

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:
- Two charging pumps shall be operable¹
 - Both boric acid transfer pumps shall be operable.
 - 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.
 - 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.

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

- c. The 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. 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

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.

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 - 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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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.

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