From: Wayne Schmidt
To: David Lew
Date: Tue, Jun 27, 2000 5:32 PM
Subject: Sorry I'll miss all the fun tomorrow. Attached is the rev with Brian's comments input.

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Greg and Ian will be continuing their review of the RAI root cause responses.

If you need me, call my cell phone [redacted] EX 6

ITEM # 55

P/4

PREDECISIONAL INSPECTION INFORMATION
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Indian Point 2 Steam Generator Special Inspection Summary

Prepared by: Wayne Schmidt - Team Leader - Region I - 610-337-5315

This is a draft of possible information for the "quick look letter."

Scope:

The team conducted this inspection to review the February 15, 2000, excessive primary to secondary leak from steam generator (SG) 24 (primary water stress corrosion crack (PWSCC) at the inter diameter (ID) apex of tube SG 24 - Row 2 Column 5 (R2C5)). The inspection was conducted in several phases. First, directly following the event, NRR staff members and a SG tube eddy-current specialist conducted inspection and data gathering. This activity included in-process review of eddy current examination data and comparison of results to the 1997 SG eddy current inspection data. Second, regional inspectors and an NRR eddy-current inspection specialist gathered information from ConEdison and at the eddy-current contractor's site and conducted the onsite inspection during the week of June 19, 2000.

The team focused on the eddy current and visual inspection programs conducted in 1997 with respect to row 2, low radius U-bend ID apex indications in Indian Point 2 SGs. Specifically, the team focused on the licensee's response following the identification of a flaw in tube SG 24 - R2C67 during the 1997 examination. During the initial phase of the inspection the team determined, based on independent review of 1997 data, that ConEdison failed to identify several tubes with indications, including SG 24 - R2C5, that should have been plugged prior to restart from the 1997 refueling outage. ConEdison, in its root cause analysis dated April 14, 2000, attributed the failure to identify these indications to the masking effects of noise in the mid-range plus point eddy-current signal. The team evaluated the acceptability of the mid-range plus point examination techniques used in 1997 on the Indian Point 2 steam generators. The team reviewed the root causes analysis and the ConEdison responses to the associated NRC staff questions.

Conclusions:

The team concluded that ConEdison should have identified the PWSCC indications in six SG tubes, including SG 24 - R2C5, during the 1997 outage. Further, the root cause of these missed indications and the R2C5 tube failure was poor ConEdison management of the SG inspection program, as evidenced by: no extent of condition review for the newly identified PWSCC at a low radius U-bend ID apex, the use of an unqualified eddy current technique, and the insensitivity to the possibility of upper support plate denting and/or flow slot hourglassing contributing to increased stress at the apex of low radius U-bend tubes.

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Specifically,

- ConEdison did not identify SG tube u-bend defect indications in SG 21 - R2C87; SG 23 - R2C85; and SG 24 - R2C69, R2C71, and R2C72.
- ConEdison had weak controls over the eddy current inspection process in 1997. Poor quality data (low signal to noise ratios) was not evaluated as to its possible effect on the probability of detection of a low radius u-bend crack.
- ConEdison took no actions to evaluate the extent of condition when PWSCC was identified in SG 24. Following identification of a new significant degradation mechanism there was no analysis conducted to determine its possible extent or cause for this condition.
- ConEdison used an unqualified plus point technique that negatively affected the probability of detection of u-bend indications. The plus point probe used in 1997 was not setup with the required calibration standard, nor the eddy current technique phase rotation required by the EPRI qualified technique sheet.
- ConEdison did not recognize that the tube denting in the upper support plate, identified as eddy current probe restrictions was a precursor to flow slot hourglassing. Further, ConEdison did not have the ability to monitor for upper flow slot hourglassing in two of the four SGs, nor did they have a program to determine when such degradation would become significant with respect to stressing at the apex of low radius u-bend tubes.

Overall, ConEdison failed to identify, evaluate, and integrate the effects of poor eddy-current data quality, the use of an unqualified eddy current technique, and the possibility that stresses were affecting tubes other than SG24 - R2C67. Specifically, the licensee failed to identify adverse impacts on the probability of detection of flaws in low radius U-bend tubes and that tube denting and/or hourglassing at the upper support plate flow slots had reached the point where other tubes were being affected by apex ID PWSCC.