

NORTHEAST UTILITIES



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April 13, 1979

Docket No. 50-336

Director of Nuclear Reactor Regulation
Attn: Mr. R. Reid, Chief
Operating Reactors Branch #4
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Reference: (1) W. G. Council letter to R. Reid dated February 12, 1979.

Gentlemen:

Millstone Nuclear Power Station, Unit No. 2
Steam Generator Inspections

In Reference (1), Northeast Nuclear Energy Company (NNECO) proposed revisions to Technical Specifications concerning steam generator inspections. It was proposed that the inspection requirements adopted as a result of the condition of the steam generators following Cycle 1 operation, and pertinent only to the March, 1979 inspection, be deleted. This concept was technically justified considering the corrective actions taken, and presumed that the inspections following Cycle 2 operation would demonstrate acceptable steam generator performance.

NNECO has performed eddy current and visual inspections of both Millstone Unit No. 2 steam generators during the present refueling outage that began March 10, 1979. Although the data obtained are still being analyzed, preliminary results are currently available, and these preliminary results are provided below to facilitate disposition of the Reference (1) request.

The eddy current testing program specified in the Millstone Unit No. 2 Technical Specifications (Section 4.4.5.0) has been performed. Results, summarized in Table 1, are based on testing approximately 2700 tubes in Steam Generator 1 and approximately 2200 tubes in Steam Generator 2.

No tube defects were discovered, as indicated in Table 1. Therefore, no corrective action based on tube defects is required. It is significant to note that this complete absence of defects includes 100% of the peripheral, exposed tubes that were examined. This region would be expected to be most susceptible to "loose-part" induced damage.

The deformation manifested by constriction of the tube ID to block passage of a 0.540 inch diameter probe at a Tube Support Plate (TSPL) elevation indicates active dent-related processes. The number of such blocked tubes has decreased

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dramatically during the last operating period to three tubes in the current outage. Likewise, dent progression at TSPL elevations was essentially insignificant when test accuracy is considered, zero in Steam Generator 1 and 2 mils in Steam Generator 2. Statistical plots of dent progression by TSPL are shown in Figures 1 - 8.

"Dent" signals had been observed at tube sheet and egg crate elevations during the January, 1978 outage. Based on the magnitude and frequency of these indications, they represented a relatively minor failure threat, as compared to TSPL indications.

Current dent indication results for these areas are also given in Table 1. No progression was apparent although the frequency of these occurrences may have increased slightly in localized areas.

Visual inspection of the secondary sides of both steam generators was performed both from the top of bundles, and from the lower hand holes.

The following observations were made:

- (1) The gap between the upper support plates and the shroud, established by the January, 1978 rim cutting, appeared essentially unchanged. No plate/shroud contact was observed.
- (2) The deposits appeared to be unchanged in general and some reductions were noted.
- (3) Several "loose parts" were present.
- (4) The general condition appeared similar to the condition existing after the repairs performed during the last outage.

The largest "loose part" observed is shown in Figure 9. It is a piece of TSPL that had apparently broken loose. Tube holes, flow holes, and ruptured ligaments are evident. The piece's dimensions are irregular, bounded roughly by a 5 cm. x 3 cm. rectangle. The piece was found on the No. 10 TSPL outer rim, on the cold leg side of Steam Generator 1. It is probable that this piece came from the No. 11 TSPL. Note the retention of a sharp angular geometry. It was also noted that the nonprotective magnetite at the tube hole surface was essentially intact. These observations, along with the absence of tube defects in the area of the No. 10 TSPL, support the conclusion that postulated impact-type movements that could lead to tube damage are not a serious threat.

Several areas around the existing, upper TSPL rim had cracked tube hole to flow hole ligaments. This situation is believed to have resulted from the synergistic effects of normal operating vibrations and the partially cracked ligament conditions existing in January, 1978. To minimize the possibility of complete separation during the next cycle, similar pieces that were loosely attached have been manually removed.

Corrective or preventative actions instituted by NNECO as a result of this inspection consisted of manually removing the loosely attached, and unattached, TSPL pieces, as discussed above and plugging a total of five (5) tubes, two (2) in Steam Generator No. 1 and three (3) in Steam Generator No. 2. The five plugged tubes included the three blocked tubes, tubes that would not pass the EC probe, one tube whose hot-leg plug had inadvertently been omitted during the 1978 plugging campaign, and one suspect "weld leaker". These actions are more conservative than the tube plugging criteria established during the previous outage.

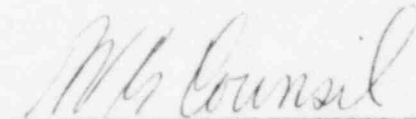
In summary, preliminary analysis of the results of this steam generator inspection indicate that the denting rate has been reduced significantly, if not completely arrested. Furthermore, no tube defects were detected in an eddy current test sample representing approximately 30% of the total tube population. It is believed that the corrective actions instituted by NNECO during and subsequent to the November, 1977 outage are responsible for this favorable situation. Two (2) actions of particular importance were: (1) the phasing in of a full flow condensate polishing system using deep-bed demineralizers, and (2) the "rim cut". The former action maintained feedwater purity, thus avoiding a "denting chemistry", and the latter minimized potentially harmful secondary effects associated with any possible denting brought on by residual impurities. The gap between the upper support plates and the shroud has been maintained for Cycle 3 operation, and the full flow condensate polishing system will remain in operation for Cycle 3.

Although detailed analyses of the nearly 5000 tubes inspected is in progress, the review conducted to date is sufficient to conclude that the steam generators are suitable for service during Cycle 3. The Technical Specifications proposed in Reference (1) are in conformance with or in excess of the requirements of Regulatory Guide 1.83, and are appropriate for Millstone Unit No. 2.

We trust the above information is sufficient for you to favorably disposition our request of Reference (1).

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY



W. G. Council
Vice President

Attachment