CENTERIOR ENERGY

PERRY NUCLEAR POWER PLANT
10 CENTER ROAD
PERRY, OHIO 44081
(216) 259-3737

Mail Address:
P.O. BOX 97
PERRY, OHIO 44081

Michael D. Lyster
Vice President - Nuclear

November 26, 1990
PY-CEI/NRR-1264 L

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Perry Nuclear Power Plant
Docket No. 50-440
Feedwater Nozzle Cracks Identified
During Inservice Examination

Gentlemen:

An Inservice Examination conducted in accordance with ASME Code Section XI and Generic Letter 88-01, "NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping", of all required reactor vessel nozzles during this refueling outage revealed indications in two feedwater nozzles (N4E and N4C) that require evaluation per the ASME Code to support plant operation through Cycle 3. The indications are oriented in a circumferential direction and are located near the junction of the feedwater nozzle safe-end and the Inconel 182 buttering. The N4E nozzle indication is 1.6 inches in length and 0.15 inches in depth, while the N4C nozzle indication is 2.9 inches in length and 0.15 inches in depth. The techniques used to identify and size these indications are included as Attachment 1 to this letter.

The presence of Intergranular Stress Corrosion Cracking (IGSCC) could not be definitively confirmed based upon the results of these inspections. Because of this uncertainty, calculations were conservatively performed assuming the presence of IGSCC. The predicted maximum crack size at the end of Cycle 3 was determined assuming an upper bounding crack growth rate more conservative than that specified in Generic Letter 88-01 and NUREC-0313, Rev. 2 "Technical Report on Material Selection and Process Guidelines for BWR Coolant Pressure Boundary Piping", for stainless steel, and was compared with the ASME Code allowable flaw size. The conservative evaluation projects a growth to 0.45 inches deep by 9.0 inches long during Cycle 3. The Code allowable flaw depth for a crack of this length is 0.65", which is almost 50% greater than the maximum predicted crack growth depth to 0.45". This evaluation was performed for the N4C nozzle which envelopes the smaller N4E nozzle indication. Based upon the predicted crack size, it has been determined that operation through Cycle 3 is acceptable. The results of the crack growth rate evaluation along with the assumptions used are included as Attachment 2.

9012040057 901126
PDR ADOCK 05000440
Q PDC

A047
'11

The original construction radiographs of the N4C and the N4E nozzle KB welds were reviewed to determine whether either of these indications was present at that time. Using a high intensity film viewer without magnification, no indications were noted. Under magnification, an indication of approximately 1/2 inch in length, but not sharp or well defined, was noted on the radiograph of the N4E nozzle KB weld. This radiograph was then digitized and video enhanced in order to interpret the indication. Conclusive evidence could not be found and therefore the indication was conservatively determined to be non-relevant. All of the radiographs of the N4C and N4E nozzle KB welds were then digitized and enhanced to allow viewing the KB welds through the entire 360 degrees. Particular attention was paid to the safe-end-to-Inconel 182 buttering interface area. No indications, other than the non-relevant one discussed above, were identified.

As suggested by NRC, CEI has evaluated the benefit to be gained from obtaining additional UT measurements midway through Cycle 3, should a forced outage of sufficient duration for an inspection occur. Preliminary calculations show that personnel exposure in excess of 20 man-rem would result from obtaining these additional measurements. Based upon the conservative, bounding nature of the calculations as summarized in Attachment 2, and the man-rem estimate discussed above, additional data obtained during Cycle 3 does not appear to be warranted at this time. UT examinations of these cracks will be performed during the next refueling outage.

This evaluation of the two weld indications is being provided in accordance with our commitment to the reporting requirements of Generic Letter 88-01 which specifies NRC review and approval prior to reactor restart. Based upon the scheduled early December restart (criticality) of Unit 1, your prompt review is requested.

Please feel free to contact me should you desire any additional information.

Sincerely,

Michael D. Lyster

MDL:GSC:njc
Attachments
cc: USNRC Project Manager
USNRC Resident Office
USNRC Region III

EXAMINATION TECHNIQUES UTILIZED FOR THE DETECTION AND SIZING OF INDICATIONS IN FEEDWATER NOZZLES 1B13-N4C AND 1B13-N4E

I. METHODS EMPLOYED FOR DETECTION

A. 55 DEGREE REFRACTED LONGITUDINAL WAVE
B. 45 DEGREE SHEAR WAVE
C. WSY-70 ID CREEP WAVE

NOTES:
1.) These methods were performed utilizing the automated P-SCAN system, operated by Universal Testing Laboratories (UTL) personnel. System and personnel are qualified through EPRI for detection for IGSCC.
2.) Indications were detected with the 45 deg. shear wave and WSY-70 at 12db to 18db above average noise level.

II. METHODS EMPLOYED FOR VERIFICATION AND CHARACTERIZATION

A. 48 DEGREE SHEAR WAVE
B. 60 DEGREE SHEAR WAVE
C. 45 DEGREE REFRACTED LONGITUDINAL WAVE
D. WSY-70 ID CREEP WAVE

NOTES:
1.) These methods were performed manually after the P-SCAN analysis was completed to further aid in characterization and evaluation of the indications.
2.) The indications were seen and characterized with all four of the above methods.

III. METHODS EMPLOYED FOR SIZING

A. P-SCAN AUTOMATED SYSTEM
B. WSY-70 ID CREEP WAVE
C. 48 DEGREE SHEAR WAVE (UTILIZING TIP DEFRACTION)

NOTES:
1.) Length was determined by the P-SCAN automated system and verified manually.
2.) Depth was determined by utilizing a 48 deg. shear wave using tip defraction methods. 5%, 10%, 20%, and 30% notches were used as reference reflectors.
3.) The WSY-70 was utilized to aid in the verification of the tip defraction sizing determinations.
4.) Sizing was performed manually by UTL's Level III (Mike Dalichow), who is qualified through EPRI for sizing IGSCC.