



(PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

CON'T

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

80CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)80808080800380

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NRC USE ONLY

(803) 332-3501

SUPPLEMENTAL INFORMATION FOR  
REPORTABLE OCCURRENCE 79-12

I. Cause Description and Analysis:

The safety injection line from the pump header to the boron injection tank (4-SI-110) could have been considered inoperable due to pipe support failures. The line was analyzed by the plant Architect Engineer (A. E.) to determine its operability. The results indicated that for the analyzed case of a Design Basis Earthquake (DBE), the calculated stress at one point exceeded the piping code allowable by 1.06% and the integrity of the line could therefore not be assured. The analysis also indicated that for less severe seismic loadings, including an Operating Basis Earthquake (OBE) concurrent with post LOCA operation, the line would have been totally functional.

The line was first discovered in a faulted condition on 12/15/78 and was reported on a plant "Trouble Ticket." The Trouble Ticket was handled in accordance with plant procedures. However, the potential significance of the failure was not recognized and no immediate action was taken. The line was again noted in the faulted condition on 12/19/78. The Shift Foreman was notified and corrective action was initiated immediately.

The line, as found, had a 74-foot unsupported length deflected about 12 inches at the center where it rested on the floor. Four supports failed completely and the line slid off an intact spring support. Two other failed supports remained in place providing vertical support. All of the failures occurred in "post-type" supports which were welded to a stainless steel saddle which in turn were welded to the line. The center support was anchored while the remainder were installed in guides which permitted axial movement. The baseplate of the anchored support pulled loose and sheared the concrete where it was bolted. This, it is believed, led to excessive movement of the line and precipitated the failure of the other supports.

Although still under investigation, this failure is believed to have resulted from waterhammer. The nature of the support failures suggests this type of additional loading. In addition, line configuration and certain past maintenance evolutions involving this system could have resulted in the formation of a nonventing air pocket in this section of the line. The air pocket then could have caused waterhammer during subsequent monthly testing. Recent witnessing of the monthly test, however, revealed little or no line movement during starting and stopping of the pumps, suggesting that this condition no longer exists.

Corrective Action:

Temporary corrective action was initiated on 12/19/78. On 12/20/78, under the guidance of the plant A. E., the line was fully supported using temporary supports. The temporary supports replaced the four supports which had failed completely. The welds in the line which were subject to the maximum bending stresses were dye penetrant inspected and found acceptable. However, it was not obvious at this time that welds on two other supports had failed. On 12/21/78, our A. E. completed an analysis which indicated that the line had not been overstressed while in the faulted condition. Efforts were then initiated to re-evaluate the faulted condition and perform analyses for a permanent repair/modification of the failed supports. On 2/9/79 while obtaining additional information for the faulted condition analysis, two additional failed supports were discovered. The plant A. E. was again contacted and temporary corrective action was discussed and implemented. The final temporary support arrangement was again analyzed and found acceptable.

The permanent repair will include the replacement of the six failed supports and two additional intact supports. Two intact spring supports and one hanger rod will remain. The new support designs were analyzed by the plant A. E. and are oversized to withstand loadings in addition to those of seismic and normal forces. The installation of these supports will be completed prior to heatup following the 1979 refueling.

Corrective Action to Prevent Further Occurrence:

The apparent cause of the failure is being addressed by the deliberate overdesign of the new replacement supports. However, additional investigation will be directed toward identifying the source of the waterhammer. Any information derived from the investigation will be factored into further corrective action as appropriate.

In addition, all Operations personnel will review this event in an effort to ensure that failures such as these come to the attention of the appropriate personnel for immediate followup.