ATTACHMENT I

PROPOSED TECHNICAL SEPCIFICATION CHANGES

REACTIVITY CONTROL SYSTEMS

BORATED WATER SOURCE - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.5 As a minimum, one of the following borated water sources shall be OPERABLE:

a. A Boric Acid Storage System with:

1) A minimum contained borated water volume of ~~5100~~ 12,000 gallons,

2) A minimum boron concentration of 7000 ppm, and

3) A minimum solution temperature of 65°F.

b. The refueling water storage tank with:

1) A minimum contained borated water volume of ~~26,000~~ 45,000 gallons,

2) A minimum boron concentration of 2000 ppm, and

3) A minimum solution temperature of 70°F.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no borated water source OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

4.1.2.5 The above required borated water source shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1) Verifying the boron concentration of the water,

2) Verifying the contained borated water volume, and

3) Verifying the boric acid storage tank solution temperature when it is the source of borated water.

b. At least once per 24 hours by verifying the refueling water storage tank temperature when it is the source of borated water and the outside air temperature is less than 70°F.

## BORATED WATER SOURCES - OPERATING

### LIMITING CONDITION FOR OPERATION

3.1.2.6 As a minimum, the following borated water source(s) shall be OPERABLE as required by Specification 3.1.2.2:

a. A Boric Acid Storage System with:

1) A minimum contained borated water volume of ~~19500~~ 22,000 gallons,

2) A minimum boron concentration of 7000 ppm, and

3) A minimum solution temperature of 65°F.

b. The refueling water storage tank with:

1) A contained borated water volume of at least 363,513 gallons,

2) A minimum boron concentration of 2000 ppm,

3) A minimum solution temperature of 70°F, and

4) A maximum solution temperature of 100°F.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

a. With the Boric Acid Storage System inoperable and being used as one of the above required borated water sources, restore the system to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and borated to a SHUTDOWN MARGIN equivalent to at least 1% $\Delta k/k$ at 200°F; restore the Boric Acid Storage System to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

b. With the refueling water storage tank inoperable, restore the tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

ATACHMENT II

JUSTIFICATION AND NO SIGNIFICANT HAZARDS ANALYSIS

Discussion, No Significant Hazards Analysis and
Environmental Impact Statement

The proposed amendment to Technical Specifications (TS) 3.1.2.5 and 3.1.2.6 will change the required volume of the Boric Acid Tank (BAT) from 5100 gallons to 12,000 gallons in Modes 5-6, and 19,500 gallons to 22,000 gallons in Modes 1-4. The required volume of the Refueling Water Storage Tank (FWST) will change from 26,000 gallons to 45,000 gallons in Modes 5-6.

The volume required for the FWST in Modes 1-4, 363,513 gallons, will not change. This level provides the maximum available volume to account for shutdown margin, worst case single failure, adequate containment sump volume for transfer to sump recirculation, and sufficient volume above the switch over initiation level such that no operator action is required prior to ten minutes after the initiation of the accident.

During the review of a plant modification for necessary procedure changes, it was found that the TS values for BAT volume in TS 3.1.2.5 and 3.1.2.6 did not appear to account for unusable volume in the BAT as is assumed in Basis 3/4.1.2, Boration Systems. This basis, in fact, states: "The contained water volume limits include allowance for water not available because of discharge line location and other physical characteristics." A Duke Power Problem Investigation Report was initiated and a calculation was done to determine the necessary contained volume to meet the TS Basis for the BAT. As part of the resolution to this Problem Investigation Report a calculation was also completed to verify the FWST volumes required in Modes 1-6.

As part of the problem resolution, the Design Bases requirements for BAT and FWST level were researched and reconstructed based on the required safety function of the tanks. The BATs are designed to store sufficient boric acid for a cold shutdown from full power operation immediately following refueling with the most reactive control rod not inserted, plus operating margins (FSAR Section 9.3.4). Additionally, conditions at Cold Shutdown require the reactor to be shutdown by at least 1.0% $\Delta K/K$ (FSAR Section 15.4). The FWST is required to provide a source of borated water at refueling water boron concentration for use during refueling or a postulated loss-of-coolant accident. The FWST must contain enough inventory to bring the reactor to a safe shutdown through all six modes of operation (FSAR Section 9.27). The Design Bases volumes for these tanks account for tank specific characteristics including:

1. Tank tolerances
2. Suction line locations above the tank bottom
3. Vortex allowance for maximum outflow expected for each TS Mode.
4. System specific NPSH requirements and tank outlet piping considerations.
5. Instrument loop error based on Total Loop Accuracy to the Control Room, and
6. Any temperature, specific gravity, or other variables not included in the Total Loop Accuracy Calculation.

The results of the calculations were compared to the existing values in TSs and the TS Basis to evaluate the differences. Per Design Engineering calculations, the minimum volume for the BAT during Modes 5-6 should be 12,000 gallons and during Modes 1-4 it should be 22,000 gallons.

The existing TSs require a BAT volume of 5100 gallons in Modes 5-6 (TS 3.1.2.5) and 19,500 gallons in Modes 1-4 (TS 3.1.2.6) The current required volume for the FWST is 26,000 gallons in Modes 5-6 (TS 3.1.2.5). The above tank volumes required per TSs for the BAT and the FWST do not meet Design Bases, and are not conservative because they do not account for unusable tank volumes. This proposed change to TSs will correct the volumes required for the BAT and FWST to account for unusable tank volumes.

10 CFR 50.92 states that a proposed amendment involves no significant hazards considerations if operation in accordance with the amendment would not:

1) Involve a significant increase in the probability or consequences of of an accident previously evaluated; or

2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or

3) Involve a significant reduction in the margin of safety.

The proposed amendment will change the required volumes for the BAT and the FWST to account for unusable tank volumes. This change will not increase the probability or consequences of an accident previously evaluated, the BAT and FWST required volumes are being increased to meet current Design Bases for the tanks.

The proposed amendment will not increase the possibility of a new or different kind of accident from any previously evaluated. Current TS required volumes are not conservative because they do not take into account unusable tank volumes. The proposed amendment will change TS requirements to reflect the Design Bases of the tanks.

The proposed amendment does not involve a reduction in the margin of safety. Current TS requirements do not reflect the Design Bases of the tanks because unusable tank volumes are not accounted for. The proposed amendment reflects Design Bases by accounting for unusable tank volumes, and is therefore more conservative.

For all the above reasons, Duke Power concludes that this proposed amendment does not involve any Significant Hazards Considerations.

The proposed Technical Specification change has been reviewed against the criteria of 10 CFR 51.22 for environmental considerations. As shown above, the proposed change does not involve any significant hazards consideration, nor increase the types and amounts of effluents that may be released offsite, nor increase the individual or cumulative occupational radiation exposures. Based on this, the proposed Technical Specification change meets the criteria given in 10 CFR 51.22(c)(9) for categorical exclusion from the requirement for an Environmental Impact Statement.

ATTACHMENT III

TECHNICAL SPECIFICATION BASES CHANGE

No Changes To This page



MODERATOR TEMPERATURE COEFFICIENT (Continued)

involved subtracting the incremental change in the MDC associated with a core condition of all rods inserted (most positive MDC) to an all rods withdrawn condition and, a conversion for the rate of change of moderator density with temperature at RATED THERMAL POWER conditions. This value of the MDC was then transformed into the limiting MTC value $-4.1 \times 10^{-4}$ $\Delta k/k/°F$. The MTC value of $-3.2 \times 10^{-4}$ $\Delta k/k/°F$ represents a conservative value (with corrections for burnup and soluble boron) at a core condition of 300 ppm equilibrium boron concentration and is obtained by making these corrections to the limiting MTC value of $-4.1 \times 10^{-4}$ $\Delta k/k/°F$.

The Surveillance Requirements for measurement of the MTC at the beginning and near the end of the fuel cycle are adequate to confirm that the MTC remains within its limits since this coefficient changes slowly due principally to the reduction in boron concentration associated with fuel burnup.

3/4.1.1.4 MINIMUM TEMPERATURE FOR CRITICALITY

This specification ensures that the reactor will not be made critical with the Reactor Coolant System average temperature less than 551°F. This limitation is required to ensure: (1) the moderator temperature coefficient is within it analyzed temperature range, (2) the trip instrumentation is within its normal operating range, (3) the P-12 interlock is above its setpoint, (4) the pressurizer is capable of being in an OPERABLE status with a steam bubble, and (5) the reactor vessel is above its minimum $RT_{NDT}$ temperature.

3/4.1.2 BORATION SYSTEMS

The Boron Injection System ensures that negative reactivity control is available during each mode of facility operation. The components required to perform this function include: (1) borated water sources, (2) charging pumps, (3) separate flow paths, (4) boric acid transfer pumps, and (5) an emergency power supply from OPERABLE diesel generators.

With the coolant average temperature above 200°F, a minimum of two boron injection flow paths are required to ensure single functional capability in the event an assumed failure renders one of the flow paths inoperable. The boration capability of either flow path is sufficient to provide a SHUTDOWN

BORATION SYSTEMS (Continued)

MARGIN from expected operating conditions of 1.3% Δk/k after xenon decay and cooldown to 200°F. The maximum expected boration capability requirement occurs at EOL from full power equilibrium xenon conditions and requires 9851 ~~16,321~~ gallons of 7000 ppm borated water from the boric acid storage tanks or ~~75,000~~ gallons of 2000 ppm borated water from the refueling water storage tank. 37,107

Insert #1 from attached page

With the coolant temperature below 200°F, one Boron Injection flow path ~~System~~ is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the additional restrictions prohibiting CORE ALTERATIONS and positive reactivity changes in the event the single Boron Injection flow path ~~System~~ becomes inoperable.

~~The limitation for a maximum of one centrifugal charging pump to be OPERABLE and the Surveillance Requirement to verify all charging pumps except the required OPERABLE pump to be inoperable below 285°F provides assurance that a mass addition pressure transient can be relieved by the operation of a single PORV.~~

The boron capability required below 200°F is sufficient to provide a SHUTDOWN MARGIN of 1% Δk/k after xenon decay and cooldown from 200°F to 140°F. This condition requires either [illegible] ~~906~~ gallons of 7000 ppm borated water from the boric acid storage tanks or ~~3170~~ 8500 gallons of 2000 ppm borated water from the refueling water storage tank.

Insert #2 from attached

The contained water volume limits include allowance for water not available because of discharge line location and other physical characteristics.

The limits on contained water volume and boron concentration of the refueling water storage tank also ensure a pH value of between ~~8.5~~ 8 and ~~10.5~~ 9 for the solution recirculated within containment after a LOCA. This pH band minimizes the evolution of iodine and minimizes the effect of chloride and caustic stress corrosion on mechanical systems and components.

The OPERABILITY of one Boron Injection System during REFUELING ensures that this system is available for reactivity control while in MODE 6.

## 3/4.1.3 MOVABLE CONTROL ASSEMBLIES

The specifications of this section ensure that: (1) acceptable power distribution limits are maintained, (2) the minimum SHUTDOWN MARGIN is maintained, and (3) the potential effects of rod misalignment on associated accident analyses are limited. OPERABILITY of the control rod position indicators is required to determine control rod positions and thereby ensure compliance with the control rod alignment and insertion limits. Verification that the Digital Rod Position Indicator agrees with the demanded position within ± 12 steps at 24, 48, 120 and 228 steps withdrawn for the Control Banks and 18, 210 and 228 steps withdrawn for the Shutdown Banks provides assurances that the Digital Rod Position Indicator is operating correctly over the full range of indication. Since the Digital Rod Position System does not indicate the actual shutdown rod position between 18 steps and 210 steps, only points in the indicated ranges are picked for verification of agreement with demanded position.

1. The Technical Specification requires 22,000 gallons of 7000 ppm borated water from the boric acid tanks to be available in Modes 1-4. This volume is based on the required volume for maintaining shutdown margin, unusable volume (to allow for a full suction pipe), instrument error, and additional margin to account for different cores and conservatism as follows:

Modes 1-4 Boric Acid Tank

| | |
|---|---|
| Required volume for maintaining SDM | 9,851 gallons |
| 5% Additional Margin | 496 gallons |
| Unusable Volume (to maintain full suction pipe) | 7,230 gallons |
| 14" of water equivalent | |
| Vortexing (4" of water above top of suction pipe | 2,066 gallons |
| Instrumentation Error (Based on Total Loop Acc. for 1&2 NV5740 loops) - 2" of water equivalent | 1,550 gallons |
| | 21,193 gallons |

This value is increased to 22,000 gallons for additional margin.

A similar approach is taken for calculating the required Refueling Water Storage Tank volume:

When the temperature of one or more cold legs drops below 285°F in Mode 4, the potential for low temperature overpressurization of the reactor vessel makes it necessary to render one charging pump INOPERABLE and at least one safety injection pump INOPERABLE. The limitation for a maximum of one centrifugal charging pump to be OPERABLE and the Surveillance Requirement to verify all charging pumps except the required OPERABLE pump to be inoperable below 285°F provides assurance that a mass addition pressure transient can be relieved by the operation of a single PORV.

<u>Refueling Water Storage Tank Requirements For Maintaining SDM - Modes 1-4</u>

| | |
|---|---|
| Required Volume for Maintaining SDM | 57,107 gallons |
| Unusable Volume (below nozzle) | 13,442 gallons |
| Instrument Inaccuracy | 11,307 gallons |
| Vortexing | 13,247 gallons |
| | 95,103 gallons |

The Tech Spec Volume 363,513 gallons was determined by correcting the tank's low level setpoint (level at which makeup is added to tank) for instrument inaccuracy. This level provides the maximum available volume to account for shutdown margin, worst case single failure, adequate containment sump volume for transfer to recirculation, and sufficient volume above the switchover initiation level such that no operator action is required prior to ten minutes after the initiation of the accident.

2. The Boric Acid Tank and Refueling Water Storage Tank volumes required in Modes 5-6 to provide necessary SDM are based on the following inputs as discussed previously:

Boric Acid Tank

| | |
|---|---|
| Required Volume for maintaining SDM | 585 gallons |
| Unusable Volume, Vortexing, Inst. Error | 10,846 gallons |
| 5% additional margin | 33 gallons |
| | 11,464 gallons |

This value is increased to the Tech. Spec. value of 12,000 gallons for additional margin.

Refueling Water Storage Tank

| | |
|---|---|
| Required Volume for Maintaining SDM | 3,500 gallons |
| Water Below the Nozzle | 13,442 gallons |
| Instrument Inaccuracy | 11,307 gallons |
| Vortexing | 13,247 gallons |
| | 41,496 gallons |

This value is increased to the Tech. Spec. value of 45,000 gallons for additional margin.

ATTACHMENT IV

JUSTIFICATION FOR BASES CHANGE

# Justification for Bases Change

The existing Bases, 3/4.1.2 Boration Systems, does not accurately reflect required tank volumes to maintain shutdown margin for the BAT and the FWST. The bases also states an incorrect pH value for the solution recirculated in containment after a LOCA.

This proposed amendment changes the required volume for maintaining shutdown margin for the Boric Acid Storage Tank, and the Refueling Water Storage Tank. The required boration capability to provide a shutdown margin from expected operating conditions of 1.36% K/K after xenon decay and cooldown to 200°F changes from 16,321 gallons to 9851 gallons of 7000 ppm borated water from the boric acid storage tank and from 75,000 gallons to 57,107 gallons of 2000 ppm borated water from the refueling water storage tank. The required boration capability below 200°F which will provide a shutdown marginal 1% K/K after xenon decay and cooldown from 200° to 140° changes from 90[illegible] gallons to 5[illegible]5 gallons of 7000 ppm borated water from the boric acid storage tank and from 3170 gallons to 3500 gallons of 2000 ppm borated water from the refueling water storage tank. These changes reflect the most recent Design Engineering calculations which have been completed for the volumes required in the BAT, and the FWST.

This proposed amendment also changes the range for the pH value of the solution recirculated in containment after a LOCA. Currently the stated range is 8.5 to 10.5. This proposed amendment changes the pH range to 8 to 9. This pH range is consistent with Catawba FSAR Section 6.1.1.2.2 and has been verified by a Design Engineering calculation to be correct.

This proposed amendment also adds sections which clarify the margins which were taken into account in arriving at the final TS requirements for the BAT and FWST in TSs 3.1.2.5 and 3.1.2.6. The text which has been added make it clear what items were actually taken into account in Design Engineering calculations and how much margin was added for each inaccuracy.