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

JUL 1 1988

MEMORANDUM FOR: Chairman Zech
Commissioner Roberts
Commissioner Carr
Commissioner Rogers

FROM: Victor Stello, Jr.
Executive Director for Operations

SUBJECT: RESPONSE TO INFORMATION REQUESTED DURING NOVEMBER 9, 1987, BRIEFING OF COMMISSION ON NORTH ANNA STEAM GENERATOR TUBE RUPTURE - GENERIC IMPLICATIONS (M871109)

On November 9, 1987, the NRC staff briefed the Commission on the July 15, 1987, steam generator tube rupture (SGTR) event at North Anna Unit 1. During the briefing, Chairman Zech requested a report to the Commission concerning staff action on the generic implications of this event.

The generic implications of the North Anna event can be grouped into two general categories:

1. tube integrity implications - are additional actions necessary to minimize the potential for similar tube rupture failures in the future?

2. implications relating to the adequacy of emergency procedures to mitigate the consequences of SGTR events.

This memorandum addresses item 1, above. The staff has already fully responded to item 2 in a memorandum to the Commissioners dated March 31, 1988. As indicated in that memorandum, the staff has concluded that the actions taken during the event by the North Anna operators were appropriate and have no generic implications with respect to plant operating procedures or the Westinghouse Emergency Response Guidelines.

The failure mechanism that led to the North Anna SGTR event involved a rapidly propagating fatigue crack due to excessive flow-induced vibration of the tube. The staff's investigation of this incident indicated that other Westinghouse steam generators employing carbon steel support plates might also be susceptible to this type of failure, depending on whether they exhibit other necessary requisite conditions, namely, "denting-type" corrosion of the uppermost tube support plates, high fluidelastic stability ratios, and tubes without effective support from antivibration bar supports.

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Accordingly, on February 5, 1988, the staff issued Bulletin 88-02, "Rapidly Propagating Fatigue Cracks in Steam Generator Tubes," to licensees and applicants for all 37 plants employing Westinghouse steam generators with carbon steel support plates. This bulletin requested that licensees and applicants for these plants evaluate their plant's susceptibility to such fatigue cracks and implement corrective actions, if necessary.

The NRC has received initial responses to the bulletin from all 37 plants. These responses indicate that 26 of the 37 plants are either confirmed or assumed to be affected by denting at the upper tube support and thus may be potentially susceptible to the North Anna failure mechanism. Each of these 26 plants has committed to an assessment of fluidelastic stability ratios and of the effectiveness of antivibration bar supports. Corrective actions (e.g., plugging susceptible tubes) will be implemented if found to be necessary. These tasks will generally be scheduled for completion during the next refueling outages for these plants. Pending completion of these tasks and their review and approval by the NRC staff, the licensees for each of these 26 plants have committed to implement an enhanced primary-to-secondary leak rate monitoring program pursuant to guidance presented in the bulletin as an interim compensatory measure. Licensees will be permitted to discontinue these enhanced programs after the above-mentioned analyses and corrective actions have been completed and approved by the NRC staff. The enhanced leak rate monitoring program is intended to ensure that in the event of a rapidly propagating fatigue crack, (1) the resulting leakage will be detected and adequately monitored by the operators and (2) the plant will be reduced to less than 50 percent power and ultimately shut down before rupture of the leaking tube occurs. Analysis by Westinghouse indicates that a reduction in power to 50 percent reduces flow velocities across the steam generator tubes sufficiently to halt further crack propagation.

In conclusion, the staff believes that the actions required by Bulletin 88-02 will be effective in minimizing the potential for future SGTRs involving the North Anna type mechanism.

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cc: SECY
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*(See previous concurrences).

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