

INDEX

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

<u>SECTION</u>	<u>PAGE</u>
<u>REACTOR COOLANT SYSTEM (Continued)</u>	
Figure 3.4.1.1-1 Thermal Power versus Core Flow	3/4 4-3
Jet Pumps	3/4 4-4
Recirculation Pumps	3/4 4-5
Idle Recirculation Loop Startup	3/4 4-6
3/4.4.2 SAFETY/RELIEF VALVES	3/4 4-7
3/4.4.3 REACTOR COOLANT SYSTEM LEAKAGE	
Leakage Detection Systems	3/4 4-8
Operational Leakage	3/4 4-9
Table 3.4.3.2-1 Reactor Coolant System Pressure Isolation Valves	3/4 4-11
3/4.4.4 CHEMISTRY	3/4 4-12
Table 3.4.4-1 Reactor Coolant System Chemistry Limits	3/4 4-14
3/4.4.5 SPECIFIC ACTIVITY	3/4 4-15
Table 4.4.5-1 Primary Coolant Specific Activity Sample and Analysis Program	3/4 4-17
3/4.4.6 PRESSURE/TEMPERATURE LIMITS	
Reactor Coolant System	3/4 4-18
Figure 3.4.6.1-1 Minimum Reactor Pressure Vessel Metal Temperature Vs. Reactor Vessel Pressure	3/4 4-20
Table 4.4.6.1.3-1 Deleted	3/4 4-21
Reactor Steam Dome	3/4 4-22
3/4.4.7 MAIN STEAM LINE ISOLATION VALVES	3/4 4-23
3/4.4.8 STRUCTURAL INTEGRITY	3/4 4-24

REACTOR COOLANT SYSTEM

SURVEILLANCE REQUIREMENTS (Continued)

4.4.6.1.2 The reactor coolant system temperature and pressure shall be determined to be to the right of the criticality limit line of Figure 3.4.6.1-1 curve C within 15 minutes prior to the withdrawal of control rods to bring the reactor to criticality and at least once per 30 minutes during system heatup.

4.4.6.1.3 DELETED

4.4.6.1.4 DELETED

4.4.6.1.5 The reactor vessel flange and head flange temperature shall be verified to be greater than or equal to 80°F:

- a. In OPERATIONAL CONDITION 4 when reactor coolant system temperature is:
 - 1. $\leq 100^{\circ}\text{F}$, at least once per 12 hours.
 - 2. $\leq 90^{\circ}\text{F}$, at least once per 30 minutes.
- b. Within 30 minutes prior to and at least once per 30 minutes during tensioning of the reactor vessel head bolting studs.

INFORMATION CONTAINED ON THIS PAGE HAS BEEN DELETED

REACTOR COOLANT SYSTEM

BASES

PRESSURE/TEMPERATURE LIMITS (Continued)

The operating limit curves of Figure 3.4.6.1-1 are derived from the fracture toughness requirements of 10 CFR 50 Appendix G and ASME Code Section XI, Appendix G. The curves are based on the RT_{NDT} and stress intensity factor information for the reactor vessel components. Fracture toughness limits and the basis for compliance are more fully discussed in FSAR Chapter 5, Paragraph 5.3.1.5, "Fracture Toughness."

The reactor vessel materials have been tested to determine their initial RT_{NDT} . The results of these tests are shown in Table B 3/4.4.6-1. Reactor operation and resultant fast neutron, E greater than 1 MeV, irradiation will cause an increase in the RT_{NDT} . Therefore, an adjusted reference temperature, based upon the fluence, nickel content and copper content of the material in question, can be predicted using Bases Figure B 3/4.4.6-1 and the recommendations of Regulatory Guide 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials." The pressure/temperature limit curves, Figure 3.4.6.1-1, include a shift in RT_{NDT} for conditions at 32 EFPY. The A, B and C limit curves are predicted to be bounding for all areas of the RPV until 32 EFPY. In addition, an intermediate A curve has been provided for 22 EFPY.

The pressure-temperature limit lines shown in Figures 3.4.6.1-1, curves C, and A, for reactor criticality and for inservice leak and hydrostatic testing have been provided to assure compliance with the minimum temperature requirements of Appendix G to 10 CFR Part 50 for reactor criticality and for inservice leak and hydrostatic testing.

3/4.10 SPECIAL TEST EXCEPTIONS

BASES

3/4.10.8 INSERVICE LEAK AND HYDROSTATIC TESTING

This special test exception permits certain reactor coolant pressure tests to be performed in OPERATIONAL CONDITION 4 when the metallurgical characteristics of the reactor pressure vessel (RPV) or plant temperature control capabilities during these tests require the pressure testing at temperatures greater than 200°F and less than or equal to 212°F (normally corresponding to OPERATIONAL CONDITION 3). The additionally imposed OPERATIONAL CONDITION 3 requirements for SECONDARY CONTAINMENT INTEGRITY provide conservatism in response to an operational event.

Invoking the requirement for Refueling Area Secondary Containment Integrity along with the requirement for Reactor Enclosure Secondary Containment Integrity applies the requirements for Reactor Enclosure Secondary Containment Integrity to an extended area encompassing Zones 1 and 3. Operations with the Potential for Draining the Vessel, Core alterations, and fuel handling are prohibited in this secondary containment configuration. Drawdown and inleakage testing performed for the combined zone system alignment shall be considered adequate to demonstrate integrity of the combined zones.

Inservice hydrostatic testing and inservice leak pressure tests required by Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code are performed prior to the reactor going critical after a refueling outage. The minimum temperatures (at the required pressures) allowed for these tests are determined from the RPV pressure and temperature (P/T) limits required by LCO 3.4.6, Reactor Coolant System Pressure/Temperature Limits. These limits are conservatively based on the fracture toughness of the reactor vessel, taking into account anticipated vessel neutron fluence. With increased reactor fluence over time, the minimum allowable vessel temperature increases at a given pressure.

INDEX

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

<u>SECTION</u>	<u>PAGE</u>
<u>REACTOR COOLANT SYSTEM (Continued)</u>	
Figure 3.4.1.1-1 Thermal Power versus Core Flow	3/4 4-3
Jet Pumps	3/4 4-4
Recirculation Pumps	3/4 4-5
Idle Recirculation Loop Startup	3/4 4-6
3/4.4.2 SAFETY/RELIEF VALVES	3/4 4-7
3/4.4.3 REACTOR COOLANT SYSTEM LEAKAGE	
Leakage Detection Systems	3/4 4-8
Operational Leakage	3/4 4-9
Table 3.4.3.2-1 Reactor Coolant System Pressure Isolation Valves	3/4 4-11
3/4.4.4 CHEMISTRY	3/4 4-12
Table 3.4.4-1 Reactor Coolant System Chemistry Limits	3/4 4-14
3/4.4.5 SPECIFIC ACTIVITY	3/4 4-15
Table 4.4.5-1 Primary Coolant Specific Activity Sample and Analysis Program	3/4 4-17
3/4.4.6 PRESSURE/TEMPERATURE LIMITS	
Reactor Coolant System	3/4 4-18
Figure 3.4.6.1-1 Minimum Reactor Pressure Vessel Metal Temperature Vs. Reactor Vessel Pressure	3/4 4-20
Table 4.4.6.1.3-1 Deleted	3/4 4-21
Reactor Steam Dome	3/4 4-22
3/4.4.7 MAIN STEAM LINE ISOLATION VALVES	3/4 4-23
3/4.4.8 STRUCTURAL INTEGRITY	3/4 4-24

REACTOR COOLANT SYSTEM

SURVEILLANCE REQUIREMENTS (Continued)

4.4.6.1.2 The reactor coolant system temperature and pressure shall be determined to be to the right of the criticality limit line of Figure 3.4.6.1-1 curve C within 15 minutes prior to the withdrawal of control rods to bring the reactor to criticality and at least once per 30 minutes during system heatup.

4.4.6.1.3 DELETED

4.4.6.1.4 DELETED

4.4.6.1.5 The reactor vessel flange and head flange temperature shall be verified to be greater than or equal to 70°F:

- a. In OPERATIONAL CONDITION 4 when reactor coolant system temperature is:
 - 1. $\leq 100^{\circ}\text{F}$, at least once per 12 hours.
 - 2. $\leq 90^{\circ}\text{F}$, at least once per 30 minutes.
- b. Within 30 minutes prior to and at least once per 30 minutes during tensioning of the reactor vessel head bolting studs.

INFORMATION CONTAINED ON THIS PAGE HAS BEEN DELETED

REACTOR COOLANT SYSTEM

BASES

PRESSURE/TEMPERATURE LIMITS (Continued)

The operating limit curves of Figure 3.4.6.1-1 are derived from the fracture toughness requirements of 10 CFR 50 Appendix G and ASME Code Section XI, Appendix G. The curves are based on the RT_{NDT} and stress intensity factor information for the reactor vessel components. Fracture toughness limits and the basis for compliance are more fully discussed in FSAR Chapter 5, Paragraph 5.3.1.5, "Fracture Toughness."

The reactor vessel materials have been tested to determine their initial RT_{NDT} . The results of these tests are shown in Table B 3/4.4.6-1. Reactor operation and resultant fast neutron, E greater than 1 MeV, irradiation will cause an increase in the RT_{NDT} . Therefore, an adjusted reference temperature, based upon the fluence, nickel content and copper content of the material in question, can be predicted using Bases Figure B 3/4.4.6-1 and the recommendations of Regulatory Guide 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials." The pressure/temperature limit curve, Figure 3.4.6.1-1, curves A, B and C, includes an assumed shift in RT_{NDT} for the conditions at 32 EFPY. In addition, an intermediate A curve has been provided for 22 EFPY. The A, B and C limit curves are predicted to be bounding for all areas of the RPV until 32 EFPY.

The pressure-temperature limit lines shown in Figures 3.4.6.1-1, curves C, and A, for reactor criticality and for inservice leak and hydrostatic testing have been provided to assure compliance with the minimum temperature requirements of Appendix G to 10 CFR Part 50 for reactor criticality and for inservice leak and hydrostatic testing.

3/4.10 SPECIAL TEST EXCEPTIONS

BASES

3/4.10.8 INSERVICE LEAK AND HYDROSTATIC TESTING

This special test exception permits certain reactor coolant pressure tests to be performed in OPERATIONAL CONDITION 4 when the metallurgical characteristics of the reactor pressure vessel (RPV) or plant temperature control capabilities during these tests require the pressure testing at temperatures greater than 200°F and less than or equal to 212°F (normally corresponding to OPERATIONAL CONDITION 3). The additionally imposed OPERATIONAL CONDITION 3 requirements for SECONDARY CONTAINMENT INTEGRITY provide conservatism in response to an operational event.

Invoking the requirement for Refueling Area Secondary Containment Integrity along with the requirement for Reactor Enclosure Secondary Containment Integrity applies the requirements for Reactor Enclosure Secondary Containment Integrity to an extended area encompassing Zones 2 and 3. Operations with the Potential for Draining the Vessel, Core alterations, and fuel handling are prohibited in this secondary containment configuration. Drawdown and inleakage testing performed for the combined zone system alignment shall be considered adequate to demonstrate integrity of the combined zones.

Inservice hydrostatic testing and inservice leak pressure tests required by Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code are performed prior to the reactor going critical after a refueling outage. The minimum temperatures (at the required pressures) allowed for these tests are determined from the RPV pressure and temperature (P/T) limits required by LCO 3.4.6, Reactor Coolant System Pressure/Temperature Limits. These limits are conservatively based on the fracture toughness of the reactor vessel, taking into account anticipated vessel neutron fluence. With increased reactor fluence over time, the minimum allowable vessel temperature increases at a given pressure.