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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING RELIEF TO USE HELICAL COIL THREADED INSERTS

ENTERGY OPERATIONS, INC.

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

## 1.0 INTRODUCTION

Steam generators are provided with access for periodic inspection and maintenance. Access is gained through manways located in areas of interest. The manway cover plates are secured to a number of threaded studs (typically 20) by hexagonal nuts. The base of each stud is tightened into a matching threaded hole in the base of the manway. After the manway cover is removed, the studs are removed to provide free access to the generator and protect the studs from possible damage.

During the repair of a leak in the cold leg steam generator manway the licensee determined that helical coil inserts were installed during refueling outage four without the required approval from the NRC. These inserts were used as a result of stuck manway studs. The removal and repair of these studs not only results in confusion and delay during an outage, it also results in additional radiological exposure to maintenance workers.

The licensee at Waterford 3 removed the stuck studs by drilling and machining, enlarged the resulting stud hole slightly, then restored the stud hole to its original size, configuration and load carrying capacity through the use of a threaded helical coil insert.

The use of oversized studs in place of those removed has been considered. Although the next larger size stud also would satisfy stress requirements, multiple sized studs, nuts and tools would increase the possibility of installation error, equipment damage and unnecessary radiological exposure to workers. The use of weld build-up and redrilling the stud hole to its original size was also considered. This technique would result in field welding under difficult conditions in an adverse radiological environment.

## 2.0 DISCUSSION

The studs for the primary side manway covers are designed and inspected according to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. The ASME code covers the situation

where a stud cannot be removed and must be replaced under IWA-7000, IWB-7000, IWC-7000 or IWD-7000. The replacement stud "shall meet the edition of the Construction Code to which the original component or part was constructed" as stated in IWA-7210 of the ASME code. Normal practice has been to drill or machine the stud out and to tap the new stud hole for the next larger sized stud. Using the next larger size stud provides a larger stud cross-sectional area and the stress requirements of NB 3230 of the code are satisfied. The use of a helical coil insert would permit the use of a stud identical to the one that was drilled out and the stress requirements of NB 3230 would be satisfied. The licensee at Waterford 3 has included the stress analysis results and has shown that the maximum stud service stress intensity meets the requirements of the ASME code. The helical coil is designed so that the stress on the helical coil is lower than the stress on the stud and; hence, also meets the requirements of NB 3230.

ASME Code Case N-496 has been approved by the ASME but has not been endorsed by the NRC. The use of this code case would reduce confusion on the part of maintenance personnel who would have to carry a range of sizes of wrenches to accommodate the range of sizes of studs. Also, the clearance between studs is not great and the studs may become more difficult to remove as the number of oversized studs increases. The maintenance personnel would be exposed to an increased manrem exposure as a result of the mixture of stud sizes and the decreased spacing between studs as the number of oversized studs increases.

## 3.0 CONCLUSION

Based on a review of the information provided, the staff has concluded that this use of helical coils according to ASME Code Case N-496 for the Waterford 3 steam generator primary side plenums provides an adequate level of quality and safety and, thus, is an acceptable alternative repair in accordance with 10 CFR 50.55a(a)(3)(i).

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