April 25, 2003

Mr. R. T. Ridenoure
Division Manager - Nuclear Operations
Omaha Public Power District
Fort Calhoun Station, FC-2-4 Adm.
P.O. Box 550
Fort Calhoun, NE 68023-0550

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION RELATED TO THE FORT CALHOUN STATION STEAM GENERATOR REPORT (TAC NO. MB6954)

Dear Mr. Ridenoure:

By letters dated July 1, 2002 (ML021910122), and December 3, 2002 (ML023400505), Omaha Public Power District (OPPD), provided the results from their 2002 steam generator tube inspections for the Fort Calhoun Station, Unit 1 (FCS). By letter dated September 17, 2002 (Adams Accession No. ML022490219), the NRC staff summarized a phone call held with OPPD during their 2002 steam generator tube inspections.

The staff has reviewed OPPD's submittals and determined that additional information is needed to complete our review of the steam generator inspection results. A request for additional information is enclosed. This request was discussed with Richard Jarworski of your staff on April 22, 2003, and it was agreed that a response would be provided by July 30, 2003.

If you have any questions, please contact me at (301) 415-1445.

Sincerely,

/RA/

Alan B. Wang, Project Manager, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-285

Enclosure: Request for Additional Information

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION

STEAM GENERATOR TUBE INSPECTIONS

OMAHA PUBLIC POWER DISTRICT

FORT CALHOUN STATION, UNIT 1

DOCKET NO. 50-285

By letters dated July 1, 2002 (Adams Accession No. ML021910122), and December 3, 2002 (Adams Accession No. ML023400505), Omaha Public Power District (OPPD), provided the results from their 2002 steam generator tube inspections for the Fort Calhoun Station, Unit 1 (FCS). By letter dated September 17, 2002 (Adams Accession No. ML022490219), the staff summarized a phone call held with the licensee during their 2002 steam generator tube inspections.

The staff has reviewed the licensee's submittals and has determined that additional information is needed to complete our review. Please respond to the following questions.

1. It is the staff's understanding that the reporting criteria at FCS for dents was established at 3 volts and that motorized rotating probe coil (MRPC) inspections were performed at various dented locations in the steam generator. With respect to dented locations:

   a. Please discuss the basis for the selection of 3 volts as the screening criteria for identifying dents rather than some lower threshold such as 2 volts. Your response should include discussions on both outer diameter stress corrosion cracking (ODSSC) and primary water stress corrosion cracking (PWSSC). In addition, probe wobble can mask dents. The staff's concern is at what point do dents and/or probe wobble signals need to be further investigated with rotating probes to ensure an effective inspection. OPPD should review the lessons learned from the Comanche Peak Special Inspection (Adams Accession No. ML030090566) in which probe wobble masked a dent and, in turn, resulted in a flaw not being reported.

   b. Please clarify the number, location, and magnitude of the dents including whether the dent is at a drilled hole tube support, an eggcrate support, or some other support structure. If possible, determine whether the dents at drilled hole locations can be separated from the dents at eggcrates.

   c. For each flaw detected during the outage, indicate the magnitude of the dent at that location and indicate whether the flaw (1) was initially found during the bobbin screening, (2) was only identified with the MRPC, (3) was identified during the initial bobbin screening and confirmed by MRPC, or (3) was only identified with the bobbin after the MRPC results were available.

   d. For those dents not at drilled hole tube supports (since all dents at drilled tube supports were examined by MRPC), it appears that 20 percent of these locations

on the hot-leg were originally scheduled to be examined by MRPC (and was subsequently expanded to included 100 percent of the dents at the first two hot-leg tube supports). Please clarify whether the "hot-leg" includes the hot-leg diagonal bar and the vertical supports (V1, V2, and V3). Please discuss the inspection results for these dents. If any flaws were identified, discuss the size of the flaw and the size of the dent at this location.

e. Regarding the expansion of the MRPC inspection to include all hot-leg dents at the first two hot-leg tube supports, please clarify why the expansion was limited to this region. The staff notes that both stress and temperature affect a tube's susceptibility to stress corrosion cracking. As a result, a larger dent at a lower temperature may be as severe (from a stress corrosion cracking standpoint) as a smaller dent at a higher temperature (material properties being equal). PWSCC is also a concern at dents. Your response should reflect both ODSCC and PWSCC.

The licensee has taken a position that magnitude of the dent does not necessarily equate to severity. However, there is still an issue that a more severe dent at a higher elevation with a lower temperature may crack earlier than a lower location. As a result, once cracking is observed, some assessment of not only the temperature but also the severity of the dent/ding should be performed. The staff noted that although the population of flaws may follow a trend, this does not ensure there are not exceptions (i.e., the experience at Westinghouse plants where flaws are detected at higher tube supports in one outage and then at lower tube supports in subsequent outages).

f. It is the staff's understanding that dent sizes at FCS range up to 100 volts in magnitude. Discuss whether the bobbin probe is qualified to inspect dents with that magnitude. Discuss the extent to which the bobbin probe is qualified to inspect dented regions exceeding a specific voltage threshold (e.g., 5 volts).

2. For locations with dings, please provide information similar to what was provided for the dented locations. For example: (1) clarify the screening criteria (e.g., 3 volts), (2) provide a summary of the number, location, and severity of all dings, (3) provide a list of all flaws associated with dings along with the amplitude of the ding, (4) provide the basis for any expansion of the inspection, etc.

3. Please clarify what is meant by the term "previous less than zero indications." This term was used in bullet 4 on page 3 of the December 3, 2002, submittal.

4. With respect to the MRPC examinations performed from DBH to H5 in the critical area and the MRPC examinations performed in the 90-degree bends outside the critical area, discuss the results from the examination. If flaws were identified, indicate whether the flaw was initially found during the bobbin screening (or whether the flaw was only identified with the bobbin after the MRPC results were available, or whether the flaw was only identifiable from the MRPC data). If flaws were identified, discuss whether the scope of the inspection was expanded. If not, discuss why not.

5. Discuss the technical basis for the critical area (superposition of partial drilled hole tube support plate locations) discussed in question 4.

6. On page 6 of the December 3, 2002, submittal, it was indicated that historical data reviews were performed for the single axial indications and that of the 74 indications identified, 33 indications showed no change and 3 showed change. Please clarify how the 74 indications were detected during the 2002 outage (by bobbin, by MRPC only, by bobbin only after MRPC identification, etc.). Please discuss whether the "change" referred to is a change in the bobbin coil data and/or the MRPC data.

   From above, 33 indications were identified and confirmed as flaws by MRPC in 2002. In evaluating the previous data (presumably bobbin data) for these indications, there was no change in the signals from the prior inspection. Given there was no change in the bobbin data and flaws are known to exist at these locations, discuss why it was appropriate to use historical comparisons of the bobbin data as a basis for not MRPC inspecting other bobbin indications identified in 2002. That is, if in 2002 a bobbin indication is identified and a historical comparison is made to the 2001 bobbin data and there is no change (regardless of the results of previous MRPC examinations), wouldn't the results from the evaluation of the 74 indications discussed above indicate that there is a potential for a flaw to be present. Were any of the flaws that were identified in 2002 and that exhibited "no change" since the 2001 data, inspected by MRPC in 2002? At locations where the bobbin shows no change and for which a previous MRPC examination did not confirm a flaw (i.e., non-relevant indications), please discuss whether any random MRPC examinations have been performed to confirm the adequacy of the screening criteria for determining when an MRPC examination should be performed?

7. Circumferential indications were detected at dented hot-leg drilled supports. The dent size associated with these indications ranged from 2.3 volts to 22.09 volts. Discuss whether circumferential indications could also be present at hot-leg dents at non-drilled hole tube supports. If not, discuss the technical basis. If so, discuss whether all "dented" non-drilled hole hot-leg tube supports were inspected with an MRPC. The staff also notes that the smallest dent associated with these circumferential indications was below the dent screening criteria used at FCS (2.3 volts). Also, can OPPD provide information regarding to what extent were rotating probe examinations performed at the eggcrate locations?

8. For the two tubes which were restricted because of a severe geometric condition, discuss how this condition occurred and whether it has been getting more severe with time. Discuss what actions were taken to confirm that these tubes satisfied the performance criteria.

9. It was indicated that "signal confirmation requirements" for reporting flaws at eggcrate supports was eliminated based on recent experience from another Combustion Engineering designed steam generator. Please discuss what is meant by "signal confirmation requirements". Please discuss why this signal confirmation was not eliminated for all locations (i.e., regardless of whether the flaw was at an eggcrate location). For flaws identified this outage at non-eggcrate locations, discuss whether

they could have been reported in the previous outage if the signal confirmation requirements had not been imposed at these locations.

10. During the inspection, a bobbin probe with a diameter of 0.540-inch or 0.560-inch was used to inspect the tubes during 2002. Discuss why a probe of larger diameter (that would improve the fill factor) is not used during the inspections? Include in the response a discussion of the noise levels in the tubes and the severity of the dents and how they compare to the qualification data for these probes for the examination of 0.750-inch diameter tubes with 0.048-inch wall thickness. Discuss whether the fill factor is an essential variable for the bobbin techniques used at FCS. If so, provide the limits for the qualification. Specifically, discuss how many data points are available in the qualification data set for these sized probes for the examination of the size of tubing used at FCS.

    OPPD has noted that the Examination Technique Specification Sheet for the bobbin technique now indicates the maximum probe size to be used during qualification. Does this mean that the use of smaller probes would no longer be considered adequate without a site specific demonstration? If so, what site specific demonstration was performed.

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