

ENCLOSURE

BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2  
FAILURE TO INCORPORATE REQUIREMENTS OF A DESIGN CRITERIA  
INTO THE ACTUAL DESIGN OF THE REACTOR COOLANT DRAIN AND  
VENT SYSTEM  
NCR BLP 79-6  
10 CFR 50.55(e)  
FINAL REPORT

Description of Deficiency

Section 2.5 of the Bellefonte Nuclear Plant design criteria for the reactor coolant drain and vent system (N4-NK-D740) issued October 15, 1975, requires that the lines which lead from the pressurizer safety, steam vent, and relief valves "shall be designed to withstand anticipated transient without trip (ATWT) events, i.e., steam and water transient combinations or just steam." A subsequent review of the design of these lines during the first two weeks of August of this year revealed that the present design of these lines does not make provision for incorporating the requirements of Section 2.5 of the design criteria.

The cause of the deficiency can be attributed to an inadvertent error on behalf of the pressurizer safety, steam vent, and relief valve tailpipes designer to incorporate the requirements of Section 2.5 of the design criteria into the design of the tailpipes. At the time the design of the tailpipes was accomplished by TVA, the Nuclear Steam Supply System (NSSS) vendor's (B&W) Chapter 15 analysis showed that only saturated steam would be relieved through the safety, steam vent, and relief valves. This was not consistent with the design criteria requirements for the tailpipes and contributed to the design error.

Safety Implications

Had the safety, steam vent, and relief valve tailpipes been installed without the design changed to incorporate the requirements of Section 2.5 of the design criteria (i.e., qualified for water, two-phase, and saturated steam relief during anticipated transients without scram), the potential existed for the tailpipes to fail while relieving water or two-phase fluid during a postulated event in such a way so as to make the consequences of the event more severe. The occurrence of such a failure would increase the risk to the health and safety of the public.

Corrective Action

The requirements in the design criteria for the tailpipes in question were imposed solely by TVA since neither NRC nor the NSSS vendor (B&W) had imposed requirements for the pressurizer safety, steam vent, and relief valve tailpipes to be qualified for water, two-phase, and saturated steam relief.

The entire ATWS picture to date has not been defined sufficiently for B&W to be able to provide TVA with the necessary input parameters, i.e., peak pressure, peak temperature, pressure spike ramp rate, etc., to design the tailpipes.

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With this background in mind, the corrective actions for this NCR are follows:

1. TVA will incorporate in the design the effects of water, two-phase mixture, and saturated steam relief on the tailpipes during the worst conditions (i.e., peak pressure, peak temperature, steam pressure, ramp rate, etc.) for transients defined in Chapter 15 of the FSAR.
2. Whenever the ATWS issue is resolved, TVA will review and modify, as necessary, the design and qualification of the pressurizer relief valve, steam vent, and safety valve tailpipes to accommodate the worst case ATWS event loadings, as required by the tailpipes' design criteria.
3. TVA will revise the design criteria for the Reactor Coolant Drain and Vent System to incorporate the changes in design philosophy reflected in this NCR.

Failure to implement the requirements of a design criteria into the final design of a system should be an isolated occurrence because of the checks and balances stipulated in the Division of Engineering Design Engineering Procedures that govern the development of final designs. However, because of the occurrence of this NCR, the requirements to check designs against existing system design criteria has been reemphasized to the employees in the Bellefonte Design Project.