3.2 DELETED

3.2 CHEMICAL AND VOLUME CONTROL SYSTEM

Applicability

Applies to the operational status of the Chemical and Volume Control System.

Objective

To define those conditions of the Chemical and Volume Control System necessary to ensure safe reactor operation.

Specification

3.2.1 When fuel is in the reactor there shall be at least one flow path to the core for boric acid injection. The minimum capability for boric acid injection shall be equivalent to that supplied from the refueling water storage tank.

3.2.2 The reactor shall not be made critical unless the following Chemical and Volume Control System conditions are met:

a. Two charging pumps shall be operable[1].

b. Both boric acid transfer pumps shall be operable.

c. The boric acid tanks together shall contain a total minimum of 3080 gallons of 20,000 to 22,500 ppm boron solution at a temperature of at least 145°F.

d. System piping, instrumentation, controls, and valves shall be operable to the extent of establishing one flow path from the boric acid tanks and one flow path from the refueling water storage tank to the Reactor Coolant System.

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[1]The Emergency Power sources are not required for operability of the charging pumps.

e. [redacted] channels of heat tracing shall be operable for the flow path from the boric acid tanks.

f. The primary water storage tank contains not less than 30,000 gallons of water.

3.2.3 During power operation, the requirements of 3.2.2 may be modified to allow any one of the following components to be inoperable. If the system is not restored to meet the requirements of 3.2.2 within the time period specified, the reactor shall be placed in the hot shutdown condition utilizing normal operating procedures. If the requirements of 3.2.2 are not satisfied within an additional 48 hours, the reactor shall be placed in the cold shutdown condition utilizing normal operating procedures.

a. One of the two operable charging pumps may be removed from service provided a charging pump is restored to operable status within 24 hours.

b. One boric acid transfer pump may be out of service provided the pump is restored to operable status within 24 hours.

c. One channel of heat tracing may be out of service for 24 hours.

3.2.4 Extended Maintenance

As soon as there is reason to expect that maintenance to restore components or systems to an operable condition will last longer than periods specified, the circumstances of the extended maintenance and the estimated date for returning the components or systems to an operable condition shall promptly be reported to the Director - Office

of Nuclear Reactor Regulation and to the Director - Region II Office of Inspection and Enforcement. The purpose of prompt reporting is to allow the NRC to review the circumstances of the request for extended outage and to render a timely decision on whether to extend the specified out-of-service period while reactor operations continue.

3.2.5 When the reactor is in the hot shutdown condition, the requirements of 3.2.2, 3.2.3, and 3.2.4 shall be met. Except that any one component as defined in 3.2.3 may be inoperable for a period equal to the time period specified in the subparagraphs 3.2.2 plus 48 hours, after which the plant shall be placed in the cold shutdown condition utilizing normal operating procedures.

Basis

The Chemical and Volume Control System provides control of the Reactor Coolant System boron inventory.[1] This is normally accomplished by using either one of the three charging pumps in series with one of the two boric acid pumps. An alternate method of boration will be to use the charging pumps directly from the refueling water storage tank. A third method will be to depressurize and use the safety injection pumps. There are two sources of borated water available for injection through two different paths.

a. The boric acid transfer pumps can deliver the boric acid tank contents (concentration of boric acid) to the charging pumps.

b. The charging pumps can take suction from the refueling water storage tank (1950 ppm boron solution).

c. [redacted] safety injection pumps can take their suction from the refueling water storage tank.

System reliability is reduced when two of the three charging pumps are out of service; therefore, the outage time has been limited. Since credit is not taken for the charging pumps as accident mitigation equipment (i.e., engineered safety feature equipment assumed to function in an accident analyzed in the Final Safety Analysis Report (FSAR), Chapter 15), operability of the respective emergency electrical power source (i.e., emergency diesel generator) is not necessary for the operability of a charging pump.

The quantity of boric acid in storage from either the boric acid tanks or the refueling water storage tank is sufficient and fast enough to borate the reactor to cold shutdown at any time during core life. Thus, the out of service interval for the boric acid pumps is considered conservative since borated water is also available from the refueling water storage tank via the charging pumps. Approximately 2640 gallons of the 20,000 to 22,500 ppm boron solution are required to meet cold shutdown conditions.[2] Thus a minimum of 3080 gallons in the boric acid tanks is specified. An upper concentration limit of 13% boric acid (22,500 ppm) in the tank is specified to maintain solution solubility at the specified low temperature limit of 145°F. Two channels of heat tracing are installed on lines normally containing concentrated boric acid solution to maintain the specified low temperature limit. The plant operating procedures require immediate action to affect repairs of an inoperable component; therefore, in most cases repairs will be completed in less than the specified repair time.

When borating to the cold shutdown condition using boric acid from the boric acid tanks, make up water must be supplied to compensate for shrinkage of the reactor coolant. Sufficient water for this purpose must be maintained in the primary water storage tank and the refueling water storage tank as required in 3.2.2.f and 3.3.1.1.a.

The overall reliability of the chemical and volume control system is improved by its normal mode of operation, i.e., at least one charging pump, one boric acid transfer pump and one boric acid tank are in continuous operation.

The plant operating procedures will require immediate action to effect repairs of an inoperable component and, therefore, in most cases repairs

will be completed in less than the specified allowable repair times. Infrequently, however, major maintenance might be required. Replacement of principal system components could necessitate outages of more than the time allowed for a system or component to be out of service. The prompt reporting of an anticipated need for an extended maintenance period is intended to allow a timely ruling by the NRC on whether to allow continued operation during an anticipated extended equipment outage on a case-by-case basis.

References

(1) FSAR Section 9.2.2
(2) FSAR Table 9.2-2