



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

ENCLOSURE

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
OF AN OVERLAY REPAIR OF WELD 12-I-1C  
IN THE REACTOR WATER CLEAN UP SYSTEM  
PEACH BOTTOM ATOMIC POWER STATION, UNIT 3  
PHILADELPHIA ELECTRIC COMPANY (PECO)  
DOCKET 50-278

1.0 INTRODUCTION

1.0 Purpose

To determine whether the overlay repair to weld (12-I-1C) in the reactor water clean up system will allow Peach Bottom, Unit 3 to return to safe operation.

1.2 Background

In October 1991, PECO, the licensee, reported a crack like indication in a weld of the reactor water clean up system piping. This report was filed in accordance with the "Staff Position on Reporting Requirements" of Generic Letter 89-01 ("NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping"). On November 14, 1991, the licensee submitted a final report of the weld overlay for review. In response to staff questions, PECO submitted further documentation in January and April, 1992.

2.0 DISCUSSION

2.1 Summary of licensee's submittal

The licensee found a circumferential crack like indication in the heat affected zone of weld 12-I-1C. The indication was identified as intergranular stress corrosion cracking. Its depth was .18 inches maximum, its length, 3 inches. It extended 45% of the .40 inch wall thickness and 20% of the circumference. It was repaired with a full structural overlay. The overlay was designed and welded by GE according to the requirements of the ASME Code, Section XI. The overlay repair is based on one used for a similar repair of Unit 2. The procedure and welders were qualified by a mockup.

2.2 Evaluation of licensee's submittal

A review of the overlay design and repair procedure shows the repair is in accordance with the NRC positions defined in Generic Letter 88-01. The design

of the full structural overlay is based on conservative assumptions. It was designed to support the entire pressure, deadweight, and seismic loading for a crack conservatively assumed to extend through the wall of the whole circumference.

The weld metal was high ferrite low carbon Type ER 308 L stainless steel, an NRC approved resistant material. Gas tungsten arc welding was used to weld the 304 stainless steel components. Heat sink welding was incorporated. In this procedure the inside surface of the pipe is cooled by flowing water while welding to create favorable residual stresses. However, for conservative reasons the licensee did not take credit for the effect of weld residual stresses in arresting crack growth.

The final width of the overlay was 1.5 inches on each side of the indication. The necessary width to meet structural requirements was .55 inch, but for inspectability by ultrasonics, 1.5 inches on each side was required. The final measurements, ranging from .280-.380 inch, exceeded the minimum required thickness of .175 inches.

Delta ferrite measurements were taken. The first layer measured less than 7.5 FN so no credit was taken for the first pass. The second layer ranged from 7.5 to 11 FN and averaged 9.7 FN. The remaining passes met the delta ferrite requirement. These passes are acceptable because they meet the minimum of 7.5 FN required by Generic Letter 88-01.

Shrinkage measured .375 - .438 inch for a maximum variation of .063 inches. The variation is within the licensee's distortion control guideline of .0725 inch. The effect of shrinkage on the piping was evaluated by a walkdown. No adverse effects on adjacent pipe supports were found.

Calculations showed the additional stresses were acceptable based on Code allowable stresses. Calculations showed that ample margin existed to accommodate the additional deadweight and stiffness from the overlay. This overlay is the only one in the reactor water clean up system so cumulative shrinkage is not an issue.

### 3.0 CONCLUSION

The NRC staff concludes that the overlay repair to weld 12-I-1C meets the guidance in Generic Letter 88-01. There is reasonable assurance that structural integrity will be maintained and Peach Bottom, Unit 3 can return to safe operation.

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