
Item A-1: Water Hammer (Rev. 2)

DESCRIPTION

The issue was raised after the occurrence of various incidents of water hammer that involved steam generator feedings and piping, emergency core cooling systems, RHR systems, containment spray, service water, feedwater, and steam lines. The incidents were attributed to such causes as rapid condensation of steam pockets, steam-driven slugs of water, pump startup with partially empty lines, and rapid valve motion. Most of the damage was relatively minor and involved pipe hangers and restraints. However, there were several incidents

which resulted in piping and valve damage. This item was originally identified in NUREG-0371¹ and was later declared a USI in NUREG-0510.²

No water hammer incident resulted in the release of radioactivity outside of plants. However, because of the continuing incidence of water hammer events, the number of phenomena, and the potential safety significance of the systems involved, the staff believed that systematic review procedures needed to be developed to ensure that water hammer would be given appropriate consideration in CP and OL reviews, and in the review of operating reactors.

CONCLUSION

This USI was RESOLVED with the publication of NUREG-0927, Rev. 1,³ and the following SRP⁴ Sections: 3.9.3, Rev. 1; 3.9.4, Rev. 2; 5.4.6, Rev. 3; 5.4.7, Rev. 3; 6.3, Rev. 2; 9.2.1, Rev. 3; 9.2.2, Rev. 2; 10.3, Rev. 3; and

10.4.7, Rev. 3. The revised SRP Sections will be used only for the review of "custom plant" CP applications and for standard plant applications docketed after the issuance of these revised SRP Sections (which are intended for referencing in CP applications). Thus, this USI will affect all future plants only.

¹ NUREG-0371, "Task Action Plans for Generic Activities (Category A)," U.S. Nuclear Regulatory Commission, November 1978.

² NUREG-0510, "Identification of Unresolved Safety Issues Relating to Nuclear Power Plants," U.S. Nuclear Regulatory Commission, January 1979.

³ NUREG-0927, "Evaluation of Water Hammer Occurrence in Nuclear Power Plants," U.S. Nuclear Regulatory Commission, (Rev. 1) March 1984.

⁴ NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," U.S. Nuclear Regulatory Commission, (1st Ed.) November 1975, (2nd Ed.) March 1980, (3rd Ed.) July 1981.