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February 5, 1995
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U. S. Nuclear Regulatory Commission
Att: Document Control Desk
Washington, DC 20555

Dear Sir:

Subject: Three Mile Island Nuclear Station, Unit 1 (TMI-1)
Operating License No. DPR 50
Docket No. 50-289
Request for NRC Review of the TMI-1 OTSG Tube Inspection
Plan for the Cycle 11 Refueling (11R) Outage

During NRC Inspection 94-23 GPU Nuclear discussed plans for eddy current tests (ECT) of the Once Through Steam Generator (OTSG) tubes during the Cycle 11 Refueling (11R). For future inspections, we have explored the option of testing a larger sample size of approximately 21%. We believe that establishing a sample size this large will provide a better data base of information on which to base conclusions regarding OTSG tube integrity.

Inspection Report (IR) 94-23, dated January 10, 1995 concluded that the 10R OTSG tube inspections and GPU Nuclear's evaluation of the results met the Technical Specifications (TS) Requirements. The NRC Region I inspectors had no comments on GPU Nuclear plans for 11R tube inspections. However, because of the differences resulting from the 21% sample size, it was suggested that we submit our TS interpretation for NRC review at this time to preclude the need for discussions related to TS compliance during or after the 11R Outage.

We believe that the approach described in the attached TS Interpretation remains in compliance with the existing TS requirements. NRC comments are requested by June 1995 to provide the time to resolve any comments regarding TS compliance prior to the 11R outage which is scheduled to begin in September 1995.

Sincerely,

T. G. Broughton
Vice President and Director, TMI

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cc: Region I Administrator
TMI-1 Senior Project Manager
TMI Senior Resident Inspector

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Technical Specification (TS) Interpretation
TS 4.19 - OTSG Inservice Inspection Sampling Requirements

REQUIREMENT

Assuming that both Once Through Steam Generators (OTSGs) are to be inspected, TMI-1 TS 4.19 requires that each OTSG inservice inspection begin with a sample of least 3% of the total number of tubes in each OTSG (15,531) and that tube selection be on a random basis except as specified in TS 4.19.2. Examination results are classified as either Category C-1, C-2, or C-3 where:

1. Category C-1 occurs when less than 5% of the total tubes inspected in a steam generator are degraded tubes and none of the inspected tubes are defective.
2. Category C-2 occurs when one or more tubes, but not more than 1% of the total tubes inspected in a steam generator are defective, or between 5% and 10% of the total tubes inspected are degraded tubes.
3. Category C-3 occurs when more than 10% of the total tubes inspected in a steam generator are degraded tubes or more than 1% of the inspected tubes are defective.

Depending on the results classification, sampling may be required to escalate to a second or third sample beyond 3% and could require inspection of the entire OTSG.

BACKGROUND

This interpretation is only concerned with the organization and sequencing of inspection samples in keeping with the objective of the OTSG inspections. The escalations of inspections as required by TS Table 4.19-2 for Category C-1, C-2, or C-3 inspection results are unaffected by this interpretation.

Plans for 11R will involve programming a total inspection sample of 21% of the 15,531 tubes in each OTSG. This total sample will be broken down into predesignated 3%, 6%, and 12% elements. Predesignated subsamples will provide a means of categorizing the inspection results for reporting purposes. If category C-3 results were to be obtained, inspection of the entire OTSG would still be required per TS Table 4.19-2.

The predesignated 3% subsample will include all previously degraded tubes as required by TS 4.19.2 and the remainder will be randomly selected. For inspection efficiency and to keep personnel exposures ALARA, the predesignated 6% and 12% subsamples will not be selected randomly. Tubes from each of the 3%, 6%, and 12% elements may be distributed throughout the total 21% sample and will likely not be inspected as discrete groups in succession. Use of this sampling method over time, even without further escalation, would result in the inspection of 100% of the tubes in each OTSG.

INTERPRETATION

1. In all cases, the initial random sample shall be greater than or equal to 3% and the following guidelines shall be applied:
 - a. For the predesignated initial 3% sample, the selection requirements of TS 4.19.a 1-4 documenting the exceptions to a "random basis" shall be followed.

- b. For the predesignated second and third sample (6% + 12%) portions of the 21% tube inspection sample, tube selection is not required to be from "those areas of the tubesheet array where tubes with imperfections were previously found" unless partial tube length inspections are elected under T.S. 4.19.2.b. For the predesignated second and third samples, representative sampling of all areas of the tube bundle may be performed in lieu of purely random tube selection. Such representative sampling should ordinarily be from the population of tubes which has not been inspected in the most recent tube inspections. Over several outages this sampling method would ensure that all tubes are inspected at least once. Purely "random" sampling might reinspect the same tubes several times while ignoring other tubes.
2. This TS interpretation is based on application of Table 4.19-2 in a cumulative manner. Selecting a programmed sample size beyond the minimum can provide for a better utilization of resources for the planning and execution of the OTSG inspections. TS compliance is accomplished by determining a programmed sample size which equals or exceeds the cumulative sample size which could result from the inspections performed per TS Table 4.19-2. Sample groups are pre-designated before the outage to ensure compliance with C-3 escalation criteria; if C-3 escalation is not required, the minimum additional sampling required shall be those inservice tubes immediately adjacent to new defective tubes. (It is recommended that adjacent tubes to new degraded tubes also be inspected).
3. The derivation of a programmed sample size of 9% is as follows:
- Assuming an initial sample of 3% and the results of this sample are C-2 (one defective tube but not more than 1% defective in a steam generator, or between 5%-10% are degraded), then an additional 6% random tube sample is required. If the results of this second sample are C-1 (no defective tubes and less than 5% degraded tubes), then no additional samples are required. The cumulative inspection size is 9% with <5 defective tubes and <47 degraded tubes allowed without further evaluation.
4. The derivation of a programmed sample size of 21% is as follows:
- Assuming an initial sample of 3% and the results of this sample are C-2 (second sample of 6% is required) and the results of this second sample are also C-2 (additional sample of 12% is required). The cumulative sample size is 21% and with each sample having C-2 results, up to 1% defective tubes (<5 tubes) and 5-10% degraded tubes (<47 tubes) are allowed without further evaluation. A 21% sample is the minimum required in this instance.
5. If 5 or more defective tubes (1% of 3% sample) or 47 or more degraded tubes (10% of 3% sample) result from 21% programmed inspection (or any other programmed sample size greater than 3%), then further results evaluation shall be done to ensure that more extensive tube inspections are not required by TS Table 4.19-2.

Example 1: For a 21% programmed sample, if 5 or more tubes are found defective (or 47 or more tubes are found degraded) in the initial 3% portion of the sample (designated before the outage), then a C-3 condition is declared and all tubes in that OTSG plus 6% of the other OTSG must be inspected.

Example 2: For a 21% programmed sample, if 10 or more tubes are found defective (or 94 or more tubes are found degraded) in the 6% portion of the sample (designated before the outage), then a C-3 condition is declared and all tubes in that OTSG plus 6% of the other OTSG must be inspected.

Example 3: For a 21% programmed sample, if 19 or more tubes are found defective (or 187 or more tubes are found degraded) in the 12% portion of the sample (designated before the outage), then a C-3 condition is declared and all tubes in that OTSG plus 6% of the other OTSG must be inspected.

6. As discussed in Paragraphs 3 and 4 above, further evaluation of cumulative inspection results may be necessary if the results are not as straightforward as the first three examples. For the sake of simplicity, only defective tubes are considered below. (A similar approach would apply the different categorization criteria totals for degraded tubes.)

Example 4: For a 21% programmed sample, if no tubes are defective in the initial 3% sample, and 1 to 9 (or 1 to 18) tubes are defective in either the predesignated 6% (or 12%) second (or third) samples respectively, then a C-2 condition is declared, but no additional inspections (beyond the "adjacent to defective tubes" minimum allowed sampling of Paragraph 2 above) are required.

CONCLUSION:

This interpretation complies with the existing TS requirements because a 21% inspection size satisfies the requirements resulting from inspection results up to and including C-2. This interpretation provides for predesignation of 3, 6, and 12% samples in order to retain the TS required sample escalations beyond a 21% sample size for C-3 results and for the required reporting of C-3 results to the NRC.