

**From:** Michael Modes  
**To:** Lew, David  
**Date:** Tue, May 2, 2000 8:16 AM  
**Subject:** Summary of IP2 Root Cause

In general IP2 concludes the crack was caused by axial PWSCC exacerbated by denting and hourglassing (which itself is caused by denting). They conclude the vulnerability exists for Row 1 - 4 based on direct measurement, retrospective and present eddy current data, and industry information about the vulnerability. The crack growth, they conclude, was moderate and the rapid acceleration in leak rate was caused by intra-crack ligament tear.

IP2 discusses the 800 kHz Plus-Point as a supplementary examination and concludes the original Eddy Current categorization of the flaw was appropriate because it was masked by unavoidable noise caused by pitting in the generator. IP2 further concludes that industry reports of low row u-bend PWSCC are "sporadic and infrequent". In addition IP2 points to historical antidotes that the low row tube bends in their generators were made with a ball-and-mandrel which reduces the contributions made by ovality in the tubing.

NRR however suggests that it is "over-simplification" to state that excessive noise prevented detection of the R2C5 crack. NRR states the "calibration setup during the 1997 inspection was not performed properly" and that had it been done properly "could have rendered the precursor signal detectable." NRR further suggests that IP2 should have "rejected" the data in '97 as "beyond the bounds of that considered in the generic qualification".

NRR also takes IP2 to task for only briefly discussing the historical evidence of the problems in the steam generators. Further NRR criticizes IP2 for not considering the flow slot hourglassing more carefully and requests greater detail in the root cause document discussing the "basis for not considering this hourglassing as significant."

These comments are only part of a 17 item list from NRR critical of the IP2 root cause analysis.

It should be a very vigorous and interesting meeting tomorrow in OWFN.

**CC:** Holian, Brian, Lanning, Wayne

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