

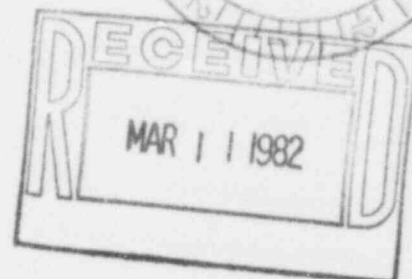


**LOUISIANA**  
**POWER & LIGHT**

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March 8, 1982

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Q-3-T33



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Subject: Waterford SES Unit 3  
Section XI Program for the  
Replacement of Pressurizer Heaters

Gentlemen:

Attached is the ASME/B&PV Code Section XI repair program for the replacement of all of the inconel sheathed heaters with Watlow supplied heaters equipped with austenitic stainless steel Type 316 sheaths in the pressurizer heater. This program has been reviewed and approved by Louisiana Power and Light for repair activities at the Waterford SES Unit #3 Site.

C-E began an investigation in July of 1979, following the failure of twelve similar heaters used in the High Pressure Test Loop at the C-E Chattanooga facility due to sheath cracking.

Metallurgical evaluation of the cracks revealed the inconel 600 material to be in a highly cold worked condition, due to the fabrication process, with a hardness ranging from 27 to 30 Rockwell C. In this condition, the yield strength of the material is approximately 100 KSI and the residual stress (Hoop direction) ranges from 25 to 50 KSI.

During operation, additional Hoop stresses are caused by a radial thermal gradient due to the hot core and from thermal expansion of the magnesium oxide core. This highly stressed condition, combined with a high temperature aqueous environment, has caused stress corrosion cracking (Coriou) on the O.D. of the heater sheath.

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DESIGNATED ORIGINAL  
Certified By W. Montague

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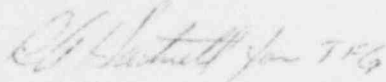
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Coriou cracking has been duplicated in the autoclave tests at C-E; the cracks observed were identical to those in the failed sheaths.

Based on the high operating time capability (in excess of 20,000 hours), demonstrated by heaters with austenitic stainless steel Type 316 sheaths which are in use in C-E's Reactor Component Test Facility in Windsor, the decision has been made to use these heaters in lieu of the inconel 600 sheath heaters. Corion cracking has not been observed in the 316 SS.

If there are any questions regarding this repair program, please advise.

Very truly yours,



T. F. Gerrets  
Quality Assurance Manager

TFG/RAH/grf

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