UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

ROCHESTER GAS AND ELECTRIC CORPORATION

R.E. GINNA NUCLEAR POWER PLANT

DOCKET NO. 50-244

1.0 INTRODUCTION

In the April 1, 1983 Safety Evaluation (SE), the staff approved sleeving of degraded steam generator tubes to be an acceptable repair alternative to plugging for Ginna. The use of up to 30 tubesheet sleeves was approved by an SE dated June 13, 1983.

By letter dated March 23, 1984, Rochester Gas and Electric Corporation (RG&E) (the licensee) requested approval to install ten (10) tubesheet sleeves of a design modified to improve inspectability. Additional information was provided by the licensee by letters dated March 30 and April 23, 1984.

2.0 BACKGROUND

The June 13, 1983 staff SE limited the number of tubesheet sleeves that could be installed in 1983 to not more than 30 and also prevented the installation of additional tubesheet sleeves after the Spring 1983 outage until the effectiveness of inspection techniques could be demonstrated by RG&E. During the 1983 outage, four tubesheet sleeves were installed in the A Steam Generator and twenty-four in the B Steam Generator.

After the 1983 outage the staff recommended technical areas which should be pursued prior to the next outage so that further enhancements to the data acquisition and analysis of the sleeve/tube inspection could potentially be developed. RG&E was supportive of these recommendations and has pursued them. Specifically, those areas which have been pursued are:

- Mixing of frequencies on the rotating probes.
- Use of nonrotating multi-element coils.
- Digital signal processing.
- Evaluation of the 3-d probe.
- Construction and evaluation of cross wound probes.
- Additional magnetism studies.
- Fabrication of more standards.
- An industry review of the technology.

Improvements have been made in the eddy current inspection techniques, but there are still some areas of the tubesheet sleeve/tube combination where detection and sizing of defects at the 20% level is not possible. These areas are at the weld transitions and at the upper end of the sleeve. Although improvements have been made in inspection techniques, to further minimize the consequences of potential defects, the tubesheet sleeves have been shortened approximately 1.25 inches. This will provide a minimum of 0.75 inches of tube within the tubesheet which can be inspected to the 20% thru wall criteria. A 0.75 inch length of tubing within the tubesheet will restrict the maximum achievable flow rate should a leak occur at this location.

3.0 EVALUATION

In a previous Safety Evaluation (June 13, 1983), the staff made certain recommendations with respect to improvements in the data acquisition and analysis of the sleeve/tube inspection. The licensee has stated that all of these recommendations have been pursued to completion. The licensee has also pursued other inspection techniques such as the mixing of frequencies in rotating coils, the use of multi-element coils, digital signal processing and the evaluation of 3-d and cross wound probes. Rochester Gas and Electric indicated that although improvements have been made in the eddy current inspection techniques, for those areas at the weld transitions and the upper end of the sleeve, the technique still cannot detect and size defects at the 20% level. However, the current technique, using a biased annular differential multi-frequency coil, can see 20% thru wall defects, one inch above the top of the tubesheet sleeve and also at the lower transition region. The sensitivity is reduced to 40% at intermediate locations. There is a region of only 1½ inches in length along the tube where flaw detection in unreliable. The licensee has based the acceptability of the current inspection method on the fact that there have been only a small number of defects found in the crevice region during the last outage (attributed to their program of crevice flushing and water chemistry control) and the observation that those indications are within the crevice, below the explosive joint. Therefore, the potential for experiencing additional degradation in the area of concern is small. This is reinforced by preliminary results from a test on primary side stress corrosion cracking test program which indicates that there have been no detrimental effects caused by the tubesheet sleeve process.

To further minimize the consquences of postulated defects in the tubesheet region, the new sleeve design length is shorter by 1¼ inches. This provides a minimum of 0.75 inches of tube within the tubesheet that can be inspected with a sensitivity of 20% through wall. A leak rate calculation described in the RG&E letter of April 23, 1984 showed that 23 gpm would be the maximum leak rate during a main steam line break accident. This analysis postulated a severed tube with a 0.20 inch gap separation. Calculated flow from a 360° circumferential break is well within the charging pump capacity and, therefore, acceptable. The parameters for the calculation were based on the area of minimum inspectability extending from the top of the sleeve to approximately 0.75 inches below the top of the tubesheet at which point the inspectability is reliable..

4.0 CONCLUSION

As described above, the licensee has fulfilled the commitment to pursue the development of an improved inspection system. The licensee has also, as noted, modified the design of the sleeve to limit the area of minimum inspectability and provided an analysis to show acceptable consequences of a postulated tube failure. The licensee has further committed to continue the efforts to enhance the eddy current inspection capability. The staff, therefore, finds that the installation of no more than ten tubesheet sleeves of the modified design is acceptable.

5.0 ACKNOWLEDGEMENT

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