

From: Wayne Schmidt
To: Brian Holian, David Lew, Edmund Sullivan, Emmett Murphy, Gregory Cranston, Jack Strosnider, Joseph Muscara, Stephanie Coffin(...)
Date: Wed, Jul 5, 2000 4:19 PM
Subject: Tomorrows meeting

Attahced is a revised summary. We will see you in the morning 8:00 am in Jack's office.

CC: Wayne Lanning

ITEM # 57

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Indian Point 2 Steam Generator Special Inspection
Notes for July 6, 2000 Meeting in Headquarters

Root Cause Assessment:

Con Edison stated in their root cause analysis that excessive noise in the plus point probe eddy current data caused the analyst to miss the indication in steam generator (SG) 24 tube Row 2 Column 5 (R2C5) during the 1997 inspection.

The NRC determined the root cause to be a lack of Con Edison technical oversight and management attention given to the 1997 SG inspection program. This assessment is based on the numerous performance issues discussed below.

Performance Issues:

1. Out of eight U-bend indications detected in the 2000 inspection, based on review of 1997 eddy current data, the NRC determined that six should have been identified in 1997. This included SG 24, R2C5, the tube that leaked on February 15, 2000. During the 1997 steam generator inspection Con Edison did not adequately account for the following issues that increased likelihood of apex flaws and caused significant limitations and uncertainties in data collection and analyses for the small radius U-bend steam generator tubes.
 1. After identifying an apex U-bend PWSCC flaw in SG 24 tube R2C67, Con Edison took no actions to determine the root cause and took on actions to ensure that this new mechanism understood.
 2. After encountering eddy current probe restrictions in the upper support plate, Con Edison did not evaluate the potential for increased apex stresses and PWSCC.
 3. After analysts encountering poor quality data (low signal to noise ratios), Con Edison failed to evaluate the effect on the probability of detection of small radius U-bend tube indications.
2. Con Edison did not properly set-up the Plus-Point probe technique in 1997, which negatively affected the probability of detection of U-bend indications. Con Edison did not ensure that the probe was set-up with the calibration standard or with the phase rotation required by the EPRI qualified technique sheet.
3. Con Edison did not have an accurate method of measuring nor some criteria for determining when significant hourglassing of the upper tube support plates had taken place. As such Con Edison could not conduct and submit an evaluation of how the hourglassing affected the long term integrity of the small radius U-bends tubes beyond

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- row 1.
4. Con Edison's root cause determination, dated April 14, 2000, did not adequately address the failure to identify the tube flaws in the u-bend region during the 1997 outage. The root cause analysis did not identify the inadequacies in Con Edison's technical oversight and management of the 1997 steam generator inspections, as discussed above.

Potential Notices of Violations

- A. 10 CFR 50, Appendix B Criterion XVI - Corrective Actions, requires, in part, that Con Edison, promptly identify and take corrective actions for conditions adverse to quality.

Contrary to the above, Con Edison failed to promptly identify and plug six steam generator tubes with identifiable U-bend inside diameter primary water stress corrosion crack (PWSCC) during the 1997 refueling outage. Consequently, these tubes were left in-service after the 1997 refueling outage, eventually leading to the February 15, 2000, steam generator 24 tube row 2 column 5 failure.

- B. 10 CFR 50, Appendix B Criterion IX - Control of Special Processes, requires, in part, that measures shall be established to assure those special processes, including nondestructive testing, are controlled and accomplished using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements.

Paragraph 4.3 of Specification No. NPE-72217, "Eddy Current Examination of Nuclear Steam Generator Tubes, Indian Point 2," Revision 10 dated December 17, 1996, states, in part, "The examination technique shall be performed using qualified methods that are capable of detecting axial, skew, and circumferential cracking. The techniques used shall be qualified to the EPRI Steam Generator Examination Guidelines, Appendix H."

The EPRI Steam Generator Examination Guidelines, Appendix H qualified technique for low radius u-bends (96511Pwsccl_ubend.doc) specified a phase rotation setting of 10° for a calibration standard 40 percent inside diameter through-wall circumferential and axial notches.

Contrary to the above, the Indian Point 2 specific qualification sheet (Sheet IP2-97-E, Revision 0,) specified a phase rotation so that probe motion was horizontal and the calibration standard did not include 40 percent through-wall circumferential and axial inside diameter notches. As such, the plus point probe technique used at Indian Point 2

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in 1997 was not calibrated or set-up in accordance with the EPRI Appendix H qualified u-bend examination technique.

- C. Technical Specification 4.13.C.3 requires, in part, the monitoring for significant hour-glassing (closure) of the upper support plate flow slots to ensure the long term integrity of small radius U-bends beyond row 1.

Contrary to the above, Con Edison did not adequately monitor for significant hour-glassing of the upper support plate flow slots. Specifically, Con Edison did not have a method to measure the flow slot hour-glassing nor a criteria to determine when it was significant, with respect to long term integrity of small radius U-bends beyond row 1.

- D. CFR 50, Appendix B Criterion XVI - Corrective Actions, requires that Con Edison, determine the cause and take actions to prevent recurrence for a significant conditions adverse to quality.

Contrary to the above, Con Edison did not adequately determine the cause for the failure of SG 24 tube R2C5, as such corrective actions may not have been taken for a significant condition adverse to quality. Specifically, the root cause analysis did not identify inadequacies in Con Edison's technical oversight and management of the 1997 steam generator inspections. It failed to address the lack of corrective action in response to a new SG degradation mechanism and did not identify the improper set-up of the eddy current probe, and inadequate inspection and evaluation of the upper support plate denting and/or flow slot hour-glassing.