2.0 LIMITING CONDITIONS FOR OPERATION

2.2 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 assure safe reactor operation.

Specifications

(1) When fuel is in the reactor and the reactor is subcritical, there shall be at least one flow path to the core for boric acid injection. This flow path may be from the SIRWT, with at least 10,000 gals. available at refueling boron concentration or from a BAST which meets the requirements of Figure 2-11 for a SIRWT boron concentration at the technical specification limit.

(2) The reactor shall not be made critical unless all the following minimum requirements are met:

a. At least two charging pumps shall be operable.

b. One boric acid transfer pump shall be operable.

c. The minimum volume of borated water contained in the concentrated boric acid tank(s) is dependent on the boric acid storage tank (BAST) and SIRW tank boron concentrations. The minimum required volume curve is shown in Figure 2-11. Depending on the flow paths available, this volume of borated water can be either the combined volume of the two BASTs, or the minimum in each BAST, or can be contained in a specific BAST. The BAST is defined as the tank, gravity feed valve, pump and associated piping. The ambient temperature of the boric acid tank solution CH-11A and CH-11B shall meet the temperature requirements of Figure 2-12.

d. System piping and valves shall be operable such that one of the following four conditions will be satisfied. If piping or valves become inoperable and a condition change is required, six (6) hours are allowed when changing from one condition listed below to another condition listed below. In the event that the condition change cannot be completed within the six (6) hours allowed, the unit shall be placed in at least HOT SHUTDOWN within six (6) hours, in at least subcritical and <300°F within the next six (6) hours and in at least COLD SHUTDOWN within the following 30 hours unless corrective measures are completed.

d1. The required BAST volume of Figure 2-11 can be combined between CH-11A and CH-11B when both tanks are operable.

d2. When LCV-218-3 is inoperable or the SIRWT volume is below Technical Specification minimum, then each BAST must be operable and contain the required volume of Figure 2-11 corresponding to the requirements of the SIRWT Technical Specification boron concentration.

d3. When BAST CH-11B is inoperable, then BAST CH-11A must be operable and contain the required volume of Figure 2-11 and LCV-218-3 must be operable.

d4. When BAST CH-11A is inoperable, then BAST CH-11B must be operable and contain the required volume of Figure 2-11 and LCV-218-3 must be operable.

e. Level instruments on the inservice concentrated boric acid tank(s) shall be operable.

(3) Modification of Minimum Requirements

During power operation, the minimum requirements may be modified to allow any one of the following conditions to exist at any one time. If the system is not restored to meet the minimum requirements within the time period specified, the reactor will be placed in a hot shutdown condition in 4 hours. If the minimum requirements are not satisfied within an additional 48 hours, a cold shutdown shall be initiated.

a. One of the operable charging pumps may be removed from service provided two charging pumps are operable within 24 hours.

b. Both boric acid pumps may be out of service for 24 hours provided that both BASTs meet the requirements of Figure 2-11.

c. One level instrument channel on each inservice concentrated boric acid tank may be out of service for 24 hours.

d. One BAST may be out of service for 72 hours provided that one of the conditions of (2)d. is met.

Basis

The chemical and volume control system provides control of the reactor coolant system boron inventory.(1) This is normally accomplished by using any 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 SIRW 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 three different paths.

(1) The boric acid pumps can deliver the concentrated boric acid tank contents (2.5-4.5 weight percent concentration of boric acid) to the charging pumps. The tanks are located above the charging pumps to that the boric acid will flow by gravity without being pumped.

(2) The safety injection pumps can take suction from the SIRW tank which maintains a boric acid concentration greater than the required refueling concentration.

(3) The charging pumps can take their suctions by gravity from either the boric acid tanks or the SIRW tank.

Each concentrated boric acid tank containing 2.5-4.5 weight percent boric acid has sufficient boron to bring the plant to a cold shutdown condition. Boric acid pumps are each of sufficient capacity to feed all three charging pumps at their maximum capacity.

The concentrated boric acid storage tank is sized for 2.5-4.5 weight percent boric acid solution and is capable of storing solution up to 4.5 weight percent solution. All components of the system are capable of maintaining 4.5 weight percent solution. The elevation of the concentrated boric acid tank is sufficiently above the charging pump suction so as to provide adequate gravity flow to the charging pumps.

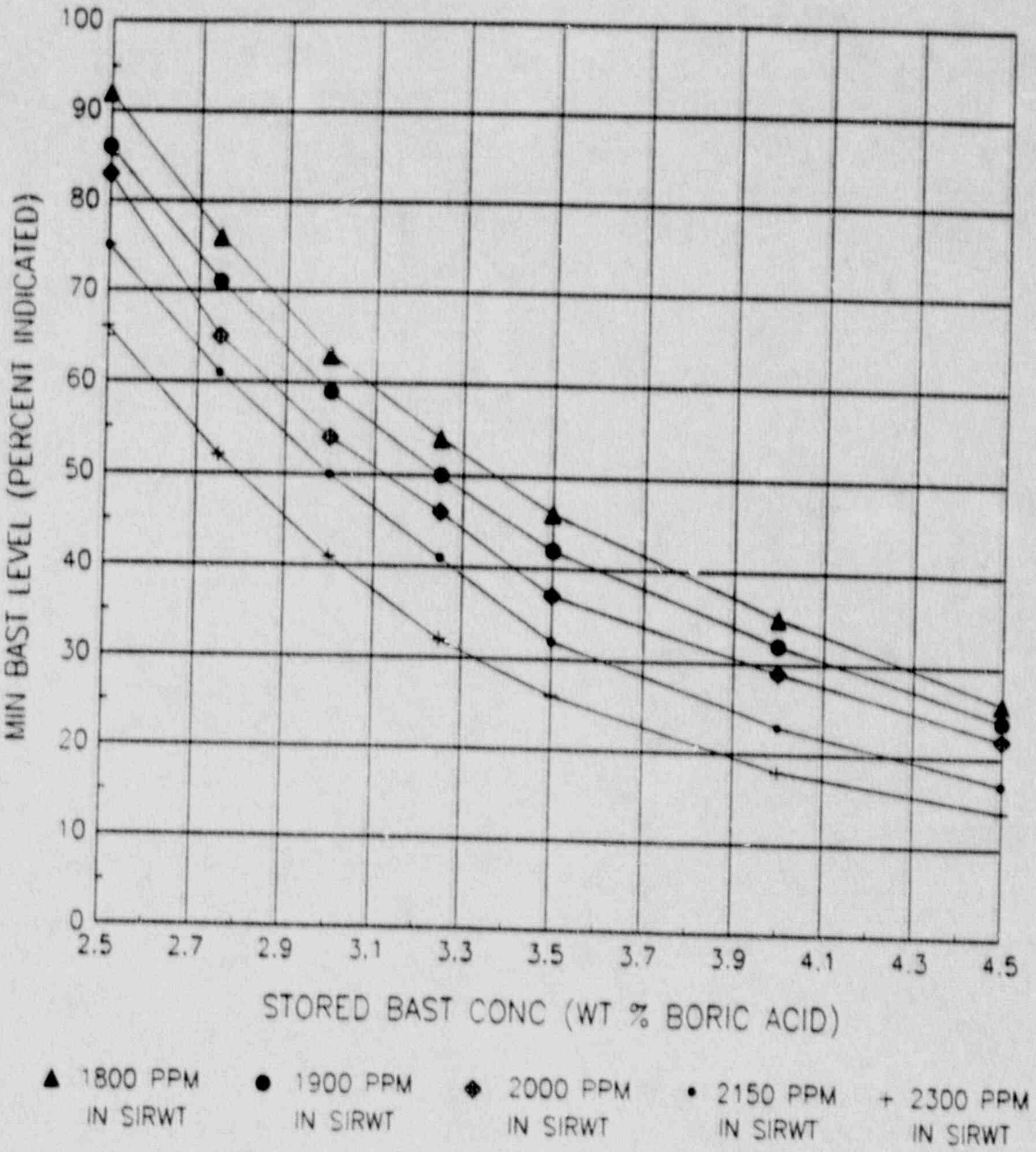
Figure 2-12 contains a 10°F bias to account for temperature measurement uncertainty. An administrative procedure to monitor the temperature of the BASTs and boric acid system piping in the Auxiliary Building ensures that the temperature requirements of Figure 2-12 are met. Should the system temperature be unacceptable for operation at the current boric acid concentration, immediate steps will be taken to reduce the boric acid concentration or raise the temperature of the system such that the concentration is within the acceptable range of Figure 2-12. The operation of an inservice BAST, in accordance with 2.2.(3).c, with only an alarm channel is permitted.

The SIRW tank contents are sufficient to borate the reactor coolant in order to reach cold shutdown at any time during core life.

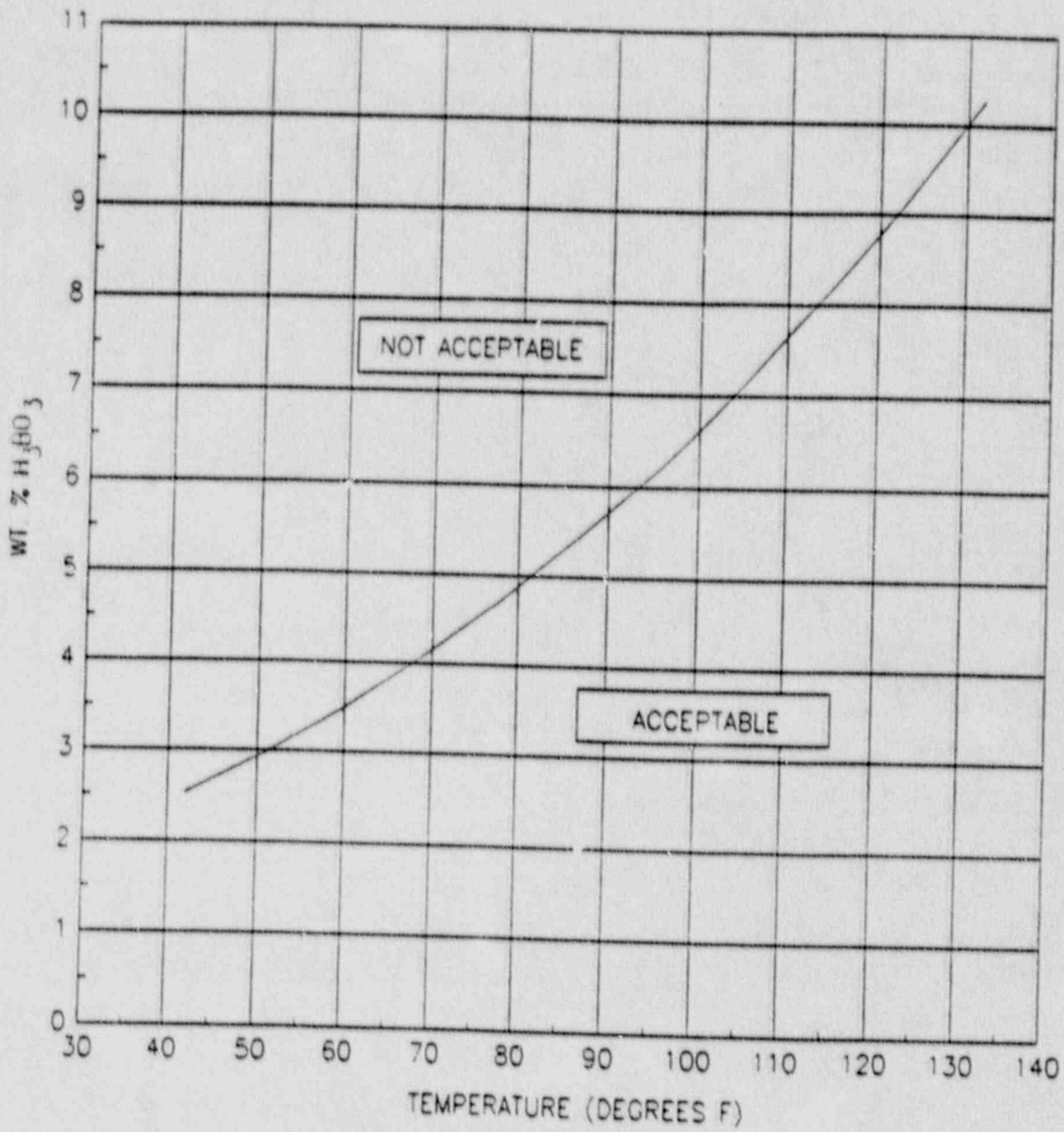
The limits on component operability and the time periods for inoperability were selected on the basis of the redundancy indicated above and engineering judgment.

References

(1) USAR, Section 9.2



FORT CALHOUN MIN BAST LEVEL vs STORED BAST CONCENTRATION	OMAHA PUBLIC POWER DISTRICT FORT CALHOUN STATION-UNIT 1	FIGURE 2-11



BORIC ACID SOLUBILITY IN WATER	OMAHA PUBLIC POWER DISTRICT FORT CALHOUN STATION-UNIT 1	FIGURE 2-12

TABLE 3-2 (continued)

MINIMUM FREQUENCIES FOR CHECKS, CALIBRATIONS AND TESTING OF ENGINEERED SAFETY FEATURES, INSTRUMENTATION AND CONTROLS

Channel Description	Surveillance Function	Frequency	Surveillance Method
14. (continued)	b. Calibrate	R	b. Known pressure and differential pressure applied to pressure and level sensors.
15. Boric Acid Tank Level	a. Check	D	a. Compare two indications.
	b. Test	R	b. Pump tank below low-level alarm point to verify switch operation.
	c. Calibrate	R	c. Known differential pressure applied to level sensors. At least three points in indicator range will be obtained-high, middle-of-range, and low (near alarm set-point).
16. Boric Acid Tank Temperature Indication	a. Check	D	a. Observe temperature devices for proper readings.
17. Steam Generator Low Pressure Signal (SGLS)	a. Check	S	a. Compare four independent pressure indications.
	b. Test	$M^{(2)}$	b. Simulated signal.
	c. Calibrate	R	c. Known pressure applied to sensors to verify trip points, logic operation, block permissive, auto reset and valve closures.

Basis for No Significant Hazards Considerations

The proposed change to Section 2.2, Chemical and Volume Control System will revise Technical Specifications 2.2(2).c, 2.2.(2).d, 2.2.(2).e, 2.2.(3).c, 2.2.(3).d, 2.2.(3).e and 2.2.(3).f, add Figure 2-11, and 2-12 and amend the basis and reference.

The specifications define: (1) the volume and concentration of boric acid to be maintained in the Safety Injection Refueling Water Tank (SIRWT) and Boric Acid Storage Tanks (BAST) for cooldown of the plant; and (2) the flow paths from the BAST to the reactor coolant system during the various modes of plant operation.

Technical Specification Section 2.2.(2).c and 2.2.(2).d specify the minimum tank levels and system flow paths to ensure that an adequate source of boric acid is available to provide a 4.0% delta k/k shutdown margin during a plant cooldown. The flow path available will determine if the required volume of borated water can be either the combined volume of the two BASTs, or the minimum in each BAST, or can be contained in a specific BAST. The most conservative cooldown requirements have been utilized in the determination of the minimum BAST level along with application of appropriate biases and uncertainties for level indication, vortex generation, and auxiliary spray usage. Single failure requirements with operator action have been identified to ensure the ability of the boric acid system to perform its safety function of plant cooldown. Credit is not taken in any of the safety analyses including the LOCA analysis for concentrated boric acid injection to mitigate an accident or anticipated operational occurrence.

Technical Specification Section 2.2.(2).e is deleted as heat tracing of the boric acid system is no longer required to prevent precipitation of boric acid from solution. The reduction of the concentration range to be maintained in one or both BASTs is specified in Figure 2-11. The new Figure 2-11 will represent the minimum required volume at a given concentration of boric acid to be maintained. The proposed change will allow this volume to be maintained as a combined volume in either or both of the BASTs. The concentration is in the range of approximately 2.5 to 4.5 weight percent boric acid. Figure 2-11 incorporates four curves which represent the minimum boric acid volume required from BASTs for a given SIRWT concentration. The minimum ambient temperature in the Auxiliary Building is sufficient to prevent boric acid precipitation.

Technical Specification Section 2.2.(3).c and 2.2.(3).d are deleted since they specify the minimum system configuration requirements for the equipment during operation. The system flow paths have been established in Section 2.2.(2).d to ensure sufficient boric acid is available for injection to the RCS. The proposed change will require that both the gravity feed and the boric acid transfer pumps are operable. There is one gravity feed path and one boric acid pump path from each BAST. If the combined volume of boric acid required is contained as a combined volume between the two BASTs, then the proposed change will required both gravity feed paths and both boric acid transfer pump paths be operable. If the minimum boric acid requirements are being satisfied by one BAST, then the proposed change will require only the gravity feed path and boric acid pump path from that tank to be operable.

Technical Specification Section 2.2.(3).e is deleted as it specifies the minimum heat tracing operability. The reduction of the concentration range to be maintained in one or both BASTs is specified in Figure 2-11. The new Figure 2-11 will represent the minimum required volume at a given concentration of boric acid to be maintained. The proposed change will allow this volume to be maintained as a combined volume in either or both of the BASTs. The concentration is in the range of approximately 2.5 to 4.5 weight percent boric acid. Figure 2-4A incorporates four curves which represent the minimum boric acid volume required from BASTs for a given SIRWT concentration. The minimum ambient temperature in the Auxiliary Building is sufficient to prevent boric acid precipitation.

Technical Specification Section 2.2.(3).f has been changed to 2.2.(3).c for consistency in numbering for the section.

Technical Specification 2.2.(3).d has been added to specify a 72 hour duration for one of the BASTs to be removed from service. This time period is consistent with the standard technical specifications utilized by other Combustion Engineering Plants.

Figure 2-11 specifies the minimum required boric acid tank volume as a function of concentration to maintain the shutdown margin of 4.0% delta k/k at all times during a cooldown to 210°F. To set the minimum BAST volume corresponding to the various BAST and SIRWT concentrations a parametric analysis was completed to calculate the required boric acid concentration to maintain the 4.0% delta k/k shutdown margin for various BAST and SIRWT level versus RCS temperature.

Figure 2-12 specifies the acceptable boric acid concentration for system temperature to ensure the solubility of the boric acid in water. The curve is derived from the US Borax & Chemical Corporation Technical Data Sheet for boric acid solubility in water. A 10°F bias has been added to the US Borax temperature value to account for temperature measurement uncertainty and to provide for additional solubility margin. This is consistent with the proposed changes described above.

The basis of Technical Specification Section 2.2 has been amended to reflect the proposed change as described in the justification and discussion evaluation. This is consistent with the proposed changes described above.

The reference "FSAR, Section 9.2" has been changed to "USAR, Section 9.2" as the FSAR has been replaced by the USAR. This is an administrative change and does not have any impact on the Technical Specification.

The proposed amendment to the Technical Specification does not involve a significant hazards consideration because the operation of the Fort Calhoun Station in accordance with this amendment would not:

(1) Involve a significant increase in the probability of occurrence or consequences of an accident or malfunction of equipment important to safety previously evaluated in the safety analysis report. The boric acid system is not utilized in the safety analysis report to mitigate the consequences of an accident or malfunction. From the standpoint of reactivity control, the BAST and SIRWT concentrations ensure that a minimum of 4.0% shutdown margin is maintained during a cooldown from hot standby to cold shutdown as described in the safe shutdown scenario described below.

The plant is in hot standby and has been held at hot zero power conditions with the most reactive rod stuck in the full out position for 23.5 hours following a power reduction from 100% to 0%. (The Xenon peak after shutdown will have decayed back to the 100% power equilibrium Xenon level. Further Xenon decay will add positive reactivity to the core during the plant cooldown). No credit was taken for the negative activity effects of the Xenon concentration peak following the power reduction. At 23.5 hours offsite power is lost and the plant does into natural circulation. All non-safety grade plant equipment and components are lost. During the natural circulation cooldown the RCS average temperature initially rises 25°F due to decay heat in the core. The initial temperature at the start of the cooldown is 557°F.

Approximately 0.5 hours later, at 24 hours, the operators commence a cooldown to cold shutdown (210°F). The proposed volume and flow path requirements will ensure that the plant can be brought to cold shutdown conditions assuming letdown is unavailable, in conjunction with the loss of offsite power, and assuming the limiting single failure. Therefore, the proposed change does not increase the probability or consequences of an accident or malfunction of equipment important to safety.

(2) Create the possibility for an accident or malfunction of a new or different type than previously evaluated in the safety analysis report. The proposed change does not physically alter the configuration of the plant and no new or different mode of operation has been implemented. Therefore, the possibility of an accident or malfunction of a new or different type than any previously evaluated in the safety analysis report.

(3) Involve a significant reduction in the margin of safety as defined in the basis for any Technical Specification. The proposed change maintains the basis of the safety analysis. In addition, the more restrictive requirements of boron flow paths effectively ensure that the plant can be brought to cold shutdown in the limiting safe shutdown scenario. Therefore, the margin of safety as defined in the basis for the Technical Specification is not reduced.

Based on the above considerations, OPPD does not believe that this amendment involves a significant hazards consideration as defined by 10CFR50.92 and the proposed changes will not result in a condition which significantly alters the impact of the station on the environment. Thus, the proposed changes meet the eligibility criteria for categorical exclusion set forth in 10CFR51.22(e)(9) and pursuant to 10CFR51.22(b) no environmental impact or environmental assessment need be prepared.