ENCLOSURE

SAFETY EVALUATION

Susquehanna Steam Electric Station Units 1 and 2

Docket Nos.: 50-387/388

REANALYSIS OF FEEDWATER PENETRATION BYPASS LEAKAGE

The criteria by which the staff determines potential bypass leakage paths are set forth in Branch Technical Position, Containment Systems Branch 6-3, "Determination of Bypass Leakage Paths in Dual Containment Plants." These criteria include specific requirements for barriers; such as water sealing systems, leakage control systems, and closed systems; employed to process or preclude bypass leakage. The feedwater lines penetrate both the primary and secondary containment boundaries creating potential bypass leakage paths through which radioactive material within the primary containment could leak to the outside bypassing the Standby Gas Treatment System (SGTS). A review of BWR plants revealed that the feedwater system on the majority of the Mark I, Mark II and Mark III plants have all been reviewed from the view point of a potential bypass leakage path. For this grouping of plants, a few are equipped with a simple fill system or a positive leakage control system, but the majority do not have an active system. For these plants, zero feedwater bypass leakage was assumed by taking credit for a water seal in the feedwater system between the containment isolation valves and the feedwater pumps.

The piping system of this portion of the feedwater system is not seismically qualified, however, it is subject to operating pressure ranges from 500 psig to 1100 psig, and is continuously monitored during normal operation. Therefore, operability of the feedwater system is always demonstrated. The NRC staff, therefore, believes that a water seal would be expected to be maintained.

The staff has concluded that bypass leakage through the feedwater line would be eliminated based on the following reasons:

1. For all accidents involving sudden rupture of systems containing reactor coolant, except for a feedwater line break which is later discussed, no bypass leakage would occur as long as the feedwater system is operable. Upon manual isolation of the feedwater motor operated valve, a water seal would exist in the piping between the inboard check valve and the remote manual motor operated valve. An additional water seal would also be maintained by the feedwater system outside the containment. If the feedwater is inoperable during the rapid vessel depressurization following the accident, the feedwater will begin to flash to steam. The steam flow will choke in the feedwater nozzle and limit the feedwater velocity in the piping and, therefore, reduce the amount of water removed from the feedwater piping. It is expected that a water seal would remain for a considerable length of time following the accident until the operator remotely isolates the motor operated valve. A water seal would then exist in the piping outside the motor operated valve.

2. For all small pipe breaks, a much slower reactor depressurization is expected and consequently a much lower amount of feedwater flashing, resulting in a much higher probability of maintaining a water seal between the feedwater isolation valves.

3. For the case of a large feedwater line rupture, loss of offsite power and a very large degree of reactor core damage occurring very suddenly, the availability of water seal might not be that easily maintained. However, in light of current research findings related to the fission product chemical form and timing, and the capability to restore offsite power in 0.5 to 3 hours (NUREG-1032), the staff believes that a water seal could be restored to the feedwater piping outside the containment through the use of condensate pumps or other water sources such as the control rod drive pumps.

Therefore, based on the above, the staff concludes that it is not prudent to require design modifications to improve the potential for a water seal for this narrow range of accidents and limited time period for which a water seal is questionable. The staff continues to monitor the results of these research activities in order to assure that the present conclusions remain correct.

The staff recognizes the existence of a water seal to eliminate "valve through leakage." However, leakage can also occur through the valve's stem and packing. Credit for a water seal to eliminate this leakage path could not be as readily supported. Therefore, the staff will continue to require that all feedwater containment isolation valves be pneumatically leak tested.

The NRC staff finds that the PP&L's proposal to not test the feedwater isolation valve for bypass leakage requirements is acceptable. However, we still require those valves to be pneumatically tested in accordance with Appendix J to 10 CFR 50 as required by the plant's Technical Specifications.