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AMERICAN SOCIETY OF MECHANICAL ENGINEERS ASME BOILER AND PRESSURE VESSEL CODE, SECTION XI

A. PURPOSE

To provide guidance on ASME Boiler and Pressure Vessel Code, Section XI, as it relates to system pressure tests.

B. BACKGROUND

Region II requested NRR to provide a position regarding the performance of system pressure tests (leakage and hydrostatic) using nuclear heating and to provide a definition of plant startup with regard to pressure testing. This directive provides NRR's response to Region II's request.

C. DISCUSSION

ASME Code Section XI requires that the system leakage test be performed prior to startup following each refueling outage (Table IWB-2500-1, Note 5). The examination method required for this test is visual, Type VT-2. Later additions of Section XI permit system hydrostatic tests to be performed in lieu of the system leakage test. The Code further states that reactor coolant shall be used as the pressurizing medium. The Code also permits visual examination to be performed at 200°F with appropriate pressure corresponding to a pressure consistent with fracture prevention for system components that require a test temperature above 200°F.

ASME Code Section XI is incorporated by 10 CFR 50.55a in the NRC regulations. Therefore, this is an issue concerning whether or not regulations are being met, not just a code compliance question.

The position of NRR is that system pressure tests (leakage and hydrostatic) are to be performed before the reactor goes critical after a refueling outage. The system leakage test is a test to determine if any abnormal leakage is occurring in the reactor coolant pressure boundary after its opening and closing. The hydrostatic test is a proof test of repairs on the reactor coolant pressure boundary or other components. Prudence dictates that both of these tests be performed at the lowest temperatures that are

consistent with the fracture prevention criteria for the reactor vessel or other component so that stored energy can be minimized during testing conditions by having the system water solid. The temperature correction terms are provided to account for changes in material properties when the vessel must be heated for fracture prevention. NRR

does not believe that the temperature corrections are an invitation to perform the testing at higher temperatures to minimize the test pressures. The pressurizing medium is to be reactor coolant rather than steam. NRR recognizes that some flashing to steam of any potential leakage could occur when temperatures in excess of boiling are necessary for testing. NRR believes that the Code section which allows testing temperatures below 200°F for corresponding pressures is prudent for the visual examination in that the risk to plant personnel is reduced and any leakage would be liquid and, therefore, more rapidly detectable.

With regard to a definition of startup, startup occurs when the mode switch is placed in the "startup/hot standby" position and control rod withdrawal is begun.

D. CONCLUSION

The ASME Code intended both system leakage and hydrostatic tests to be performed prior to reactor criticality from a refueling outage. The later Code position (footnote 7 to Table IWB-2500-1, Category B-P), permitting the system hydrostatic test to be used in lieu of the leakage test, is a clear indication that the Code intended the system hydrostatic test also to be performed at low temperatures consistent with fracture prevention considerations prior to reactor startup.

E. REFERENCE

The guidance provided in this directive was extracted from a memorandum from Robert M. Bernero, Director, Division of BWR Licensing, NRR for Albert F. Gibson, Director, Division of Reactor Safety, Region II, dated April 29, 1986; Subject: Interpretation of System Pressure Test Requirements. The complete memorandum is in the Document Control System (DCS 68390/353).

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