

FINAL REPORT

LPSI DRAIN LINE WELD FAILURE

Description of Deficiency

A leak was detected in a drain line weld (GCB-508-1) off L. P. Safety Injection Pump 2P60A on August 16, 1978. Radiographic and Liquid Penetrant Examinations revealed a 3/4 inch linear indication on the 1 inch side of a 1" x 2" reducer running circumferentially in the fusion zone between weld metal and fitting. Original records revealed weld had successfully passed Liquid Penetrant Examination and Hydro Testing. An examination of the failed weld was performed.

It was determined the crack was not associated with material quality or welding process used. Also, no positive evidence was found to support the possibility that corrosion fatigue or stress corrosion cracking mechanisms contributed to the failure.

The examination, combined with jobsite information, indicates that fatigue was the cause of failure, possibly the results of excessive cyclical (alternating) stresses from the LPSI pump located within four (4) feet of the subject weld.

In February, 1978, the 8 x 20 LPSI pump, located within four feet of the cracked drain line, required shutdown because of excessive noise and vibration. This event may have caused excessive cyclical stresses which could have contributed to the failure. This failure was reported by a May 9, 1978 letter to Mr. G. L. Madsen.

Safety Implication

This leak could not have gone undetected for an extended period of time because the LPSI pump rooms are inspected each shift and the rooms are equipped with safety grade drain level detectors. In the worst case, a non-leaking (therefore undetected) crack, the fitting could have begun to leak during post-LOCA recirculation. It is extremely unlikely, though possible, that this leakage could exceed the 5 gpm considered in the Final Safety Analysis Report. Leakage of this fitting during a LOCA could reduce LPSI flow from one pump--most likely an insignificant amount. Complete failure would be required to reduce the flow as much as 500 gpm and would be within the single failure analysis for this system.

During shutdown cooling operation, a failure of this fitting would result in a loss of reactor coolant inventory and small radiological dose to operators.

Corrective Action

Corrective actions taken were to replace the pipe and fitting and re-hydro. Also, both LPSI systems were examined for cyclic stressing during start, stop and steady state operating conditions. Inspections of other safety related systems are incorporated in the on-going startup test procedure TP 2.650.16.

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