

Indian Point 2 (IP2) Steam Generator (SG) Tube Failure  
Lessons-Learned Task Group  
(TAC No. MA9163)

Task Group Notes - Discussion with Jack Strosnider on 7/5/00

Attendees: Scott Newberry, Louise Lund, Alan Rubin, Rick Ennis, Maitri Banerjee, Jack Goldberg

Background

Jack is the Director of the Division of Engineering (DE) in NRR.

Focus of Discussion

The focus of this discussion was to determine if there are any lessons-learned as a result of the IP2 steam generator tube failure event.

Results

Jack provided his thoughts on the IP2 lessons learned to the Task Group (see attached "Indian Point Lessons Learned" table). He also had the following observations:

- 1) Copper deposits on the SG tubes were a particular problem at IP2 compared to other plants. This contributed to the high degree of noise in the inspection. Other sources of noise in eddy current are pilgered tubes (rather than drawn), other deposits on the tube surfaces, geometry differences, etc. NEI has been asked to address noise in a formal way.
- 2) IP2 had very poor data quality which was a major problem. Also, it could have been difficult and time consuming for the technicians to look at so many points in the noisy region of the U bends to ferret out indications from the noise. Jack suggested that one way for the staff to identify data problems such as excessive noise would be to have the plants with possible inspection challenges/data quality issues send in a diskette with their raw inspection data from certain locations, and have our eddy current experts review the quality of the data. Another suggestion is to give the inspectors in the regions a checklist for Appendix H qualification, to have them evaluate whether the techniques are implemented the same during the inspection as when they were qualified.
- 3) Even if it could be debated that, during the 1997 inspection, the licensee "could have" and "should have" detected the flaw in the tube that ruptured in February 2000 (i.e., given the poor quality inspection data should still have been able to detect a 70% through-wall flaw). However, you could still have tube ruptures if the flaw is less than 70% and it wasn't detected. The NRC would expect licensees using the EPRI guidelines to detect a threshold closer to the 40% Technical Specification limit. However, the EPRI guidelines acknowledge that you won't find everything at 40% throughwall, and he has conveyed this message to the Commissioners. In spite of this, the industry experience has shown that the licensees can manage degradation by using the EPRI qualified methods. The lesson learned is that the licensee should have recognized the poor data quality and taken the appropriate corrective action.

J/104

- 4) Con Ed basically turned the SG inspection over to their contractors, apparently, without much management oversight from Con Ed. This raises questions about lessons learned relative to the role played by the vendors that perform the SG inspections. The key to addressing any shortcomings in this area is to ensure that the licensee's management has the proper oversight for the SG inspection process. Jack is very surprised that the eddy current analyst from Westinghouse didn't flag the poor quality data. He wondered who at Westinghouse had reviewed the data and written the operational assessment.
- 5) The main issue being investigated with respect to possible enforcement is the adequacy of the licensee's corrective action program, i.e., when the licensee finds a new form of degradation, do they put it through an Appendix B root cause and corrective action determination. He discussed how Palo Verde found a new form of degradation, which put them into midcycle inspections until they had accumulated enough information about the anticipated behavior to let them run a full cycle.
- 6) With respect to the issuance of the IP2 amendment related to the new source term, Jack needs to talk to John Zwolinski to discuss EMCB's technical assessment of Con Ed's letter dated June 30, 2000. This letter states that Con Ed plans to perform testing at 340F and 1500 psig if the amendment is approved. This testing would be performed prior to plant startup. EMCB is reviewing this issue from a steam generator tube integrity standpoint, to ensure that they meet the design basis. This will be based on row 3 u-bend tubes and threshold of detection.
- 7) With respect to the restart safety evaluation (SE), DE is coordinating with RES as needed (i.e., RES is providing technical support on an as needed basis, but no formal RES review of the SE is planned). RES is not normally part of the concurrence for SEs that are issued from NRR, so including them in this SE would be a process change. The main issue for the SE is the 3<sup>rd</sup> row U-bends. Con Ed still owes the NRC information of a reassessment of U-bends and the staff is not certain IP2 will be able to meet the 3ΔP licensing basis criteria.
- 8) Jack discussed how there were missed opportunities for the licensee, Westinghouse and the NRC staff to look deeper at the significance of the flaw. When he considered the root cause, he asked himself "what was the one thing that could have been done to change the outcome."
- 9) When asked about the RES review comments on crack growth rates, Jack commented that the pedigree of the data doesn't necessarily justify crack growth rate conclusions. The data is overwhelmed by measurement uncertainty.
- 10) When asked about the argument in Lochbaum's 2.206 petition about the use of EFPY, he said the argument was valid and they do capture the time at temperature in some SEs.
- 11) When asked about qualitative vs. quantitative argument, he said that based on your confidence in the data, you could make a qualitative argument that the threshold is low enough to ensure that you have structural integrity margin, and the growth rate will be no different the next cycle than it was during the last.

- 12) When asked if the NRC would endorse the EPRI guidelines, he said that the intent was not to endorse the guidelines, but rather that the guidelines would provide the basis for the plant procedures. The future intent is to set performance criteria in the TS, and during the inspection look at the procedures to see if they're doing what they are expected to do.
- 13) When asked about industry experience in row 3 u-bend tubes, Jack said that ConEd had said during the presentation on their root cause assessment that there had never been a row 3 U-bend crack. The staff believes that there has been. In fact, this question is one of the RAI questions that has been sent to ConEd.

Table provided by Jack Stromer 7/5/00  
Pg 1 of 2

INDIAN POINT 2 LESSONS LEARNED

LESSON LEARNED	RECOMMENDED INDUSTRY ACTION	RECOMMENDED NRC ACTION	COMMENTS
Action needs to be taken to ensure appropriate quality of steam generator inspection data	1) Management attention by licensees, and  2) Review and modification, as necessary, to plant specific procedures and generic industry guidelines	1) Include inspection data quality in regional inspections and in HQ reviews	Intended to address root cause of failure
Increased attention is necessary when "new" types of degradation are found during a steam generator inspection	1) Licensee management should provide increased attention to "new" types of degradation,  2) Licensees should perform root cause evaluations and take corrective actions for "new" types of degradation, and  3) Plant specific procedures and industry generic guidelines should be reviewed and modified as necessary to assure management involvement, root cause evaluations, and corrective actions	1) Regional inspections and HQ reviews should include assessment of "new" forms of degradation and adequacy of licensee root cause and corrective actions	Intended to address issue of understanding and taking appropriate action to manage "new" degradation mechanisms e.g., U-bend cracking and influence of denting/hourglassing.  "New" refers to a mechanism occurring for the first time in the SG under inspection - similar degradation may have occurred previously in other plants or steam generators

Pg 2 of 2

SERs prepared by NRC should clearly state the bases for the conclusions reached and clearly identify licensee information <u>not</u> relied upon as part of the bases	NA	1) Provide guidance to reviewers on preparation of SERs	Based on RES review of NRR SER related to extending IP-2 inspection schedule
Substantial limitations exist in the ability to quantify crack growth rates.	1) Industry guidelines for performing operational assessments should be reviewed and modified, as necessary, to assure that uncertainties associated with quantitative estimates of crack growth rates are appropriately considered and that operating experience is used to assess their reasonableness	1) Staff should be cautious in crediting quantitative estimates of crack growth rates and should utilize prior operating experience to assess their reasonableness	Based on RES review of NRR SER related to extending IP-2 inspection schedule
Vendor / licensee interface?	Management oversight?		
Limitations of ECT for condition monitoring?	Review guidelines relative to in-situ testing		
Other management oversight issues?			