



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
EVALUATION OF AN ULTRASONIC TEST INDICATION IN THE N4A-2 FEEDWATER  
NOZZLE TO SAFE-END WELD  
GULF STATES UTILITIES COMPANY  
RIVER BEND STATION, UNIT 1  
DOCKET NO. 50-458

1.0 INTRODUCTION

Gulf States Utilities (GSU) has been monitoring a circumferential indication in the N4A-2 inlet feedwater nozzle to safe-end weld since it was identified during the second refueling outage in March 1989. GSU re-examined this indication during the second fuel cycle in March 1990 and during the third refueling outage in November 1990. The indication was found to have grown each time. It was last measured to be about 7.7 inches long and 0.33 inches deep.

After the November 1990 examination, the NRC authorized plant restart and concluded that there was reasonable assurance that structural integrity would be maintained through mid-cycle of the fourth fuel cycle scheduled for September 1991. GSU made a commitment to re-examine and evaluate the cracked weld during the mid-cycle outage and the fourth refueling outage.

2.0 DISCUSSION

By letter dated September 26, 1991, GSU submitted the results of the mid-cycle inspection to show that River Bend can safely operate until the end of the current fuel cycle (approximately March 1992). The data consists of mid-cycle ultrasonic inspection results and a crack growth evaluation.

Manual and automatic P scan ultrasonic examinations were done with the same type search units, angles, calibration blocks and sound modes used for previous examinations of this crack. Results showed the crack dimensions had increased from the third refueling outage to a maximum length of 7.8 inches and to a maximum depth of 0.400 inches. The length increased 0.1 inches from 20.4 to 20.7 percent of the pipe circumference. The depth increased 0.07 inches (from 30 to 36 percent of the wall thickness). The crack growth rate was calculated to be about  $1 \text{ E}(-5)$  inches/hour.

The indication shows branching, multiple peaks, short pulse durations, fast rise and fall times; all indicative of intergranular stress corrosion cracking (IGSCC). GSU classifies this flawed weld as IGSCC Category F per Generic

Letter 88-01, "IGSCC in BWR Austenitic Stainless Steel Piping," to be inspected every refueling outage.

The licensee's data shows that River Bend can safely operate with the cracked weld to the end of the current fuel cycle, because the final flaw dimensions will not exceed the ASME Code allowable (60 percent wall thickness).

The measured crack growth rate of about  $1 \text{ E}(-5)$  inches/hour is well below the earlier predicted value of  $3 \text{ E}(-5)$  inches/hour. Calculations with the earlier predicted value showed that the crack would grow to the ASME Code allowable limits by the end of the current fuel cycle. A revised calculation, based on current depth measurements and a conservative growth rate of  $3 \text{ E}(-5)$  inches/hour, predicts the crack depth to be about 50 percent of the wall thickness by the March 1992 refueling outage. This value is well within the Code allowable.

This weld, categorized as a Category F weld, is to be inspected every refueling outage per Generic Letter 88-01. The next refueling outage is scheduled for March 1992. Since the predicted depth of the crack for the next refueling outage in March 1992 is less than the Code allowable of 60 percent through wall, operation until the next refueling outage is acceptable.

### 3.0 CONCLUSION

Based on the review of the information provided, the NRC staff has concluded that there is reasonable assurance that the structural integrity of the subject nozzle to safe-end weld will be maintained and River Bend Station may continue operation to the end of the current fuel cycle scheduled for March 1992.

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