From: "Kivi, Jeffrey L." <Jeffrey.Kivi@nmcco.com>
To: "Chawla, Mahesh" <mlc@nrc.gov>
Date: 09/26/2006 3:39:34 PM
Subject: RE: SG Inspection Report

Before we put our response on the docket, our staff wanted to make sure we incorporated the three questions to your satisfaction (to avoid having to make an additional response). The revised draft unvalidated response is below. If we have not adequately addressed your questions, let me know.

Jeff Kivi P.E.
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Prairie Island Nuclear Generating Plant
651.388.1121 x4120

=======================Unvalidated Response draft r1===
==NRC Question 1

In Table III of your September 8, 2005 letter, several tubes were plugged for indications at the cold-leg tube support plates (presumably attributed to cold-leg thinning). The depth of the degradation for several of these indications increased significantly when compared to the last outage. For example, one indication grew from 25- to 44-percent through-wall (steam generator 21, row 45, column 41); another indication grew from no reported degradation to 56-percent through-wall (steam generator 22, row 44, column 34); and another indication grew from 26- to 46-percent through-wall (steam generator 22, row 42, column 60). Assuming these indications are attributed to cold-leg thinning, the growth rates appear high. Please discuss any insights you have on the growth rates for the cold-leg thinning indications at Prairie Island Unit 2. Please include in your response historic growth rates for cold-leg thinning (average growth rates and maximum growth rates) and the implications of these apparently high growth rates on future inspection intervals.

==Nuclear Management Company, LLC, (NMC) Response to Question 1

The presumption that the tubes repaired by plugging for indications at cold leg tube support plates were attributable to cold leg thinning is correct. The apparent high growth rates appear abnormal, but can be explained when taking into consideration the effect of the mix residual and signal to noise ratio on the resultant phase angle and subsequent depth estimate. Generally, the lower the voltage of the measured signals the less accurate the resultant depth estimates and the higher the voltage of the measured signals the more accurate the resultant depth estimates. For R45C41, the 2003 data was 2.08 Volts and the 2005 data was 1.70 Volts indicating little or no growth. Similarly for R44C34, a 2003 look back revealed a 0.73 Volt distorted support indication (DSI) (70% depth estimate) called by the primary analyst which was resolved to no detectable discontinuity (NDD) in the resolution process and the 2005 data was 0.69 Volts again indicating little or no growth. For R42C60, the 2003 data was 1.37 Volts and the 2005 data was 2.45 Volts indicating some degree of growth. However, when R42C60 voltage growth is compared to the voltage growth of R45C39 (3.28 Volts in 2003 and 3.68 Volts in 2005) both depth estimates of R42C60 appear biased to the high side. These results are in line with the Electric Power Research Institute (EPRI) ETSS #96001.1 estimate of technique sizing error of 15.27 root mean square error (RMSE).

To determine future inspection intervals a Condition Monitoring Operational Assessment is done per the Nuclear Energy Institute (NEI) and EPRI guidelines. This evaluation demonstrates the as-found condition of the steam generator tubes met the Structural Integrity Performance Criteria (Condition Monitoring) and that over the next operating cycle (or future inspection interval) the tubing will continue to meet these Performance Criteria (Operational Assessment). A Condition Monitoring Evaluation of all indications demonstrated that structural integrity was maintained - all indications were less than the End of Cycle Allowable Degradation Severity limit (discussed below). The Condition Monitoring Evaluation also verifies that the previous Operational Assessment was correct and structural integrity was maintained throughout the inspection cycle. However, a new Operational Assessment needed to be done because of the inaccuracies in some tube degradation measurements for tubes lower voltage signals (as described above) a statistical evaluation is done. This evaluation uses the Beginning of Cycle Worst Case Degradation (48.8% through wall (TW) Average Depth for Cold Leg Thinning indications - this includes measurement inaccuracies), and uses the 95th Percentile Degradation Growth for the next 1.5 effective full power years (EFPY), our next inspection interval/operating cycle (7.2% TW Average Depth), with the Bounding Axial Length (.43" - a function of the tube support plate geometry and verified by tube pull). This gives the Projected Degradation Severity (48.8% + 7.2% = 56.0%). This is compared to the End of Cycle Allowable Degradation Severity 78.4%. The End of Cycle severity is based on tube pull data, In-Situ testing, and Flaw Analysis. The difference between the Projected and the Allowable is considered the Structural Margin. This evaluation uses a Monte Carlo analysis, thus, the average growth rates and maximum growth rates are useful only as a starting point for deriving the Degradation Growth Rate and evaluating future inspection interval.

Therefore, there is no effect on the current inspection interval and future inspection intervals will be addressed in the Operational Assessment based on the Condition Monitoring for that inspection.

==NRC Question 2

Please discuss the nature of the single volumetric indications that were plugged during the outage.

==NMC Response to Question 2

The two single volumetric indications (SVI) indications plugged were both attributed to thinning located outside the site-specific cold leg thinning defined location. For R7C38, a 2003 look back revealed a 0.59 Volt DSI (59% depth estimate) called by the primary analyst which was resolved to NDD in the resolution process and the 2005 data was a 0.75 Volt DSI confirmed by motorized rotating pancake coil (MRPC) testing as a SVI. For R7C86, a 2003 look back revealed a NDD condition and the 2005 data was a 0.44 Volt distorted tubesheet indication (DTI) confirmed by MRPC testing as a SVI.

==NRC Question 3

Please discuss whether the extent (number of tubes affected) and the severity of the dents at the uppermost tube support plates is similar to what has historically been observed at Prairie Island Unit 2 (i.e., is the denting "stable").

==NMC Response to Question 3

In steam generator 21, during the 2003 inspection, eight dents were reported at the uppermost tube support plates and during the 2005 inspection six of those were reported, two were called indication not reportable (INR) (one due to mix residual and one was below the 2.0 Volt calling criteria) and two new dents were reported. A 2003 look back on the two new dents revealed a 2.35 Volt and a 3.57 Volt dent not called by secondary using computerized data screening (CDS).

In steam generator 22, during the 2003 inspection, 27 dents were reported at the uppermost tube support plates and during the 2005 inspection 24 of those were reported, three were called INR (all below the 2.0 Volt calling criteria) and seven new dents were reported. A 2003 look back on the seven new dents revealed a 1.62, 1.90, 2.04, 2.23, 2.26, 2.28 and 4.57 Volt dent not called by secondary using CDS.

Of the nine new indications in both steam generators, two were below the 2.00 Volt calling criteria. There is no apparent reason why the other seven were not called as they are all above the calling criteria and have phase angles between 177 and 188 degrees, well within the CDS sort parameter of 170 to 220 degrees. It is Prairie Island's practice to only have CDS flag non-degradation signals, like dents. However, both primary (doing manual analysis) and secondary (using a separate CDS sort from the dent sort) review all dent signals for indications indicative of cracking using EPRI ETSS# 24013.1 (bobbin coil detection of ODSCC at less than 5.0 Volt dents). Only dent signals greater than or equal to 5.0 Volts require MRPC testing as they could mask flaws. During the 2003 inspection all but one of the nine dent indications in question were MRPC tested in response to the Diablo Canyon operating experience and during the 2005 inspection three were tested again during the low row u-bend MRPC program.

In steam generator 21, the average voltage of the six repeatable indications is 9.76 Volts in 2003 and 11.05 Volts in 2005. In steam generator 22, the average voltage of the 24 repeatable indications is 4.42 Volts in 2003 and 4.60 Volts in 2005. The relatively small number of dents in steam generator 21 make the apparent 13% voltage increase statistically insignificant based on the sample size. The more relevant sample size found in steam generator 22 suggests a 4% increase in dent voltage between outages. This small increase in voltage can be discounted as it is well below the expected repeatability of the bobbin coil inspection method to measure tubing inside diameter variations.

==NRC Question 4

Please discuss the final results of your foreign object search and retrieval in steam generator 21. The staff notes that at the time of the conference call in May 2005, the inspections were still ongoing. If any loose parts (foreign objects) were left in service, please discuss whether an analysis was performed to confirm that tube integrity would be maintained (with the part in the steam generator) until the next scheduled tube inspection.

==NMC Response to Question 4

The nine previous possible loose part (PLP) indications in 21 Steam Generator discussed in our May 17, 2005 conference call with the NRC were inspected from the secondary side. These indications were associated with four objects. However, because of the locations of the parts and the potential for introduction of loose parts while trying to retrieve the four stationary objects, the objects were left in service. The objects were confirmed visually and appear to be hard scale, a sludge rock, a 3/8" x 1/4" x 1/8" smooth object, and a ½" x ¼" x 1/8" metal bar. There were no eddy current tubing indications adjacent to these objects and all four had been observed at these locations for a least one outage. Therefore, retrieval was not attempted.
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-----Original Message-----
From: Mahesh Chawla [mailto:MLC@nrc.gov]
Sent: Wednesday, September 20, 2006 2:18 PM
To: Kivi, Jeffrey L.
Subject: RE: SG Inspection Report

Yes! That would be prefered route. Thanks

>>> "Kivi, Jeffrey L." <Jeffrey.Kivi@nmcco.com> 09/20/2006 2:23 PM >>>
Do you want a response on the docket?

-----Original Message-----
From: Mahesh Chawla [mailto:MLC@nrc.gov]
Sent: Wednesday, September 20, 2006 1:02 PM
To: Kivi, Jeffrey L.
Cc: Kenneth Karwoski

Subject: SG Inspection Report

Jeff,

The NRC staff reviewed your response to our RAI questions and has the following suggestions:

1. In their response to RAI 1, the licensee should consider addressing why R44C34 was not detectable in 2003 at 56% through-wall (assuming little or no growth). In addition, they should consider adding why this wasn't the starting point for their operational assessment.

2. In their response to RAI 3, the licensee should discuss any insights on why these dents were not flagged by CDS (or the primary analyst) since dents can mask flaws so it is important to ensure they are all identified.

3. In their response to RAI 4, the licensee may want to indicate that the 9 PLPs were associated with 4 loose parts (or were in 4 distinct locations).

Please let me know if you need a teleconference for further clarifications. Otherwise, please send in your revised response.
Please let me know the estimated date for your proposed response.
Thanks

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Subject:	RE: SG Inspection Report
Creation Date	09/26/2006 2:37:18 PM
From:	"Kivi, Jeffrey L." <Jeffrey.Kivi@nmcco.com>
Created By:	Jeffrey.Kivi@nmcco.com

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MLC (Mahesh Chawla)

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TEXT.htm	16441	
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Options

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Priority:	Standard
ReplyRequested:	No
Return Notification:	None
Concealed Subject:	No
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