U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

BRANCH TECHNICAL POSITION 7-1

GUIDANCE ON ISOLATION OF LOW-PRESSURE SYSTEMS FROM THE HIGH-PRESSURE REACTOR COOLANT SYSTEM

REVIEW RESPONSIBILITIES

Primary - Organization responsible for the review of instrumentation and controls

Secondary - None

A. Background

During normal and emergency conditions, it is necessary to keep low-pressure systems that are connected to the high-pressure reactor coolant system properly isolated in order to avoid either damage by overpressurization or the loss of integrity of the low-pressure system and possible radioactive releases. The residual heat removal system used for cold shutdown conditions when in service becomes an extension of the reactor coolant pressure boundary. General Design Criterion 15 requires that reactor coolant system and associated auxiliary, control, and protection systems shall be designed with sufficient margin to ensure that the design conditions of the reactor coolant pressure boundary are not exceeded during any condition of normal operation, including anticipated operational occurrences. There have been loss of decay heat removal during nonpower operation incidents and they have been a concern for years. NRC issued Generic Letters (GL) 87-12 and GL 88-17 for licensees to perform a systems analysis to avoid these problems. There have been a number of recommendations for accomplishing this

aim. Until a more definitive guide is published, the criteria in Part B, below, provide an adequate and acceptable design solution for this concern.

B. Branch Technical Position

The following measures should be incorporated in designs of the interfaces between low-pressure systems and the high-pressure reactor coolant system:

1. At least two valves in series should be provided to isolate any subsystem whenever the primary system pressure is above the pressure rating of the subsystem.

2. For system interfaces where both valves are motor-operated, the valves should have independent and diverse interlocks to prevent both from opening unless the primary system pressure is below the subsystem design pressure. Also, the valve operators should receive a signal to close automatically whenever the primary system pressure exceeds the subsystem design pressure.

3. For those system interfaces where one check valve and one motor-operated valve are provided, the motor-operated valve should be interlocked to prevent the valve from opening whenever the primary pressure is above the subsystem design pressure, and to close automatically whenever the primary system pressure exceeds the subsystem design pressure.

4. Suitable valve position indication should be provided in the control room for the interface valves.

5. For those interfaces where the subsystem is required for emergency core cooling system operation, the above recommendations need not be implemented. System interfaces of this type should be evaluated on an individual basis, as discussed in GL 87-12 and GL 88-17.

6. The system should satisfy the requirements of the General Design Criteria and Section 50.55a(h) of 10 CFR Part 50. 10 CFR 50.55a(h), “Protection and Safety Systems,” requires compliance with IEEE Std 603-1991, “IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Station,” and the correction sheet dated January 30, 1995. For nuclear power plants with construction permits issued before January 1, 1971, the applicant/licensee may elect to comply instead with their plant-specific licensing basis. For nuclear power plants with construction permits issued between January 1, 1971 and May 13, 1999, the applicant/licensee may elect to comply instead with the requirements stated in IEEE Std 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations". SRP Appendix 7.1-B provides procedures for reviewing systems against IEEE Std 279-1971. SRP Appendix 7.1-C provides procedures for reviewing systems against IEEE Std 603-1991.

C. References

1. IEEE Std 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations."

2. IEEE Std 603-1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power

Generating Stations."

3. Generic Letter 87-12, “Loss of Residual Heat Removal (RHR) While the Reactor Coolant System (RCS) is Partially Filled.”

4. Generic Letter 88-17, “Loss of Decay Heat Removal.”

Branch Technical Position 7-1
Description of Changes

This Branch Technical Position updates the guidance previously provided in Revision 4, dated June 1997 of this Branch Technical Position. See ADAMS accession number ML052500522.

In addition this Branch Technical Position was administratively updated in accordance with NRR Office Instruction, LIC-200, Revision 1, "Standard Review Plan (SRP) Process." The revision also adds standard paragraphs to extend application of the updated Branch Technical Position to prospective submittals by applicants pursuant to 10 CFR Part 52.

The technical changes are incorporated in Revision 5, dated [Month] 2007:

Review Responsibilities - Reflects changes in review branches resulting from reorganization and branch consolidation. Change is reflected throughout the Branch Technical Position..

A. Background

1. Added discussion of the loss of decay heat problem and references to Generic Letters 87-12 and GL 88-17.

B. Branch Technical Position

1. Added references to Generic Letter 87-12 and GL 88-17.

2. Updated to meet the 1999 revision of 10 CFR 50.55(h), "Protection and Safety Systems."

C. References

1. Deleted reference to Regulatory Guide 1.153.

2. Added reference to Generic Letter 87-12.

3. Added reference to Generic Letter 88-17.