9.0 TECHNICAL SPECIFICATIONS

The Technical Specification changes which are being requested in order to make the Calvert Cliffs Unit 1 Technical Specifications consistent with the analyses contained herein are presented in this section. Table 9-1 presents a summary of the Technical Specification changes, excluding those for HPSI flow reduction, in the form of: 1) an action statement for each change; 2) the reason for each change and 3) a reference to the supporting analyses which demonstrate acceptable safety analyses results for each change. Following Table 9-1 the existing Technical Specification page with the intended modification is provided for each Technical Specification for which a change is being requested.

In addition to the Technical Specification changes summarized in Table 9-1 other changes are being requested to provide increased flexibility for acceptable HPSI flow balance test results. This flexibility has been improved by a reduction in analytic conservatisms which are not controlled by Tech. Specs. and by proposed Tech. Spec. revisions crediting charging pump flow delivery on SIAS and a reduced DNB LCO ASI band. The requested Tech. Spec. changes for HPSI flow balance testing are presented in Table 9-2 in the form of an action statement and a reason for each change. Following Table 9-2 the existing Technical Specification page with the intended modification is provided for each Technical Specification for which a change is being requested.

The overall set of HPSI flow changes are supported by the Excess Load (Section 7.1.4) and Steam Line Rupture (Section 7.3.3) analyses of Chapter 7 and by the Samll Break LOCA analysis of Section 8.2. The Small Break LOCA analysis credits the flow of one charging pump on SIAS. An evaluation of the availability of the assumed charging flow has been made. It was determined that the failure of a single diesel generator (DG) would bound the effects of any single failure impacting availability of both charging and HPSI flow. A review of the effects of a single DG failure on charging flow determined that with the Technical Specification changes of Table 9.2 in effect it is acceptable to credit the flow of one charging pump.

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Table 9-1

Calvert Cliffs 1 Cycle 8
Technical Specification Changes
Excluding HPSI Flow Changes

Tech. Spec. No. and Page	Action	Explanation	Support
3/4.1.1.1 page 3/4 1-1	Change shutdown margin, T_{avg}>200°/F, from 4.3% $\Delta k/k$ to 3.5% $\Delta k/k$	The shutdown margin is being lowered to accomodate the effects of extended burnup.	The following safety analyses presented in Chapter 7 support this reduction: a) Boron Dilution (Sec. 7.1.1) b) Excess Load (Sec. 7.1.4) c) Steam Line Rupture (Sec. 7.3.2)
3.1.1.4 page 3/4 1-5	Change MTC positive limit, Power < 70%, from $+0.5\times10^{-4}$ $\Delta k/k/^{o}F$ to $+0.7\times10^{-4}$ $\Delta k/k/^{o}F$.	The MTC is being raised to accomodate the effects of long cycles and to simplify startup procedures.	The follwing safety analyses presented in Chapter 7 support this increase: a) Loss of Load (Section 7.1.3) b) CEA Ejection (Sec. 7.3.1)
	Change MTC negative limit from -2.5×10^{-4} $\Delta k/k/^{o}F$ to -2.7×10^{-4} $\Delta k/k/^{o}F$.	The MTC is being lowered to to accomodate the effects of of extended burnup.	The following safety analyses presented in Chapter 7 support this decrease: a) Excess Load (Sec. 7.1.4) b) Asym. Steam Gen. (Sec. 7.2.4) c) Steam Line Rupture (Sec. 7.3.2)
4.1.1.4.2 page 3/4 1-6	Modify MTC surveillance requirement as indicated	Section "b" is being changed to make it identical to the same Unit 2 subsection; Section "c" is being changed to permit MTC testing up to 7 EFPDs before reaching 300 PPM.	Subsection "b" - clarification Subsection "c" - provides operational flexibility while preserving the intent of the subsection.

Table 9-1 (continued)

Tech. Spec. No. and Page	Action	Explanation	Support
4.2.1.4 page 3/4 2-2	Remove flux peaking augmentation factors	Augmentation factors are being removed in recognition of the demonstrated lack of gap formation in pre-pressurized non-densifying fuel and to increase operating margin.	1) Detailed discussion and data was presented in Reference 1 to support this change. 2) The thermal design analysis of the fuel pins presented in Section 4.3 supports the change. 3) The ECCS performance analysis for the large break spectrum presented in Section 8.1 supports this change.
	Reduce the measurement-calculational uncertainty from 7.0% to 6.2%	This uncertainty is being reduced to conform to the approved value and to increase operating margin.	1) The new value is supported in Reference 2. 2) The thermal design analysis of the fuel pins presented in Section 4.3 supports this change.
	Reduce the axial fuel densification and thermal expansion factor from 1.0% to 0.2%	This uncertainty is being reduced to a level consistent with existing calculations and to increase operating margin.	The thermal design analysis of the fuel pins presented in Section 4.3 supports this change.
Figure 4.2-1 page 3/4 2-5	Delete Figure 4.2-1	See change for Tech. Spec. 4.2.1.4 which covers removal of flux peaking augmentation factor.	See change for Tech. Spec. 4.2.1.4 which covers removal of flux peaking augmentation factors.
Figure 3.2-4 page 3/4 2-11	Modify Figure 3.2-4 as indicated to restrict the allowable negative ASI to -.10 at full power	The allowable negative ASI is being reduced to improve the results of the ECCS performance analysis for the small break spectrum.	The ECCS performance analysis for the small break spectrum presented in Section 8.2 takes credit for this improvement in demonstrating acceptable results for reduced HPSI flow.
3/4.7.1.7 page 3/4 7-1	Add the indicated Subsection "d" to the Action Statement	This change will allow entry into Mode 3 with a minimum number of valves operable to facilitate post-overhaul and operability testing of the remaining valves.	An evaluation has been performed whic demonstrates that sufficient relievin capacity exists in Mode 3 with a mini mum of 2 valves per steam generator operable.

Table 9-1 (continued)

Tech. Spec. No. and Page	Action	Explanation	Support
Table 4.7-1 page 3/4 7-4	Change lift setting values and format as indicated	The lift setting values and format for the Main Steam Safety Valves (MSSVs) are being changed to increase operating margin and to eliminate/ reduce violations of this Tech. Spec.	1) The following safety analyses presented in Chapter 7 support this change: a) Loss of Load (Sec. 7.1.3) b) Asymmetric Steam Generator (Sec. 7.2.4) 2) The ECCS performance analysis fo the small break spectrum present in Section 8.2 supports this change. 3) The setpoint analysis which verified continued acceptability of the present thermal margin Te Specs supports this change.
B 3/4.1.1.1 and B 3/4.1.1.2	Change EOC shutdown margin, T_{avg}>200°F, from 4.3% Δk/k to 3.5% Δk/k and change BOC shutdown margin, T_{avg} >200°F, from 4.3% Δk/k to 3.5% Δk/k	See change for Tech. Spec. 3/4.1.1.1	See change for Tech. Spec. 3/4.1.1.
B 3/4.2.1 page B 3/4 2-1	Remove flux peaking augmentation factors, change measurement-calculational uncertainty from 7.0% to 6.2% and change axial fuel densification and thermal expansion factor from 1.0% to 0.2%	See change for Tech. Spec. 4.2.1.4.	See change for Tech. Spec. 4.2.1.4.

Table 9-1 (continued)

Tech. Spec. No. and Page	Action	Explanation	Support
B 3/4.2.5 page B 3/4 2-2	Insert the additional text concerning limiting criteria on the DNB LCO, as indicated	The BASES section for the DNB LCO is being expanded to more clearly define all of the criteria which are used to establish the Tech. Spec. values.	The text is merely updating the BASES to describe what has been standard practice.
B 3/4.7.1.1 page B 3/4 7-1	Modify the text concerning Mode 3 operation, as indicated	See change for Tech. Spec. 3/4.7.1.	See change for Tech. Spec. 3/4.7.1

3/4.1.1 ~~BORATION~~ CONTROL

SHUTDOWN MARGIN - T_{avg} > 200°F

LIMITING CONDITION FOR OPERATION

3.5

3.1.1.1 The SHUTDOWN MARGIN shall be ≥ 4.3%* Δk/k.

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

ACTION:

3.5

With the SHUTDOWN MARGIN < 4.3%* Δk/k, immediately initiate and continue boration at ≥ 40 gpm of 2300 ppm boric acid solution or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

3.5

4.1.1.1.1 The SHUTDOWN MARGIN shall be determined to be ≥ 4.3%* Δk/k:

a. Within one hour after detection of an inoperable CEA(s) and at least once per 12 hours thereafter while the CEA(s) is inoperable. If the inoperable CEA is immovable or untrippable, the above required SHUTDOWN MARGIN shall be increased by an amount at least equal to the withdrawn worth of the immovable or untrippable CEA(s).

b. When in MODES 1 or 2#, at least once per 12 hours by verifying that CEA group withdrawal is within the Transient Insertion Limits of Specification 3.1.3.6.

c. When in MODE 2##, within 4 hours prior to achieving reactor criticality by verifying that the predicted critical CEA position is within the limits of Specification 3.1.3.6.

d. Prior to initial operation above 5% RATED THERMAL POWER after each fuel loading, by consideration of the factors of e below, with the CEA groups at the Transient Insertion Limits of Specification 3.1.3.6.

* Adherence to Technical Specification 3.1.3.6 as specified in Surveillance Requirements 4.1.1.1.1 assures that there is sufficient available shutdown margin to match the shutdown margin requirements of the safety analyses.

** See Special Test Exception 3.10.1.

With K_{eff} ≥ 1.0.

With K_{eff} < 1.0.

MODERATOR TEMPERATURE COEFFICIENT

LIMITING CONDITION FOR OPERATION

3.1.1.4 The moderator temperature coefficient (MTC) shall be:

0.7

a. Less positive than 0.5 x 10^{-4} $\Delta k/k/°F$ whenever THERMAL POWER is $\leq$ 70% of RATED THERMAL POWER,

b. Less positive than 0.2 x 10^{-4} $\Delta k/k/°F$ whenever THERMAL POWER is > 70% of RATED THERMAL POWER, and

c. Less negative than -2.5 x 10^{-4} $\Delta k/k/°F$ at RATED THERMAL POWER.

2.7

APPLICABILITY: MODES 1 and 2*#

ACTION:

With the moderator temperature coefficient outside any one of the above limits, be in at least HOT STANDBY within 6 hours.

SURVEILLANCE REQUIREMENTS

4.1.1.4.1 The MTC shall be determined to be within its limits by confirmatory measurements. MTC measured values shall be extrapolated and/or compensated to permit direct comparison with the above limits.

*With $K_{eff} \geq 1.0$.

#See Special Test Exception 3.10.2.

SURVEILLANCE REQUIREMENTS (Continued)

4.1.1.4.2 The MTC shall be determined at the following frequencies and THERMAL POWER conditions during each fuel cycle:

a. Prior to initial operation above 5% of RATED THERMAL POWER, after each fuel loading.

b. At any THERMAL POWER above 90% of RATED THERMAL POWER, within 7 EFPD after initially reaching an equilibrium condition at or above 90% of RATED THERMAL POWER after each fuel loading.

c. At any THERMAL POWER, within 7 EFPD after reaching a RATED THERMAL POWER equilibrium boron concentration of 300 ppm.

of

SURVEILLANCE REQUIREMENTS (Continued)

c. Verifying at least once per 31 days that the AXIAL SHAPE INDEX is maintained within the limits of Figure 3.2-2, where 100 percent of the allowable power represents the maximum THERMAL POWER allowed by the following expression:

$$M \times N$$

where:

1. M is the maximum allowable THERMAL POWER level for the existing Reactor Coolant Pump combination.

2. N is the maximum allowable fraction of RATED THERMAL POWER as determined by the $F_{xy}^{'}$ curve of Figure 3.2-3b.

4.2.1.4 Incore Detector Monitoring System - The incore detector monitoring system may be used for monitoring the core power distribution by verifying that the incore detector Local Power Density alarms:

a. Are adjusted to satisfy the requirements of the core power distribution map which shall be updated at least once per 31 days of accumulated operation in MODE 1.

b. Have their alarm setpoint adjusted to less than or equal to the limits shown on Figure 3.2-1 when the following factors are appropriately included in the setting of these alarms:

~~1. Flux peaking augmentation factors as shown in Figure 4.2-1,~~

2. 1 A measurement-calculational uncertainty factor of 1.070, 1.062

3. 2 An engineering uncertainty factor of 1.03,

4. 3 A linear heat rate uncertainty factor of 1.01 1.002 due to axial fuel densification and thermal expansion, and

5. 4 A THERMAL POWER measurement uncertainty factor of 1.02.

DELETE

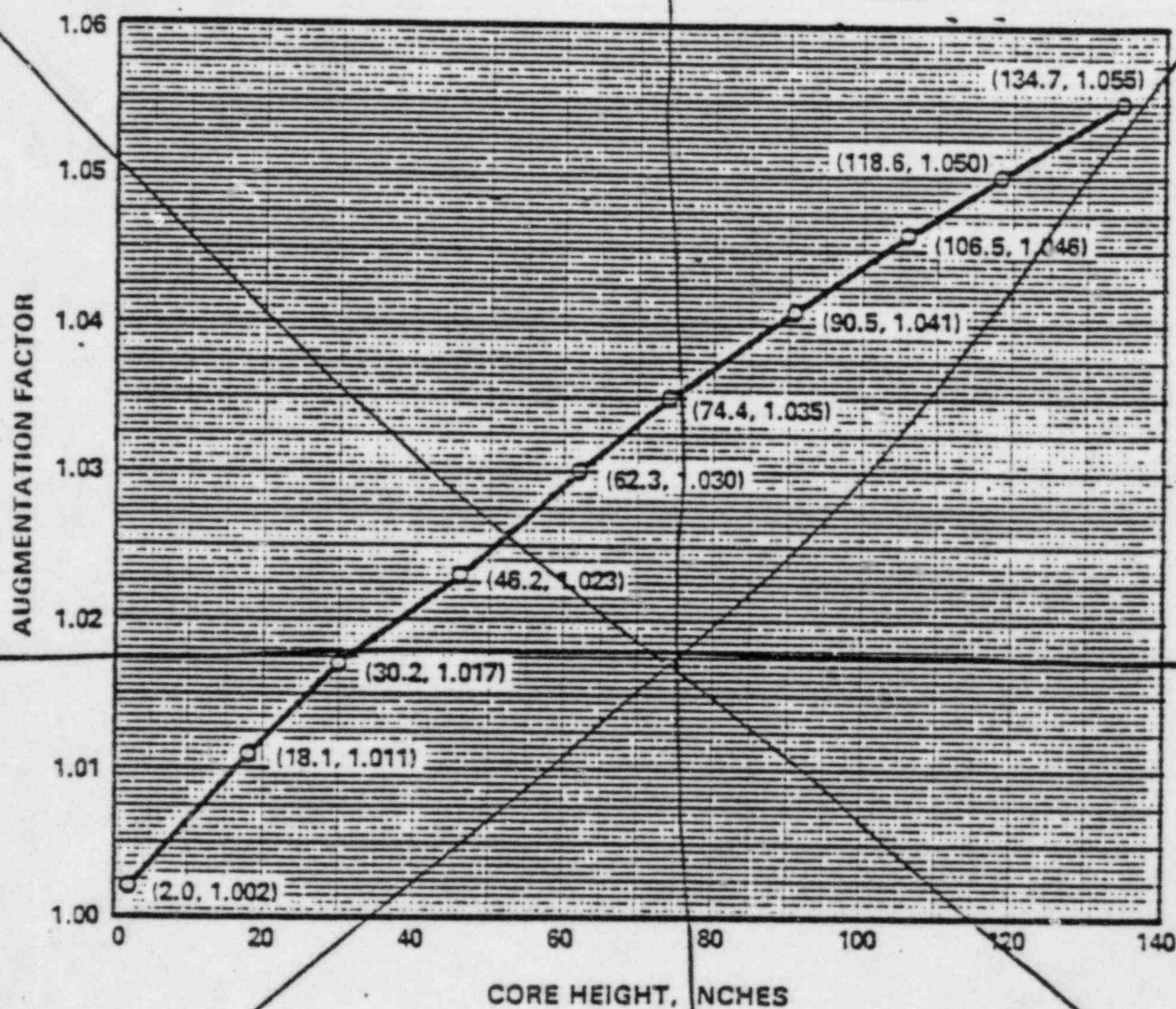

FIGURE 4.2-1

Augmentation Factor vs
Distance from Bottom of Core

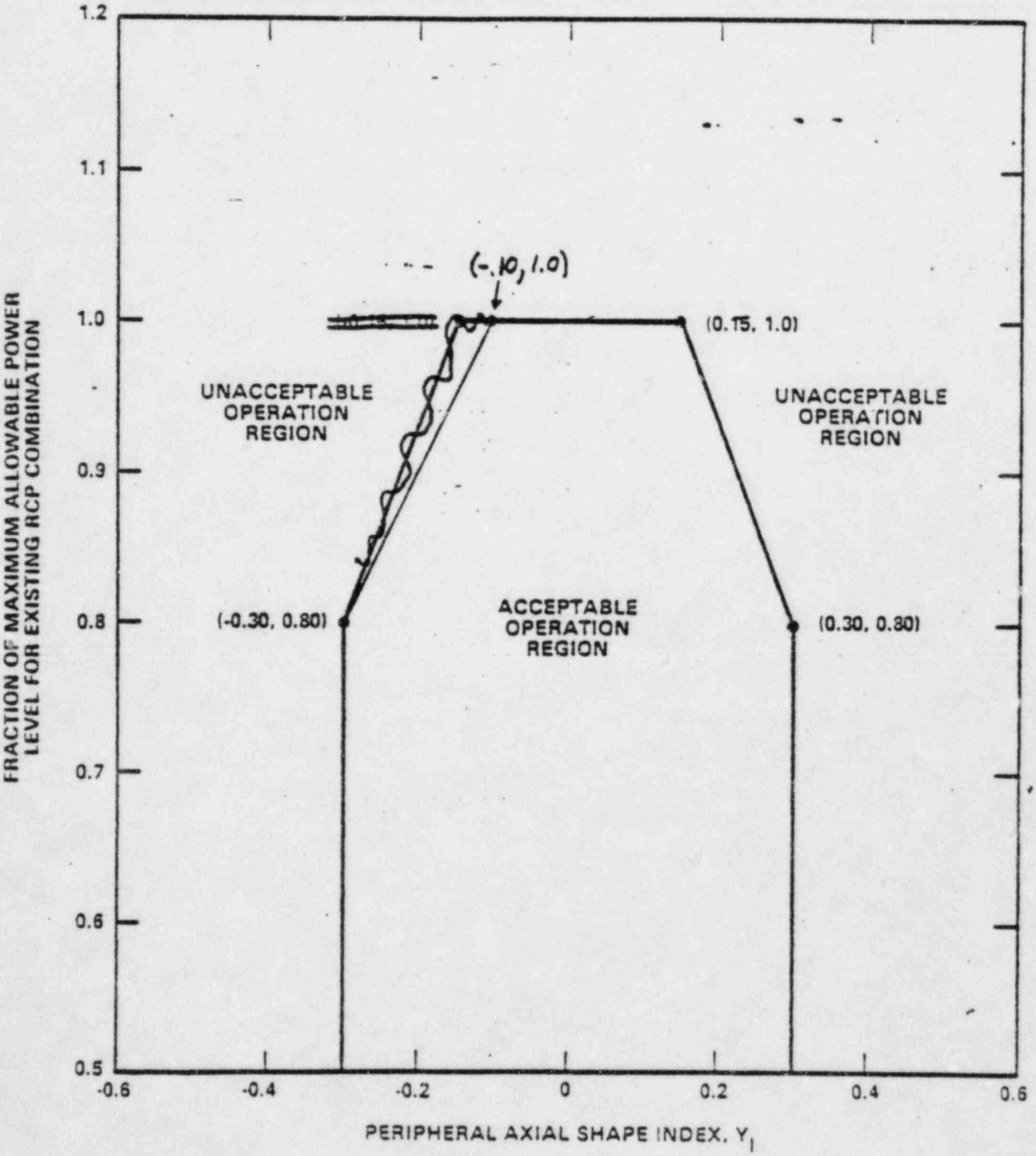

Figure 3.2-4
DNB Axial Flux Offset Control Limits

3/4.7 PLANT SYSTEMS

3.4.7.1 TURBINE CYCLE

SAFETY VALVES

LIMITING CONDITION FOR OPERATION

3.7.1.1 All main steam line code safety valves shall be OPERABLE.

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

a. With both reactor coolant loops and associated steam generators in operation and with one or more main steam line code safety valves inoperable, operation in MODES 1, 2 and 3 may proceed provided, that within 4 hours, either the inoperable valve is restored to OPERABLE status or the Power Level-High trip setpoint is reduced per Table 3.7-1; otherwise, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With one reactor coolant loop and associated steam generator in operation and with one or more main steam line code safety valves associated with the operating steam generator inoperable, operation in MODES 1, 2 and 3 may proceed provided:

   1. That at least 2 main steam line code safety valves on the non-operating steam generator are OPERABLE, and

   2. That within 4 hours, either the inoperable valve is restored to OPERABLE status or the Power Level-High trip setpoint is reduced per Table 3.7-2; otherwise, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. The provisions of Specification 3.0.4 are not applicable.

d. For entry into MODE 3, 2 operable main steam line code safety valves are required per steam generator.

SURVEILLANCE REQUIREMENTS

4.7.1.1 No additional Surveillance Requirements other than those required by Specification 4.0.5 are applicable for the main steam line code safety valves of Table 4.7-1.

TABLE 4.7-1

STEAM LINE SAFETY VALVES PER LOOP

	VALVE NUMBER	ALLOWABLE LIFT SETTINGS* ~~[illegible]~~	ORIFICE SIZE
a.	RV-3992/4000	935-995 ~~986~~ psig	R
b.	RV-3993/4001	935-995 ~~985~~ psig	R
c.	RV-3994/4002	935-1035 ~~995~~ psig	R
d.	RV-3995/4003	935-1035 ~~995~~ psig	R
e.	RV-3996/4004	935-1065 ~~1015~~ psig	R
f.	RV-3997/4005	935-1065 ~~1015~~ psig	R
g.	RV-3998/4006	935-1065 ~~1035~~ psig	R
h.	RV-3999/4007	935-1065 ~~1035~~ psig	R

* Lift settings for a given steam line are also acceptable if any 2 valves lift between 935 and 995 psig, any 2 other valves lift between 935 and 1035 psig and the 4 remaining valves lift between 935 and 1065 psig.

3/4.1.1 BORATION CONTROL

3/4.1.1.1 and 3/4.1.1.2 SHUTDOWN MARGIN

A sufficient SHUTDOWN MARGIN ensures that 1) the reactor can be made subcritical from all operating conditions, 2) the reactivity transients associated with postulated accident conditions are controllable within acceptable limits, and 3) the reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

3.5

SHUTDOWN MARGIN requirements vary throughout core life as a function of fuel depletion, RCS boron concentration and RCS T_{avg}. The minimum available SHUTDOWN MARGIN for no load operating conditions at beginning of life is 4.3% $\Delta k/k$ and at end of life is 4.3% $\Delta k/k$. The SHUTDOWN MARGIN is based on the safety analyses performed for a steam line rupture event initiated at no load conditions. The most restrictive steam line rupture event occurs at EOC conditions. For the steam line rupture event at beginning of cycle conditions, a minimum SHUTDOWN MARGIN of less than 4.3% $\Delta k/k$ is required to control the reactivity transient, and end of cycle conditions require 4.3% $\Delta k/k$. Accordingly, the SHUTDOWN MARGIN requirement is based upon this limiting condition and is consistent with FSAR safety analysis assumptions. With $T_{avg} \leq 200°F$, ~~the~~ reactivity transients resulting from any postulated accident are minimal and a 3% $\Delta k/k$ shutdown margin provides adequate protection. With the pressurizer level less than 90 inches, the sources of non-borated water are restricted to increase the time to criticality during a boron dilution event.

3.5 3.5 3.5

3/4.1.1.3 BORON DILUTION

A minimum flow rate of at least 3000 GPM provides adequate mixing, prevents stratification and ensures that reactivity changes will be gradual during boron concentration reductions in the Reactor Coolant System. A flow rate of at least 3000 GPM will circulate an equivalent Reactor Coolant System volume of 9,601 cubic feet in approximately 24 minutes. The reactivity change rate associated with boron concentration reductions will therefore be within the capability of operator recognition and control.

3/4.1.1.4 MODERATOR TEMPERATURE COEFFICIENT (MTC)

The limitations on MTC are provided to ensure that the assumptions used in the accident and transient analyses remain valid through each fuel cycle. The surveillance requirements for measurement of the MTC during each fuel cycle are adequate to confirm the MTC value since this coefficient changes slowly due principally to the reduction in RCS boron concentration associated with fuel burnup. The confirmation that the measured MTC value is within its limit provides assurances that the coefficient will be maintained within acceptable values throughout each fuel cycle.

3/4.2 POWER DISTRIBUTION LIMITS

BASES

3/4.2.1 LINEAR HEAT RATE

The limitation on linear heat rate ensures that in the event of a LOCA, the peak temperature of the fuel cladding will not exceed 2200°F.

Either of the two core power distribution monitoring systems, the Excore Detector Monitoring System and the Incore Detector Monitoring System, provide adequate monitoring of the core power distribution and are capable of verifying that the linear heat rate does not exceed its limits. The Excore Detector Monitoring System performs this function by continuously monitoring the AXIAL SHAPE INDEX with the OPERABLE quadrant symmetric excore neutron flux detectors and verifying that the AXIAL SHAPE INDEX is maintained within the allowable limits of Figure 3.2-2. In conjunction with the use of the excore monitoring system and in establishing the AXIAL SHAPE INDEX limits, the following assumptions are made: 1) the CEA insertion limits of Specifications 3.1.3.5 and 3.1.3.6 are satisfied, ~~2) the flux peaking augmentation factors are as shown in Figure 4.2-1,~~ 2 3) the AZIMUTHAL POWER TILT restrictions of Specification 3.2.4 are satisfied, and 4) the TOTAL PLANAR RADIAL PEAKING FACTOR does not exceed the limits of Specification 3.2.2.
3

The Incore Detector Monitoring System continuously provides a direct measure of the peaking factors and the alarms which have been established for the individual incore detector segments ensure that the peak linear heat rates will be maintained within the allowable limits of Figure 3.2-1. The setpoints for these alarms include allowances, set in the conservative directions, for ~~1) flux peaking augmentation factors as shown in Figure 4.2-1,~~ 2) a measurement-calculational uncertainty factor of 1.070, 1.062 3) an engineering uncertainty factor of 1.03, 2 4) an allowance of 1.01 for axial fuel densification and thermal expansion, 3 and 5) a THERMAL POWER measurement 4 uncertainty factor of 1.02. 1.002
1

3/4.2.2, 3/4.2.3 and 3/4.2.4 TOTAL PLANAR AND INTEGRATED RADIAL PEAKING FACTORS - F_{xy}^T AND F_r^T AND AZIMUTHAL POWER TILT - T_q

The limitations on F_{xy}^T and T_q are provided to ensure that the assumptions used in the analysis for establishing the Linear Heat Rate and Local Power Density - High LCOs and LSSS setpoints remain valid during operation at the various allowable CEA group insertion limits. The limitations on F_r^T and T_q are provided to ensure that the assumptions used in

the analysis establishing the DNB Margin LCO, and Thermal Margin/Low Pressure LSSS setpoints remain valid during operation at the various allowable CEA group insertion limits. If F_{xy}^T, F_r^T or T_q exceed their basic limitations, operation may continue under the additional restrictions imposed by the ACTION statements since these additional restrictions provide adequate provisions to assure that the assumptions used in establishing the Linear Heat Rate, Thermal Margin/Low Pressure and Local Power Density - High LCOs and LSSS setpoints remain valid. An AZIMUTHAL POWER TILT > 0.10 is not expected and if it should occur, subsequent operation would be restricted to only those operations required to identify the cause of this unexpected tilt.

The value of T_q that must be used in the equation $F_{xy}^T = F_{xy} (1 + T_q)$ and $F_r^T = F_r (1+T_q)$ is the measured tilt.

The surveillance requirements for verifying that F_{xy}^T, F_r^T and T_q are within their limits provide assurance that the actual values of F_{xy}^T, F_r^T and T_q do not exceed the assumed values. Verifying F_{xy}^T and F_r^T after each fuel loading prior to exceeding 75% of RATED THERMAL POWER provides additional assurance that the core was properly loaded.

3/4.2.5 DNB PARAMETERS

The limits on the DNB related parameters assure that each of the parameters are maintained within the normal steady state envelope of operation assumed in the transient and accident analyses. The limits are consistent with the safety analyses assumptions and have been analytically demonstrated adequate to maintain a minimum DNBR of 1.23 throughout each analyzed transient. INSERT NEW PARAGRAPH A HERE (A IS ON NEXT PAGE)

The 12 hour periodic surveillance of these parameters through instrument readout is sufficient to ensure that the parameters are restored within their limits following load changes and other expected transient operation. The 18 month periodic measurement of the RCS total flow rate is adequate to detect flow degradation and ensure correlation of the flow indication channels with measured flow such that the indicated percent flow will provide sufficient verification of flow rate on a 12 hour basis.

(A)

In addition to the DNB criteria, there are two other criteria which set the specification in Figure 3.2-4. The second criteria is to ensure that the existing core power distribution at full power is less severe than the power distribution factored into the small-break LOCA analysis. This results in a limitation on the allowed negative AXIAL SHAPE INDEX value at full power. The third criteria is to maintain limitations on peak linear heat rate at low power levels resulting from Anticipated Operational Occurrences (AOOs). Figure 3.2-4 is used to assure the LHR criteria for this condition because the linear heat rate LCO, for both ex-core and in-core monitoring, is set to maintain only the LOCA kw/ft requirements which are limiting at high power levels. At reduced power levels, the kw/ft requirements of certain AOOs (e.g., CEA withdrawal), tend to become more limiting than that for LOCA.

The as-left lift settings will be no less than 985 psig to insure that the lift setpoints will remain within specification during the cycle.

3/4.7.1 TURBINE CYCLE

3/4.7.1.1 SAFETY VALVES

The OPERABILITY of the main steam line code safety valves ensures that the secondary system pressure will be limited to within 110% of its design pressure of 1000 psig during the most severe anticipated system operational transient. The maximum relieving capacity is associated with a turbine trip from 100% RATED THERMAL POWER coincident with an assumed loss of condenser heat sink (i.e., no steam bypass to the condenser). The main steam line code safety valves are tested and maintained

~~The specified valve lift settings and relieving capacities are~~ in accordance with the requirements of Section ~~III~~ XI of the ASME Boiler and Pressure Vessel Code, 1971 Edition. The total relieving capacity for all valves on all of the steam lines is 12.18 x 10^6 lbs/hr ~~which is 108 percent of the total secondary steam flow of 11.23 x 10^6 lbs/hr~~ at 100% RATED THERMAL POWER. ~~A minimum of 2 OPERABLE safety valves per steam generator ensures that sufficient relieving capacity is available for removing decay heat.~~ INSERT NEW PARAGRAPH (B) HERE; (B) IS ON NEXT PAGE

STARTUP and/or POWER OPERATION is allowable with safety valves inoperable within the limitations of the ACTION requirements on the basis of the reduction in secondary system steam flow and THERMAL POWER required by the reduced reactor trip settings of the Power Level-High channels. The reactor trip setpoint reductions are derived on the following bases:

For two loop operation

$$SP = \frac{(X) - (Y)(V)}{X} \times 106.5$$

For single loop operation (two reactor coolant pumps operating in the same loop)

$$SP = \frac{(X) - (Y)(U)}{X} \times 46.8$$

where:

SP = reduced reactor trip setpoint in percent of RATED THERMAL POWER

V = maximum number of inoperable safety valves per steam line

B

In Mode 3, two main steam safety valves are required operable per steam generator. These valves will provide adequate relieving capacity for removal of both decay heat and reactor coolant pump heat from the reactor coolant system via either of the two steam generators. This requirement is provided to facilitate the post-overhaul setting and operability testing of the safety valves which can only be conducted when the RCS is at or above 500^{o}F. It allows entry into Mode 3 with a minimum number of main steam safety valves operable so that the set pressure for the remaining valves can be adjusted in the plant. This is the most accurate means for adjusting safety valve set pressures since the valves will be in thermal equilibrium with the operating environment.

Table 9-2

Calvert Cliffs 1 Cycle 8
Technical Specification Changes
Concerning HPSI Flow

Tech. Spec. No. and Page	Action	Explanation
3/4.1.2.2 page 3/4 1-9	a) Add statement clarifying requirements for operable flow paths from the boric acid storage tanks. b) Delete the requirements that testing be performed during shutdown. c) Add requirement for demonstrating that each boric acid pump starts on SIAS.	a) Simply a clarifying statement. b) This restriction is unnecessary since this test can be performed at any time. c) The boric acid pump can be part of a flow-path which must be operable for the charging pump, in turn, to be operable following SIAS. This addition is necessary to support the crediting of charging pump flow in the Small Break LOCA analysis.
4.1.2.4 page 3/4 1-11	Add requirement that charging pumps start on a SIAS test signal.	This addition is necessary to support the crediting of charging pump flow in the Small Break LOCA analysis.
4.1.2.6 page 3/4 1-13	Add requirement that Tech. Spec. Surveillance Requirement 4.1.2.2 be observed.	Adds a cross-reference.
3.1.2.8 page 3/4 1-16	a) Change combinations of water sources, as indicated. b) Delete applicability to Modes 1 below 80% power, 2, 3, and 4. c) Change action statement to recognize different combinations of water sources and the sufficiency of reducing power to 80%.	These changes are being made to assure that a borated water source will be available to the charging pump following SIAS while the reactor is in Mode 1 above 80% power. Such changes are necessary to support the crediting of charging pump flow in the Small Break LOCA analysis.
3/4.1.2.9 new page 3/4 1-16a	a) Change Tech. Spec. 3/4.1.2.8 to 3/4.1.2.9. b) Change applicability to Mode 1 below 80% power.	The changes for Tech. Spec. 3.1.2.8 are not necessary for operation in Mode 1 below 80% power and Modes 2, 3 and 4. Consequently, the old Tech. Spec. 3/4.1.2.8 is simply being renumbered to 3/4.1.2.9, its applicability to Mode 1 is being altered and its page number is being changed to 3/4 1-16a.

Table 9-2 (continued)

Tech. Spec. No. and Page	Action	Explanation
4.5.2 (h & i) page 3/4 5-5a	a) Clarify maintenance actions which require verification of valve stem travel. b) Change the method of verification of sufficient HPSI flow from certifying a minimum flow for each injection leg to certifying that the sum of the flow from the three legs with the lowest flows meets a minimum value. c) Lower the total required HPSI flow. d) Add Subsection "i" which adds a requirement that the HPSIs deliver a minimum pressure head when tested. e) Delete the upper limit on HPSI pump flow.	a) Some maintenance actions will not affect flow characteristics (such as motor resistance checks). b) This change will provide improved flexibility in the surveillance testing of HPSI flow without affecting the integrity of the safety analyses which credit HPSI flow. c) This change provides additional margin for verifying that sufficient flow exists; it is supported by the safety analyses presented herein. d) This addition formalizes a surveillance requirement for equipment whose proper function is necessary to preserve the assumptions used in the safety analyses. e) This limit prevents the pump from exceeding runout conditions. Detailed analyses have been performed in order to arrive at the maximum expected HPSI pump flow with all four (4) flow control valves wide open and the RCS at atmospheric conditions. These analyses show that the pump will not runout; therefore, the upper limit has been removed. Testing will be conducted at the beginning of the Unit 1 outage to confirm the mechanical and electrical characteristics of the pump.
B 3/4.1.2 page B 3/4 1-2	Revise the BASES to reflect the crediting of charging pump flow in the Small Break LOCA analysis.	The Small Break LOCA analysis of Section 8.2 credits charging pump flow to improve the results of the analysis and permit the lowering of the required HPSI flow (see change for Tech. Spec. 4.5.2 (h & i) b).
B 3/4.5.2 page B 3/4 5-2	a) Move the discussion concerning TSP from the end of the second paragraph to the end of the first paragraph. b) Revise the Bases to reflect the crediting of charging pump flow in the Small Break LOCA analysis.	a) Simply an editorial change separating all discussion of TSP in the BASES from discussions concerning ECCS subsystem performance. b) See the change for Tech. Spec. B 3/4.1.2.

FLOW PATHS - OPERATING

required to be operable pursuant to Tech. Specs. 3.1.2.8 and 3.1.2.9

LIMITING CONDITION FOR OPERATION

3.1.2.2 At least two of the following three boron injection flow paths and one associated heat tracing circuit shall be OPERABLE:

a. Two flow paths from the boric acid storage tanks via either a boric acid pump or a gravity feed connection, and a charging pump to the Reactor Coolant System, and

b. The flow path from the refueling water tank via a charging pump to the Reactor Coolant System.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With only one of the above required boron injection flow paths to the Reactor Coolant System OPERABLE, restore at least two boron injection flow paths to the Reactor Coolant System to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to at least $\geq$ $\Delta k/k$ at 200°F within the next 6 hours; restore at least two flow paths to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.2 At least two of the above required flow paths shall be demonstrated OPERABLE:

a. At least once per 7 days by verifying that the temperature of the heat traced portion of the flow path from the concentrated boric acid tanks is above the temperature limit line shown on Figure 3.1-1.

b. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

c. At least once per 18 months ~~during shutdown~~ by verifying that:
1) each automatic valve in the flow path actuates to its correct position on a SIAS test signal, and
2) Each boric acid pump starts.

CHARGING PUMPS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.4 At least two charging pumps shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With only one charging pump OPERABLE, restore at least two charging pumps to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to at least 3 % Δk/k at 200°F within the next 6 hours; restore at least two charging pumps to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

At least two charging pumps shall be demonstrated OPERABLE:

4.1.2.4 No additional Surveillance Requirements other than those required by Specification 4.0.5.

a. At least once per 18 months by verifying that each charging pump starts automatically upon receipt of a Safety Injection Actuation Test Signal.

b.

BORIC ACID PUMPS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.6 At least the boric acid pump(s) in the boron injection flow path(s) required OPERABLE pursuant to Specification 3.1.2.2a shall be OPERABLE and capable of being powered from an OPERABLE emergency bus if the flow path through the boric acid pump(s) in Specification 3.1.2.2a is OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With one boric acid pump required for the boron injection flow path(s) pursuant to Specification 3.1.2.2a inoperable, restore the boric acid pump 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 3% Δk/k at 200°F; restore the above required boric acid pump(s) to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.6 No additional Surveillance Requirements other than those required by Specification(s) 4.0.5 and 4.1.2.2.

BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

one two combinations of

3.1.2.8 At least two of the following three borated water sources shall be OPERABLE:

a. Two boric acid storage tank(s) and one associated heat tracing circuit per tank with the contents of the tanks in accordance with Figure 3.1-1 and the boron concentration limited to ≤ 8%,

or and [Boric acid Storage Tank 12 operable per Specification 3.1.2.8.a and t

b. The refueling water tank with:

1. A minimum contained borated water volume of 400,000 gallons,

2. A boron concentration of between 2300 and 2700 ppm,

3. A minimum solution temperature of 40°F, and

4. A maximum solution temperature of 100°F in MODE 1.

APPLICABILITY: MODE ~~S~~ 1, ~~2, 3 and 4~~ >80% of RATED THERMAL POWER

ACTION: neither combination of

but at least two of the individual borated water sources operable

one of the combinations defined in Specification 3.1.2.8

a) With only one borated water source~~s~~ OPERABLE, restore at least ~~two borated water sources~~ 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 3% Δk/k at 200°F; restore at least two borated water sources to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.~~ reduce power to less than 80% of RATED THERMAL POWER

w

or reduce power below 80% of RATED THERMAL POWER and comply with Specification 3.1.2.9

within 1 hour either

of the individual

b) With only one borated water source OPERABLE, restore at least two borated water sources to OPERABLE status ~~within 72 hours or be in at least HOT~~

SURVEILLANCE REQUIREMENTS

4.1.2.8 At least two borated water sources shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1. Verifying the boron concentration in each water source,

2. Verifying the contained borated water volume in each water source, and

3. Verifying the boric acid storage tank solution temperature.

b. At least once per 24 hours by verifying the RWT temperature when the outside air temperature is < 40°F.

BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.8 9 At least two of the following three borated water sources shall be OPERABLE:

a. Two boric acid storage tank(s) and one associated heat tracing circuit per tank with the contents of the tanks in accordance with Figure 3.1-1 and the boron concentration limited to ≤ 8%, and

b. The refueling water tank with:

1. A minimum contained borated water volume of 400,000 gallons,
2. A boron concentration of between 2300 and 2700 ppm,
3. A minimum solution temperature of 40°F, and
4. A maximum solution temperature of 100°F in MODE 1.

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

ACTION:

With only one borated water source OPERABLE, restore at least two borated water sources 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 3% Δk/k at 200°F; restore at least two borated water sources to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.8 9 At least two borated water sources shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1. Verifying the boron concentration in each water source,
2. Verifying the contained borated water volume in each water source, and
3. Verifying the boric acid storage tank solution temperature.

b. At least once per 24 hours by verifying the RWT temperature when the outside air temperature is < 40°F.

* At ≤ 30% of RATED THERMAL POWER

that could alter system flow characteristics

2. Within 4 hours following completion of maintenance on the valve or its operator by measurement of stem travel when the ECCS subsystems are required to be OPERABLE.

HPSI SYSTEM

Valve Number	Valve Number
MOV-616	MOV-617
MOV-626	MOV-627
MOV-636	MOV-637
MOV-646	MOV-647

h. By performing a flow balance test during shutdown following completion of HPSI system modifications that alter system flow characteristics and verifying the following flow rates ~~:~~ for a single HPSI pump system:

~~HPSI System~~
~~Single Pump~~

~~170 ± 5 gpm to each injection leg.~~

1. The sum of the three lowest flow legs shall be greater than 455* gpm.

* These limits do not contain any allowances for instrument error, drift or fluctuation.

i. By verifying that the HPSI pumps develop a total head of 2900 ft. on recirculation flow to the refueling water tank when tested pursuant to Specification 4.0.5.

The system also provides coolant flow following an SIAS (e.g., during a Small Break LOCA) to suppleme flow from the Safety Injection System. The Small Brea LOCA analyses assume [redacted] flow from a sing charging pump, accounting for measurement uncertaint and flow mal-distribution effects in calculating a cons vative value of charging flow actually delivered to the R

3/4.1.1.5 MINIMUM TEMPERATURE FOR CRITICALITY

This specification ensures that the reactor will not be made critical with the Reactor Coolant System average temperature less than 515°F. This limitation is required to ensure 1) the moderator temperature coefficient is within its analyzed temperature range, 2) the protective instrumentation is within its normal operating range, 3) the pressurizer is capable of being in an OPERABLE status with a steam bubble, and 4) the reactor pressure 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 pumps, 5) associated heat tracing systems, and 6) an emergency power supply from OPERABLE diesel generators.

With the RCS average temperature above 200°F, a minimum of two separate and redundant boron injection systems are provided to ensure single functional capability in the event an assumed failure renders one of the systems inoperable. Allowable out-of-service periods ensure that minor component repair or corrective action may be completed without undue risk to overall facility safety from injection system failures during the repair period.

The boration capability of either system is sufficient to provide a SHUTDOWN MARGIN from all operating conditions of 3.0% Δk/k after xenon decay and cooldown to 200°F. The maximum boration capability requirement occurs at EOL from full power equilibrium xenon conditions and requires 6500 gallons of 7.25% boric acid solution from the boric acid tanks or 55,627 gallons of 2300 ppm borated water from the refueling water tank. However, to be consistent with the ECCS requirements, the RWT is required to have a minimum contained volume of 400,000 gallons during MODES 1, 2, 3 and 4. The maximum boron concentration of the refueling water tank shall be limited to 2700 ppm and the maximum boron concentration of the boric acid storage tanks shall be limited to 8% to preclude the possibility of boron precipitation in the core during long term ECCS cooling.

With the RCS temperature below 200°F, one injection 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 change in the event the single injection system becomes inoperable.

Minimum HPSI flow requirements are [illegible] LOCA calculations which credit charging pump flow following an SIAS. Surveillance testing includes allowances for instrumentation and system leakage uncertainties. The OPERABILITY of the charging pumps and the associated flow paths is maintained by the Boration System Specification 3/4.1.2. Specification of safety injection pump total developed head ensures pump performance is consistent with safety analysis assumptions.

The trisodium phosphate dodecahydrate (TSP) stored in dissolving baskets located in the containment basement is provided to minimize the possibility of corrosion cracking of certain metal components during operation of the ECCS following a LOCA. The TSP provides this protection by dissolving in the sump water and causing its final pH to be raised to $\geq$ 7.0.

The Surveillance Requirements provided to ensure OPERABILITY of each component ensures that at a minimum, the assumptions used in the safety analyses are met and that subsystem OPERABILITY is maintained. Surveillance requirements for throttle valve position stops and flow balance testing provide assurance that proper ECCS flows will be maintained in the event of a LOCA. Maintenance of proper flow resistance and pressure drop in the piping system to each injection point is necessary to: (1) prevent total pump flow from exceeding runout conditions when the system is in its minimum resistance configuration, (2) provide the proper flow split between injection points in accordance with the assumptions used in the ECCS-LOCA analyses, and (3) provide an acceptable level of total ECCS flow to all injection points equal to or above that assumed in the ECCS-LOCA analyses. The requirement to dissolve a representative sample of TSP in a sample of RWT water provides assurance that the stored TSP will dissolve in borated water at the postulated post LOCA temperatures.

3/4.5.4 REFUELING WATER TANK (RWT)

The OPERABILITY of the RWT as part of the ECCS ensures that a sufficient supply of borated water is available for injection by the ECCS in the event of a LOCA. The limits on RWT minimum volume and boron concentration ensure that 1) sufficient water is available within containment to permit recirculation cooling flow to the core, and 2) the reactor will remain subcritical in the cold condition following mixing of the RWT and the RCS water volumes with all control rods inserted except for the most reactive control assembly. These assumptions are consistent with the LOCA analyses.

The contained water volume limit includes an allowance for water not usable because of tank discharge line location or other physical characteristics.

10.0 STARTUP TESTING

The startup testing program proposed for Cycle 8 is identical to the program proposed for the reference cycle in Reference 1, except that CEA 5-1, due to its small worth, will not be used for reactivity control and maintaining power. All CEAs in Group 5 or the 4 peripheral Group 5 CEAs will be used instead.

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