

January 28, 1975

Mr. Edson G. Case, Acting Director  
Office of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Dear Mr. Case:

TURKEY POINT UNIT NO. 4  
ABNORMAL OCCURRENCE NO. 251-74-7  
SUPPLEMENTAL REPORT

On November 8, 1974, Florida Power & Light Co. reported a leak in a 3/4 inch vent line assembly upstream of the Safety Injection System 10 inch check valve. The vent line assembly was removed and sent to the Southwest Research Institute for analysis.

Macroscopic, liquid penetrant, and metallographic examinations were performed with the following results:

Macroscopic and Liquid Penetrant Inspections

Initial visual inspection of the coupling/pipe sample did not reveal any evidence of a leak or any type of cracking. It was observed that the entire outside of the surface had been manually ground, presumably at the time of initial fabrication or installation.

In the visual inspection, it was noted that the bore of the coupling was not concentric with the I. D. of the pipe and that the pipe stub was tilted with respect to the centerline of the coupling.

The coupling and pipe stub assembly was inspected using a fluorescent liquid penetrant. Two defect indications were noted. One indication was located in the ground area of the fillet and oriented in a circumferential direction. The second indication was on the outside surface of the coupling and oriented parallel to the coupling axis.

The pipe/coupling assembly was cut into four segments by longitudinal saw cuts. Examination of the segments verified that the pipe was tilted with respect to the coupling axis. Also, it was noted that the pipe was bottomed in the socket at a position 90° from the weld defect indication with a variable gap around the bottom of the socket.

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### Metallographic Examination

Two metallographic sections were cut from the coupling and pipe stub. One section was taken in a radial plane located at the center of the circumferential defect indication. The other was taken in a transverse plane located to pass through the longitudinal indication.

Visual and low magnification examination of the section through the pipe-to-coupling weld revealed a void at the weld root. Also, a crack extending from the void through the weld to the ground surface was evident. The crack is oriented essentially normal to the coupling axis. Also, a tapered annular space between the O. D. of the pipe and the socket I. D., indicative of misalignment, was apparent in the micrograph.

It is evident that the weld root void is the result of incomplete weld penetration. Also, it is apparent that the inside corner of the coupling socket was chamfered. This configuration would increase the likelihood of incomplete penetration.

Several short, irregular cracks, from the corners of the void into weld metal, were noted. The location and nature of these cracks are characteristic of hot tears formed during welding.

The main crack originated from one of the hot tears and propagated completely through weld metal. The crack followed a straight path and was transgranular over its full length. These factors, together with the orientation of the crack, are characteristic of fatigue crack propagation.

In the section through the longitudinal defect a small subsurface void was observed. Small laps extending from the void were evident and one of these laps connected to the surface. The general configuration of this defect indicated that it was formed during fabrication, either in forming the original bar or machining the coupling. There is no evidence of crack propagation from the defect. In view of this factor and the size, location, and nature of the void, this defect is not considered as detrimental.

The weld exhibited typical structure for austenitic weld deposits and the fusion line is sound. The structure of the pipe material is typical of solution treated austenitic stainless steel. The coupling exhibited a sensitized microstructure.

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Conclusions

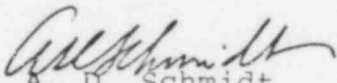
On the basis of the observations made in this investigation, the failure of the pipe-to-coupling joint may be attributed to three factors as follows:

1. The presence of a defect at the weld root resulting from lack of penetration.
2. Poor fit-up between the pipe and coupling.
3. Cyclic loading encountered in service.

Florida Power & Light Co. is investigating the source of the cyclic loading and will take appropriate corrective action after the cause is determined.

A copy of the full report is available for your inspection at Turkey Point.

Very truly yours,

  
A. D. Schmidt  
Vice President  
Power Resources

GEL/cpc

cc: Mr. Norman C. Moseley  
Jack R. Newman, Esquire