Item B-69: ECCS Leakage Ex-Containment

DESCRIPTION

Following a plant transient or accident, provisions are required for long-term decay heat removal. Redundancy of components is required as necessary to assure that a failure in the RHR system will not impair the ability to maintain the plant in a safe shutdown condition. Should such a failure involve leakage of primary coolant (as might result from various leakage mechanisms), the potential exists for a release of radioactivity to the environment. Any resultant airborne releases are typically controlled either by provisions for filtration of airborne activity or location of RHR equipment within leaktight cells. Contaminated liquid release (primary coolant not volatilized when leaked) is typically collected in a sump for subsequent transfer and cleanup through the radwaste system. However, specific leakage requirements are not well defined or known. This item is documented in NUREG-0471.[1]

During the TMI-2 accident, some systems were used with resulting releases of radioactive materials to the auxiliary building ventilation systems. These releases are believed to have resulted from leaking relief valves, waste gas compressor seals, valves, and open rupture discs. The residual heat removal system was not used in its design mode for several reasons, one of which was the uncertainty of the leakage characteristics of the system.

In the event of a severe accident, such as a loss of coolant or any other event which could lead to significant cladding failure, engineered safety features systems and reactor auxiliary systems should be capable of performing their intended safety function with large radioactive inventories in the fluid they process. Examples of such systems include residual heat removal, containment spray recirculation, high-pressure injection recirculation, sampling, makeup and letdown, and waste gas. These systems are checked out during preoperational testing and startup testing but, for the most part, are not included in any periodic leakage testing program. Therefore, a more positive control and knowledge of leakage rates of these systems is needed to provide the operating staff with the maximum usable equipment during an accident and to restrict or control the release of radioactive materials to the environment.

CONCLUSION

This issue is covered in TMI Action Plan Item III.D.1.1, "Primary Coolant Sources Outside the Containment Structure," which is being implemented as an item of NUREG-0737.[2]

[1] NUREG-0471, "Generic Task Problem Descriptions (Categories B, C, and D)," U.S. Nuclear Regulatory Commission, June 1978.
[2] NUREG-0737, "Clarification of TMI Action Plan Requirements," U.S. Nuclear Regulatory Commission, November 1980, (Supplement 1) January 1983.