

March 27, 2007

Mr. Thomas J. Palmisano
Site Vice President
Prairie Island Nuclear Generating Plant
Nuclear Management Company, LLC
1717 Wakonade Drive East
Welch, MN 55089

SUBJECT: PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNIT 2 - NUCLEAR
REGULATORY COMMISSION STAFF REVIEW OF STEAM GENERATOR
TUBE INSPECTION REPORTS FOR THE 2005 OUTAGE (TAC NO. MD2717)

Dear Mr. Palmisano:

By letters dated June 8, June 22, and September 8, 2005, and December 21, 2006 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML051650318, ML051740093, ML052560345, and ML063550354, respectfully), Nuclear Management Company, LLC (the licensee), submitted information summarizing the results of the 2005 steam generator tube inspections performed at Prairie Island Nuclear Generating Plant (PINGP) Unit 2, during refueling outage 23. In addition to these reports, the Nuclear Regulatory Commission (NRC) staff summarized additional information concerning the 2005 steam generator tube inspections at PINGP Unit 2 in a letter dated July 19, 2005 (ML051870124).

As discussed in the enclosed evaluation, the NRC staff concludes that the licensee provided the information required by their technical specifications. In addition, the NRC staff did not identify any technical issues that warrant follow up action at this time.

Sincerely,

/RA/

Mahesh L. Chawla, Project Manager
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-306

Enclosure:
Inspection Summary Report

cc: See next page

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ASSESSMENT OF THE FALL 2005
STEAM GENERATOR TUBE INSPECTION REPORT
NUCLEAR MANAGEMENT COMPANY, LLC
PRAIRIE ISLAND NUCLEAR GENERATING PLANT UNIT 2
DOCKET NO. 50-306

By letters dated June 8, June 22, and September 8, 2005, and December 21, 2006 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML051650318, ML051740093, ML052560345, and ML063550354, respectfully), Nuclear Management Company, LLC (the licensee), submitted information summarizing the results of the 2005 steam generator tube inspections performed at Prairie Island Nuclear Generating Plant (PINGP) Unit 2, during refueling outage 23. In addition to these reports, the Nuclear Regulatory Commission (NRC) staff summarized additional information concerning the 2005 steam generator tube inspections at Prairie Island Unit 2 in a letter dated July 19, 2005 (ML051870124).

The two steam generators (SGs) at PINGP Unit 2, are Westinghouse model 51 SGs. Each SG contains 3,388 mill annealed Alloy 600 tubes. Each tube has a nominal outside diameter of 0.875-inch and a nominal wall thickness of 0.050-inch. The tubes were roll expanded into the tubesheet at both ends for approximately 2.75-inch (i.e., they are expanded for only a fraction of the tubesheet thickness and are considered partial depth hard-rolled tubes). The tubes are supported by a number of carbon steel tube support plates. The original anti-vibration bars were removed and replaced. The tubes installed in rows 1 and 2 were subjected to an in-situ thermal stress relief in May 2000. To repair defects, many tubes have been roll expanded into the tubesheet region above the original factory roll expansions. The hot-leg temperature at PINGP, Unit 2, has been approximately 590 degrees Fahrenheit since commencement of initial operation. There are no sleeves installed in the Unit 2 SGs as of 2005.

In addition to the depth-based tube repair criteria, the licensee is also authorized to apply the voltage-based tube repair criteria for predominantly axially-oriented outside diameter stress corrosion cracking at the tube support plate elevations. Although authorized to implement the voltage-based repair criteria, the licensee has not found it necessary to implement these criteria since few, if any, indications subject to this repair criteria have been identified at Unit 2. In addition, the licensee is authorized to leave flaws within the tubesheet region in service provided they satisfy the F*/EF* repair criterion. The major cause of degradation within the tubesheet region is primary water stress corrosion cracking at the roll transition zones. Secondary side intergranular attack and outside diameter stress corrosion cracking have also been observed at this location.

The licensee provided the scope, extent, methods, and results of their SG tube inspections in the documents referenced above. The licensee also described corrective actions (i.e., tube plugging or repair) taken in response to the inspection findings.

ENCLOSURE

The NRC staff has the following notes/observations as a result of reviewing the aforementioned documents submitted by the licensee:

No crack-like indications were detected in the U-bend region during the 2005 outage (refer to October 28, 2004 letter (ML042880026) regarding previous inspection results).

No crack-like indications have ever been identified in the dents at PINGP, Unit 2.

Several tubes were observed to have "cold-leg" thinning. Some of these tubes appeared to exhibit high growth rates. The licensee attributed these apparent high growth rates to the effect of the mix residual and the signal to noise ratio on the resultant phase angle and subsequent depth estimate.

Two single volumetric indications were identified and plugged during the outage. These indications were attributed to thinning; however, they were located outside the location where cold-leg thinning is normally observed.

As a result of thermal stress relief of the U-bend region of the tubes in rows 1 and 2, dent-like indications occurred near the two uppermost tube support plates of the tubes in these rows. Additional details regarding the denting observed at Units 1 and 2 following the U-bend stress relief are contained in a letter dated April 29, 2004 (ML041180217). During the 2005 outage, several additional dents were detected at the uppermost tube support plate; however, a review of the 2003 data indicated that all were present at that time but were not recorded (because they did not meet the requirements for being called a dent which is based on a complex computerized data sorting algorithm). A review of the dents identified and reported in both the 2003 and 2005 outage indicated an increase in the average dent voltage. This increase was attributed (by the licensee) to eddy current repeatability.

Several loose parts were left in the SG. These loose parts were observed during at least one prior outage and there were no eddy current indications associated with these loose parts.

Based on a review of the information provided, the NRC staff concludes that the licensee provided the information required by their technical specifications. In addition, the NRC staff concludes that there are no technical issues that warrant follow-up action at this time since the inspections appear to be consistent with the objective of detecting potential tube degradation and the inspection results appear to be consistent with industry operating experience at similarly designed and operated units.

Prairie Island Nuclear Generating Plant,
Units 1 and 2

cc:

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