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Date:

Mon, Jul 24, 2000 2:07 PM

Subject:

Rebuttal

Ian and Wayne:

Here is a first attempt at the rebuttal for item 1 and 5. I have received your Emails today with additional questions and will now work on them.

Caius

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 6
FOIA- 2001-056

Cel/42

(2)

Rebuttal to Item Number 1

Review of Tube R2 C67 from 1997 data and the effect of noise:

A review of Tube 2-67 showed that the defect measured about 80% deep from 1997 data. The voltage was about 67% of that of the standard 80% EDM notch, as measured by Westinghouse. In addition, tube 2-87 had a long, possible defect that showed up on the 300 and 400 kHz scan, but rotated as a deposit on the 100 kHz scan. The presence of a 80 % deep defect at the end of a cycle indicates that the inspection is not sensitive enough and that action should be taken to improve the test. A measure of the noise in the table below shows that 2-87 had less noise in general than the other tubes in the generator. Also, it should be noted, that there was not any large noise signal in the immediate vicinity of this defect, so the signal-to-noise was actually better than

Tube /SG	Vp-p; 300 k	Vert max 300 k	Vp-p; 400 k	Vert max 400 k
2-67 SG24	3.63	1.50	3.62	1.55
Noise	1.26	0.43	0.90	0.44
2-5 SG24	2.33	1.10	2.39	1.24
Noise	1.20	0.87	1.16	0.85
2-69 SG24	1.36	0.53	1.36	0.54
Noise	1.36	0.60	1.21	0.50
2-87 SG21	0.68	0.31	0.68	0.36
Defect 2	1.06	0.33	1.01	0.40
Noise	1.11	0.46	1.05	0.52
2-71 SG24	1.12	0.45	1.17	0.55
Noise	2.48	0.60	2.16	0.86
2-72 SG24	0.84	0.44	0.85	0.48
Noise	1.24	0.56	1.10	0.67
2-85 SG23	0.53	0.13	0.58	0.20
Noise	1.39	0.71	1.37	0.45
2.74 SG24	NDD			
Noise	1.24	0.56	0.85	0.48
2-4 SG24	NDD			

Noise	1.93	0.86	1.70	0.95
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indicated by the table. The other tubes, all of which were missed, did not have as good a signal-to-noise ratio, although some had a ratio better than 1:1, particularly in the region close to the defect. Defect 1 of tube 2-87 of steam generator 21 was sitting in a clean section of the tube, although there was considerable noise elsewhere in the tube. It also seems that a signal-to-noise ratio better than 1:1 is needed in order to detect defects, unless there has been a recent tube-rupture at the plant being inspected.

A PWSCC (and a SCC defect in general) yields only 50 to 20 percent (and perhaps less) of the signal amplitude that a calibration standard yields. There is data in a Westinghouse report from the Alternate Plugging Criteria on this ratio somewhere, but I have not been able to locate it yet.

Calibration Standard

The Calibration standard was checked. I verified that a phase setting of 10 degrees was used for the values in the standard table.

Determine if possible the effect of tube-wall thinning due to the bending on the calibration of the defect depths. Also, determine the amount of thinning that was present.

The zero defect phase setting may be too high for the 2000 calibration of the high-frequency probe. This would bias the actual flaw depth too high, which may account for no shallow defects being detected.

Noise Criteria

The statement that there is no quantitative noise criteria present in 1997 is correct, and there is no quantitative noise criteria present today. However, industry has been aware of the NRR's concern and NRR's desire for such a criteria for a number of years. Eddyner 95 incorporated noise measuring tools in their software, and there have been a number of attempts by industry committees to correct this problem.

Probe Qualification

The probe qualification done on the EPRI data set in 1997 shows how erroneous these qualifications are. There were at least 9 cracks present in 1997, only one of which was found. The inclusion of EDM notches and laboratory grown samples biases the probability of detection. Also, for actual pulled tube samples, only the easily detectable cracks are ever found and pulled. This also forms a bias toward the flaws being easier to detect than they actually are.

Rebuttal to Item Number 5

A number of Level III analysts at the site, and in particular Gary Pierini said that they would have caught the defect in the 1997 data if they had looked at it.