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REACTOR COOLANT SYSTEM

3/4.4.3 REACTOR COOLANT SYSTEM LEAKAGE

LEAKAGE DETECTION SYSTEMS

LIMITING CONDITION FOR OPERATION

3.4.3.1 The following reactor coolant system leakage detection systems shall be OPERABLE:

- a. The primary containment atmosphere gaseous radioactivity monitoring system,
- b. The primary containment sump flow monitoring system, and
- c. The primary containment atmosphere particulate radioactivity monitoring system.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, and 3.

ACTION:

- a. With only two of the above required leakage detection systems OPERABLE, operation may continue for up to 30 days provided grab samples of the containment atmosphere are obtained and analyzed at least once per 24 hours when the required gaseous and/or particulate radioactive monitoring system is inoperable; otherwise, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

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SURVEILLANCE REQUIREMENTS

4.4.3.1 The reactor coolant system leakage detection systems shall be demonstrated OPERABLE by:

- a. Primary containment atmosphere particulate and gaseous monitoring systems-performance of a CHANNEL CHECK at least once per 12 hours, a CHANNEL FUNCTIONAL TEST at least once per 31 days and a CHANNEL CALIBRATION at least once per 18 months.
- b. Primary containment sump flow monitoring system-performance of a CHANNEL FUNCTIONAL TEST at least once per 31 days and a CHANNEL CALIBRATION TEST at least once per 18 months.

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- b. With the primary containment sump flow monitoring system INOPERABLE, operation may continue for up to 30 days provided an alternate manual leak rate measurement method is applied to obtain the required sump monitoring until the drain sump monitoring system is restored; otherwise, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

REACTOR COOLANT SYSTEM

OPERATIONAL LEAKAGE

LIMITING CONDITION FOR OPERATION

3.4.3.2 Reactor coolant system leakage shall be limited to:

- a. No PRESSURE BOUNDARY LEAKAGE.
- b. 5 gpm UNIDENTIFIED LEAKAGE.
- c. 2 gpm increase in UNIDENTIFIED LEAKAGE within any ²⁴ 4-hour period.
- d. 25 gpm total leakage averaged over any 24-hour period.
- e. 1 gpm leakage at a reactor coolant system pressure of 950 ± 10 psig from any reactor coolant system pressure isolation valve specified in Table 3.4.3.2-1.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, and 3.

ACTION:

- a. With any PRESSURE BOUNDARY LEAKAGE, be in at least HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the next 24 hours.
- b. With any reactor coolant system leakage greater than the limits in b. and/or d. above, reduce the leakage rate to within the limits within 4 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.
- c. With any reactor coolant system pressure isolation valve leakage greater than the above limit, isolate the high pressure portion of the affected system from the low pressure portion within 4 hours by use of at least one other closed (manual or deactivated automatic) (or check*) valve, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.
- d. With one or more of the high/low pressure interface valve leakage pressure monitors shown in Table 3.4.3.2-1 inoperable, restore the inoperable monitor(s) to OPERABLE status within 7 days or verify the pressure to be less than the alarm setpoint at least once per 12 hours; restore the inoperable monitor(s) to OPERABLE status within 30 days or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.
- e. ⁽²⁴⁾ With any reactor coolant system UNIDENTIFIED LEAKAGE increase greater than 2 gpm within any 4-hour period, identify the source of leakage increase as not service sensitive Type 304 or 316 austenitic stainless steel within 4 hours, or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

*Which has been verified not to exceed the allowable leakage limit at the last refueling outage or after the last time the valve was disturbed, whichever is more recent.

REACTOR COOLANT SYSTEM

SURVEILLANCE REQUIREMENTS

4.4.3.2.1 The reactor coolant system leakage shall be demonstrated to be within each of the above limits by:

- a. Monitoring the primary containment atmospheric particulate and gaseous radioactivity at least once per 12 hours,
- b. Monitoring the primary containment sump flow rate at least once per ~~12 hours~~, SHIFT. NOT TO EXCEED 12 HOURS.
- c. Monitoring the reactor vessel head flange leak detection system at least once per 24 hours.

4.4.3.2.2 Each reactor coolant system pressure isolation valve specified in Table 3.4.3.2-1 shall be demonstrated OPERABLE by leak testing pursuant to Specification 4.0.5 and verifying the leakage of each valve to be within the specified limit:

- a. At least once per 18 months.
- b. Prior to returning the valve to service following maintenance, repair or replacement work on the valve which could affect its leakage rate.

The provisions of Specification 4.0.4 are not applicable for entry into OPERATIONAL CONDITION 3.

4.4.3.2.3 The high/low pressure interface valve leakage pressure monitors shall be demonstrated OPERABLE with alarm setpoints per Table 3.4.3.2-2 by performance of a:

- a. CHANNEL FUNCTIONAL TEST at least once per 31 days, and
- b. CHANNEL CALIBRATION at least once per 18 months.

REACTOR COOLANT SYSTEM

BASES

3/4.4.2 SAFETY/RELIEF VALVES (Continued)

the dual purpose safety/relief valves in their ASME Code qualified mode (spring lift) of safety operation.

The overpressure protection system must accommodate the most severe pressurization transient. There are two major transients that represent the most severe abnormal operational transient resulting in a nuclear system pressure rise. The evaluation of these events with the final plant configuration has shown that the MSIV closure is slightly more severe when credit is taken only for indirect derived scrams; i.e., a flux scram. Utilizing this worse case transient as the design basis event, a minimum of 12 safety/relief valves are required to assure peak reactor pressure remains within the Code limit of 110% of design pressure.

Testing of safety/relief valves is normally performed at lower power. It is desirable to allow an increased number of valves to be out of service during testing. Therefore, an evaluation of the MSIV closure without direct scram was performed at 25% of RATED THERMAL POWER assuming only 4 safety/relief valves were operable. The results of this evaluation demonstrate that any 4 safety/relief valves have sufficient flow capacity to assure that the peak reactor pressure remains well below the code limit of 110% of design pressure.

Demonstration of the safety/relief valve lift settings will be performed in accordance with the provisions of Specification 4.0.5.

3/4.4.3 REACTOR COOLANT SYSTEM LEAKAGE

3/4.4.3.1 LEAKAGE DETECTION SYSTEMS

The RCS leakage detection systems required by this specification are provided to monitor and detect leakage from the reactor coolant pressure boundary. These detection systems are consistent with the recommendations of Regulatory Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973.

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The primary containment sump flow monitoring system monitors the UNIDENTIFIED LEAKAGE collected in the floor drain sump with a sensitivity such that 1 gpm change within 1 hour can be measured. Alternatively, other methods for measuring flow to the sump which are capable of detecting a change in UNIDENTIFIED LEAKAGE of 1 gpm within 1 hour may be used, for up to 30 days, when the installed system is INOPERABLE.

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REACTOR COOLANT SYSTEM

BASES

3/4.4.3.2 OPERATIONAL LEAKAGE

The allowable leakage rates from the reactor coolant system have been based on the predicted and experimentally observed behavior of cracks in pipes. The normally expected background leakage due to equipment design and the detection capability of the instrumentation for determining system leakage was also considered. The evidence obtained from experiments suggests that for leakage somewhat greater than that specified for UNIDENTIFIED LEAKAGE the probability is small that the imperfection or crack associated with such leakage would grow rapidly. However, in all cases, if the leakage rates exceed the values specified or the leakage is located and known to be PRESSURE BOUNDARY LEAKAGE, the reactor will be shut down to allow further investigation and corrective action. Service sensitive reactor coolant system Type 304 and 316 austenitic stainless steel piping; i.e., those that are subject to high stress or that contain relatively stagnant, intermittent, or low flow fluids, requires additional surveillance and leakage limits. AND
ADDITIONAL
SPECIFICATIONS
CONTAINED IN
GENERIC LETTER
88-01.

The surveillance requirements for RCS pressure isolation valves provide added assurance of valve integrity thereby reducing the probability of gross valve failure and consequent intersystem LOCA. Leakage from the RCS pressure isolation valves is IDENTIFIED LEAKAGE and will be considered as a portion of the allowed limit.

3/4.4.4 CHEMISTRY

The water chemistry limits of the reactor coolant system are established to prevent damage to the reactor materials in contact with the coolant. Chloride limits are specified to prevent stress corrosion cracking of the stainless steel. The effect of chloride is not as great when the oxygen concentration in the coolant is low, thus the 0.2 ppm limit on chlorides is permitted during POWER OPERATION. During shutdown and refueling operations, the temperature necessary for stress corrosion to occur is not present so a 0.5 ppm concentration of chlorides is not considered harmful during these periods.

Conductivity measurements are required on a continuous basis since changes in this parameter are an indication of abnormal conditions. When the conductivity is within limits, the pH, chlorides and other impurities affecting conductivity must also be within their acceptable limits. With the conductivity meter inoperable, additional samples must be analyzed to ensure that the chlorides are not exceeding the limits.

The surveillance requirements provide adequate assurance that concentrations in excess of the limits will be detected in sufficient time to take corrective action.

