



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF THE NUCLEAR REGULATION
EVALUATION OF AN ULTRASONIC TEST INDICATION IN THE N2H REACTOR VESSEL
NOZZLE-TO-SAFE END WELD AT LIMERICK, UNIT 1
PHILADELPHIA ELECTRIC COMPANY
LIMERICK GENERATING STATION, UNIT 1
DOCKET NO. 50-352

1.0 INTRODUCTION

The Materials and Chemical Engineering Branch (EMCB), Division of Engineering Technology has completed its review of Philadelphia Electric Company's (licensee) submittal dated October 23, 1990. The licensee requested the NRC to permit Cycle 4 operation of Limerick Generating Station (LGS), Unit 1 with regard to an ultrasonic (UT) test indication in the Recirculation Riser Nozzle N2H to Safe End weld that has increased in size since the last inspection (January 13, 1989). Inspections of Nozzle N2H during the third LGS, Unit 1 refueling outage (September 8, 1990) indicated that there was a small change to the existing indication in which an extension of the circumferential length by 1.6 inches, with a maximum depth of 0.47 inches was reported. In addition, during LGS, Unit 1 cycle 3 operation the crack growth of the alloy 182 test specimen in a Crack Advance Verification System (CAVS) was reported to be very small and did not reach any of the action step values. These action step values were proposed in the licensee's letter dated April 3, 1989 to support continued operation for cycle 3 of LGS, Unit 1 which was approved by NRC in a letter dated May 2, 1989.

2.0 DISCUSSION

The licensee, along with its consultant, the General Electric (GE) evaluated the recent (1990) N2H nozzle-to-safe end weld UT inspection results and have assessed the effect of the maximum (i.e., most conservative) growth rate for this indication on the integrity of the N2H nozzle to safe end weld. As the reported crack growth in the nozzle weld during cycle 3 operation is small, the staff agrees with the licensee's conclusion that LGS, Unit 1 can be safely operated for the fourth cycle without taking any corrective actions at the present time.

In addition, the licensee indicated that there was a difference between the 1989 and 1990, N2H nozzle inspection. Prior to the 1990 examination, the inside surface of the N2H nozzle-to-safe weld was decontaminated to reduce personnel radiation exposure. This removed wave absorbing material ("crud") and may have caused higher baseline noise levels than the levels observed during the 1989 inspection. "Crud" may have collected on the inside surface between cycles 3 and 4. As a result of "crud" it may have masked or reduced the reflectivity inside connected indications during the 1989 UT inspection.

Thus, the crack may have not have grown since 1989 and its present size may have been masked or reduced during the 1989 inspection. Furthermore, the licensee has committed to continue monitoring the crack growth of the CAVS specimen and perform inspection when the growth exceeds its values as specified below:

1. The crack growth of the CAVS specimens will continue to be monitored during the cycle 4 operation.
2. If the CAVS specimen crack growth is greater than or equal to 0.1 inches after nine months of plant operation, an examination of the N2H nozzle-to-safe end weld will be performed if the plant is shut down for a forced outage that is planned to last for greater than two weeks.
3. If the CAVS specimen crack growth is greater than or equal to 0.15 inches after nine months of plant operation, the plant will be shut down and examination of the N2H nozzle-to-safe end will be performed.

The action step values for the crack growth of the CAVS specimen have been reduced by a factor of two from those established for cycle 3 operation. This will provide an additional margin with respect to structural integrity.

The licensee indicated that a corrective action plan for N2H nozzle-to-safe end weld will be finalized prior to the end of the first nine months of Unit 1 cycle 4 operation and submitted to the NRC for review. This corrective action will be implemented during cycle 4 operation when necessary as a result of the monitoring specimen reaching action step crack growth values and weld inspection findings. Otherwise, a corrective action plan to be implemented during the LGS, Unit 1 fourth refueling outage will be finalized and submitted to the NRC prior to the fourth refueling outage. Furthermore, the licensee will request NRC approval of the corrective action plan if the action is other than safe end replacement.

3.0 CONCLUSION

Based on the review of the licensee's submittal, the staff has concluded that there is a reasonable assurance the facility can be safely operated during Cycle 4 with the N2H vessel nozzle-to-safe end weld in its current condition. The licensee has committed to continue monitoring the crack growth of the CAVS specimens during cycle 4 operation and will perform inspection when the crack growth exceeds the action step values as specified above. Although, the acoustic emissions (AE) crack monitoring system was not discussed in the licensee's submittals, the licensee should evaluate the AE data as requested in NRC letter dated April 12, 1989. Furthermore, the licensee will submit to the NRC corrective action plans as discussed above.

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Dated: November 20, 1990