until the old plugs crack to reduce worker dosage.

3.0 CONCLUSION

Based on the above evaluation, the staff concludes that there is a reasonable assurance that the repair methods described above, in accordance with the 1989 Edition of the ASME Code, will effectively seal the steam generator tubes where previously installed explosively welded plugs have shown cracks. The staff further suggests that the licensee consider plugging the degraded tubes that have been explosively plugged.

Pursuant to 10 CFR50.55a(a)(3)(i), the staff concludes that the licensee's alternative proposal will provide an acceptable level of quality and safety and will not endanger life or property or the common defense and security and is otherwise in the public interest.

Date: September 13, 1991