



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

**SAFETY EVALUATION**

**NIAGARA MOHAWK POWER CORPORATION  
NINE MILE POINT NUCLEAR STATION, UNIT 1  
DOCKET NO. 50-220**

**REPAIR OF CRACKED 12" CORE SPRAY SYSTEM PIPING - LOOP II**

**1.0 INTRODUCTION**

Inservice Inspection results of ultrasonic and surface examinations of loop 11 - 12" core spray piping between the drywell penetration and internal isolation valve - detected the presence of a crack. The crack was located adjacent to a longitudinally oriented welded attachment lug. The crack turned circumferentially from the lug, is approximately 90% around the pipe, and had a depth (by ultrasonics) of approximately 50% of the wall thickness. The crack appeared to have started at the OD surface. Penetrant indications were reported as spaced intermittently at approximately  $\frac{1}{2}$ " intervals with a 45° orientation of the pipe axis. Subsequent excavation of the crack by grinding confirmed the depth to be between 0.250 and 0.398 inches. This confirmed the ultrasonic examination results.

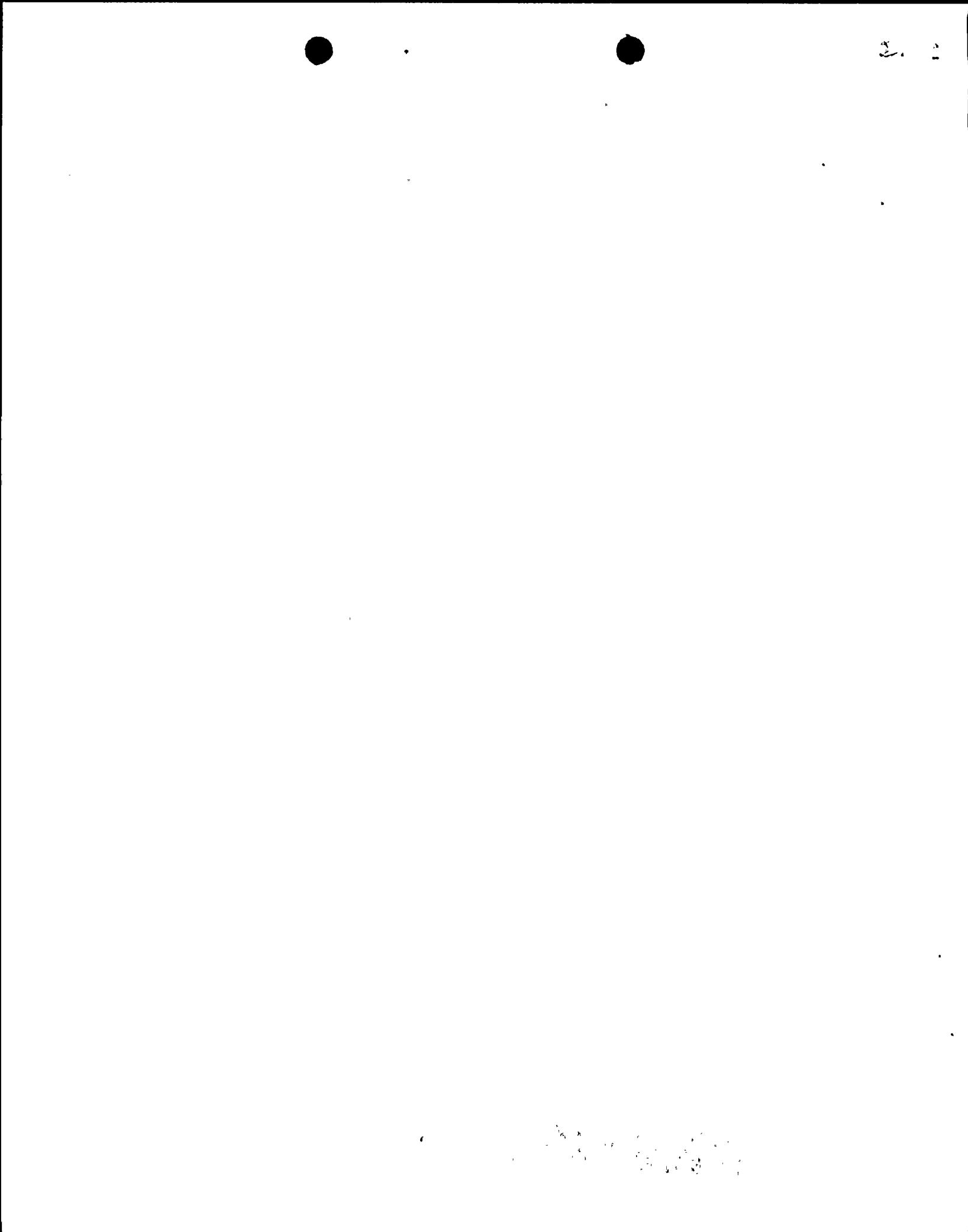
**2.0 EVALUATION**

The licensee repaired the defective piping by local grinding to remove the flaw and tungsten gas welding (TIG) to restore the pipe wall to its original thickness. Liquid penetrant and ultrasonic examinations were performed on the excavated cavity prior to repair welding to ensure that the defect was completely removed. The weld repair was accomplished by the TIG process using SFA 5.9 - ER 309, 3/32" filler wire to fill the cavity in the P-8, ASTOR - A-358, Class 1 pipe. Liquid penetrant and ultrasonic examinations were performed following the repair to verify that the weldment and heat affected zone were sound.

The welding process utilized by the licensee to effect the repair is a low heat input process and minimizes sensitization of the P-8, 304 austenitic stainless steel base material. Further, the inter-pass temperature was maintained less than 300°F during the repair. The filler wire is compatible with the base material. The non-destructive examinations performed verified that the base material was free of cracking prior to repair welding and that the final weldment was sound.

Preliminary results from the licensee in analyzing the boat sample removed from the cracked pipe indicate the crack is transgranular in nature. EDAX analysis by the licensee has identified the presence of chlorides on the fracture face.

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The mode of failure has been identified by the licensee as transgranular stress corrosion cracking. Preliminary analysis by Brookhaven Laboratories, our contractor, has verified the licensee findings.

3.0 CONCLUSION

We find the repair performed by the licensee to be acceptable. The repair was performed in a manner to minimize sensitization of the base material and should not affect performance of the pipe since it was similar to a repair that would have been performed on an initial fabrication defect. Region I has verified that the repair was performed in an acceptable manner. The stress corrosion was most likely caused by contamination on the pipe surface acting with stress from the installation of the lug and/or other operating or residual stresses.

We recommend that a volumetric examination of the repaired area be performed at the next scheduled refueling outage.

Dated: July 19, 1984

