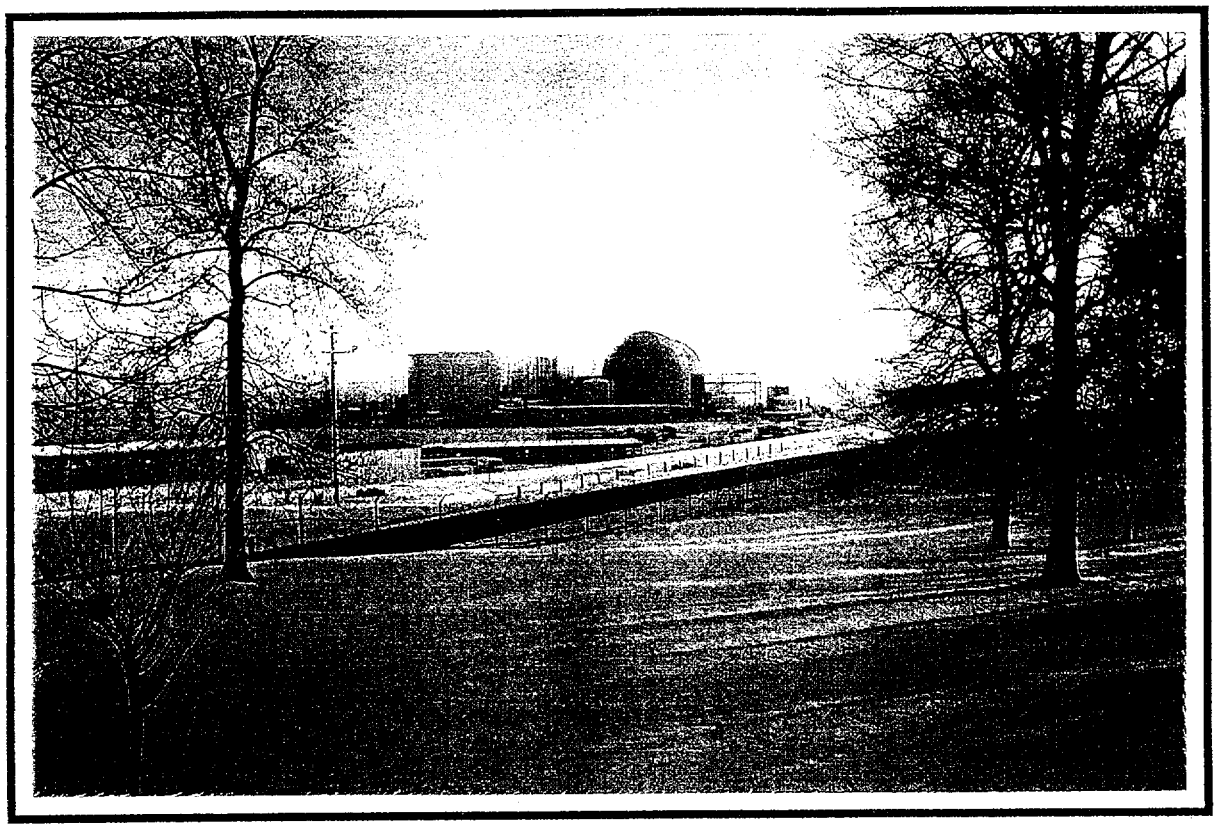
NORTH ANNA POWER STATION

Section 3.1
Reactivity Control System



VOLUME 7

Improved Technical Specifications

Dominion

NORTH ANNA POWER STATION

IMPROVED TECHNICAL SPECIFICATION CONVERSION

SECTION 3.1 - REACTIVITY CONTROL SYSTEMS

SECTION 3.1 - REACTIVITY CONTROL SYSTEMS

IMPROVED TECHNICAL SPECIFICATIONS

3.1 REACTIVITY CONTROL SYSTEMS

3.1.1 SHUTDOWN MARGIN (SDM)

LCO 3.1.1 SDM shall be within the limits provided in the COLR.

APPLICABILITY: MODE 2 with $k_{eff} < 1.0$,
MODES 3, 4, and 5.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SDM not within limit.	A.1 Initiate boration to restore SDM to within limit.	15 minutes

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.1.1.1 Verify SDM to be within limits.	24 hours

Intentionally Blank

3.1 REACTIVITY CONTROL SYSTEMS

3.1.2 Core Reactivity

LCO 3.1.2 The measured core reactivity shall be within ± 1% $\Delta k/k$ of predicted values.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Measured core reactivity not within limit.	A.1 Re-evaluate core design and safety analysis, and determine that the reactor core is acceptable for continued operation.	7 days
	AND	
	A.2 Establish appropriate operating restrictions and SRs.	7 days
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.2.1	----------NOTE---------- The predicted reactivity values may be adjusted (normalized) to correspond to the measured core reactivity prior to exceeding a fuel burnup of 60 effective full power days (EFPD) after each fuel loading. ----------	
	Verify measured core reactivity is within ± 1% $\Delta k/k$ of predicted values.	Once prior to entering MODE 1 after each refueling AND -----NOTE------ Only required after 60 EFPD ---------- 31 EFPD thereafter

3.1 REACTIVITY CONTROL SYSTEMS

3.1.3 Moderator Temperature Coefficient (MTC)

LCO 3.1.3 The MTC shall be maintained within the limits specified in the COLR. The upper limit specified in the COLR shall be $\leq 0.6 \times 10^{-4}$ $\Delta k/k/°F$ when < 70% RTP, and ≤ 0.0 $\Delta k/k/°F$ when $\geq$ 70% RTP.

APPLICABILITY: MODE 1 and MODE 2 with $k_{eff} \geq 1.0$ for the upper MTC limit, MODES 1, 2, and 3 for the lower MTC limit.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. MTC not within upper limit.	A.1 Establish administrative withdrawal limits for control banks to maintain MTC within limit.	24 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 2 with $k_{eff} < 1.0$.	6 hours
C. MTC not within lower limit.	C.1 Be in MODE 4.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.1.3.1 Verify MTC is within upper limit.	Once prior to entering MODE 1 after each refueling

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.3.2	----------NOTES---------- 1. Not required to be performed until 7 effective full power days (EFPD) after reaching the equivalent of an equilibrium RTP all rods out (ARO) boron concentration of 300 ppm 2. If the MTC is more negative than the 300 ppm Surveillance limit (not LCO limit) specified in the COLR, SR 3.1.3.2 shall be repeated once per 14 EFPD during the remainder of the fuel cycle. 3. SR 3.1.3.2 need not be repeated if the MTC measured at the equivalent of equilibrium RTP-ARO boron concentration of ≤ 60 ppm is less negative than the 60 ppm Surveillance limit specified in the COLR. ----------	
	Verify MTC is within lower limit.	Once each cycle

3.1 REACTIVITY CONTROL SYSTEMS

3.1.4 Rod Group Alignment Limits

LCO 3.1.4 All shutdown and control rods shall be OPERABLE.

AND

Individual indicated rod positions shall be within 12 steps of their group step counter demand position.

- - - - - - - - - - - - - - NOTE - - - - - - - - - - - - - -

When THERMAL POWER is ≤ 50% RTP, the indicated position of each rod as determined by its individual rod position indicator may be within 24 steps from its group step counter demand position for up to 1 hour per 24 hours. This NOTE is not applicable for control rods known to be greater than 12 steps from the rod group step counter demand position.

- -

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more rod(s) inoperable.	A.1.1 Verify SDM to be within the limits provided in the COLR.	1 hour
	OR	
	A.1.2 Initiate boration to restore SDM to within limit.	1 hour
	AND	
	A.2 Be in MODE 3.	6 hours

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One rod not within alignment limits.	B.1.1 Verify SDM to be within the limits provided in the COLR.	1 hour AND Once per 12 hours thereafter
	OR	
	B.1.2 Initiate boration to restore SDM to within limit.	1 hour
	AND	
	B.2.1 Reduce THERMAL POWER to ≤ 75% RTP.	2 hours
	OR	
	B.2.2.1 Perform SR 3.2.1.1.	72 hours
	AND	
	B.2.2.2 Perform SR 3.2.2.1.	72 hours
	AND	
	B.3 Re-evaluate safety analyses and confirm results remain valid for duration of operation under these conditions.	5 days
C. Required Action and associated Completion Time of Condition B not met.	C.1 Be in MODE 3.	6 hours

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. More than one rod not within alignment limit.	D.1.1 Verify SDM to be within the limit provided in the COLR.	1 hour
	OR	
	D.1.2 Initiate boration to restore required SDM to within limit.	1 hour
	AND	
	D.2 Be in MODE 3.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.4.1	Verify individual rod positions within alignment limit.	12 hours
SR 3.1.4.2	Verify rod freedom of movement (trippability) by moving each rod not fully inserted in the core ≥ 10 steps in either direction.	92 days
SR 3.1.4.3	Verify rod drop time of each rod, from the fully withdrawn position, is ≤ 2.7 seconds from the beginning of decay of stationary gripper coil voltage to dashpot entry, with: a. T_{avg} ≥ 500°F; and b. All reactor coolant pumps operating.	Prior to reactor criticality after each removal of the reactor head

Intentionally Blank

3.1 REACTIVITY CONTROL SYSTEMS

3.1.5 Shutdown Bank Insertion Limits

LCO 3.1.5 Each shutdown bank shall be within insertion limits specified in the COLR.

APPLICABILITY: MODES 1 and 2.

- - - - - - - - - - - - - - NOTE - - - - - - - - - - - - - -
This LCO is not applicable while performing SR 3.1.4.2.
- -

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more shutdown banks not within limits for reasons other than Condition B.	A.1.1 Verify SDM to be within the limits provided in the COLR.	1 hour
	OR	
	A.1.2 Initiate boration to restore SDM to within limit.	1 hour
	AND	
	A.2 Restore shutdown banks to within limits.	2 hours

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One shutdown bank inserted ≤ 18 steps below the insertion limit and immovable. AND Each control and shutdown bank within limits of LCO 3.1.4. AND Each control bank within the insertion limits of LCO 3.1.6.	B.1 Verify SDM to be within the limits provided in the COLR. AND B.2 Restore the shutdown bank to within insertion limit.	Every 12 hours 72 hours
C. Required Action and associated Completion Time not met.	C.1 Be in MODE 3.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.5.1	Verify each shutdown bank is within the limits specified in the COLR.	12 hours

3.1 REACTIVITY CONTROL SYSTEMS

3.1.6 Control Bank Insertion Limits

LCO 3.1.6 Control banks shall be within the insertion, sequence, and overlap limits specified in the COLR.

APPLICABILITY: MODE 1,
MODE 2 with $k_{eff} \geq 1.0$.

- - - - - - - - - - - - - - NOTE - - - - - - - - - - - - - -
This LCO is not applicable while performing SR 3.1.4.2.
- -

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Control bank sequence or overlap limits not met.	A.1.1 Verify SDM to be within the limits provided in the COLR.	1 hour
	OR	
	A.1.2 Initiate boration to restore SDM to within limit.	1 hour
	AND	
	A.2 Restore control bank sequence and overlap to within limits.	2 hours
B. Control bank insertion limits not met for reasons other than Condition C.	B.1.1 Verify SDM to be within the limits provided in the COLR.	1 hour
	OR	
	B.1.2 Initiate boration to restore SDM to within limit.	1 hour
	AND	
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.2 Restore control bank(s) to within limits.	2 hours
C. Control bank A, B, or C inserted ≤ 18 steps below the insertion limit and immovable. AND Each control and shutdown bank within limits of LCO 3.1.4. AND Each shutdown bank within the insertion limits of LCO 3.1.5.	C.1 Verify SDM to be within the limits provided in the COLR. AND C.2 Restore the control bank to within insertion limit.	Every 12 hours 72 hours
D. Required Action and associated Completion Time not met.	D.1 Be in MODE 2 with $K_{eff} < 1.0$.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.6.1	Verify estimated critical control bank position is within the insertion limits specified in the COLR.	Within 4 hours prior to achieving criticality

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.6.2	Verify each control bank insertion is within the limits specified in the COLR.	12 hours
SR 3.1.6.3	Verify sequence and overlap limits specified in the COLR are met for control banks not fully withdrawn from the core.	12 hours

Intentionally Blank

3.1 REACTIVITY CONTROL SYSTEMS

3.1.7 Rod Position Indication

LCO 3.1.7 The Rod Position Indication (RPI) System and the Demand Position Indication System shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

- NOTE -

Separate Condition entry is allowed for each inoperable rod position indicator and each demand position indicator.

- -

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One RPI per group inoperable for one or more groups.	A.1 Verify the position indirectly of the rods with inoperable position indicators by using movable incore detectors.	Once per 8 hours
	OR	
	A.2 Reduce THERMAL POWER to ≤ 50% RTP.	8 hours

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. More than one RPI per group inoperable.	B.1	Place the control rods under manual control.	Immediately
	AND		
	B.2	Monitor and record RCS T_{avg}.	Once per 1 hour
	AND		
	B.3	Verify the position of the rods with inoperable position indicators indirectly by using the movable incore detectors.	Once per 8 hours
	AND		
	B.4	Restore inoperable position indicator to OPERABLE status such that a maximum of one RPI per group is inoperable.	24 hours
C. One or more rods with inoperable position indicators have been moved in excess of 24 steps in one direction since the last determination of the rod's position.	C.1	Verify the position indirectly of the rods with inoperable position indicators by using movable incore detectors.	4 hours
	OR		
	C.2	Reduce THERMAL POWER to ≤ 50% RTP.	8 hours

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One demand position indicator per bank inoperable for one or more banks.	D.1.1 Verify by administrative means all RPIs for the affected banks are OPERABLE.	Once per 8 hours
	AND	
	D.1.2 Verify the most withdrawn rod and the least withdrawn rod of the affected banks are ≤ 12 steps apart.	Once per 8 hours
	OR	
	D.2 Reduce THERMAL POWER to ≤ 50% RTP.	8 hours
E. Required Action and associated Completion Time not met.	E.1 Be in MODE 3.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.1.7.1 Perform CHANNEL CALIBRATION of each RPI.	18 months

Intentionally Blank

3.1 REACTIVITY CONTROL SYSTEMS

3.1.8 Primary Grade Water Flow Path Isolation Valves

LCO 3.1.8 Each valve used to isolate primary grade water flow paths shall be secured in the closed position.

- - - - - - - - - - - - - - NOTE - - - - - - - - - - - - - - -

Primary grade water flow path isolation valves may be opened under administrative control for planned boron dilution or makeup activities.

- -

APPLICABILITY: MODES 3, 4, and 5.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more valves not secured in closed position.	A.1	Suspend positive reactivity additions.	Immediately
	AND		
	A.2	Secure valve(s) in closed position.	15 minutes
	AND		
	A.3	Perform SR 3.1.1.1.	1 hour

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.8.1	Verify each valve in the affected flow path that isolates primary grade water flow paths is locked, sealed, or otherwise secured in the closed position.	Within 15 minutes following a boron dilution or makeup activity

Intentionally Blank

3.1 REACTIVITY CONTROL SYSTEMS

3.1.9 PHYSICS TESTS Exceptions—MODE 2

LCO 3.1.9 During the performance of PHYSICS TESTS, the requirements of

LCO 3.1.3, "Moderator Temperature Coefficient (MTC)";
LCO 3.1.4, "Rod Group Alignment Limits";
LCO 3.1.5, "Shutdown Bank Insertion Limits";
LCO 3.1.6, "Control Bank Insertion Limits"; and
LCO 3.4.2, "RCS Minimum Temperature for Criticality"

may be suspended and the number of required channels for LCO 3.3.1, "RTS Instrumentation," Functions 2, 3, and 18.d, may be reduced to "3" required channels, provided:

a. RCS lowest loop average temperature is ≥ 531°F;

b. SDM is within the limits provided in the COLR; and

c. THERMAL POWER is ≤ 5% RTP.

APPLICABILITY: During PHYSICS TESTS initiated in MODE 2.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. SDM not within limit.	A.1	Initiate boration to restore SDM to within limit.	15 minutes
	AND		
	A.2	Suspend PHYSICS TESTS exceptions.	1 hour
B. THERMAL POWER not within limit.	B.1	Open reactor trip breakers.	Immediately
C. RCS lowest loop average temperature not within limit.	C.1	Restore RCS lowest loop average temperature to within limit.	15 minutes

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition C not met.	D.1 Be in MODE 3.	15 minutes

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.9.1	Perform a CHANNEL OPERATIONAL TEST on power range and intermediate range channels per SR 3.3.1.7, SR 3.3.1.8, and Table 3.3.1-1.	Prior to initiation of PHYSICS TESTS
SR 3.1.9.2	Verify the RCS lowest loop average temperature is ≥ 531°F.	30 minutes
SR 3.1.9.3	Verify THERMAL POWER is ≤ 5% RTP.	30 minutes
SR 3.1.9.4	Verify SDM to be within the limits provided in the COLR.	24 hours

SECTION 3.1 - REACTIVITY CONTROL SYSTEMS

IMPROVED TECHNICAL SPECIFICATIONS BASES

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.1 SHUTDOWN MARGIN (SDM)

BASES

BACKGROUND

According to GDC 26 (Ref. 1), the reactivity control systems must be independent and one must be capable of holding the reactor core subcritical when shut down under cold conditions. Maintenance of the SDM ensures that postulated reactivity events will not damage the fuel.

SDM requirements provide sufficient reactivity margin to ensure that acceptable fuel design limits will not be exceeded for normal shutdown and anticipated operational occurrences (AOOs). As such, the SDM defines the degree of subcriticality that would be obtained immediately following the insertion or scram of all shutdown and control rods, assuming that the single rod cluster assembly of highest reactivity worth is fully withdrawn.

The system design requires that two independent reactivity control systems be provided, and that one of these systems be capable of maintaining the core subcritical under cold conditions. These requirements are provided by the use of movable control assemblies and soluble boric acid in the Reactor Coolant System (RCS). The Rod Control System can compensate for the reactivity effects of the fuel and water temperature changes accompanying power level changes over the range from full load to no load. In addition, the Rod Control System, together with the boration system, provides the SDM during power operation and is capable of making the core subcritical rapidly enough to prevent exceeding acceptable fuel damage limits, assuming that the rod of highest reactivity worth remains fully withdrawn. The soluble boron system can compensate for fuel depletion during operation and all xenon burnout reactivity changes and maintain the reactor subcritical under cold conditions.

During power operation, SDM control is ensured by operating with the shutdown banks fully withdrawn and the control banks within the limits of LCO 3.1.6, "Control Bank Insertion Limits." When the unit is in the shutdown and refueling modes, the SDM requirements are met by means of adjustments to the RCS boron concentration.

BASES

APPLICABLE SAFETY ANALYSES

The minimum required SDM is assumed as an initial condition in safety analyses. The safety analysis (Ref. 2) establishes an SDM that ensures specified acceptable fuel design limits are not exceeded for normal operation and AOOs, with the assumption of the highest worth rod stuck out on scram.

The acceptance criteria for the SDM requirements are that specified acceptable fuel design limits are maintained. This is done by ensuring that:

a. The reactor can be made subcritical from all operating conditions, transients, and Design Basis Events;

b. The reactivity transients associated with postulated accident conditions are controllable within acceptable limits (departure from nucleate boiling ratio (DNBR), fuel centerline temperature limits for AOOs, and ≤ 225 cal/gm energy deposition to unirradiated fuel and ≤ 200 cal/gm energy deposition to irradiated fuel for the rod ejection accident); and

c. The reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

The most limiting accident for the SDM requirements is based on a main steam line break (MSLB), as described in the accident analysis (Ref. 2). The increased steam flow resulting from a pipe break in the main steam system causes an increased energy removal from the affected steam generator (SG), and consequently the RCS. This results in a reduction of the reactor coolant temperature. The resultant coolant shrinkage causes a reduction in pressure. In the presence of a negative moderator temperature coefficient, this cooldown causes an increase in core reactivity. As RCS temperature decreases, the severity of an MSLB decreases until the MODE 5 value is reached. The most limiting MSLB, with respect to potential fuel damage before a reactor trip occurs, is a guillotine break of a main steam line inside containment initiated at the end of core life. The positive reactivity addition from the moderator temperature decrease will terminate when the affected SG boils dry, thus terminating RCS heat removal and cooldown. Following the MSLB, a post trip return to power may occur; however, no fuel

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

damage occurs as a result of the post trip return to power, and THERMAL POWER does not violate the Safety Limit (SL) requirement of SL 2.1.1.

In addition to the limiting MSLB transient, the SDM requirement must also protect against:

a. An uncontrolled rod withdrawal from subcritical or low power condition;

b. Startup of an inactive reactor coolant pump (RCP); and

c. Rod ejection.

Each of these events is discussed below.

Depending on the system initial conditions and reactivity insertion rate, the uncontrolled rod withdrawal transient is terminated by either a high source range trip or a high power range neutron flux trip, an intermediate range neutron flux trip, a high pressurizer pressure or water level trip, or an OTΔT. In all cases, power level, RCS pressure, linear heat rate, and the DNBR do not exceed allowable limits.

The startup of an inactive loop event is defined as an uncontrolled reduction in SHUTDOWN MARGIN resulting from the startup of an RCP on an idle loop containing a reduced coolant temperature or boron concentration. Adherence to LCO 3.4.18, "RCS Isolated Loop Startup," ensures that the preconditions necessary for significant reactivity insertion during the startup of an inactive loop (i.e., reduced coolant temperature or boron concentration on an idle and unisolated loop) cannot be achieved under credible circumstances. Recirculation of reactor coolant in an isolated loop through a loop stop valve bypass line prior to loop unisolation when performed in accordance with LCO 3.4.18 does not constitute an uncontrolled boron dilution event. The accident analysis demonstrates that sufficient time exists for corrective operator action in response to a postulated reactivity insertion resulting from the recirculation activity.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The ejection of a control rod rapidly adds reactivity to the reactor core, causing both the core power level and heat flux to increase with corresponding increases in reactor coolant temperatures and pressure. The ejection of a rod also produces a time dependent redistribution of core power.

SDM satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii). Even though it is not directly observed from the control room, SDM is considered an initial condition process variable because it is periodically monitored to ensure that the unit is operating within the bounds of accident analysis assumptions.

LCO

SDM is a core design condition that can be ensured during operation through control rod positioning (control and shutdown banks) and through the soluble boron concentration.

The MSLB (Ref. 2) accident is the most limiting analysis that establishes the SDM value of the LCO. For MSLB accidents, if the LCO is violated, there is a potential to exceed the DNBR limit and to exceed 10 CFR 100, "Reactor Site Criteria," limits (Ref. 3).

APPLICABILITY

In MODE 2 with $k_{eff} < 1.0$ and in MODES 3, 4, and 5, the SDM requirements are applicable to provide sufficient negative reactivity to meet the assumptions of the safety analyses discussed above. In MODE 6, the shutdown reactivity requirements are given in LCO 3.9.1, "Boron Concentration." In MODES 1 and 2 with $k_{eff} > 1.0$, SDM is ensured by complying with LCO 3.1.5, "Shutdown Bank Insertion Limits," and LCO 3.1.6, "Control Bank Insertion Limits."

ACTIONS

A.1

If the SDM requirements are not met, boration must be initiated promptly. A Completion Time of 15 minutes is adequate for an operator to correctly align and start the required systems and components. It is assumed that boration will be continued until the SDM requirements are met.

In the determination of the required combination of boration flow rate and boron concentration, there is no unique requirement that must be satisfied. Since it is imperative to raise the boron concentration of the RCS as soon as

(continued)

BASES

ACTIONS

A.1 (continued)

possible, the boron concentration should be a highly concentrated solution, such as that normally found in the boric acid storage tank, or the Refueling Water Storage Tank. The operator should borate with the best source available for the unit conditions.

In determining the boration flow rate, the time in core life must be considered. For instance, the most difficult time in core life to increase the RCS boron concentration is at the beginning of cycle when the boron concentration may approach or exceed 2000 ppm. Assuming that a value of 1% $\Delta k/k$ must be recovered and a boration flow rate of 10 gpm, it is possible to increase the boron concentration of the RCS by 100 ppm in approximately 59 minutes. If a boron worth of 10 pcm/ppm is assumed, this combination of parameters will increase the SDM by 1% $\Delta k/k$. These boration parameters of 10 gpm and 12,950 ppm represent typical values and are provided for the purpose of offering a specific example.

SURVEILLANCE REQUIREMENTS

SR 3.1.1.1

In MODES 1 and 2 with $k_{eff} \geq 1.0$, SDM is verified by observing that the requirements of LCO 3.1.5 and LCO 3.1.6 are met. In the event that a rod is known to be untrippable, however, SDM verification must account for the worth of the untrippable rod as well as another rod of maximum worth.

In MODE 2 with $k_{eff} < 1.0$ and MODES 3, 4, and 5, the SDM is verified by performing a reactivity balance calculation, considering the listed reactivity effects:

a. RCS boron concentration;

b. Control and shutdown bank position;

c. RCS average temperature;

d. Fuel burnup based on gross thermal energy generation;

e. Xenon concentration;

f. Samarium concentration; and

g. Isothermal temperature coefficient (ITC).

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.1.1 (continued)

Using the ITC accounts for Doppler reactivity in this calculation because the reactor is subcritical, and the fuel temperature will be changing at the same rate as the RCS.

The Frequency of 24 hours is based on the generally slow change in required boron concentration and the low probability of an accident occurring without the required SDM. This allows time for the operator to collect the required data, which includes performing a boron concentration analysis, and complete the calculation.

REFERENCES

1. UFSAR, Section 3.1.22.

2. UFSAR, Chapter 15.

3. 10 CFR 100.

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.2 Core Reactivity

BASES

BACKGROUND

According to GDC 26, GDC 28, and GDC 29 (Ref. 1), reactivity shall be controllable, such that subcriticality is maintained under cold conditions, and acceptable fuel design limits are not exceeded during normal operation and anticipated operational occurrences. Therefore, reactivity balance is used as a measure of the predicted versus measured core reactivity during power operation. The periodic confirmation of core reactivity is necessary to ensure that Design Basis Accident (DBA) and transient safety analyses remain valid. A large reactivity difference could be the result of unanticipated changes in fuel, control rod worth, or operation at conditions not consistent with those assumed in the predictions of core reactivity, and could potentially result in a loss of SDM or violation of acceptable fuel design limits. Comparing predicted versus measured core reactivity validates the nuclear methods used in the safety analysis and supports the SDM demonstrations (LCO 3.1.1, "SHUTDOWN MARGIN (SDM)") in ensuring the reactor can be brought safely to cold, subcritical conditions.

When the reactor core is critical or in normal power operation, a reactivity balance exists and the net reactivity is zero. A comparison of predicted and measured reactivity is convenient under such a balance, since parameters are being maintained relatively stable under steady state power conditions. The positive reactivity inherent in the core design is balanced by the negative reactivity of the control components, thermal feedback, neutron leakage, and materials in the core that absorb neutrons, such as burnable absorbers producing zero net reactivity. Excess reactivity can be inferred from the boron letdown curve (or critical boron curve), which provides an indication of the soluble boron concentration in the Reactor Coolant System (RCS) versus cycle burnup. Periodic measurement of the RCS boron concentration for comparison with the predicted value with other variables fixed (such as rod height, temperature, pressure, and power), provides a convenient method of ensuring that core reactivity is within design expectations and that the calculational models used to generate the safety analysis are adequate.

(continued)

BASES

BACKGROUND (continued)

In order to achieve the required fuel cycle energy output, the uranium enrichment, in the new fuel loading and in the fuel remaining from the previous cycle, provides excess positive reactivity beyond that required to sustain steady state operation throughout the cycle. When the reactor is critical at RTP and moderator temperature, the excess positive reactivity is compensated by burnable absorbers (if any), control rods, whatever neutron poisons (mainly xenon and samarium) are present in the fuel, and the RCS boron concentration.

When the core is producing THERMAL POWER, the fuel is being depleted and excess reactivity is decreasing. As the fuel depletes, the RCS boron concentration is reduced to decrease negative reactivity and maintain constant THERMAL POWER. The boron letdown curve is based on steady state operation at RTP. Therefore, deviations from the predicted boron letdown curve may indicate deficiencies in the design analysis, deficiencies in the calculational models, or abnormal core conditions, and must be evaluated.

APPLICABLE SAFETY ANALYSES

The acceptance criteria for core reactivity are that the reactivity balance limit ensures unit operation is maintained within the assumptions of the safety analyses.

Accurate prediction of core reactivity is either an explicit or implicit assumption in the accident analysis evaluations. Every accident evaluation (Ref. 2) is, therefore, dependent upon accurate evaluation of core reactivity. In particular, SDM and reactivity transients, such as control rod withdrawal accidents or rod ejection accidents, are very sensitive to accurate prediction of core reactivity. These accident analysis evaluations rely on computer codes that have been qualified against available test data, operating unit data, and analytical benchmarks. Monitoring reactivity balance additionally ensures that the nuclear methods provide an accurate representation of the core reactivity.

Design calculations and safety analyses are performed for each fuel cycle for the purpose of predetermining reactivity behavior and the RCS boron concentration requirements for reactivity control during fuel depletion.

The comparison between measured and predicted initial core reactivity provides a normalization for the calculational models used to predict core reactivity. If the measured and

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

predicted RCS boron concentrations for identical core conditions at beginning of cycle (BOC) do not agree, then the assumptions used in the reload cycle design analysis or the calculational models used to predict soluble boron requirements may not be accurate. If reasonable agreement between measured and predicted core reactivity exists at BOC, then the prediction may be normalized to the measured boron concentration. Thereafter, any significant deviations in the measured boron concentration from the predicted boron letdown curve that develop during fuel depletion may be an indication that the calculational model is not adequate for core burnups beyond BOC, or that an unexpected change in core conditions has occurred.

The normalization of predicted RCS boron concentration to the measured value is typically performed after reaching RTP following startup from a refueling outage, with the control rods in their normal positions for power operation. The normalization is performed at BOC conditions, so that core reactivity relative to predicted values can be continually monitored and evaluated as core conditions change during the cycle.

Core reactivity satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

Long term core reactivity behavior is a result of the core physics design and cannot be easily controlled once the core design is fixed. During operation, therefore, the LCO can only be ensured through measurement and tracking, and appropriate actions taken as necessary. Large differences between actual and predicted core reactivity may indicate that the assumptions of the DBA and transient analyses are no longer valid, or that the uncertainties in the Nuclear Design Methodology are larger than expected. A limit on the reactivity balance of ± 1% $\Delta k/k$ has been established based on engineering judgment. A 1% deviation in reactivity from that predicted is larger than expected for normal operation and should therefore be evaluated.

When measured core reactivity is within 1% $\Delta k/k$ of the predicted value at steady state thermal conditions, the core is considered to be operating within acceptable design limits. Since deviations from the limit are normally detected by comparing predicted and measured steady state RCS critical boron concentrations, the difference between

(continued)

BASES

LCO (continued)

measured and predicted values would be approximately 100 ppm (depending on the boron worth) before the limit is reached. These values are well within the uncertainty limits for analysis of boron concentration samples, so that spurious violations of the limit due to uncertainty in measuring the RCS boron concentration are unlikely.

APPLICABILITY

The limits on core reactivity must be maintained during MODES 1 and 2 because a reactivity balance must exist when the reactor is critical or producing THERMAL POWER. As the fuel depletes, core conditions are changing, and confirmation of the reactivity balance ensures the core is operating as designed. This Specification does not apply in MODES 3, 4, and 5 because the reactor is shut down and the reactivity balance is not changing.

In MODE 6, fuel loading results in a continually changing core reactivity. Boron concentration requirements (LCO 3.9.1, "Boron Concentration") ensure that fuel movements are performed within the bounds of the safety analysis. An SDM demonstration is required during the first startup following operations that could have altered core reactivity (e.g., fuel movement, control rod replacement, control rod shuffling).

ACTIONS

A.1 and A.2

Should an anomaly develop between measured and predicted core reactivity, an evaluation of the core design and safety analysis must be performed. Core conditions are evaluated to determine their consistency with input to design calculations. Measured core and process parameters are evaluated to determine that they are within the bounds of the safety analysis, and safety analysis calculational models are reviewed to verify that they are adequate for representation of the core conditions. The required Completion Time of 7 days is based on the low probability of a DBA occurring during this period, and allows sufficient time to assess the physical condition of the reactor and complete the evaluation of the core design and safety analysis.

Following evaluations of the core design and safety analysis, the cause of the reactivity anomaly may be resolved. If the cause of the reactivity anomaly is a

(continued)

BASES

ACTIONS

A.1 and A.2 (continued)

mismatch in core conditions at the time of RCS boron concentration sampling, then a recalculation of the RCS boron concentration requirements may be performed to demonstrate that core reactivity is behaving as expected. If an unexpected physical change in the condition of the core has occurred, it must be evaluated and corrected, if possible. If the cause of the reactivity anomaly is in the calculation technique, then the calculational models must be revised to provide more accurate predictions. If any of these results are demonstrated, and it is concluded that the reactor core is acceptable for continued operation, then the boron letdown curve may be renormalized and power operation may continue. If operational restriction or additional SRs are necessary to ensure the reactor core is acceptable for continued operation, then they must be defined.

The required Completion Time of 7 days is adequate for preparing whatever operating restrictions or Surveillances that may be required to allow continued reactor operation.

B.1

If the core reactivity cannot be restored to within the 1% $\Delta k/k$ limit, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours. If the SDM for MODE 3 is not met, then the boration required by SR 3.1.1.1 would occur. The allowed Completion Time is reasonable, based on operating experience, for reaching MODE 3 from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.1.2.1

Core reactivity is verified by periodic comparisons of measured and predicted RCS boron concentrations. The comparison is made, considering that other core conditions are fixed or stable, including control rod position, moderator temperature, fuel temperature, fuel depletion, xenon concentration, and samarium concentration. The Surveillance is performed prior to entering MODE 1 as an initial check on core conditions and design calculations at BOC. The SR is modified by a Note. The Note indicates that any normalization of predicted core reactivity to the

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.2.1 (continued)

measured value must take place within the first 60 effective full power days (EFPD) after each fuel loading. This allows sufficient time for core conditions to reach steady state, but prevents operation for a large fraction of the fuel cycle without establishing a benchmark for the design calculations. The required subsequent Frequency of 31 EFPD, following the initial 60 EFPD after entering MODE 1, is acceptable, based on the slow rate of core changes due to fuel depletion and the presence of other indicators (QPTR, AFD, etc.) for prompt indication of an anomaly.

REFERENCES

1. UFSAR, Sections 3.1.22, 3.1.24, and 3.1.25.

2. UFSAR, Chapter 15.

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.3 Moderator Temperature Coefficient (MTC)

BASES

BACKGROUND

According to GDC 11 (Ref. 1), the reactor core and its interaction with the Reactor Coolant System (RCS) must be designed for inherently stable power operation, even in the possible event of an accident. In particular, the net reactivity feedback in the system must compensate for any unintended reactivity increases.

The MTC relates a change in core reactivity to a change in reactor coolant temperature (a positive MTC means that reactivity increases with increasing moderator temperature; conversely, a negative MTC means that reactivity decreases with increasing moderator temperature). The reactor is designed to operate with a negative MTC over the largest possible range of fuel cycle operation. Therefore, a coolant temperature increase will cause a reactivity decrease, so that the coolant temperature tends to return toward its initial value. Reactivity increases that cause a coolant temperature increase will thus be self limiting, and stable power operation will result.

MTC values are predicted at selected burnups during the safety evaluation analysis and are confirmed to be acceptable by measurements. Both initial and reload cores are designed so that the beginning of cycle (BOC) MTC is less than or equal to zero when THERMAL POWER is at RTP. The actual value of the MTC is dependent on core characteristics, such as fuel loading and reactor coolant soluble boron concentration. The core design may require additional fixed distributed poisons to yield an MTC at BOC within the range analyzed in the unit accident analysis. The end of cycle (EOC) MTC is also limited by the requirements of the accident analysis. Fuel cycles are evaluated to ensure that the MTC does not exceed the EOC limit.

The limitations on MTC are provided to ensure that the value of this coefficient remains within the limiting conditions assumed in the UFSAR accident and transient analyses.

(continued)

BASES

BACKGROUND (continued)

If the LCO limits are not met, the unit response during transients may not be as predicted. For example, the core could violate criteria that prohibit a return to criticality, or the departure from nucleate boiling ratio criteria of the approved correlation may be violated, which could lead to a loss of the fuel cladding integrity.

The SRs 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 RCS boron concentration associated with fuel burnup.

APPLICABLE SAFETY ANALYSES

The acceptance criteria for the specified MTC are:

a. The MTC values must remain within the bounds of those used in the accident analysis (Ref. 2); and

b. The MTC must be such that inherently stable power operations result during normal operation and accidents, such as overheating and overcooling events.

The UFSAR, Chapter 15 (Ref. 2), contains analyses of accidents that result in both overheating and overcooling of the reactor core. MTC is one of the controlling parameters for core reactivity in these accidents. Both the most positive value and most negative value of the MTC are important to safety, and both values must be bounded. Values used in the analyses consider worst case conditions to ensure that the accident results are bounding (Ref. 3).

The consequences of accidents that cause core overheating must be evaluated when the MTC is positive. Such accidents include the rod withdrawal transient from either zero or RTP, loss of main feedwater flow, and loss of forced reactor coolant flow. The consequences of accidents that cause core overcooling must be evaluated when the MTC is negative. Such accidents include sudden feedwater flow increase and sudden decrease in feedwater temperature.

In order to ensure a bounding accident analysis, the MTC is assumed to be its most limiting value for the analysis conditions appropriate to each accident. The bounding value is determined by considering rodded and unrodded conditions, whether the reactor is at full or zero power, and whether it

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

is the BOC or EOC life. The most conservative combination appropriate to the accident is then used for the analysis (Ref. 2).

MTC values are bounded in reload safety evaluations assuming steady state conditions at BOC and EOC. An EOC measurement is conducted at conditions when the RCS boron concentration reaches approximately 300 ppm. The measured value may be extrapolated to project the EOC value, in order to confirm reload design predictions.

MTC satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii). Even though it is not directly observed and controlled from the control room, MTC is considered an initial condition process variable because of its dependence on boron concentration.

LCO

LCO 3.1.3 requires the MTC to be within specified limits of the COLR to ensure that the core operates within the assumptions of the accident analysis. During the reload core safety evaluation, the MTC is analyzed to determine that its values remain within the bounds of the original accident analysis during operation.

Assumptions made in safety analyses require that the MTC be less positive than a given upper bound and more positive than a given lower bound. The MTC is most positive at BOC; this upper bound must not be exceeded. This maximum upper limit occurs at BOC, all rods out (ARO), hot zero power conditions. At EOC the MTC takes on its most negative value, when the lower bound becomes important. This LCO exists to ensure that both the upper and lower bounds are not exceeded.

During operation, therefore, the conditions of the LCO can only be ensured through measurement. The Surveillance checks at BOC and EOC on MTC provide confirmation that the MTC is behaving as anticipated so that the acceptance criteria are met.

The LCO establishes a maximum positive value that cannot be exceeded. The upper limit and the lower limit are established in the COLR to allow specifying limits for each particular cycle. This permits the unit to take advantage of improved fuel management and changes in unit operating schedule.

BASES

APPLICABILITY

Technical Specifications place both LCO and SR values on MTC, based on the safety analysis assumptions described above.

In MODE 1, the limits on MTC must be maintained to ensure that any accident initiated from THERMAL POWER operation will not violate the design assumptions of the accident analysis. In MODE 2 with the reactor critical, the upper limit must also be maintained to ensure that startup and subcritical accidents (such as the uncontrolled control rod assembly or group withdrawal) will not violate the assumptions of the accident analysis. The lower MTC limit must be maintained in MODES 2 and 3, in addition to MODE 1, to ensure that cooldown accidents will not violate the assumptions of the accident analysis. In MODES 4, 5, and 6, this LCO is not applicable, since no Design Basis Accidents using the MTC as an analysis assumption are initiated from these MODES.

ACTIONS

A.1

If the upper MTC limit is violated, administrative withdrawal limits for control banks must be established to maintain the MTC within its limits. The MTC becomes more negative with control bank insertion and decreased boron concentration. A Completion Time of 24 hours provides enough time for evaluating the MTC measurement and computing the required bank withdrawal limits.

As cycle burnup is increased, the RCS boron concentration will be reduced. The reduced boron concentration causes the MTC to become more negative. Using physics calculations, the time in cycle life at which the calculated MTC will meet the LCO requirement can be determined. At this point in core life Condition A no longer exists. The unit is no longer in the Required Action, so the administrative withdrawal limits are no longer in effect.

B.1

If the required administrative withdrawal limits at BOC are not established within 24 hours, the unit must be brought to MODE 2 with $k_{eff} < 1.0$ to prevent operation with an MTC that is more positive than that assumed in safety analyses.

(continued)

BASES

ACTIONS

B.1 (continued)

The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging unit systems.

C.1

Exceeding the lower MTC limit means that the safety analysis assumptions for the EOC accidents that use a bounding negative MTC value may be invalid. If the lower MTC limit is exceeded, the unit must be brought to a MODE or condition in which the LCO requirements are not applicable. To achieve this status, the unit must be brought to at least MODE 4 within 12 hours.

The allowed Completion Time is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.1.3.1

This SR requires measurement of the MTC at BOC prior to entering MODE 1 in order to demonstrate compliance with the most positive MTC LCO. Meeting the limit prior to entering MODE 1 ensures that the limit will also be met at higher power levels.

The BOC MTC value for ARO will be inferred from isothermal temperature coefficient measurements obtained during the physics tests after refueling. The ARO value can be directly compared to the upper MTC limit of the LCO. If required, measurement results and predicted design values can be used to establish administrative withdrawal limits for control banks.

SR 3.1.3.2

In similar fashion, the LCO demands that the MTC be less negative than the specified value for EOC full power conditions. This measurement may be performed at any THERMAL POWER, but its results must be extrapolated to the conditions of RTP and all banks withdrawn in order to make a proper comparison with the LCO value. Because the RTP MTC

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.3.2 (continued)

value will gradually become more negative with further core depletion and boron concentration reduction, a 300 ppm SR value of MTC should necessarily be less negative than the lower LCO limit. The 300 ppm SR value is sufficiently less negative than the lower LCO limit value to ensure that the LCO limit will be met when the 300 ppm Surveillance criterion is met.

SR 3.1.3.2 is modified by three Notes that include the following requirements:

a. The SR is not required to be performed until 7 Effective Full Power Days (EFPDs) after reaching the equivalent of an equilibrium RTP all rods out (ARO) boron concentration of 300 ppm.

b. If the 300 ppm Surveillance limit is exceeded, it is possible that the lower limit on MTC could be reached before the planned EOC. Because the MTC changes slowly with core depletion, the Frequency of 14 EFPDs is sufficient to avoid exceeding the EOC limit.

c. The Surveillance limit for RTP boron concentration of 60 ppm is conservative. If the measured MTC at 60 ppm is more positive than the 60 ppm Surveillance limit, the lower limit will not be exceeded because of the gradual manner in which MTC changes with core burnup.

REFERENCES

1. UFSAR, Section 3.1.7.

2. UFSAR, Chapter 15.

3. VEP-FRD-42, Rev. 1A, "Reload Nuclear Design Methodology," September 1986.

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.4 Rod Group Alignment Limits

BASES

BACKGROUND

The OPERABILITY (i.e., trippability) of the shutdown and control rods is an initial assumption in all safety analyses that assume rod insertion upon reactor trip. Maximum rod misalignment is an initial assumption in the safety analysis that directly affects core power distributions and assumptions of available SDM.

The applicable criteria for these reactivity and power distribution design requirements are GDC 10, "Reactor Design," GDC 26, "Reactivity Control System Redundancy and Capability" (Ref. 1), and 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Plants" (Ref. 2).

Mechanical or electrical failures may cause a control or shutdown rod to become inoperable or to become misaligned from its group. Rod inoperability or misalignment may cause increased power peaking, due to the asymmetric reactivity distribution and a reduction in the total available rod worth for reactor shutdown. Therefore, rod alignment and OPERABILITY are related to core operation in design power peaking limits and the core design requirement of a minimum SDM.

Limits on rod alignment have been established, and all rod positions are monitored and controlled during power operation to ensure that the power distribution and reactivity limits defined by the design power peaking and SDM limits are preserved.

Rod cluster control assemblies (RCCAs), or rods, are moved by their control rod drive mechanisms (CRDMs). Each CRDM moves its RCCA one step (approximately 5/8 inch) at a time, but at varying rates (steps per minute) depending on the signal output from the Rod Control System.

The RCCAs are divided among control banks and shutdown banks. Each bank may be further subdivided into two groups to provide for precise reactivity control. A group consists of four RCCAs that are electrically paralleled to step simultaneously. If a bank of RCCAs consists of two groups,

(continued)

BASES

BACKGROUND (continued)

the groups are moved in a staggered fashion, but always within one step of each other. There are four control banks and two shutdown banks.

The shutdown banks are maintained either in the fully inserted or fully withdrawn position. The control banks are moved in an overlap pattern, using the following withdrawal sequence: When control bank A reaches a predetermined height in the core, control bank B begins to move out with control bank A. Control bank A stops at the position of maximum withdrawal, and control bank B continues to move out. When control bank B reaches a predetermined height, control bank C begins to move out with control bank B. This sequence continues until control banks A, B, and C are at the fully withdrawn position, and control bank D is approximately halfway withdrawn. The insertion sequence is the opposite of the withdrawal sequence. The control rods are arranged in a radially symmetric pattern, so that control bank motion does not introduce radial asymmetries in the core power distributions.

The axial position of shutdown rods and control rods is indicated by two separate and independent systems, which are the Bank Demand Position Indication System (commonly called group step counters) and the Rod Position Indication (RPI) System.

The Bank Demand Position Indication System counts the pulses from the rod control system that moves the rods. There is one step counter for each group of rods. Individual rods in a group all receive the same signal to move and should, therefore, all be at the same position indicated by the group step counter for that group. The Bank Demand Position Indication System is considered highly precise (± 1 step or ± 5/8 inch). If a rod does not move one step for each demand pulse, the step counter will still count the pulse and incorrectly reflect the position of the rod.

The RPI System provides a highly accurate indication of actual rod position, but at a lower precision than the step counters. This system is based on inductive analog signals from a series of coils spaced along a hollow tube. The RPI system is capable of monitoring rod position within at least ± 12 steps.

BASES

APPLICABLE SAFETY ANALYSES

Rod misalignment accidents are analyzed in the safety analysis (Ref. 3). The acceptance criteria for addressing rod inoperability or misalignment are that:

a. There be no violations of:

1. specified acceptable fuel design limits, or
2. Reactor Coolant System (RCS) pressure boundary integrity; and

b. The core remains subcritical after accident transients.

Two types of misalignment are distinguished. During movement of a rod group, one rod may stop moving, while the other rods in the group continue. This condition may cause excessive power peaking. The second type of misalignment occurs if one rod fails to insert upon a reactor trip and remains stuck fully withdrawn. This condition requires an evaluation to determine that sufficient reactivity worth is held in the rods to meet the SDM requirement, with the maximum worth rod stuck fully withdrawn.

Two types of analysis are performed in regard to static rod misalignment (Ref. 4). With control and shutdown banks at their insertion limits, one type of analysis considers the case when any one rod is completely inserted into the core. The second type of analysis considers the case of a completely withdrawn single rod from a bank inserted to its insertion limit. Satisfying limits on departure from nucleate boiling ratio in both of these cases bounds the situation when a rod is misaligned from its group by 12 steps.

Another type of misalignment occurs if one RCCA fails to insert upon a reactor trip and remains stuck fully withdrawn. This condition is assumed in the evaluation to determine that the required SDM is met with the maximum worth RCCA also fully withdrawn (Ref. 5).

The Required Actions in this LCO ensure that either deviations from the alignment limits will be corrected or that THERMAL POWER will be adjusted so that excessive local linear heat rates (LHRs) will not occur, and that the requirements on SDM and ejected rod worth are preserved.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Continued operation of the reactor with a misaligned rod is allowed if power is reduced or if the heat flux hot channel factor ($F_Q(Z)$) and the nuclear enthalpy rise hot channel factor ($F^N_{\Delta H}$) are verified to be within their limits in the COLR and the safety analysis is verified to remain valid. When a rod is misaligned, the assumptions that are used to determine the rod insertion limits, AFD limits, and quadrant power tilt limits are not preserved. Therefore, the limits may not preserve the design peaking factors, and $F_Q(Z)$ and $F^N_{\Delta H}$ must be verified directly by incore mapping. Bases Section 3.2 (Power Distribution Limits) contains more complete discussions of the relation of $F_Q(Z)$ and $F^N_{\Delta H}$ to the operating limits.

Shutdown and control rod OPERABILITY and alignment are directly related to power distributions and SDM, which are initial conditions assumed in safety analyses. Therefore they satisfy Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

The limits on shutdown or control rod alignments ensure that the assumptions in the safety analysis will remain valid. The requirements on rod OPERABILITY ensure that upon reactor trip, the assumed reactivity will be available and will be inserted. The rod OPERABILITY requirements (i.e., trippability) are separate from the alignment requirements which ensure that the RCCAs and banks maintain the correct power distribution and rod alignment. The rod OPERABILITY requirement is satisfied provided the rod will fully insert in the required rod drop time assumed in the safety analysis. Rod control malfunctions that result in the inability to move a rod (e.g., rod lift coil failures), but that do not impact trippability, do not result in rod inoperability.

The requirement to maintain the rod alignment to within plus or minus 12 steps is conservative. The minimum misalignment assumed in safety analysis is 24 steps (15 inches), and in some cases a total misalignment from fully withdrawn to fully inserted is assumed.

Failure to meet the requirements of this LCO may produce unacceptable power peaking factors and LHRs, or unacceptable SDMs, all of which may constitute initial conditions inconsistent with the safety analysis.

(continued)

BASES

LCO (continued)

The LCO has been modified by a Note. The Note permits a wider tolerance on indicated rod position for a maximum of one hour in every 24 hours to allow stabilization of known thermal drift in the individual rod position indicator channels. This thermal soak time is available both for a continuous one hour period or several discrete intervals as long as the total time does not exceed 1 hour in any 24 hour period and the indicated rod position does not exceed 24 steps from the group step counter demand position. This allowance applies to the indicated position of the rod, not its actual position. If the actual position is known to be greater than 12 steps from the group step counter demand position, the Conditions and Required Actions of the specification must be followed.

APPLICABILITY

The requirements on RCCA OPERABILITY and alignment are applicable in MODES 1 and 2 because these are the only MODES in which neutron (or fission) power is generated, and the OPERABILITY (i.e., trippability) and alignment of rods have the potential to affect the safety of the unit. In MODES 3, 4, 5, and 6, the alignment limits do not apply because the rods are normally bottomed and the reactor is shut down and not producing fission power. In the shutdown MODES, the OPERABILITY of the shutdown and control rods has the potential to affect the required SDM, but this effect can be compensated for by an increase in the boron concentration of the RCS. See LCO 3.1.1, "SHUTDOWN MARGIN (SDM)," for SDM in MODES 3, 4, and 5 and LCO 3.9.1, "Boron Concentration," for boron concentration requirements during refueling.

ACTIONS

A.1.1 and A.1.2

When one or more rods are inoperable (i.e., untrippable), there is a possibility that the required SDM may be adversely affected. Under these conditions, it is important to determine the SDM, and if it is less than the required value, initiate boration until the required SDM is recovered. The Completion Time of 1 hour is adequate for determining SDM and, if necessary, for initiating emergency boration and restoring SDM.

In this situation, SDM verification must include the worth of the untrippable rod, as well as a rod of maximum worth.

BASES

ACTIONS (continued)

A.2

If the inoperable rod(s) cannot be restored to OPERABLE status, the unit must be brought to a MODE or condition in which the LCO requirements are not applicable. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours.

The allowed Completion Time is reasonable, based on operating experience, for reaching MODE 3 from full power conditions in an orderly manner and without challenging unit systems.

B.1.1 and B.1.2

With a misaligned rod, SDM must be verified to be within limit or boration must be initiated to restore SDM to within limit.

In many cases, realigning the remainder of the group to the misaligned rod may not be desirable. For example, realigning control bank C to a rod that is misaligned 15 steps from the top of the core would require a significant power reduction, since control bank D must be moved in significantly to meet the overlap requirements.

Power operation may continue with one RCCA OPERABLE but misaligned, provided that SDM is verified within 1 hour. The Completion Time of 1 hour represents the time necessary for determining the actual unit SDM and, if necessary, aligning and starting the necessary systems and components to initiate boration. Since the core conditions can change with time, periodic verification of SDM is required. A Frequency of 12 hours is sufficient to ensure this requirement continues to be met.

B.2.1, B.2.2.1, B.2.2.2, and B.3

For continued operation with a misaligned rod, RTP must be reduced or hot channel factors ($F_Q(Z)$ and $F^N_{\Delta H}$) must be verified within limits, and the safety analyses must be re-evaluated to confirm continued operation is permissible.

Reduction of power to 75% RTP ensures that local LHR increases due to a misaligned RCCA will not cause the core design criteria to be exceeded (Ref. 4). The Completion Time

(continued)

BASES

ACTIONS

B.2.1, B.2.2.1, B.2.2.2, and B.3 (continued)

of 2 hours gives the operator sufficient time to accomplish an orderly power reduction without challenging the Reactor Protection System.

Alternatively, verifying that $F_Q(Z)$ and $F^N_{\Delta H}$ are within the required limits ensures that current operation with a rod misaligned does not result in power distributions that may invalidate safety analysis assumptions. The Completion Time of 72 hours allows sufficient time to obtain flux maps of the core power distribution using the incore flux mapping system and to calculate $F_Q(Z)$ and $F^N_{\Delta H}$.

Once current conditions have been verified acceptable, time is available to perform evaluations of accident analysis to determine that core limits will not be exceeded during a Design Basis Event for the duration of operation under these conditions. The accident analyses presented in UFSAR, Chapter 15 (Ref. 3) that may be adversely affected will be evaluated to ensure that the analysis results remain valid for the duration of continued operation under these conditions. A Completion Time of 5 days is sufficient time to obtain the required input data and to perform the analysis.

C.1

When Required Actions cannot be completed within their Completion Time, the unit must be brought to a MODE or Condition in which the LCO requirements are not applicable. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours, which obviates concerns about the development of undesirable xenon or power distributions. The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching MODE 3 from full power conditions in an orderly manner and without challenging the unit systems.

D.1.1 and D.1.2

More than one rod becoming misaligned from its group average position is not expected, and has the potential to reduce SDM. Therefore, SDM must be evaluated. One hour allows the operator adequate time to determine SDM. Restoration of the required SDM, if necessary, requires increasing the RCS boron concentration to provide negative reactivity, as

(continued)

BASES

ACTIONS

D.1.1 and D.1.2 (continued)

described in the Bases or LCO 3.1.1. The required Completion Time of 1 hour for initiating boration is reasonable, based on the time required for potential xenon redistribution, the low probability of an accident occurring, and the steps required to complete the action. This allows the operator sufficient time to align the required valves and start the boric acid pumps. Boration will continue until the required SDM is restored.

D.2

If more than one rod is found to be misaligned or becomes misaligned because of bank movement, the unit conditions fall outside of the accident analysis assumptions. Since automatic bank sequencing would continue to cause misalignment, the unit must be brought to a MODE or Condition in which the LCO requirements are not applicable. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours.

The allowed Completion Time is reasonable, based on operating experience, for reaching MODE 3 from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.1.4.1

Verification that individual rod positions are within alignment limits at a Frequency of 12 hours provides a history that allows the operator to detect a rod that is beginning to deviate from its expected position. If an individual rod position is not within the alignment limit of the group step counter demand position, a determination must be made whether the problem is the actual rod position or the indicated rod position. If the actual rod position is not within the alignment limit, follow the Conditions and Required Actions in Specification 3.1.4. If the indicated, not actual, rod position is not within the alignment limit, follow the Conditions and Required Actions of Specification 3.1.7, Rod Position Indication. The specified Frequency takes into account other rod position information that is continuously available to the operator in the control room, so that during actual rod motion, deviations can immediately be detected.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.1.4.2

Verifying each rod is OPERABLE would require that each rod be tripped. However, in MODES 1 and 2, tripping each rod would result in radial or axial power tilts, or oscillations. Exercising each individual rod every 92 days provides increased confidence that all rods continue to be OPERABLE without exceeding the alignment limit, even if they are not regularly tripped. Moving each rod by 10 steps will not cause radial or axial power tilts, or oscillations, to occur. The 92 day Frequency takes into consideration other information available to the operator in the control room and SR 3.1.4.1, which is performed more frequently and adds to the determination of OPERABILITY of the rods. Between required performances of SR 3.1.4.2 (determination of rod OPERABILITY by movement), if a rod(s) is discovered to be immovable, but remains trippable, the rod(s) is considered to be OPERABLE. At any time, if a rod(s) is immovable, a determination of the trippability (OPERABILITY) of the rod(s) must be made, and appropriate action taken.

SR 3.1.4.3

Verification of rod drop times allows the operator to determine that the maximum rod drop time permitted is consistent with the assumed rod drop time used in the safety analysis. Measuring rod drop times prior to reactor criticality, after reactor vessel head removal, ensures that the reactor internals and rod drive mechanism will not interfere with rod motion or rod drop time, and that no degradation in these systems has occurred that would adversely affect rod motion or drop time. This testing is performed with all RCPs operating and the average moderator temperature ≥ 500°F to simulate a reactor trip under actual conditions. The surveillance procedure for rod drop time uses a limit on rod drop time reduced from the value in SR 3.1.4.3 in order to ensure that the negative reactivity insertion rate used in the accident analyses bounds a reactor trip concurrent with a postulated seismic event.

This Surveillance is performed during a unit outage, due to the unit conditions needed to perform the SR and the potential for an unplanned unit transient if the Surveillance were performed with the reactor at power.

BASES

REFERENCES

1. UFSAR, Sections 3.1.6 and 3.1.22.
2. 10 CFR 50.46.
3. UFSAR, Chapter 15.
4. UFSAR, Section 15.2.3.
5. UFSAR, Section 4.3.1.5.

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.5 Shutdown Bank Insertion Limits

BASES

BACKGROUND

The insertion limits of the shutdown and control rods are initial assumptions in all safety analyses that assume rod insertion upon reactor trip. The insertion limits directly affect core power and fuel burnup distributions and assumptions of available ejected rod worth, SDM and initial reactivity insertion rate.

The applicable criteria for these reactivity and power distribution design requirements are GDC 10, "Reactor Design," GDC 26, "Reactivity Control System Redundancy and Protection," GDC 28, "Reactivity Limits" (Ref. 1), and 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Reactors" (Ref. 2). Limits on control rod insertion have been established, and all rod positions are monitored and controlled during power operation to ensure that the power distribution and reactivity limits defined by the design power peaking and SDM limits are preserved.

The rod cluster control assemblies (RCCAs) are divided among control banks and shutdown banks. Each bank is further subdivided into two groups to provide for precise reactivity control. A group consists of four RCCAs that are electrically paralleled to step simultaneously. A bank of RCCAs consists of two groups that are moved in a staggered fashion, but always within one step of each other. There are four control banks and two shutdown banks. See LCO 3.1.4, "Rod Group Alignment Limits," for control and shutdown rod OPERABILITY and alignment requirements, and LCO 3.1.7, "Rod Position Indication," for position indication requirements.

The control banks are used for precise reactivity control of the reactor. The positions of the control banks are normally automatically controlled by the Rod Control System, but they can also be manually controlled. They are capable of adding negative reactivity very quickly (compared to borating). The control banks must be maintained above designed insertion limits and are typically near the fully withdrawn position during normal full power operations.

(continued)

BASES

BACKGROUND (continued)

Hence, they are not capable of adding a large amount of positive reactivity. Boration or dilution of the Reactor Coolant System (RCS) compensates for the reactivity changes associated with large changes in RCS temperature. The design calculations are performed with the assumption that the shutdown banks are withdrawn first. The shutdown banks can be fully withdrawn without the core going critical. This provides available negative reactivity in the event of boration errors. The shutdown banks are controlled manually by the control room operator. During normal unit operation, the shutdown banks are either fully withdrawn or fully inserted. The shutdown banks must be completely withdrawn from the core, prior to withdrawing any control banks during an approach to criticality. The shutdown banks are then left in this position until the reactor is shut down. They add negative reactivity to shut down the reactor upon receipt of a reactor trip signal.

APPLICABLE SAFETY ANALYSES

On a reactor trip, all RCCAs (shutdown banks and control banks), except the most reactive RCCA, are assumed to insert into the core. The shutdown banks shall be at or above their insertion limits and available to insert the maximum amount of negative reactivity on a reactor trip signal. The control banks may be partially inserted in the core, as allowed by LCO 3.1.6, "Control Bank Insertion Limits." The shutdown bank and control bank insertion limits are established to ensure that a sufficient amount of negative reactivity is available to shut down the reactor and maintain the required SDM (see LCO 3.1.1, "SHUTDOWN MARGIN (SDM)") following a reactor trip from full power. The combination of control banks and shutdown banks (less the most reactive RCCA, which is assumed to be fully withdrawn) is sufficient to take the reactor from full power conditions at rated temperature to zero power, and to maintain the required SDM at rated no load temperature (Ref. 3). The shutdown bank insertion limit also limits the reactivity worth of an ejected shutdown rod.

The acceptance criteria for addressing shutdown rod bank insertion limits and inoperability or misalignment is that:

a. There be no violations of:

   1. specified acceptable fuel design limits, or
   2. RCS pressure boundary integrity; and

b. The core remains subcritical after accident transients.

BASES

APPLICABLE SAFETY ANALYSES (continued)

As such, the shutdown bank insertion limits affect safety analysis involving core reactivity and SDM (Ref. 3).

The shutdown bank insertion limits preserve an initial condition assumed in the safety analyses and, as such, satisfy Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

The shutdown banks must be within their insertion limits any time the reactor is critical or approaching criticality. This ensures that a sufficient amount of negative reactivity is available to shut down the reactor and maintain the required SDM following a reactor trip.

The shutdown bank insertion limits are defined in the COLR.

APPLICABILITY

The shutdown banks must be within their insertion limits, with the reactor in MODES 1 and 2. This ensures that a sufficient amount of negative reactivity is available to shut down the reactor and maintain the required SDM following a reactor trip. The shutdown banks do not have to be within their insertion limits in MODE 3, unless an approach to criticality is being made. In MODE 3, 4, or 5, the shutdown banks are fully inserted in the core and contribute to the SDM. Refer to LCO 3.1.1 for SDM requirements in MODES 3, 4, and 5. LCO 3.9.1, "Boron Concentration," ensures adequate SDM in MODE 6.

The Applicability requirements have been modified by a Note indicating the LCO requirement is suspended during SR 3.1.4.2. This SR verifies the freedom of the rods to move, and requires the shutdown bank to move below the LCO limits, which would normally violate the LCO. Should the SR testing be suspended due to equipment malfunction with a rod bank below the insertion limit, the applicable Condition should be entered.

ACTIONS

A.1.1, A.1.2 and A.2

When one or more shutdown banks is not within insertion limits, except as allowed by Condition B, 2 hours is allowed to restore the shutdown banks to within the insertion limits. This is necessary because the available SDM may be significantly reduced, with one or more of the shutdown banks not within their insertion limits. Also, verification

(continued)

BASES

ACTIONS

A.1.1, A.1.2 and A.2 (continued)

of SDM or initiation of boration within 1 hour is required, since the SDM in MODES 1 and 2 is ensured by adhering to the control and shutdown bank insertion limits (see LCO 3.1.1).

If shutdown banks are not within their insertion limits, then SDM will be verified by performing a reactivity balance calculation, considering the effects listed in the BASES for SR 3.1.1.1.

The allowed Completion Time of 2 hours provides an acceptable time for evaluating and repairing minor problems without allowing the unit to remain in an unacceptable condition for an extended period of time.

B.1 and B.2

If a shutdown bank is inserted below the insertion limits, power operation may continue for up to 72 hours provided that the bank is not inserted more than 18 steps below the insertion limits, the control and shutdown banks are within the operability and rod group alignment requirements provided in LCO 3.1.4, and the control banks are within the insertion limits provided in LCO 3.1.6. The requirement to be in compliance with LCO 3.1.4 and LCO 3.1.6 ensures that the rods are trippable, and power distribution is acceptable during the time allowed to restore the inserted rod. If any of these Conditions are not met, Condition A must be applied.

The Completion Time of 72 hours is based on operating experience and provides an acceptable time for evaluating and repairing problems with the rod control system.

C.1

If the Required Action and associated Completion Time of Conditions A or B are not met, the unit must be brought to a MODE where the LCO is not applicable. The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging unit systems.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.5.1

Verification that the shutdown banks are within their insertion limits prior to an approach to criticality ensures that when the reactor is critical, or being taken critical, the shutdown banks will be available to shut down the reactor, and the required SDM will be maintained following a reactor trip. This SR and Frequency ensure that the shutdown banks are withdrawn before the control banks are withdrawn during a unit startup.

Since the shutdown banks are positioned manually by the control room operator, a verification of shutdown bank position at a Frequency of 12 hours, after the reactor is taken critical, is adequate to ensure that they are within their insertion limits. Also, the 12 hour Frequency takes into account other information available in the control room for the purpose of monitoring the status of shutdown rods.

REFERENCES

1. UFSAR, Sections 3.1.6, 3.1.22, and 3.1.24.

2. 10 CFR 50.46.

3. UFSAR, Chapter 15.

Intentionally Blank

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.6 Control Bank Insertion Limits

BASES

BACKGROUND

The insertion limits of the shutdown and control rods are initial assumptions in all safety analyses that assume rod insertion upon reactor trip. The insertion limits directly affect core power and fuel burnup distributions and assumptions of available SDM, and initial reactivity insertion rate.

The applicable criteria for these reactivity and power distribution design requirements are GDC 10, "Reactor Design," GDC 26, "Reactivity Control System Redundancy and Protection," GDC 28, "Reactivity Limits" (Ref. 1), and 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Reactors" (Ref. 2). Limits on control rod insertion have been established, and all rod positions are monitored and controlled during power operation to ensure that the power distribution and reactivity limits defined by the design power peaking and SDM limits are preserved.

The rod cluster control assemblies (RCCAs) are divided among control banks and shutdown banks. Each bank is further subdivided into two groups to provide for precise reactivity control. A group consists of four RCCAs that are electrically paralleled to step simultaneously. A bank of RCCAs consists of two groups that are moved in a staggered fashion, but always within one step of each other. There are four control banks and two shutdown banks. See LCO 3.1.4, "Rod Group Alignment Limits," for control and shutdown rod OPERABILITY and alignment requirements, and LCO 3.1.7, "Rod Position Indication," for position indication requirements.

The control bank insertion limits are specified in the COLR. An example is provided for information only in Figure B 3.1.6-1. The control banks are required to be at or above the insertion limit lines.

Figure B 3.1.6-1 also indicates how the control banks are sequenced and moved in an overlap pattern. Overlap is the distance travelled together by two control banks. Sequencing is the order in which the banks are moved. For example, if the fully withdrawn position is 231 steps, as in

(continued)

BASES

BACKGROUND (continued)

Figure B 3.1.6-1, control bank D will begin to move with bank C on a withdrawal when control bank C is at 128 steps. The fully withdrawn position, as well as proper overlap and sequence, are defined in the COLR.

The control banks are used for precise reactivity control of the reactor. The positions of the control banks are normally controlled automatically by the Rod Control System, but can also be manually controlled. They are capable of adding reactivity very quickly (compared to borating or diluting).

The power density at any point in the core must be limited, so that the fuel design criteria are maintained. Together, LCO 3.1.4, LCO 3.1.5, "Shutdown Bank Insertion Limits," LCO 3.1.6, LCO 3.2.3, "AXIAL FLUX DIFFERENCE (AFD)," and LCO 3.2.4, "QUADRANT POWER TILT RATIO (QPTR)," provide limits on control component operation and on monitored process variables, which ensure that the core operates within the fuel design criteria.

The shutdown and control bank insertion and alignment limits, AFD, and QPTR are process variables that together characterize and control the three dimensional power distribution of the reactor core. Additionally, the control bank insertion limits control the reactivity that could be added in the event of a rod ejection accident, and the shutdown and control bank insertion limits ensure the required SDM is maintained.

Operation within the subject LCO limits will limit fuel cladding failures that would breach the primary fission product barrier and release fission products to the reactor coolant to within acceptable limits in the event of a loss of coolant accident (LOCA), loss of flow, ejected rod, or other accident requiring termination by a Reactor Trip System (RTS) trip function.

APPLICABLE SAFETY ANALYSES

The shutdown and control bank insertion limits, AFD, and QPTR LCOs are required to maintain power distributions that limit fuel cladding failures to within acceptable limits in the event of a LOCA, loss of flow, ejected rod, or other accident requiring termination by an RTS trip function.

BASES

APPLICABLE SAFETY ANALYSES (continued)

The acceptance criteria for addressing control bank insertion limits and inoperability or misalignment are that:

a. There be no violations of:

1. specified acceptable fuel design limits, or

2. Reactor Coolant System pressure boundary integrity; and

b. The core remains subcritical after accident transients.

As such, the shutdown and control bank insertion limits affect safety analysis involving core reactivity and power distributions (Ref. 3).

The SDM requirement is ensured by limiting the control bank insertion limits so that allowable inserted worth of the RCCAs is such that sufficient reactivity is available in the rods to shut down the reactor to hot zero power with a reactivity margin that assumes the maximum worth RCCA remains fully withdrawn upon trip (Ref. 3).

Operation at the insertion limits or AFD limits may approach the maximum allowable linear heat generation rate or peaking factor with the allowed QPTR present. Operation at the insertion limit may also indicate the maximum ejected RCCA worth could be equal to the limiting value in fuel cycles that have sufficiently high ejected RCCA worths.

The control bank insertion limits ensure that safety analyses assumptions for SDM, ejected rod worth, and power distribution peaking factors are preserved (Ref. 3).

The insertion limits satisfy Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

The limits on control banks sequence, overlap, and physical insertion, as defined in the COLR, must be maintained because they serve the function of preserving power distribution, ensuring that the SDM is maintained, ensuring that ejected rod worth is maintained, and ensuring adequate negative reactivity insertion is available on trip. The overlap between control banks provides more uniform rates of

(continued)

BASES

LCO (continued)

reactivity insertion and withdrawal and is imposed to maintain acceptable power peaking during control bank motion.

APPLICABILITY

The control bank sequence, overlap, and physical insertion limits shall be maintained with the reactor in MODES 1 and 2 with $k_{eff} \geq 1.0$. These limits must be maintained, since they preserve the assumed power distribution, ejected rod worth, SDM, and reactivity rate insertion assumptions. Applicability in MODE 2 with $k_{eff} < 1.0$, and MODES 3, 4, and 5 is not required, since neither the power distribution nor ejected rod worth assumptions would be exceeded in these MODES.

The applicability requirements have been modified by a Note indicating the LCO requirements are suspended during the performance of SR 3.1.4.2. This SR verifies the freedom of the rods to move, and requires the control bank to move below the LCO limits, which would violate the LCO. Should the SR testing be suspended due to equipment malfunction with a rod bank below the insertion limits, the applicable Condition should be entered.

ACTIONS

A.1.1, A.1.2, A.2, B.1.1, B.1.2, and B.2

If the control banks are found to be out of sequence or in the wrong overlap configuration, they must be restored to meet the limits.

Operation beyond the LCO limits is allowed for a short time period in order to take conservative action because the simultaneous occurrence of either a LOCA, loss of flow accident, ejected rod accident, or other accident during this short time period, together with an inadequate power distribution or reactivity capability, has an acceptably low probability.

Also, verification of SDM or initiation of boration to regain SDM is required within 1 hour, since the SDM in MODES 1 and 2 normally ensured by adhering to the control and shutdown bank insertion limits (see LCO 3.1.1, "SHUTDOWN MARGIN (SDM)") has been upset. If control banks are not within their limits, then SDM will be verified by performing a reactivity balance calculation, considering the effects listed in the BASES for SR 3.1.1.1.

(continued)

BASES

ACTIONS

A.1.1, A.1.2, A.2, B.1.1, B.1.2, and B.2 (continued)

When the control banks are outside the acceptable insertion limits, except as allowed by Condition C, they must be restored to within those limits. This restoration can occur in two ways:

a. Reducing power to be consistent with rod position; or

b. Moving rods to be consistent with power.

The allowed Completion Time of 2 hours for restoring the banks to within the insertion, sequence, and overlaps limits provides an acceptable time for evaluating and repairing minor problems without allowing the unit to remain in an unacceptable condition for an extended period of time.

C.1 and C.2

If Control Banks A, B, or C are inserted below the insertion limits, power operation may continue for up to 72 hours provided that the bank is not inserted more than 18 steps below the insertion limits, the control banks are within the operability and rod group alignment requirements provided in LCO 3.1.4, and the shutdown banks are within the insertion limits provided in LCO 3.1.5. The requirement to be in compliance with LCO 3.1.4 and LCO 3.1.5 ensures that the rods are trippable, and power distribution is acceptable during the time allowed to restore the inserted rod. If any of these Conditions are not met, Condition B must be applied.

The Completion Time of 72 hours is based on operating experience and provides an acceptable time for evaluating and repairing problems with the rod control system.

D.1

If Required Actions A.1 and A.2, B.1 and B.2, or C.1 and C.2 cannot be completed within the associated Completion Times, the unit must be brought to MODE 2 with $k_{eff} < 1.0$, where the LCO is not applicable. The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging unit systems.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.6.1

This Surveillance is required to ensure that the reactor does not achieve criticality with the control banks below their insertion limits.

The estimated critical position (ECP) depends upon a number of factors, one of which is xenon concentration. If the ECP was calculated long before criticality, xenon concentration could change to make the ECP substantially in error. Verifying the predicted critical rod bank position within 4 hours prior to criticality avoids a large error from changes in xenon concentration, but allows the operator some flexibility to schedule the verification with other startup activities.

SR 3.1.6.2

Verification of the control bank insertion limits at a Frequency of 12 hours is sufficient to detect control banks that may be approaching the insertion limits since, normally, very little rod motion occurs in 12 hours.

SR 3.1.6.3

When control banks are maintained within their insertion limits as checked by SR 3.1.6.2 above, it is unlikely that their sequence and overlap will not be in accordance with requirements provided in the COLR. A Frequency of 12 hours is consistent with the insertion limit check above in SR 3.1.6.2.

REFERENCES

1. UFSAR, Sections 3.1.6, 3.1.22, and 3.1.24.

2. 10 CFR 50.46.

3. UFSAR, Chapter 15.

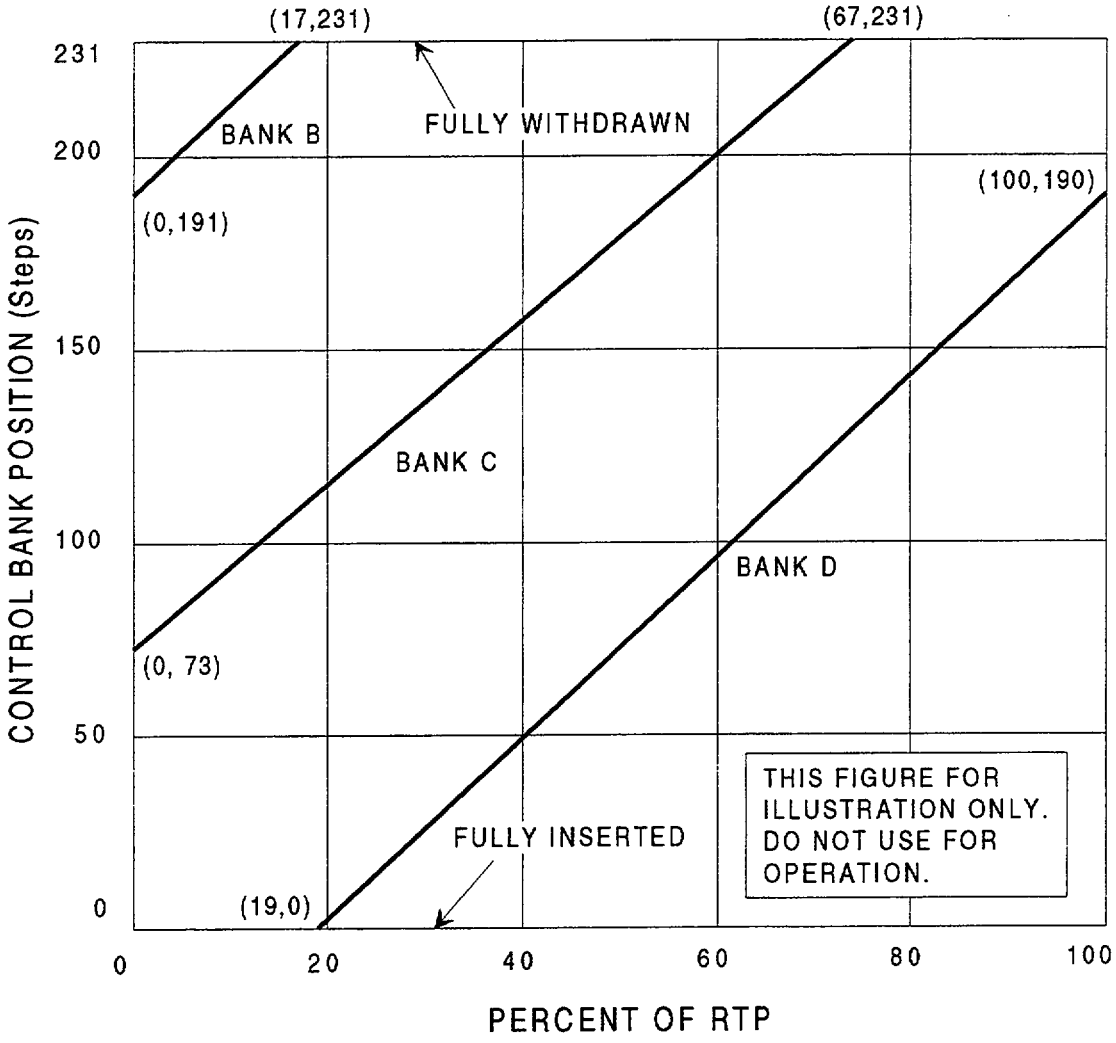


Figure B 3.1.6-1 (page 1 of 1)
Control Bank Insertion vs. Percent RTP

Intentionally Blank

B 3.1 REACTIVITY CONTROL SYSTEM

B 3.1.7 Rod Position Indication

BASES

BACKGROUND

According to GDC 13 (Ref. 1), instrumentation to monitor variables and systems over their operating ranges during normal operation, anticipated operational occurrences, and accident conditions must be OPERABLE. LCO 3.1.7 is required to ensure OPERABILITY of the rod position indicators to determine rod positions and thereby ensure compliance with the rod alignment and insertion limits.

The OPERABILITY, including position indication, of the shutdown and control rods is an initial assumption in all safety analyses that assume rod insertion upon reactor trip. Maximum rod misalignment is an initial assumption in the safety analysis that directly affects core power distributions and assumptions of available SDM. Rod position indication is required to assess OPERABILITY and misalignment.

Mechanical or electrical failures may cause a rod to become inoperable or to become misaligned from its group. Rod inoperability or misalignment may cause increased power peaking, due to the asymmetric reactivity distribution and a reduction in the total available rod worth for reactor shutdown. Therefore, rod alignment and OPERABILITY are related to core operation in design power peaking limits and the core design requirement of a minimum SDM.

Limits on rod alignment and OPERABILITY have been established, and all rod positions are monitored and controlled during power operation to ensure that the power distribution and reactivity limits defined by the design power peaking and SDM limits are preserved.

Rod cluster control assemblies (RCCAs), or rods, are moved out of the core (up or withdrawn) or into the core (down or inserted) by their control rod drive mechanisms. The RCCAs are divided among control banks and shutdown banks. Each bank is further subdivided into two groups to provide for precise reactivity control.

(continued)

BASES

BACKGROUND (continued)

The axial position of shutdown rods and control rods are determined by two separate and independent systems: the Bank Demand Position Indication System (commonly called group step counters) and the Rod Position Indication (RPI) System.

The Bank Demand Position Indication System counts the pulses from the Rod Control System that move the rods. There is one step counter for each group of rods. Individual rods in a group all receive the same signal to move and should, therefore, all be at the same position indicated by the group step counter for that group. The Bank Demand Position Indication System is considered highly precise (± 1 step or ± 5/8 inch). If a rod does not move one step for each demand pulse, the step counter will still count the pulse and incorrectly reflect the position of the rod.

The RPI System provides a highly accurate indication of actual rod position, but at a lower precision than the step counters. This system is based on inductive analog signals from a series of coils spaced along a hollow tube. The RPI System is capable of monitoring rod position within at least ± 12 steps.

APPLICABLE SAFETY ANALYSES

Control and shutdown rod position accuracy is essential during power operation. Power peaking, ejected rod worth, or SDM limits may be violated in the event of a Design Basis Accident (Ref. 2), with control or shutdown rods operating outside their limits undetected. Therefore, the acceptance criteria for rod position indication is that rod positions must be known with sufficient accuracy in order to verify the core is operating within the group sequence, overlap, design peaking limits, ejected rod worth, and with minimum SDM (LCO 3.1.5, "Shutdown Bank Insertion Limits," and LCO 3.1.6, "Control Bank Insertion Limits"). The rod positions must also be known in order to verify the alignment limits are preserved (LCO 3.1.4, "Rod Group Alignment Limits"). Control rod positions are continuously monitored to provide operators with information that ensures the unit is operating within the bounds of the accident analysis assumptions.

The control rod position indicator channels satisfy Criterion 2 of 10 CFR 50.36(c)(2)(ii).

BASES

LCO

LCO 3.1.7 specifies that the RPI System and the Bank Demand Position Indication System be OPERABLE for each rod. For the rod position indicators to be OPERABLE requires meeting the SR of the LCO and the following:

a. The RPI System indicates within 12 or 24 steps of the group step counter demand position as required by LCO 3.1.4, "Rod Group Alignment Limits";

b. For the RPI System there are no failed coils; and

c. The Bank Demand Indication System has been calibrated either in the fully inserted position or to the RPI System.

The 12 step agreement limit between the Bank Demand Position Indication System and the RPI System indicates that the Bank Demand Position Indication System is adequately calibrated, and can be used for indication of the measurement of rod bank position.

A deviation of less than the allowable limit, given in LCO 3.1.4, in position indication for a single rod, ensures high confidence that the position uncertainty of the corresponding rod group is within the assumed values used in the analysis (that specified rod group insertion limits).

These requirements ensure that rod position indication during power operation and PHYSICS TESTS is accurate, and that design assumptions are not challenged.

OPERABILITY of the position indicator channels ensures that inoperable, misaligned, or mispositioned rods can be detected. Therefore, power peaking, ejected rod worth, and SDM can be controlled within acceptable limits.

APPLICABILITY

The requirements on the RPI and step counters are only applicable in MODES 1 and 2 (consistent with LCO 3.1.4, LCO 3.1.5, and LCO 3.1.6), because these are the only MODES in which power is generated, and the OPERABILITY and alignment of rods have the potential to affect the safety of the unit. In the shutdown MODES, the OPERABILITY of the shutdown and control banks has the potential to affect the required SDM, but this effect can be compensated for by an increase in the boron concentration of the Reactor Coolant System.

BASES

ACTIONS

The ACTIONS table is modified by a Note indicating that a separate Condition entry is allowed for each inoperable rod position indicator and each demand position indicator. This is acceptable because the Required Actions for each Condition provide appropriate compensatory actions for each inoperable position indicator.

A.1

When one RPI channel per group fails, the position of the rod may still be determined indirectly by use of the movable incore detectors. The Required Action may also be satisfied by ensuring at least once per 8 hours that $F_Q(Z)$ satisfies LCO 3.2.1, $F^N_{\Delta H}$ satisfies LCO 3.2.2, and SHUTDOWN MARGIN is within the limits provided in the COLR, provided the nonindicating rods have not been moved. Based on experience, normal power operation does not require excessive movement of banks. If a bank has been significantly moved, the Required Action of C.1 or C.2 below is required. Therefore, verification of RCCA position within the Completion Time of 8 hours is adequate for allowing continued full power operation, since the probability of simultaneously having a rod significantly out of position and an event sensitive to that rod position is small.

A.2

Reduction of THERMAL POWER to ≤ 50% RTP puts the core into a condition where rod position is not significantly affecting core peaking factors (Ref. 2).

The allowed Completion Time of 8 hours is reasonable, based on operating experience, for reducing power to ≤ 50% RTP from full power conditions without challenging unit systems and allowing for rod position determination by Required Action A.1 above.

B.1, B.2, B.3, and B.4

When more than one RPI per group fail, additional actions are necessary to ensure that acceptable power distribution limits are maintained, minimum SDM is maintained, and the potential effects of rod misalignment on associated accident analyses are limited. Placing the Rod Control System in manual assures unplanned rod motion will not occur. Together with the indirect position determination available via movable incore detectors will minimize the potential for rod

(continued)

BASES

ACTIONS

B.1, B.2, B.3, and B.4 (continued)

misalignment. The immediate Completion Time for placing the Rod Control System in manual reflects the urgency with which unplanned rod motion must be prevented while in this Condition.

Monitoring and recording reactor coolant T_{avg} help assure that significant changes in power distribution and SDM are avoided. The once per hour Completion Time is acceptable because only minor fluctuations in RCS temperature are expected at steady state plant operating conditions.

The position of the rods may be determined indirectly by use of the movable incore detectors. The Required Action may also be satisfied by ensuring at least once per 8 hours that $F_Q(Z)$ satisfies LCO 3.2.1, $F^N_{\Delta H}$ satisfies LCO 3.2.2, and SHUTDOWN MARGIN is within the limits provided in the COLR, provided the nonindicating rods have not been moved. Verification of control rod position once per 8 hours is adequate for allowing continued full power operation for a limited, 24 hour period, since the probability of simultaneously having a rod significantly out of position and an event sensitive to that rod position is small. The 24 hour Completion Time provides sufficient time to troubleshoot and restore the RPI system to operation while avoiding the plant challenges associated with a shutdown without full rod position indication.

Based on operating experience, normal power operation does not require excessive rod movement. If one or more rods has been significantly moved, the Required Action of C.1 or C.2 below is required.

C.1 and C.2

These Required Actions clarify that when one or more rods with inoperable position indicators have been moved in excess of 24 steps in one direction, since the position was last determined, the Required Actions of A.1 and A.2, or B.1, as applicable, are still appropriate but must be initiated promptly under Required Action C.1 to begin verifying that these rods are still properly positioned, relative to their group positions.

(continued)

BASES

ACTIONS

C.1 and C.2 (continued)

If, within 4 hours, the rod positions have not been determined, THERMAL POWER must be reduced to ≤ 50% RTP within 8 hours to avoid undesirable power distributions that could result from continued operation at > 50% RTP, if one or more rods are misaligned by more than 24 steps. The allowed Completion Time of 4 hours provides an acceptable period of time to verify the rod positions.

D.1.1 and D.1.2

With one demand position indicator per bank inoperable, the rod positions can be determined by the RPI System. Since normal power operation does not require excessive movement of rods, verification by administrative means that the rod position indicators are OPERABLE and the most withdrawn rod and the least withdrawn rod are ≤ 12 steps apart within the allowed Completion Time of once every 8 hours is adequate.

D.2

Reduction of THERMAL POWER to ≤ 50% RTP puts the core into a condition where rod position is not significantly affecting core peaking factor limits (Ref. 2). The allowed Completion Time of 8 hours provides an acceptable period of time to verify the rod positions per Required Actions D.1.1 and D.1.2 or reduce power to ≤ 50% RTP.

E.1

If the Required Actions cannot be completed within the associated Completion Time, the unit must be brought to a MODE in which the requirement does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours. The allowed Completion Time is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.1.7.1

Performing a CHANNEL CALIBRATION on each RPI channel ensures that the RPI electronics are operating properly. This CHANNEL CALIBRATION involves injecting a test signal into the RPI electronics and verifying or adjusting the

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.7.1 (continued)

calibration from that point forward. The CHANNEL CALIBRATION also verifies all alarms and indications, such as the Rod Bottom lights. The CHANNEL CALIBRATION does not include the coil stack, as it cannot be adjusted. The indicated RPI position is adjusted as needed to compensate for thermal drift. The 18 month Frequency has been shown by operating experience to be adequate.

REFERENCES

1. UFSAR, Section 3.1.9.

2. UFSAR, Chapter 15.

Intentionally Blank

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.8 Primary Grade Water Flow Path Isolation Valves

BASES

BACKGROUND

During MODES 3, 4, and 5 operations, the isolation valves for primary grade water flow paths that are connected to the Reactor Coolant System (RCS) must be closed to prevent unplanned boron dilution of the reactor coolant. The isolation valves must be locked, sealed, or otherwise secured in the closed position.

The Chemical and Volume Control System is capable of supplying borated and unborated water to the RCS through various flow paths. Since a positive reactivity addition made by an uncontrolled reduction of the boron concentration is inappropriate during MODES 3, 4 and 5, isolation of all primary grade water flow paths prevents an unplanned boron dilution.

APPLICABLE SAFETY ANALYSES

The possibility of an inadvertent boron dilution event (Ref. 1) occurring during MODES 3, 4, or 5 is precluded by adherence to this LCO, which requires that the primary grade water flow path be isolated. Closing the required valves prevents the flow of significant volumes of primary grade water to the RCS. The valves are used to isolate primary grade water flow paths. These valves have the potential to indirectly allow dilution of the RCS boron concentration. By isolating primary grade water flow paths, a safety analysis for an uncontrolled boron dilution accident is not required for MODES 3, 4 or 5.

The RCS boron concentration satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

This LCO requires that primary grade water be isolated from the RCS to prevent unplanned boron dilution during MODES 3, 4, and 5.

For Unit 1, primary grade water flow paths may be isolated from the RCS by closing valve 1-CH-217 or 1-CH-220, 1-CH-241, FCV-1114B and FCV-1113B. For Unit 2, primary grade water flow paths may be isolated from the RCS by closing valve 2-CH140, or 2-CH-160, 2-CH-156, FCV-2114B, and FCV-2113B.

(continued)

BASES

LCO (continued)

The LCO is modified by a Note which allows the primary grade water flow path isolation valves to be opened under administrative control for planned boron dilution or makeup activities.

APPLICABILITY

This LCO is applicable in MODES 3, 4, and 5 to prevent an inadvertent boron dilution event by ensuring closure of all primary grade water flow path isolation valves.

In MODE 6, LCO 3.9.2, "Primary Grade Water Flow Path Isolation Valves—MODE 6," requires all primary grade water isolation valves to be closed to prevent an inadvertent boron dilution.

In MODES 1 and 2, the boron dilution accident was analyzed and was found to be capable of being mitigated.

ACTIONS

A.1, A.2, and A.3

Preventing inadvertent dilution of the reactor coolant boron concentration is dependent on maintaining the primary grade water flow path isolation valves locked, sealed, or otherwise secured closed, except as allowed under administrative control by the LCO Note. Because of the possibility of an inadvertent boron dilution, Required Action A.1 prohibits other positive reactivity additions while securing the isolation valves on the primary grade water system. The Completion Time of "Immediately" for suspending positive reactivity additions reflects the importance of preventing known positive reactivity additions so that any boron dilution event can be readily identified and terminated.

The Required Action A.2 Completion Time of 15 minutes for securing the isolation valves provides sufficient time to close and secure the isolation valves on the primary grade water flow paths while minimizing the probability of an unintentional dilution during the Completion Time. Securing the valves in the closed position ensures that the valves cannot be inadvertently opened.

The performance of Surveillance 3.1.1.1 under Required Action A.3 verifies that the SDM is within the limits provided in the COLR. It is performed to verify that the required SDM still exists and any inadvertent boron dilution

(continued)

BASES

ACTIONS

A.1, A.2, and A.3 (continued)

that may have occurred has been detected and corrected. The Completion Time of 1 hour is reasonable, based on the time required to request and analyze an RCS water sample to determine the boron concentration and to compute the SDM.

SURVEILLANCE REQUIREMENTS

SR 3.1.8.1

The primary grade water flow path isolation valves are to be locked, sealed, or otherwise secured closed to isolate possible dilution paths. The likelihood of a significant reduction in the boron concentration during MODES 3, 4, and 5 is remote due to the large mass of borated water in the RCS and the fact that the specified primary grade water flow paths are isolated, precluding a dilution. The SHUTDOWN MARGIN is verified every 24 hours during MODES 3, 4, and 5 under SR 3.1.1.1. The Frequency is based on the time required to verify that the isolation valves in the utilized flow path are locked, sealed, or otherwise secured in the closed position following a boron dilution or makeup activity.

REFERENCES

1. UFSAR, Section 15.2.4.

Intentionally Blank

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.9 PHYSICS TESTS Exceptions–MODE 2

BASES

BACKGROUND

The primary purpose of the MODE 2 PHYSICS TESTS exceptions is to permit relaxations of existing LCOs to allow certain PHYSICS TESTS to be performed.

Section XI of 10 CFR 50, Appendix B (Ref. 1), requires that a test program be established to ensure that structures, systems, and components will perform satisfactorily in service. All functions necessary to ensure that the specified design conditions are not exceeded during normal operation and anticipated operational occurrences must be tested. This testing is an integral part of the design, construction, and operation of the unit. Requirements for notification of the NRC, for the purpose of conducting tests and experiments, are specified in 10 CFR 50.59 (Ref. 2).

The key objectives of a test program are to (Ref. 3):

a. Ensure that the facility has been adequately designed;

b. Validate the analytical models used in the design and analysis;

c. Verify the assumptions used to predict unit response;

d. Ensure that installation of equipment in the facility has been accomplished in accordance with the design; and

e. Verify that the operating and emergency procedures are adequate.

To accomplish these objectives, testing is performed prior to initial criticality, during startup, during low power operations, during power ascension, at high power, and after each refueling. The PHYSICS TESTS requirements for reload fuel cycles ensure that the operating characteristics of the core are consistent with the design predictions and that the core can be operated as designed (Ref. 4).

(continued)

BASES

BACKGROUND (continued)

PHYSICS TESTS procedures are written and approved in accordance with established formats. The procedures include all information necessary to permit a detailed execution of the testing required to ensure that the design intent is met. PHYSICS TESTS are performed in accordance with these procedures and test results are approved prior to continued power escalation and long term power operation.

The PHYSICS TESTS required for reload fuel cycles (Ref. 5) are listed below:

a. Critical Boron Concentration—All Banks Withdrawn;

b. Differential Boron Worth;

c. Bank Worth;

d. Isothermal Temperature Coefficient (ITC); and

e. Neutron Flux Symmetry.

The first four tests are performed in MODE 2, and the last test is performed in MODE 1. These and other supplementary tests may be required to calibrate the nuclear instrumentation or to diagnose operational problems. These tests may cause the operating controls and process variables to deviate from their LCO requirements during their performance.

a. The Critical Boron Concentration—Control Rods Withdrawn Test measures the critical boron concentration at hot zero power (HZP). With all rods out, the lead control bank is at or near its fully withdrawn position. HZP is where the core is critical (k_{eff} = 1.0), and the Reactor Coolant System (RCS) is at design temperature and pressure for zero power. Performance of this test should not violate any of the referenced LCOs.

b. The Differential Boron Worth Test determines if the measured differential boron worth is consistent with the predicted value. With the core at HZP, the change in equilibrium boron concentration is determined at different rod bank positions. As the rod bank or banks are moved, the reactivity change is measured using a reactivity computer. The measured reactivity change is divided by the difference in measured critical boron

(continued)

BASES

BACKGROUND (continued)

concentrations to determine the differential boron worth. The insertion of the rod bank could result in violation of LCO 3.1.4, "Rod Group Alignment Limits," LOC 3.1.5, "Shutdown Bank Insertion Limits," or LCO 3.1.6, "Control Bank Insertion Limits."

c. The Bank Worth Test is used to measure the reactivity worth of selected banks. This test is performed at HZP and has three alternative methods of performance. The first method, the Boron Exchange Method, varies the reactor coolant boron concentration and moves the selected bank in response to the changing boron concentration. The reactivity changes are measured with a reactivity computer. This sequence is repeated for the remaining banks. The second method, the Rod Swap Method, measures the worth of a predetermined reference bank using the Boron Exchange Method above. The reference bank is then nearly fully inserted into the core. The selected bank is then inserted into the core as the reference bank is withdrawn. The HZP critical conditions are then determined with the selected bank fully inserted into the core. The worth of the selected bank is inferred, based on the position of the reference bank with respect to the selected bank. This sequence is repeated as necessary for the remaining banks. The third method, the Boron Endpoint Method, moves the selected bank over its entire length of travel and then varies the reactor coolant boron concentration to achieve HZP criticality again. The difference in boron concentration is the worth of the selected bank. This sequence is repeated for the remaining banks. Performance of this test could violate LCO 3.1.4, LCO 3.1.5, or LCO 3.1.6.

d. The ITC Test measures the ITC of the reactor. This test is performed at HZP and has two methods of performance. The first method, the Slope Method, varies RCS temperature in a slow and continuous manner. The reactivity change is measured with a reactivity computer as a function of the temperature change. The ITC is the slope of the reactivity versus the temperature plot. The test is repeated by reversing the direction of the temperature change, and the final ITC is the average of two or more calculated ITCs. The second method, the Endpoint Method, changes the RCS temperature and measures the reactivity at the beginning and end of the temperature change. The ITC is the total reactivity change divided by the total

(continued)

BASES

BACKGROUND (continued)

temperature change. The test is repeated by reversing the direction of the temperature change, and the final ITC is the average of the two or more calculated ITCs. Performance of this test could violate LCO 3.4.2, "RCS Minimum Temperature for Criticality."

e. The Flux Symmetry Test measures the degree of azimuthal symmetry of the neutron flux at as low a power level as practical. The Flux Distribution Method uses the incore flux detectors to measure the azimuthal flux distribution at selected locations with the core at ≤ 30% RTP.

APPLICABLE SAFETY ANALYSES

The fuel is protected by LCOs that preserve the initial conditions of the core assumed during the safety analyses. The methods for development of the LCOs that are excepted by this LCO are described in Reference 6. The above mentioned PHYSICS TESTS, and other tests that may be required to calibrate nuclear instrumentation or to diagnose operational problems, may require the operating control or process variables to deviate from their LCO limitations.

The UFSAR defines requirements for initial testing of the facility, including PHYSICS TESTS. Tables 14.1-1, 14.1-2, and 14.1-3 summarize the zero, low power, and power tests. Requirements for reload fuel cycle PHYSICS TESTS are defined in ANSI/ANS-19.6.1-1997 (Ref. 4). Although these PHYSICS TESTS are generally accomplished within the limits for all LCOs, conditions may occur when one or more LCOs must be suspended to make completion of PHYSICS TESTS possible or practical. This is acceptable as long as the fuel design criteria are not violated. When one or more of the requirements specified in LCO 3.1.3, "Moderator Temperature Coefficient (MTC)," LCO 3.1.4, LCO 3.1.5, LCO 3.1.6, and LCO 3.4.2 are suspended for PHYSICS TESTS, the fuel design criteria are preserved as long as the power level is limited to ≤ 5% RTP, the reactor coolant temperature is kept ≥ 531°F, and SDM is within the limits provided in the COLR.

The PHYSICS TESTS include measurement of core nuclear parameters or the exercise of control components that affect process variables. Among the process variables involved are AFD and QPTR, which represent initial conditions of the unit safety analyses. Also involved are the movable control components (control and shutdown banks), which are required to shut down the reactor. The limits for these variables are

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

specified for each fuel cycle in the COLR. As described in LCO 3.0.7, compliance with Test Exception LCOs is optional and, therefore, no criteria of 10 CFR 50.36(c)(2)(ii) apply.

Test Exception LCOs provide flexibility to perform certain operations by appropriately modifying requirements of other LCOs. A discussion of the criteria satisfied for the other LCOs is provided in their respective Bases.

Reference 7 allows special test exceptions (STEs) to be included as part of the LCO that they affect. It was decided, however, to retain this STE as a separate LCO because it was less cumbersome and provided additional clarity.

LCO

This LCO allows the reactor parameters of MTC and minimum temperature for criticality to be outside their specified limits. In addition, it allows selected control and shutdown banks to be positioned outside of their specified alignment and insertion limits. One Power Range Neutron Flux channel may be bypassed, reducing the number of required channels from "4" to "3" to provide input to the reactivity computer. Operation beyond specified limits is permitted for the purpose of performing PHYSICS TESTS and poses no threat to fuel integrity, provided the SRs are met.

The requirements of LCO 3.1.3, LCO 3.1.4, LCO 3.1.5, LCO 3.1.6, and LCO 3.4.2 may be suspended during the performance of PHYSICS TESTS provided:

a. RCS lowest loop average temperature is ≥ 531°F;

b. SDM is within the limits provided in the COLR; and

c. THERMAL POWER is ≤ 5% RTP.

APPLICABILITY

This LCO is applicable when performing low power PHYSICS TESTS. The Applicability stated as "during PHYSICS TESTS initiated in MODE 2" to ensure that the 5% RTP maximum power level is not exceeded. Should the THERMAL POWER exceed 5% RTP and, consequently, enter MODE 1, this Applicability statement prevents exiting the Specification and its Required Action.

BASES

ACTIONS

A.1 and A.2

If the SDM requirement is not met, boration must be initiated promptly. A Completion Time of 15 minutes is adequate for an operator to correctly align and start the required systems and components. The operator should begin boration with the best source available for the unit conditions. Boration will be continued until SDM is within limit.

Suspension of PHYSICS TESTS exceptions requires restoration of each of the applicable LCOs to within specification.

B.1

When THERMAL POWER is > 5% RTP, the only acceptable action is to open the reactor trip breakers (RTBs) to prevent operation of the reactor beyond its design limits. Immediately opening the RTBs will shut down the reactor and prevent operation of the reactor outside of its design limits.

C.1

When the RCS lowest T_{avg} is < 531°F, the appropriate action is to restore T_{avg} to within its specified limit. The allowed Completion Time of 15 minutes provides time for restoring T_{avg} to within limits without allowing the unit to remain in an unacceptable condition for an extended period of time. Operation with the reactor critical and with temperature below 531°F could violate the assumptions for accidents analyzed in the safety analyses.

D.1

If the Required Actions and associated Completion Times cannot be completed within the associated Completion Time, the unit must be brought to a MODE in which the requirement does not apply. To achieve this status, the unit must be brought to at least MODE 3 within an additional 15 minutes. The Completion Time of 15 additional minutes is reasonable, based on operating experience, for reaching MODE 3 in an orderly manner and without challenging unit systems.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.9.1

The power range and intermediate range neutron detectors must be verified to be OPERABLE in MODE 2 by LCO 3.3.1, "Reactor Trip System (RTS) Instrumentation." A CHANNEL OPERATIONAL TEST is performed on each power range and intermediate range channel prior to initiation of the PHYSICS TESTS. This will ensure that the RTS is properly aligned to provide the required degree of core protection during the performance of the PHYSICS TESTS. Performance of the normally scheduled COT is sufficient to ensure the equipment is OPERABLE. LCO 3.3.1 requires a COT on the power range and intermediate range channels every 92 days. These Frequencies have been determined to be sufficient for verification that the equipment is working properly. Because initiation of PHYSICS TESTS does not affect the ability of the equipment to perform its function or the RTS trip capability, and does not invalidate the previous Surveillances, requiring the testing to be performed at a fixed time prior to the initiation of PHYSICS TESTS has no benefit.

SR 3.1.9.2

Verification that the RCS lowest loop T_{avg} is ≥ 531°F will ensure that the unit is not operating in a condition that could invalidate the safety analyses. Verification of the RCS temperature at a Frequency of 30 minutes during the performance of the PHYSICS TESTS will ensure that the initial conditions of the safety analyses are not violated.

SR 3.1.9.3

Verification that the THERMAL POWER is ≤ 5% RTP will ensure that the unit is not operating in a condition that could invalidate the safety analyses. Verification of the THERMAL POWER at a Frequency of 30 minutes during the performance of PHYSICS TESTS will ensure that the initial conditions of the safety analyses are not violated.

SR 3.1.9.4

The SDM is verified by performing a reactivity balance calculation, considering the following reactivity effects:

a. RCS boron concentration;

b. Rod bank position;

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.9.4 (continued)

c. RCS average temperature;

d. Fuel burnup based on gross thermal energy generation;

e. Xenon concentration;

f. Samarium concentration;

g. Isothermal temperature coefficient (ITC), when below the point of adding heat (POAH);

h. Moderator Defect when above the POAH; and

i. Doppler Defect when above the POAH.

Using the ITC accounts for Doppler reactivity in this calculation when the reactor is subcritical or critical but below the POAH, and the fuel temperature will be changing at the same rate as the RCS.

The Frequency of 24 hours is based on the generally slow change in required boron concentration and on the low probability of an accident occurring without the required SDM.

REFERENCES

1. 10 CFR 50, Appendix B, Section XI.

2. 10 CFR 50.59.

3. Regulatory Guide 1.68, Revision 2, August, 1978.

4. ANSI/ANS-19.6.1-1997, August 22, 1997.

5. Letter from W.L. Stewart to NRC, "Virginia Electric and Power Company, Surry Power Station, Units 1 and 2, North Anna Power Station, Units 1 and 2, Modification of Startup Physics Testing Program Inspector Follow-Up Item 280, 281/88-29-01," dated 12/8/89.

6. VEP-FRD-42, Rev. 1A, "Reload Nuclear Design Methodology," September 1986.

7. WCAP-11618, including Addendum 1, April 1989.

SECTION 3.1 - REACTIVITY CONTROL SYSTEMS

IMPROVED STANDARD TECHNICAL SPECIFICATIONS

MARKUP AND JUSTIFICATION FOR DEVIATIONS

ITS 3.1.1

SDM ~~T_{avg} > 200°F~~ TSTF-136
3.1.1

CTS

3.1 REACTIVITY CONTROL SYSTEMS

3.1.1 SHUTDOWN MARGIN (SDM) ~~T_{avg} > 200°F~~ TSTF-136

LCO 3.1.1.1
LCO 3.1.1.2

LCO 3.1.1 SDM shall be ~~≥ [1.6]% Δk/k~~. within the limits provided in the COLR TSTF-9

3.1.1.1
3.1.1.2

APPLICABILITY: MODE 2 with k_{eff} < 1.0, MODES 3, 4, ~~and~~ 5~~.~~ TSTF-136

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SDM not within limit.	A.1 Initiate boration to restore SDM to within limit.	15 minutes

3.1.1.1 Action
3.1.1.2 Action

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.1.1	Verify SDM ~~is ≥ [1.6]% Δk/k~~.	24 hours

4.1.1.1.1.e
4.1.1.2.b

to be within limits

TSTF-9

Rev. 0

ITS 3.1.1

3.1 REACTIVITY CONTROL SYSTEMS

3.1.2 SHUTDOWN MARGIN (SDM)—T_{avg} ≤ 200°F

LCO 3.1.2 The SDM shall be ≥ [1.0]% Δk/k.

APPLICABILITY: MODE 5.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. SDM not within limit.	A.1	Initiate boration to restore SDM to within limit.	15 minutes

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.2.1	Verify SDM is ≥ [1.0]% Δk/k.	24 hours

TSTF-136

Rev.0

None

CTS

TSTF-136

3.1 REACTIVITY CONTROL SYSTEMS

3.1.3 2 Core Reactivity

4.1.1.1.2

LCO 3.1.3 The measured core reactivity shall be within ± 1% Δk/k of predicted values.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
New A. Measured core reactivity not within limit.	A.1 Re-evaluate core design and safety analysis, and determine that the reactor core is acceptable for continued operation.	~~72 hours~~ 7 days TSTF-142
	AND	
	A.2 Establish appropriate operating restrictions and SRs.	~~72 hours~~ 7 days TSTF-142
New B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	6 hours

Rev. 0

CTS

4.1.1.1.2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.3 2 .1	----------NOTE---------- The predicted reactivity values may be adjusted (normalized) to correspond to the measured core reactivity prior to exceeding a fuel burnup of 60 effective full power days (EFPD) after each fuel loading. ----------	TSTF-136
	Verify measured core reactivity is within ± 1% Δk/k of predicted values.	Once prior to entering MODE 1 after each refueling AND -----NOTE------ Only required after 60 EFPD ---------- 31 EFPD thereafter

Rev. 0

None

CTS

3.1 REACTIVITY CONTROL SYSTEMS

3.1.4 3 Moderator Temperature Coefficient (MTC)

TSTF-136 3

3.1.1.4 LCO 3.1.4 3 The MTC shall be maintained within the limits specified in the COLR. The ~~maximum~~ upper limit shall be ~~[≤ [ ] Δk/k°F at hot zero power] [that specified in Figure 3.1.4-1].~~ specified in the COLR

Insert

TSTF-136 3 1

3.1.1.4 APPLICABILITY: MODE 1 and MODE 2 with $k_{eff} \geq 1.0$ for the upper MTC limit, MODES 1, 2, and 3 for the lower MTC limit.

ACTIONS

	CONDITION	REQUIRED ACTION	COMPLETION TIME
Action a.1	A. MTC not within upper limit.	A.1 Establish administrative withdrawal limits for control banks to maintain MTC within limit.	24 hours
Action a.1	B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 2 with $k_{eff} < 1.0$.	6 hours
Action a.4	C. MTC not within lower limit.	C.1 Be in MODE 4.	12 hours

Rev. 0

INSERT

$\leq 0.6 \times 10^{-4}$ $\Delta k/k/°F$ when < 70% RTP, and ≤ 0.0 $\Delta k/k/°F$ when $\geq$ 70% RTP.

CTS

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
4.1.1.4.a SR 3.1.4.1	Verify MTC is within upper limit.	Once prior to entering MODE 1 after each refueling
~~SR 3.1.4.2~~	~~Verify MTC is within 300 ppm Surveillance limit specified in the COLR.~~	~~NOTE~~ 1. Not required to be performed until 7 effective full power days (EFPD) after reaching the equivalent of an equilibrium RTP all rods out (ARO) boron concentration of 300 ppm ~~Once each cycle~~ TSTF-13
4.1.1.4.b SR 3.1.4.2 <TSTF-136>	NOTES If the MTC is more negative than the 300 ppm Surveillance limit (not LCO limit) specified in the COLR, SR 3.1.4.2 shall be repeated once per 14 EFPD during the remainder of the fuel cycle. SR 3.1.4.2 need not be repeated if the MTC measured at the equivalent of equilibrium RTP-ARO boron concentration of ≤ 60 ppm is less negative than the 60 ppm Surveillance limit specified in the COLR. Verify MTC is within lower limit.	~~NOTE~~ ~~Not required to be performed until 7 EFPD after reaching the equivalent of an equilibrium RTP-ARO boron concentration of 300 ppm~~ TSTF-13 Once each cycle

Rev. 0

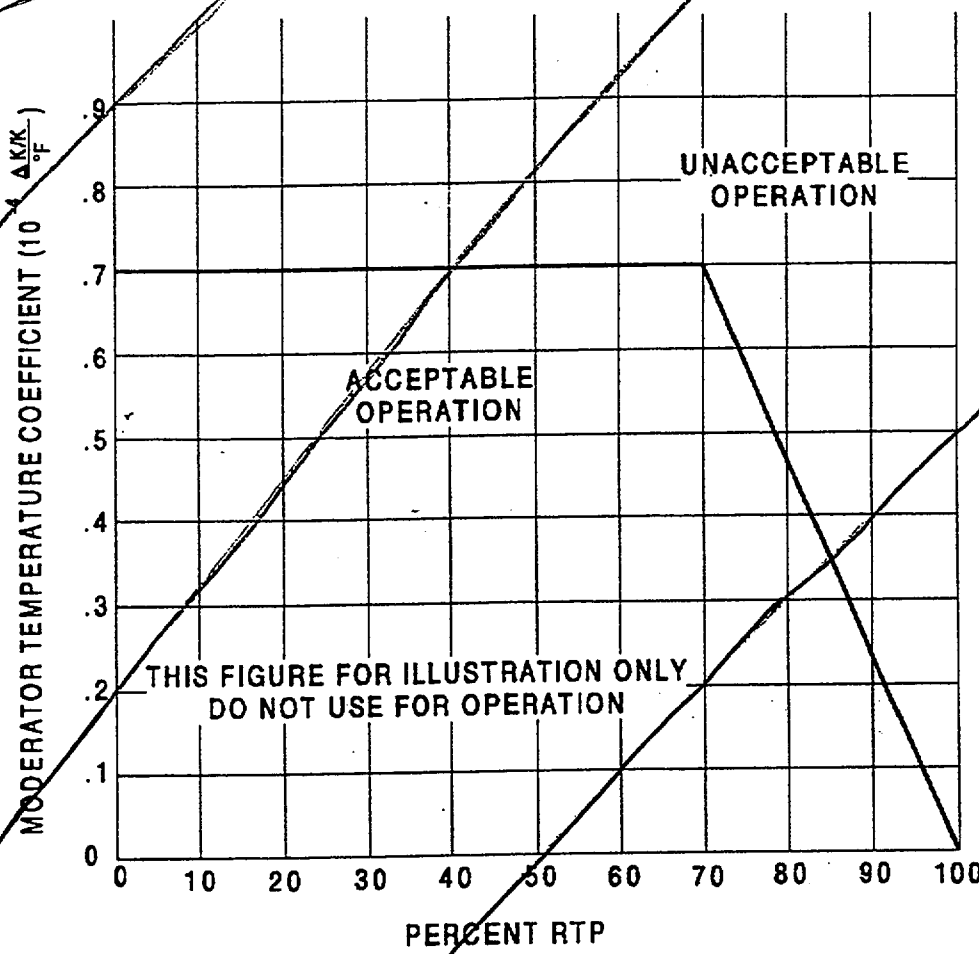


Figure 3.1.4-1 (page 1 of 1)
– Moderator Temperature Coefficient vs. Power Level

2

Rev.0

JUSTIFICATION FOR DEVIATIONS
ITS 3.1.3, MODERATOR TEMPERATURE COEFFICIENT (MTC)

1. The brackets have been removed and the proper plant specific information/value has been provided.

2. North Anna does not utilize a Figure for the allowable MTC values.

3. The LCO is revised to clarify that there is only one maximum MTC limit, not two, and that limit is provided in the COLR. This change is consistent with the Bases.

CTS

3.1 REACTIVITY CONTROL SYSTEMS

TSTF-136

3.1.5 Rod Group Alignment Limits

LCO 3.1.3.1

LCO 3.1.5 All shutdown and control rods shall be OPERABLE ~~with all~~ individual indicated rod positions within 12 steps of their group step counter demand position. shall be

AND

TSTF-136 TSTF-107

LCO 3.1.3.1 NOTE

Insert

APPLICABILITY: MODES 1 and 2.

to be within the limits provided in the COLR

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more rod(s) ~~untrippable~~. inoperable	A.1.1 Verify SDM is ~~≥ [1.6]% Δk/k.~~	1 hour
	OR	
	A.1.2 Initiate boration to restore SDM to within limit.	1 hour
	AND	
	A.2 Be in MODE 3.	6 hours
B. One rod not within alignment limits.	~~B.1 Restore rod to within alignment limits.~~	~~1 hour~~
	~~OR~~	
	B.2.1.1 Verify SDM is ~~≥ [1.6]% Δk/k.~~	1 hour
	OR	
	(continued)	

3.1.3.1 action a

TSTF9 TSTF-107

TSTF-240

3.1.3.1 action C.2

action C.2.b)

TSTF-240 TSTF-9

to be within the limits provided in the COLR

AND Once per 12 hours thereafter

Rev. 0

INSERT

---------- NOTE ----------

When THERMAL POWER is ≤ 50% RTP, the indicated position of each rod as determined by its individual rod position indicator may be within 24 steps from its group step counter demand position for up to 1 hour per 24 hours. This NOTE is not applicable for control rods known to be greater than 12 steps from the rod group step counter demand position.

CTS

ACTIONS

	CONDITION	REQUIRED ACTION	COMPLETION TIME
New	B. (continued)	B.2.1.2 Initiate boration to restore SDM to within limit.	1 hour
		AND	
3.1.3.1 action C.2.d)		B.2.2 Reduce THERMAL POWER to ≤ 75% RTP.	2 hours
		~~AND~~	
		~~B.2.3 Verify SDM is ≥ [1.67% Δk/k.~~	~~Once per 12 hours~~
		~~AND~~ OR	
3.1.3.1 action c.2.c)	2.2.1	B.2.4 Perform SR 3.2.1.1.	72 hours
		AND	
action c.2.c)	2.2.2	B.2.5 Perform SR 3.2.2.1.	72 hours
		AND	
3.1.3.1 action c.2.a)		B.2.6 Re-evaluate safety analyses and confirm results remain valid for duration of operation under these conditions.	5 days
New	C. Required Action and associated Completion Time of Condition B not met.	C.1 Be in MODE 3.	6 hours

(continued)

Rev. 0

CTS

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
3.1.3.1 action b D. More than one rod not within alignment limit.	D.1.1 Verify SDM is ~~≥ [1.6]% Δk/k.~~ to be within the limit provided in the COLR.	1 hour TSTF-9
	OR	
	D.1.2 Initiate boration to restore required SDM to within limit.	1 hour
	AND	
	D.2 Be in MODE 3.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
4.1.3.1.1 SR 3.1.~~5~~4.1	Verify individual rod positions within alignment limit.	12 hours TSTF-136 ~~AND~~ ~~Once within 4 hours and every 4 hours thereafter when the rod position deviation monitor is inoperable~~ TSTF-110

(continued)

Rev. 0

CTS

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE		FREQUENCY	
4.1.3.1.2	SR 3.1.~~5~~ 4.2	Verify rod freedom of movement (trippability) by moving each rod not fully inserted in the core ≥ 10 steps in either direction.	92 days	TSTF-136
3.1.3.4	SR 3.1.~~5~~ 4.3	Verify rod drop time of each rod, from the fully withdrawn position, is ≤ ~~[2.2]~~ 2.7 seconds from the beginning of decay of stationary gripper coil voltage to dashpot entry, with: a. T_{avg} ≥ 500°F; and b. All reactor coolant pumps operating.	Prior to reactor criticality after each removal of the reactor head	TSTF-136 2

Rev.0

1. The LCO has been modified by a Note to incorporate a North Anna specific allowance. The Note addresses the inaccuracy of the rod position indication system at less than 50% RTP and allows the accuracy of the individual rod position indications to decrease from 12 steps to 24 steps for up to 1 hour in every 24 hours. This allowance applies to the indicated position of the rod, not its actual position. If the actual position is known to be greater than 12 steps from the group step counter demand position, the Conditions and Required Actions of the specification must be followed.

2. The brackets have been removed and the proper plant specific information/value has been provided.

3. The ITS Actions have been modified to incorporate a North Anna specific allowance to reduce power or verify the reactor peaking factors when a single rod is not within the alignment limits. This is appropriate because verification that the peaking factors are within limits assures that the reactor power distribution is acceptable and a reduction in power is not necessary. If the peaking factors cannot be verified, a reduction in power is appropriate.

CTS

3.1 REACTIVITY CONTROL SYSTEMS

3.1.6 5 Shutdown Bank Insertion Limits TSTF-136

LCO 3.1.3.5

LCO 3.1.6 5 Each shutdown bank shall be within insertion limits specified in the COLR. TSTF-136

APPLICABILITY: MODE 1 5 and 2. ~~MODE 2 with any control bank not fully inserted.~~ } TSTF-239

New

----------NOTE---------- TSTF-136
This LCO is not applicable while performing SR 3.1.6 4.2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more shutdown banks not within limits. (for reasons other than Condition B)	A.1.1 Verify SDM is ≥ [1.6]% Δk/k. (to be within the limits provided in the COLR)	1 hour TSTF-9 1
	OR	
	A.1.2 Initiate boration to restore SDM to within limit.	1 hour
	AND	
	A.2 Restore shutdown banks to within limits.	2 hours 1
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	6 hours 1

New

Action b

Insert

Action b

C

Rev. 0

INSERT

B. One shutdown bank inserted ≤ 18 steps below the insertion limit and immovable. AND Each control and shutdown bank within limits of LCO 3.1.4. AND Each control bank within the insertion limits of LCO 3.1.6.	B.1 Verify SDM to be within the limits provided in the COLR. AND B.2 Restore the shutdown bank to within insertion limit.	Every 12 hours 72 hours

CTS

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE		FREQUENCY	
4.1.3.5.6	SR 3.1.6 5.1	Verify each shutdown bank is within the limits specified in the COLR.	12 hours	TSTF-136

Rev. 0

1. The Actions have been modified to incorporate a North Anna specific allowance. The CTS allows a shutdown bank to be inserted below the insertion limits and power operation to continue for up to 72 hours provided that the bank is not inserted more than 18 steps below the insertion limit, the control and shutdown banks are within the limits provided in LCO 3.1.4, and the control banks are within the insertion limits provided in LCO 3.1.6. The shutdown banks are normally fully withdrawn prior to reactor criticality and remain fully withdrawn until after reactor shutdown. The shutdown banks are exercised every 92 days under SR 3.1.4.2 by moving the banks into the core more than 10 steps and ITS 3.1.5 Applicability includes a Note excluding the shutdown bank insertion limits during this testing. However, should the shutdown bank become immovable due to problems with the control rod drive system during the performance of the Surveillance, time is needed to diagnose and repair the problem. Therefore, the CTS allows 72 hours to restore the shutdown bank to within its limit. The requirement to be in compliance with LCO 3.1.4 and LCO 3.1.6 ensures that the required shutdown margin is available, the rods are trippable, and power distribution is acceptable during the time allowed to restore the inserted bank. Editorial changes are made to the other Actions to accommodate this change.

CTS

3.1 REACTIVITY CONTROL SYSTEMS

3.1.~~7~~ 6 Control Bank Insertion Limits TSTF-136

LCO 3.1.3.6

LCO 3.1.~~7~~ 6 Control banks shall be within the insertion, sequence, and overlap limits specified in the COLR. TSTF-136

APPLICABILITY: MODE 1,
MODE 2 with $k_{eff} \geq 1.0$.

NOTE
This LCO is not applicable while performing SR 3.1.~~6~~ 4.2. TSTF-136

Insert
Moved Condition A from pg 3.1-15

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
Action a ~~A~~ B. Control bank insertion limits not met.	~~A~~ B.1.1 Verify SDM is ≥ [1.6]% ~~Δk/k~~.	1 hour (1) TSTF-9 (1)
	OR	
	~~A~~ B.1.2 Initiate boration to restore SDM to within limit.	1 hour
	AND	
	~~A~~ B.2 Restore control bank(s) to within limits.	2 hours
Action b Insert		(1)

for reasons other than Condition C

to be within the limits provided in the COLR

(continued)

Rev. 0

INSERT

C. Control bank A, B, or C inserted ≤ 18 steps below the insertion limit and immovable. AND Each control and shutdown bank within limits of LCO 3.1.4. AND Each shutdown bank within the insertion limits of LCO 3.1.5.	C.1 Verify SDM to be within the limits provided in the COLR. AND C.2 Restore the control bank to within insertion limit.	Every 12 hours 72 hours

CTS

New

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~B~~ A. Control bank sequence or overlap limits not met.	~~B~~ A.1.1 Verify SDM is ≤ [1.6]% Δk/k	1 hour
	OR	
	~~B~~ A.1.2 Initiate boration to restore SDM to within limit.	1 hour
	AND	
	~~B~~ A.2 Restore control bank sequence and overlap to within limits.	2 hours
~~C~~ B. Required Action and associated Completion Time not met.	~~C~~ B.1 Be in MODE ~~B~~ 2 with K_{eff} < 1.0	6 hours

Move to Condition A on pg 3.1-14

to be within the limits provided in the COLR

TSTF-9

1

Action A.3 + B

TSTF-238

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.1.~~0~~ 6.1 Verify estimated critical control bank position is within the limits specified in the COLR.	Within 4 hours prior to achieving criticality

TSTF-136

2

4.1.1.1.c

insertion

(continued)

Rev. 0

CTS

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE		FREQUENCY
SR 4.1.3.6	SR 3.1.0.2	Verify each control bank insertion is within the limits specified in the COLR.	12 hours TSTF-136 ~~AND~~ ~~Once within 4 hours and every 4 hours thereafter when the rod insertion limit monitor is inoperable~~ TSTF-110
New	SR 3.1.0.3	Verify sequence and overlap limits specified in the COLR are met for control banks not fully withdrawn from the core.	12 hours TSTF-136

Rev. 0

1. The Actions have been modified to incorporate a North Anna specific allowance. The CTS allows any control bank, except control bank D, to be inserted below the insertion limits and power operation to continue for up to 72 hours provided that the bank is not inserted more than 18 steps beyond the insertion limits provided in the COLR, the control and shutdown banks are within the limits provided in LCO 3.1.4, and the shutdown banks are within the insertion limits provided in LCO 3.1.5. The control banks are normally fully withdrawn during power operation. The control banks are exercised every 92 days under SR 3.1.4.2 by moving the banks into the core more than 10 steps and Specification 3.1.6 Applicability includes a Note excluding the control bank insertion limits during this testing. However, should the control bank become immovable due to problems with the control rod drive system during the performance of the Surveillance, time is needed to diagnose and repair the problem. Therefore, the CTS allows 72 hours to restore the control bank to within its limit. The requirement to be in compliance with LCO 3.1.4 and LCO 3.1.5 ensures that the required shutdown margin is available, the rods are trippable, and power distribution is acceptable during the time allowed to restore the inserted bank. Editorial changes are made to the other Actions to accommodate this change. For example, ITS Condition B is moved to Condition A so that the two control bank insertion Conditions appear together and in order of increasing Completion Times.

2. SR 3.1.6.1 is clarified to state that the estimated critical control bank position must be verified to be within the insertion limits, instead of just limits, specified in the COLR. Many limits are specified in the COLR and the clarification is needed to avoid confusion.

CTS

3.1 REACTIVITY CONTROL SYSTEMS

3.1.~~8~~ 7 Rod Position Indication TSTF-136

3.1.3.2 LCO 3.1.~~8~~ 7 The ~~Digital~~ Rod Position Indication (~~D~~RPI) System and the Demand Position Indication System shall be OPERABLE. TSTF-136 1

APPLICABILITY: MODES 1 and 2.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each inoperable rod position indicator ~~per group~~ and each demand position indicator ~~per bank~~. TSTF-234

	CONDITION	REQUIRED ACTION		COMPLETION TIME	
Action a.1	A. One ~~D~~RPI per group inoperable for one or more groups.	A.1	Verify the position of the rods with inoperable position indicators by using movable incore detectors.	Once per 8 hours indirectly	1 TSTF-234
		OR			
Action a.2 Insert		A.2	Reduce THERMAL POWER to ≤ 50% RTP.	8 hours	TSTF-234
Action a.1	C ~~B~~. One or more rods with inoperable position indicators have been moved in excess of 24 steps in one direction since the last determination of the rod's position.	C ~~B~~.1	Verify the position of the rods with inoperable position indicators by using movable incore detectors.	~~24~~ hours indirectly	3 TSTF-234
		OR			
				(continued)	

Rev.0

INSERT

Condition	Required Action	Completion Time
B. More than one RPI per group inoperable	B.1 Place the control rods under manual control	Immediately
	AND	
	B.2 Monitor and Record RCS T_{avg}	Once per 1 hour
	AND	
	B.3 Verify the position of the rods with inoperable position indicators indirectly by using the movable incore detectors	Once per 8 hours
	AND	
	B.4 Restore inoperable position indicators to OPERABLE status such that a maximum of one RPI per group is inoperable.	24 hours

CTS

ACTIONS

	CONDITION	REQUIRED ACTION	COMPLETION TIME	
Action a.2	B. (continued)	B.2 Reduce THERMAL POWER to ≤ 50% RTP.	8 hours	TSTF-234
Action b.1	C. One demand position indicator per bank inoperable for one or more banks.	C.1.1 Verify by administrative means all RPIs for the affected banks are OPERABLE.	Once per 8 hours	TSTF-234
Action b.1		AND C.1.2 Verify the most withdrawn rod and the least withdrawn rod of the affected banks are ≤ 12 steps apart.	Once per 8 hours	TSTF-234
Action b.2		OR C.2 Reduce THERMAL POWER to ≤ 50% RTP.	8 hours	TSTF-234
New	D. Required Action and associated Completion Time not met.	D.1 Be in MODE 3.	6 hours	TSTF-234

Rev. 0

CTS

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE		FREQUENCY	
4.1.3.2.1.b	SR 3.1.8 7.1	~~Verify each [D]RPI agrees within [12] steps of the group demand position for the [full indicated range] of rod travel.~~	~~[18 months]~~	TSTF-136 4
		Perform CHANNEL CALIBRATION of each RPI.	18 months	

Rev. 0

JUSTIFICATION FOR DEVIATIONS
ITS 3.1.7, ROD POSITION INDICATION

1. North Anna utilizes an analog rod position indication system. References to a digital rod position indication system have been removed.

2. Not used.

3. The brackets have been removed and the proper plant specific information/value has been provided.

4. The ISTS requirement to verify each RPI agrees within 12 steps of the group demand position for the full indicated range of rod travel prior to criticality after each removal of the reactor vessel head is replaced with the CTS requirement to perform a CHANNEL CALIBRATION of each RPI. Because of the thermal drift characteristics of the North Anna RPIs, performing a full range comparison of RPI and demand position before criticality is not useful, as the RPI response will change with RPI temperature . The CTS requires a CHANNEL CALIBRATION of each RPI, which involves calibrating the power supplies and control room indicators to known input voltages. Actual RPI position is adjusted to demand position as needed to adjust for thermal drift.

CTS

3.1 REACTIVITY CONTROL SYSTEMS

3.1.1.3.2

3.1.8 Primary Grade Water Flow Path Isolation Valves

LCO 3.1.8 Each valve used to isolate primary grade water flow paths shall be secured in the closed position.

3.1.1.3.2

---------- NOTE ----------
Primary grade water flow path isolation valves may be opened under administrative control for planned boron dilution or makeup activities.

APPLICABILITY: MODES 3, 4, and 5

ACTIONS

Action

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more valves not secured in closed position.	A.1 Suspend positive reactivity additions.	Immediately
	AND	
	A.2 Secure valve(s) in closed position.	15 minutes
	AND	
	A.3 Perform SR 3.1.1.1.	1 hour

Unit 1 - new
Unit 2 - Action

SPECIFICATION 3.1.8, PRIMARY GRADE WATER FLOW PATH ISOLATION VALVES

SURVEILLANCE REQUIREMENTS

CTS

SR 4.1.1.3.2

SURVEILLANCE		FREQUENCY
SR 3.1.8.1	Verify each valve in the affected flow path that isolates primary grade water flow paths is locked, sealed, or otherwise secured in the closed position.	Within 15 minutes following a boron dilution or makeup activity

1. A specification on primary grade water flow path isolation valves has been added to the ITS. The specification supports the North Anna boron dilution accident analysis which assumes that a boron dilution event is precluded in MODES 3, 4, 5, and 6 due to isolation of the primary grade water flow paths. In MODE 6, primary grade water flow path isolation valves are governed by ITS 3.9.2.

TSTF-12 ITS 3.1.9

3.1 REACTIVITY CONTROL SYSTEMS

3.1.9 PHYSICS TESTS Exceptions—MODE 1

LCO 3.1.9 During the performance of PHYSICS TESTS, the requirements of

LCO 3.1.5, "Rod Group Alignment Limits";
LCO 3.1.6, "Shutdown Bank Insertion Limits";
LCO 3.1.7, "Control Bank Insertion Limits";
LCO 3.2.3, "AXIAL FLUX DIFFERENCE (AFD)"; and
LCO 3.2.4, "QUADRANT POWER TILT RATIO (QPTR)"

may be suspended, provided:

a. THERMAL POWER is maintained ≤ 85% RTP;

b. Power Range Neutron Flux—High trip setpoints are ≤ 10% RTP above the THERMAL POWER at which the test is performed, with a maximum setting of 90% RTP; and

c. SDM is ≥ [1.6]% Δk/k.

APPLICABILITY: MODE 1 during PHYSICS TESTS.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SDM not within limit.	A.1 Initiate boration to restore SDM to within limit.	15 minutes
	AND	
	A.2 Suspend PHYSICS TESTS exceptions.	1 hour

(continued)

Rev.0

TSTF-12 ITS 3.1.9

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. THERMAL POWER not within limit.	B.1 Reduce THERMAL POWER to within limit.	1 hour
	OR	
	B.2 Suspend PHYSICS TESTS exceptions.	1 hour
C. Power Range Neutron Flux—High trip setpoints > 10% RTP above the PHYSICS TEST power level.	C.1 Restore Power Range Neutron Flux—High trip setpoints to ≤ 10% above the PHYSICS TEST power level, or to ≤ 90% RTP, whichever is lower.	1 hour
OR		
Power Range Neutron Flux—High trip setpoints > 90% RTP.	OR	
	C.2 Suspend PHYSICS TESTS exceptions.	1 hour

Rev. 0

TSTF-12 ITS 3.1.9

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.9.1	Verify THERMAL POWER is ≤ 85% RTP.	1 hour
SR 3.1.9.2	Verify Power Range Neutron Flux—High trip setpoints are ≤ 10% above the PHYSICS TEST power level, and ≤ 90% RTP.	Within 8 hours prior to initiation of PHYSICS TESTS
SR 3.1.9.3	Perform SR 3.2.1.1 and SR 3.2.2.1.	12 hours
SR 3.1.9.4	Verify SDM is ≥ [1.6]% Δk/k.	24 hours

Rev. 0

3.1 REACTIVITY CONTROL SYSTEMS

CTS

3.1.~~10~~ 9 PHYSICS TESTS Exceptions—MODE 2 TSTF-12 TSTF-136

LCO 3.1.~~10~~ 9 During the performance of PHYSICS TESTS, the requirements of TSTF-12 TSTF-136

LCO 3.10.3

3 LCO 3.1.~~6~~, "Moderator Temperature Coefficient (MTC)";
4 LCO 3.1.~~8~~, "Rod Group Alignment Limits";
5 LCO 3.1.~~9~~, "Shutdown Bank Insertion Limits";
6 LCO 3.1.~~7~~, "Control Bank Insertion Limits"; and
LCO 3.4.2, "RCS Minimum Temperature for Criticality" TSTF-136

may be suspended, provided: TSTF-315 2

New and the number of required channels for LCO 3.3.1, "RTS Instrumentation," Functions 2, 3, 6 and 18.d, may be reduced to "3" required channels.

New a. RCS lowest loop average temperature is ≥ [531]°F; and 1 TSTF-14

LCO 3.10.3.a b. SDM is ~~≥ [1.6]% Δk/k.~~ ; and within the limits provided in the COLR TSTF-9

c. THERMAL POWER is ≤ 5% RTP.

APPLICABILITY: ~~MODE 2~~ during PHYSICS TESTS initiated in MODE 2 TSTF-14 TSTF-256

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SDM not within limit.	A.1 Initiate boration to restore SDM to within limit.	15 minutes
	AND	
	A.2 Suspend PHYSICS TESTS exceptions.	1 hour
B. THERMAL POWER not within limit.	B.1 Open reactor trip breakers.	Immediately

New

Action

(continued)

Rev. 0

CTS

ACTIONS (continued)

	CONDITION	REQUIRED ACTION	COMPLETION TIME
New	C. RCS lowest loop average temperature not within limit.	C.1 Restore RCS lowest loop average temperature to within limit.	15 minutes
New	D. Required Action and associated Completion Time of Condition C not met.	D.1 Be in MODE 3.	15 minutes

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE		FREQUENCY	
4.10.3.2	SR 3.1.~~10~~ 9.1	Perform a CHANNEL OPERATIONAL TEST on power range and intermediate range channels per ~~[~~SR 3.3.1.7, SR 3.3.1.8, and Table 3.3.1-1~~]~~.	~~Within 12 hours~~ prior to initiation of PHYSICS TESTS	TSTF-12 TSTF-86 TSTF-108 1
4.10.3.3 (U2) New (U1)	SR 3.1.~~10~~ 9.2	Verify the RCS lowest loop average temperature is ≥ ~~[531]~~°F.	30 minutes	TSTF-12 TSTF-136 1
New	SR 3.1.~~10~~ 9.~~2~~ 4	Verify SDM ~~is ≥ 1.6% Δk/k~~. to be within the limits provided in the COLR	24 hours	TSTF-14 TSTF-12 TSTF-136 TSTF-9
4.10.3.1	SR 3.1.9.3 Verify THERMAL POWER is ± 5% RTP.		30 minutes	TSTF-14

Rev.0

TSTF-12 ITS 3.1.9

3.1 REACTIVITY CONTROL SYSTEMS

3.1.11 SHUTDOWN MARGIN (SDM) Test Exceptions

LCO 3.1.11 The SDM requirements in MODE 2 may be suspended, provided the reactivity equivalent to at least the highest estimated control rod worth is available for trip insertion from OPERABLE control rod(s).

APPLICABILITY: MODE 2 when measuring control rod worth and SDM.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more control rods not fully inserted. AND Available trip reactivity from OPERABLE control rods less than the highest estimated control rod worth.	A.1 Initiate boration to restore SDM to within limit.	15 minutes
B. All control rods fully inserted. AND Reactor subcritical by less than the highest estimated control rod worth.	B.1 Initiate boration to restore SDM to within limits.	15 minutes

Rev. 0

TSTF-12

ITS 3.1.9

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.11.1	----------NOTE---------- Only required for control rods not fully inserted. ---------- Determine the position of each control rod.	2 hours
SR 3.1.11.2	----------NOTE---------- Only required for control rods not fully inserted. ---------- Trip each control rod from ≥ the 50% withdrawn position, and verify full control rod insertion.	Within 24 hours prior to reducing SDM outside limits

Rev. 0

1. The brackets have been removed and the proper plant specific information/value has been provided.

2. ITS 3.3.1 RTS Instrumentation Function 6, Overtemperature ΔT, is deleted from the list of Functions that may be reduced to 3 required channels because there are only three of these channels, and they remain OPERABLE during the performance of PHYSICS TESTS.

SECTION 3.1 - REACTIVITY CONTROL SYSTEMS

IMPROVED STANDARD TECHNICAL SPECIFICATIONS BASES

MARKUP AND JUSTIFICATION FOR DEVIATIONS

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.1 SHUTDOWN MARGIN (SDM) ~~T_{avg} > 200°F~~ TSTF-136

BASES

BACKGROUND

According to GDC 26 (Ref. 1), the reactivity control systems must be ~~redundant and~~ independent capable of holding the reactor core subcritical when shut down under cold conditions. One must be Maintenance of the SDM ensures that postulated reactivity events will not damage the fuel. (2)

SDM requirements provide sufficient reactivity margin to ensure that acceptable fuel design limits will not be exceeded for normal shutdown and anticipated operational occurrences (AOOs). As such, the SDM defines the degree of subcriticality that would be obtained immediately following the insertion or scram of all shutdown and control rods, assuming that the single rod cluster assembly of highest reactivity worth is fully withdrawn.

The system design requires that two independent reactivity control systems be provided, and that one of these systems be capable of maintaining the core subcritical under cold conditions. These requirements are provided by the use of movable control assemblies and soluble boric acid in the Reactor Coolant System (RCS). The Control Rod System can compensate for the reactivity effects of the fuel and water temperature changes accompanying power level changes over the range from full load to no load. In addition, the Control Rod System, together with the boration system, provides the SDM during power operation and is capable of making the core subcritical rapidly enough to prevent exceeding acceptable fuel damage limits, assuming that the rod of highest reactivity worth remains fully withdrawn. The soluble boron system can compensate for fuel depletion during operation and all xenon burnout reactivity changes and maintain the reactor subcritical under cold conditions. (5) (5)

During power operation, SDM control is ensured by operating with the shutdown banks fully withdrawn and the control banks within the limits of LCO 3.1.~~7~~6, "Control Bank Insertion Limits." When the unit is in the shutdown and refueling modes, the SDM requirements are met by means of adjustments to the RCS boron concentration. (6) TSTF-136

(continued)

Rev. 0

BASES (continued)

APPLICABLE SAFETY ANALYSES

The minimum required SDM is assumed as an initial condition in safety analyses. The safety analysis (Ref. 2) establishes an SDM that ensures specified acceptable fuel design limits are not exceeded for normal operation and AOOs, with the assumption of the highest worth rod stuck out on scram. ③ TSTF-136

~~For MODE 5, the primary safety analysis that relies on the SDM limits is the boron dilution analysis.~~

The acceptance criteria for the SDM requirements are that specified acceptable fuel design limits are maintained. This is done by ensuring that:

a. The reactor can be made subcritical from all operating conditions, transients, and Design Basis Events;

b. The reactivity transients associated with postulated accident conditions are controllable within acceptable limits (departure from nucleate boiling ratio (DNBR), fuel centerline temperature limits for AOOs, and ~~≤ 280 cal/gm energy deposition~~ ≤ 225 cal/gm energy deposition to unirradiated fuel and ≤ 200 cal/gm energy deposition to irradiated fuel for the rod ejection accident); and ⑤

c. The reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

The most limiting accident for the SDM requirements is based on a main steam line break (MSLB), as described in the accident analysis (Ref. 2). The increased steam flow resulting from a pipe break in the main steam system causes an increased energy removal from the affected steam generator (SG), and consequently the RCS. This results in a reduction of the reactor coolant temperature. The resultant coolant shrinkage causes a reduction in pressure. In the presence of a negative moderator temperature coefficient, this cooldown causes an increase in core reactivity. As RCS temperature decreases, the severity of an MSLB decreases until the MODE 5 value is reached. The most limiting MSLB, with respect to potential fuel damage before a reactor trip occurs, is a guillotine break of a main steam line inside containment initiated at the end of core life. The positive reactivity addition from the moderator temperature decrease will terminate when the affected SG boils dry, thus terminating RCS heat removal and cooldown. Following the MSLB, a post trip return to power may occur; however, no fuel damage occurs as a result of the post trip return to

(continued)

Rev. 0

APPLICABLE SAFETY ANALYSES (continued)

power, and THERMAL POWER does not violate the Safety Limit (SL) requirement of SL 2.1.1.

In addition to the limiting MSLB transient, the SDM requirement must also protect against:

~~a. Inadvertent boron dilution;~~ 3

a. ~~b.~~ An uncontrolled rod withdrawal from subcritical or low power condition; 3

b. ~~c.~~ Startup of an inactive reactor coolant pump (RCP); and 3

c. ~~d.~~ Rod ejection. 3

Each of these events is discussed below.

~~In the boron dilution analysis, the required SDM defines the reactivity difference between an initial subcritical boron concentration and the corresponding critical boron concentration. These values, in conjunction with the configuration of the RCS and the assumed dilution flow rate, directly affect the results of the analysis. This event is most limiting at the beginning of core life, when critical boron concentrations are highest.~~ 3

5

Depending on the system initial conditions and reactivity insertion rate, the uncontrolled rod withdrawal transient is terminated by either a high power level trip or a high ~~pressurizer pressure~~ trip. In all cases, power level, RCS pressure, linear heat rate, and the DNBR do not exceed allowable limits.

source range

power range neutron flux

an intermediate range neutron flux trip, a high pressurizer pressure or water level trip, or a OTΔT trip

Insert

~~The startup of an inactive RCP will not result in a "cold water" criticality, even if the maximum difference in temperature exists between the SG and the core. The maximum positive reactivity addition that can occur due to an inadvertent RCP start is less than half the minimum required SDM. Startup of an idle RCP cannot, therefore, produce a return to power from the hot standby condition.~~ 5

The ejection of a control rod rapidly adds reactivity to the reactor core, causing both the core power level and heat flux to increase with corresponding increases in reactor

(continued)

Rev. 0

INSERT

The startup of an inactive loop event is defined as an uncontrolled reduction in SHUTDOWN MARGIN resulting from the startup of an RCP on an idle loop containing a reduced coolant temperature or boron concentration. Adherence to LCO 3.4.18, "RCS Isolated Loop Startup", ensures that the preconditions necessary for significant reactivity insertion during the startup of an inactive loop (i.e., reduced coolant temperature or boron concentration on an idle and unisolated loop) cannot be achieved under credible circumstances. Recirculation of reactor coolant in an isolated loop through a loop stop valve bypass line prior to loop unisolation when performed in accordance with LCO 3.4.18 does not constitute an uncontrolled boron dilution event. The accident analysis demonstrates that sufficient time exists for corrective operator action in response to a postulated reactivity insertion resulting from the recirculation activity.

BASES

APPLICABLE SAFETY ANALYSES (continued)

coolant temperatures and pressure. The ejection of a rod also produces a time dependent redistribution of core power.

SDM satisfies Criterion 2 of ~~the NRC Policy Statement~~. Even though it is not directly observed from the control room, SDM is considered an initial condition process variable because it is periodically monitored to ensure that the unit is operating within the bounds of accident analysis assumptions. 10 CFR 50.36(c)(2)(ii) (6)

LCO

SDM is a core design condition that can be ensured during operation through control rod positioning (control and shutdown banks) and through the soluble boron concentration.

The MSLB (Ref. 2) ~~and the boron dilution (Ref. 3)~~ accidents ~~are~~ is the most limiting ~~analyses~~ analysis that establish~~s~~ the SDM value of the LCO. For MSLB accidents, if the LCO is violated, there is a potential to exceed the DNBR limit and to exceed 10 CFR 100, "Reactor Site Criteria," limits (Ref. ~~4~~ 3). ~~For the boron dilution accident, if the LCO is violated, the minimum required time assumed for operator action to terminate dilution may no longer be applicable.~~ (3)

APPLICABILITY

In MODE 2 with k_{eff} < 1.0 and in MODES 3, ~~and~~ 4, and 5, the SDM requirements are applicable to provide sufficient negative reactivity to meet the assumptions of the safety analyses discussed above. ~~[In MODE 5, SDM is addressed by LCO 3.1.2, "SHUTDOWN MARGIN (SDM)—T_{avg} ≤ 200°F."]~~ In MODE 6, the shutdown reactivity requirements are given in LCO 3.9.1, "Boron Concentration." In MODES 1 and 2, with k_{eff} ≥ 1.0, SDM is ensured by complying with LCO 3.1.~~6~~ 5, "Shutdown Bank Insertion Limits," and LCO 3.1.~~7~~ 6, "Control Bank Insertion Limits." TSTF-136 TSTF-136 (5) TSTF-136

ACTIONS

A.1

If the SDM requirements are not met, boration must be initiated promptly. A Completion Time of 15 minutes is adequate for an operator to correctly align and start the required systems and components. It is assumed that

(continued)

Rev. 0

TSTF-136

BASES

ACTIONS

A.1 (continued)

boration will be continued until the SDM requirements are met.

In the determination of the required combination of boration flow rate and boron concentration, there is no unique requirement that must be satisfied. Since it is imperative to raise the boron concentration of the RCS as soon as possible, the boron concentration should be a highly concentrated solution, such as that normally found in the boric acid storage tank, or the borated water storage tank. The operator should borate with the best source available for the plant conditions.

Refueling (5) (5) unit

In determining the boration flow rate, the time in core life must be considered. For instance, the most difficult time in core life to increase the RCS boron concentration is at the beginning of cycle when the boron concentration may approach or exceed 2000 ppm. Assuming that a value of 1% Δk/k must be recovered and a boration flow rate of (10) [ ] gpm, it is possible to increase the boron concentration of the RCS by 100 ppm in approximately 35 minutes. If a boron worth of 10 pcm/ppm is assumed, this combination of parameters will increase the SDM by 1% Δk/k. These boration parameters of [ ] gpm and [ ] ppm represent typical values and are provided for the purpose of offering a specific example.

(7) 59 (9) (7) (10) (12,950)

SURVEILLANCE REQUIREMENTS

SR 3.1.1.1 with $K_{eff} \geq 1.0$ (5) (6) (8)

In MODES 1 and 2, SDM is verified by observing that the requirements of LCO 3.1.6 and LCO 3.1.7 are met. In the event that a rod is known to be untrippable, however, SDM verification must account for the worth of the untrippable rod as well as another rod of maximum worth.

TSTF-136

MODE 2 with $K_{eff} < 1.0$ and (8)

In MODES 3, 4, and 5, the SDM is verified by performing a reactivity balance calculation, considering the listed reactivity effects:

and shutdown

a. RCS boron concentration;

b. Control bank position; (5)

(continued)

Rev. 0

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.1.1 (continued)

c. RCS average temperature;

d. Fuel burnup based on gross thermal energy generation;

e. Xenon concentration;

f. Samarium concentration; and

g. Isothermal temperature coefficient (ITC).

Using the ITC accounts for Doppler reactivity in this calculation because the reactor is subcritical, and the fuel temperature will be changing at the same rate as the RCS.

The Frequency of 24 hours is based on the generally slow change in required boron concentration and the low probability of an accident occurring without the required SDM. This allows time for the operator to collect the required data, which includes performing a boron concentration analysis, and complete the calculation.

REFERENCES

1. ~~10 CFR 50, Appendix A, GDC 26.~~ ULFSAR Section 3.1.22. (1)
2. (4) FSAR, Chapter ~~[15]~~. (5) (7)
3. ~~FSAR, Chapter [15].~~ (3)
4. (3) 10 CFR 100. (3)

Rev. 0

TSTF-136 ITS 3.1.1

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.2 SHUTDOWN MARGIN (SDM)—T_{avg} ≤ 200°F

BASES

BACKGROUND

According to GDC 26 (Ref. 1), the reactivity control systems must be redundant and capable of holding the reactor core subcritical when shut down under cold conditions. Maintenance of the SDM ensures that postulated reactivity events will not damage the fuel.

SDM requirements provide sufficient reactivity margin to ensure that acceptable fuel design limits will not be exceeded for normal shutdown and anticipated operational occurrences (AOOs). As such, the SDM defines the degree of subcriticality that would be obtained immediately following the insertion or scram of all shutdown and control rods, assuming the single rod cluster assembly of highest reactivity worth is fully withdrawn.

The system design requires that two independent reactivity control systems be provided, and that one of these systems be capable of maintaining the core subcritical under cold conditions. These requirements are provided by the use of movable control assemblies and soluble boric acid in the Reactor Coolant System (RCS). The Control Rod System can compensate for the reactivity effects of the fuel and water temperature changes accompanying power level changes over the range from full load to no load. In addition, the Control Rod System, together with the boration system, provides SDM during power operation and is capable of making the core subcritical rapidly enough to prevent exceeding acceptable fuel damage limits assuming that the rod of highest reactivity worth remains fully withdrawn. The soluble boron system can compensate for fuel depletion during operation and all xenon burnout reactivity changes, and maintain the reactor subcritical under cold conditions.

During power operation, SDM control is ensured by operating with the shutdown banks fully withdrawn and the control banks within the limits of LCO 3.1.7, "Control Bank Insertion Limits." When the unit is in the shutdown and refueling modes, the SDM requirements are met by means of adjustments to the RCS boron concentration.

(continued)

Rev. 0

TSTF-136 ITS 3.1.1

BASES (continued)

APPLICABLE SAFETY ANALYSES

The minimum required SDM is assumed as an initial condition in the safety analysis. The safety analysis (Ref. 2) establishes an SDM that ensures specified acceptable fuel design limits are not exceeded for normal operation and AOOs with the assumption of the highest worth rod stuck out on scram. Specifically, for MODE 5, the primary safety analysis that relies on the SDM limits is the boron dilution analysis.

The acceptance criteria for the SDM requirements are that specified acceptable fuel design limits are maintained. This is done by ensuring that:

a. The reactor can be made subcritical from all operating conditions, transients, and Design Basis Events;

b. The reactivity transients associated with postulated accident conditions are controllable within acceptable limits (departure from nucleate boiling ratio, fuel centerline temperature limits for AOOs, and ≤ 280 cal/gm energy deposition for the rod ejection accident); and

c. The reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

In the boron dilution analysis, the required SDM defines the reactivity difference between an initial subcritical boron concentration and the corresponding critical boron concentration. These values, in conjunction with the configuration of the RCS and the assumed dilution flow rate, directly affect the results of the analysis. This event is most limiting at the beginning of core life when critical boron concentrations are highest.

SDM satisfies Criterion 2 of the NRC Policy Statement. Even though it is not directly observed from the control room, SDM is considered an initial condition process variable because it is periodically monitored to ensure that the unit is operating within the bounds of accident analysis assumptions.

(continued)

Rev. 0

BASES (continued)

LCO

SDM is a core design condition that can be ensured during operation through control rod positioning (control and shutdown banks) and through the soluble boron concentration.

The boron dilution accident (Ref. 2) is the most limiting analysis that establishes the SDM value of the LCO. For the boron dilution accident, if the LCO is violated, then the minimum required time assumed for operator action to terminate dilution may no longer be applicable.

APPLICABILITY

In MODE 5, the SDM requirements are applicable to provide sufficient negative reactivity to meet the assumptions of the safety analyses discussed above. In MODE 2, with k_{eff} ≥ 1.0 and MODES 3 and 4, the SDM requirements are given in LCO 3.1.1, "SHUTDOWN MARGIN (SDM)—T_{avg} > 200°F." In MODE 6, the shutdown reactivity requirements are given in LCO 3.9.1, "Boron Concentration." In MODE 1 and MODE 2, with k_{eff} ≥ 1.0, SDM is ensured by complying with LCO 3.1.6, "Shutdown Bank Insertion Limits," and LCO 3.1.7.

ACTIONS

A.1

If the SDM requirements are not met, boration must be initiated promptly. A Completion Time of 15 minutes is adequate for an operator to correctly align and start the required systems and components. It is assumed that boration will be continued until the SDM requirements are met.

In the determination of the required combination of boration flow rate and boron concentration, there is no unique requirement that must be satisfied. Since it is imperative to raise the boron concentration of the RCS as soon as possible, the boron concentration should be a highly concentrated solution, such as that normally found in the boric acid storage tank or the borated water storage tank. The operator should borate with the best source available for the plant conditions.

In determining the boration flow rate the time in core life must be considered. For instance, the most difficult time

(continued)

TSTF-136 ITS 3.1.1

BASES

ACTIONS

A.1 (continued)

in core life to increase the RCS boron concentration is at the beginning of cycle, when the boron concentration may approach or exceed 2000 ppm. Assuming that a value of 1% Δk/k must be recovered and a boration flow rate of [ ] gpm, it is possible to increase the boron concentration of the RCS by 100 ppm in approximately 35 minutes. If a boron worth of 10 pcm/ppm is assumed, this combination of parameters will increase the SDM by 1% Δk/k. These boration parameters of [ ] gpm and [ ] ppm represent typical values and are provided for the purpose of offering a specific example.

SURVEILLANCE REQUIREMENTS

SR 3.1.2.1

In MODE 5, the SDM is verified by performing a reactivity balance calculation, considering the following reactivity effects:

a. RCS boron concentration;

b. Control bank position;

c. RCS average temperature;

d. Fuel burnup based on gross thermal energy generation;

e. Xenon concentration;

f. Samarium concentration; and

g. Isothermal temperature coefficient (ITC).

Using the ITC accounts for Doppler reactivity in this calculation because the reactor is subcritical, and the fuel temperature will be changing at the same rate as the RCS.

The Frequency of 24 hours is based on the generally slow change in required boron concentration and on the low probability of an accident occurring without the required SDM. This allows time enough for the operator to collect

(continued)

Rev. 0

TSTF-136 ITS 3.1.1

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.2.1 (continued)

the required data, which includes performing a boron concentration analysis, and complete the calculation.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 26.
2. FSAR, Chapter [15].

Rev.0

1. North Anna Units 1 and 2 were designed and constructed on the basis of the proposed General Design Criteria, published in 1966. Since February 20, 1971, when the General Design Criteria for Nuclear Power Plants, Appendix A to 10 CFR Part 50, were published, the Company attempted to comply with the intent of the newer criteria to the extent practical, recognizing previous design commitments. The NRC's Safety Evaluation Report for North Anna Units 1 and 2 reviewed the plant against 10 CFR Part 50, Appendix A and concluded that the facility design conforms to the intent of the newer criteria. The North Anna UFSAR contains discussions comparing the design of the plant to the 10 CFR 50, Appendix A, General Design Criteria. Bases references to the 10 CFR 50, Appendix A criteria have been replaced with references to the appropriate section of the UFSAR.

2. The description of GDC 26 is revised to match the description in the UFSAR and to be consistent with the description provided in the third paragraph of the Background section of the Bases.

3. The Bases are revised to eliminate the discussion of the North Anna boron dilution accident analyses. In subcritical conditions, the North Anna boron dilution analysis assumes that all significant primary grade water sources are locked out and that all remaining unborated water sources are incapable of diluting the reactor to critical conditions in less than the time assumed for an operator to recognize and stop the boron dilution. Therefore, boron dilution is not a limiting event for SHUTDOWN MARGIN. Where necessary, subsequent items are renumbered due to the revised discussion.

4. Not used.

5. Changes are made (additions, deletions, and/or changes) to the ISTS which reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.

6. The criteria of the NRC Final Policy Statement on Technical Specifications Improvements have been included in 10 CFR 50.36(c)(2)(ii). Therefore, references in the ISTS Bases to the NRC Final Policy Statement are revised in the ITS Bases to reference 10 CFR 50.36.

7. The brackets have been removed and the proper plant specific information/value has been provided.

8. Changes are made to the Bases to reflect the ITS.

9. The time required to raise RCS boron concentration from 2000 ppm to 2100 ppm using the stated boration flow rate, boron concentration, and boron worth, is revised from 35 to 59 minutes to match the stated parameters, based on the equation:

$$\text{Gallons of Acid} = \frac{(\text{RCS Volume} \times \text{Density of RCS})}{(\text{Density of Charging Flow})} \times \ln \frac{(\text{Added PPM} - \text{Initial PPM})}{(\text{Added PPM} - \text{Desired PPM})}$$

Where:

RCS Volume = 9262 ft^3
RCS Density = 57.380 lbm/ft^3 at 300 °F
Charging Density = 8.22 lbm/ft^3
Charging Flow = 10 gpm

Initial PPM = 2000
Desired PPM = 2100
Added PPM = 12,950

Required Acid Gallons = 593
Given a flow rate of 10 gpm, time to raise boron concentration by 100 ppm equals 59 minutes.

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.~~6~~ 2 Core Reactivity TSTF-136

BASES

BACKGROUND

According to GDC 26, GDC 28, and GDC 29 (Ref. 1), reactivity shall be controllable, such that subcriticality is maintained under cold conditions, and acceptable fuel design limits are not exceeded during normal operation and anticipated operational occurrences. Therefore, reactivity balance is used as a measure of the predicted versus measured core reactivity during power operation. The periodic confirmation of core reactivity is necessary to ensure that Design Basis Accident (DBA) and transient safety analyses remain valid. A large reactivity difference could be the result of unanticipated changes in fuel, control rod worth, or operation at conditions not consistent with those assumed in the predictions of core reactivity, and could potentially result in a loss of SDM or violation of acceptable fuel design limits. Comparing predicted versus measured core reactivity validates the nuclear methods used in the safety analysis and supports the SDM demonstrations (LCO 3.1.1, "SHUTDOWN MARGIN (SDM) ~~($T_{avg} > 200°F$)~~") in ensuring the reactor can be brought safely to cold, subcritical conditions. TSTF-136

When the reactor core is critical or in normal power operation, a reactivity balance exists and the net reactivity is zero. A comparison of predicted and measured reactivity is convenient under such a balance, since parameters are being maintained relatively stable under steady state power conditions. The positive reactivity inherent in the core design is balanced by the negative reactivity of the control components, thermal feedback, neutron leakage, and materials in the core that absorb neutrons, such as burnable absorbers producing zero net reactivity. Excess reactivity can be inferred from the boron letdown curve (or critical boron curve), which provides an indication of the soluble boron concentration in the Reactor Coolant System (RCS) versus cycle burnup. Periodic measurement of the RCS boron concentration for comparison with the predicted value with other variables fixed (such as rod height, temperature, pressure, and power), provides a convenient method of ensuring that core reactivity is within design expectations and that the

(continued)

Rev. 0

BASES

BACKGROUND (continued)

calculational models used to generate the safety analysis are adequate.

In order to achieve the required fuel cycle energy output, the uranium enrichment, in the new fuel loading and in the fuel remaining from the previous cycle, provides excess positive reactivity beyond that required to sustain steady state operation throughout the cycle. When the reactor is critical at RTP and moderator temperature, the excess positive reactivity is compensated by burnable absorbers (if any), control rods, whatever neutron poisons (mainly xenon and samarium) are present in the fuel, and the RCS boron concentration.

When the core is producing THERMAL POWER, the fuel is being depleted and excess reactivity is decreasing. As the fuel depletes, the RCS boron concentration is reduced to decrease negative reactivity and maintain constant THERMAL POWER. The boron letdown curve is based on steady state operation at RTP. Therefore, deviations from the predicted boron letdown curve may indicate deficiencies in the design analysis, deficiencies in the calculational models, or abnormal core conditions, and must be evaluated.

APPLICABLE SAFETY ANALYSES

The acceptance criteria for core reactivity are that the reactivity balance limit ensures ~~plant~~ unit operation is maintained within the assumptions of the safety analyses. 3

Accurate prediction of core reactivity is either an explicit or implicit assumption in the accident analysis evaluations. Every accident evaluation (Ref. 2) is, therefore, dependent upon accurate evaluation of core reactivity. In particular, SDM and reactivity transients, such as control rod withdrawal accidents or rod ejection accidents, are very sensitive to accurate prediction of core reactivity. These accident analysis evaluations rely on computer codes that have been qualified against available test data, operating ~~plant~~ unit data, and analytical benchmarks. Monitoring reactivity balance additionally ensures that the nuclear methods provide an accurate representation of the core reactivity. 3

Design calculations and safety analyses are performed for each fuel cycle for the purpose of predetermining reactivity

(continued)

Rev. 0

BASES

APPLICABLE SAFETY ANALYSES (continued)

behavior and the RCS boron concentration requirements for reactivity control during fuel depletion.

The comparison between measured and predicted initial core reactivity provides a normalization for the calculational models used to predict core reactivity. If the measured and predicted RCS boron concentrations for identical core conditions at beginning of cycle (BOC) do not agree, then the assumptions used in the reload cycle design analysis or the calculational models used to predict soluble boron requirements may not be accurate. If reasonable agreement between measured and predicted core reactivity exists at BOC, then the prediction may be normalized to the measured boron concentration. Thereafter, any significant deviations in the measured boron concentration from the predicted boron letdown curve that develop during fuel depletion may be an indication that the calculational model is not adequate for core burnups beyond BOC, or that an unexpected change in core conditions has occurred.

The normalization of predicted RCS boron concentration to the measured value is typically performed after reaching RTP following startup from a refueling outage, with the control rods in their normal positions for power operation. The normalization is performed at BOC conditions, so that core reactivity relative to predicted values can be continually monitored and evaluated as core conditions change during the cycle.

Core reactivity satisfies Criterion 2 of ~~the NRC Policy Statement~~. 10 CFR 50.36 (c)(2)(ii) 2

LCO

Long term core reactivity behavior is a result of the core physics design and cannot be easily controlled once the core design is fixed. During operation, therefore, the LCO can only be ensured through measurement and tracking, and appropriate actions taken as necessary. Large differences between actual and predicted core reactivity may indicate that the assumptions of the DBA and transient analyses are no longer valid, or that the uncertainties in the Nuclear Design Methodology are larger than expected. A limit on the reactivity balance of ± 1% $\Delta k/k$ has been established based on engineering judgment. A 1% deviation in reactivity from

(continued)

Rev. 0

BASES

LCO (continued)

that predicted is larger than expected for normal operation and should therefore be evaluated.

When measured core reactivity is within 1% Δk/k of the predicted value at steady state thermal conditions, the core is considered to be operating within acceptable design limits. Since deviations from the limit are normally detected by comparing predicted and measured steady state RCS critical boron concentrations, the difference between measured and predicted values would be approximately 100 ppm (depending on the boron worth) before the limit is reached. These values are well within the uncertainty limits for analysis of boron concentration samples, so that spurious violations of the limit due to uncertainty in measuring the RCS boron concentration are unlikely.

APPLICABILITY

The limits on core reactivity must be maintained during MODES 1 and 2 because a reactivity balance must exist when the reactor is critical or producing THERMAL POWER. As the fuel depletes, core conditions are changing, and confirmation of the reactivity balance ensures the core is operating as designed. This Specification does not apply in MODES 3, 4, and 5 because the reactor is shut down and the reactivity balance is not changing.

In MODE 6, fuel loading results in a continually changing core reactivity. Boron concentration requirements (LCO 3.9.1, "Boron Concentration") ensure that fuel movements are performed within the bounds of the safety analysis. An SDM demonstration is required during the first startup following operations that could have altered core reactivity (e.g., fuel movement, control rod replacement, control rod shuffling).

ACTIONS

A.1 and A.2

Should an anomaly develop between measured and predicted core reactivity, an evaluation of the core design and safety analysis must be performed. Core conditions are evaluated to determine their consistency with input to design calculations. Measured core and process parameters are evaluated to determine that they are within the bounds of

(continued)

Rev. 0

BASES

ACTIONS

A.1 and A.2 (continued)

the safety analysis, and safety analysis calculational models are reviewed to verify that they are adequate for representation of the core conditions. The required Completion Time of ~~72 hours~~ 7 days is based on the low probability of a DBA occurring during this period, and allows sufficient time to assess the physical condition of the reactor and complete the evaluation of the core design and safety analysis. TSTF-142

Following evaluations of the core design and safety analysis, the cause of the reactivity anomaly may be resolved. If the cause of the reactivity anomaly is a mismatch in core conditions at the time of RCS boron concentration sampling, then a recalculation of the RCS boron concentration requirements may be performed to demonstrate that core reactivity is behaving as expected. If an unexpected physical change in the condition of the core has occurred, it must be evaluated and corrected, if possible. If the cause of the reactivity anomaly is in the calculation technique, then the calculational models must be revised to provide more accurate predictions. If any of these results are demonstrated, and it is concluded that the reactor core is acceptable for continued operation, then the boron letdown curve may be renormalized and power operation may continue. If operational restriction or additional SRs are necessary to ensure the reactor core is acceptable for continued operation, then they must be defined.

The required Completion Time of ~~72 hours~~ 7 days is adequate for preparing whatever operating restrictions or Surveillances that may be required to allow continued reactor operation. TSTF-142

B.1

If the core reactivity unit cannot be restored to within the 1% Δk/k limit, the ~~plant~~ unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the ~~plant~~ unit must be brought to at least MODE 3 within 6 hours. If the SDM for MODE 3 is not met, then the boration required by SR 3.1.1.1 would occur. The allowed Completion Time is reasonable, based on operating experience, for reaching MODE 3 from full power conditions in an orderly manner and without challenging ~~plant~~ unit systems. 3

(continued)

Rev. 0

BASES (continued)

TSTF-136

SURVEILLANCE REQUIREMENTS

SR 3.1.~~3~~ 2.1

Core reactivity is verified by periodic comparisons of measured and predicted RCS boron concentrations. The comparison is made, considering that other core conditions are fixed or stable, including control rod position, moderator temperature, fuel temperature, fuel depletion, xenon concentration, and samarium concentration. The Surveillance is performed prior to entering MODE 1 as an initial check on core conditions and design calculations at BOC. The SR is modified by a Note. The Note indicates that any ~~the~~ normalization of predicted core reactivity to the measured value must take place within the first 60 effective full power days (EFPD) after each fuel loading. This allows sufficient time for core conditions to reach steady state, but prevents operation for a large fraction of the fuel cycle without establishing a benchmark for the design calculations. The required subsequent Frequency of 31 EFPD, following the initial 60 EFPD after entering MODE 1, is acceptable, based on the slow rate of core changes due to fuel depletion and the presence of other indicators (QPTR, AFD, etc.) for prompt indication of an anomaly. 5

REFERENCES

1. ~~10 CFR 50, Appendix A, GDC 26, GDC 28, and GDC 29.~~ 3 4
2. UFSAR, Chapter ~~{15}~~.

UFSAR, Sections 3.1.22, 3.1.24 and 3.1.25 1

Rev. D

1. North Anna Units 1 and 2 were designed and constructed on the basis of the proposed General Design Criteria, published in 1966. Since February 20, 1971, when the General Design Criteria for Nuclear Power Plants, Appendix A to 10 CFR Part 50, were published, the Company attempted to comply with the intent of the newer criteria to the extent practical, recognizing previous design commitments. The NRC's Safety Evaluation Report for North Anna Units 1 and 2 reviewed the plant against 10 CFR Part 50, Appendix A and concluded that the facility design conforms to the intent of the newer criteria. The North Anna UFSAR contains discussions comparing the design of the plant to the 10 CFR 50, Appendix A, General Design Criteria. Bases references to the 10 CFR 50, Appendix A criteria have been replaced with references to the appropriate section of the UFSAR.

2. The criteria of the NRC Final Policy Statement on Technical Specifications Improvements have been included in 10 CFR 50.36(c)(2)(ii). Therefore, references in the ISTS Bases to the NRC Final Policy Statement are revised in the ITS Bases to reference 10 CFR 50.36.

3. Changes are made (additions, deletions, and/or changes) to the ISTS which reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.

4. The brackets have been removed and the proper plant specific information/value has been provided.

5. The Bases are revised to be consistent with the ITS.

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.~~4~~5 Moderator Temperature Coefficient (MTC) TSTF-136
3

BASES

BACKGROUND

According to GDC 11 (Ref. 1), the reactor core and its interaction with the Reactor Coolant System (RCS) must be designed for inherently stable power operation, even in the possible event of an accident. In particular, the net reactivity feedback in the system must compensate for any unintended reactivity increases.

The MTC relates a change in core reactivity to a change in reactor coolant temperature (a positive MTC means that reactivity increases with increasing moderator temperature; conversely, a negative MTC means that reactivity decreases with increasing moderator temperature). The reactor is designed to operate with a negative MTC over the largest possible range of fuel cycle operation. Therefore, a coolant temperature increase will cause a reactivity decrease, so that the coolant temperature tends to return toward its initial value. Reactivity increases that cause a coolant temperature increase will thus be self limiting, and stable power operation will result.

MTC values are predicted at selected burnups during the safety evaluation analysis and are confirmed to be acceptable by measurements. Both initial and reload cores are designed so that the beginning of cycle (BOC) MTC is less than zero when THERMAL POWER is at RTP. The actual value of the MTC is dependent on core characteristics, such as fuel loading and reactor coolant soluble boron concentration. The core design may require additional fixed distributed poisons to yield an MTC at BOC within the range analyzed in the plant accident analysis. The end of cycle (EOC) MTC is also limited by the requirements of the accident analysis. Fuel cycles that are designed to achieve high burnups or that have changes to other characteristics are evaluated to ensure that the MTC does not exceed the EOC limit.

or equal to 2
unit 2
2

The limitations on MTC are provided to ensure that the value of this coefficient remains within the limiting conditions assumed in the FSAR accident and transient analyses. 2
U

(continued)

Rev.0

BASES

BACKGROUND (continued)

If the LCO limits are not met, the unit response during transients may not be as predicted. The core could violate criteria that prohibit a return to criticality, or the departure from nucleate boiling ratio criteria of the approved correlation may be violated, which could lead to a loss of the fuel cladding integrity.

The SRs 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 RCS boron concentration associated with fuel burnup.

APPLICABLE SAFETY ANALYSES

The acceptance criteria for the specified MTC are:

a. The MTC values must remain within the bounds of those used in the accident analysis (Ref. 2); and

b. The MTC must be such that inherently stable power operations result during normal operation and accidents, such as overheating and overcooling events.

The FSAR, Chapter 15 (Ref. 2), contains analyses of accidents that result in both overheating and overcooling of the reactor core. MTC is one of the controlling parameters for core reactivity in these accidents. Both the most positive value and most negative value of the MTC are important to safety, and both values must be bounded. Values used in the analyses consider worst case conditions to ensure that the accident results are bounding (Ref. 3).

The consequences of accidents that cause core overheating must be evaluated when the MTC is positive. Such accidents include the rod withdrawal transient from either zero ~~(Ref. 4)~~ or RTP, loss of main feedwater flow, and loss of forced reactor coolant flow. The consequences of accidents that cause core overcooling must be evaluated when the MTC is negative. Such accidents include sudden feedwater flow increase and sudden decrease in feedwater temperature.

In order to ensure a bounding accident analysis, the MTC is assumed to be its most limiting value for the analysis conditions appropriate to each accident. The bounding value is determined by considering rodded and unrodded conditions,

(continued)

Rev.0

BASES

APPLICABLE SAFETY ANALYSES (continued)

whether the reactor is at full or zero power, and whether it is the BOC or EOC life. The most conservative combination appropriate to the accident is then used for the analysis (Ref. 2).

MTC values are bounded in reload safety evaluations assuming steady state conditions at BOC and EOC. An EOC measurement is conducted at conditions when the RCS boron concentration reaches approximately 300 ppm. The measured value may be extrapolated to project the EOC value, in order to confirm reload design predictions. 10 CFR 50.36(c)(2)(ii)

MTC satisfies Criterion 2 of ~~the NRC Policy Statement~~. Even though it is not directly observed ~~and controlled~~ from the control room, MTC is considered an initial condition process variable because of its dependence on boron concentration. 3

TSTF-136

LCO

LCO 3.1.~~4~~ 2 requires the MTC to be within specified limits of the COLR to ensure that the core operates within the assumptions of the accident analysis. During the reload core safety evaluation, the MTC is analyzed to determine that its values remain within the bounds of the original accident analysis during operation.

Assumptions made in safety analyses require that the MTC be less positive than a given upper bound and more positive than a given lower bound. The MTC is most positive at BOC; this upper bound must not be exceeded. This maximum upper limit occurs at BOC, all rods out (ARO), hot zero power conditions. At EOC the MTC takes on its most negative value, when the lower bound becomes important. This LCO exists to ensure that both the upper and lower bounds are not exceeded.

During operation, therefore, the conditions of the LCO can only be ensured through measurement. The Surveillance checks at BOC and EOC on MTC provide confirmation that the MTC is behaving as anticipated so that the acceptance criteria are met.

The LCO establishes a upper maximum positive value that lower cannot be exceeded. The BOC ~~positive~~ limit and the EOC ~~negative~~ limit are established in the COLR to allow specifying limits for each particular cycle. This permits the unit to take 5

(continued)

Rev. 0

BASES

LCO (continued)

advantage of improved fuel management and changes in unit operating schedule.

APPLICABILITY

Technical Specifications place both LCO and SR values on MTC, based on the safety analysis assumptions described above.

In MODE 1, the limits on MTC must be maintained to ensure that any accident initiated from THERMAL POWER operation will not violate the design assumptions of the accident analysis. In MODE 2 with the reactor critical, the upper limit must also be maintained to ensure that startup and subcritical accidents (such as the uncontrolled CONTROL ROD assembly or group withdrawal) will not violate the assumptions of the accident analysis. The lower MTC limit must be maintained in MODES 2 and 3, in addition to MODE 1, to ensure that cooldown accidents will not violate the assumptions of the accident analysis. In MODES 4, 5, and 6, this LCO is not applicable, since no Design Basis Accidents using the MTC as an analysis assumption are initiated from these MODES. 6

ACTIONS

A.1 upper

If the BOC MTC limit is violated, administrative withdrawal limits for control banks must be established to maintain the MTC within its limits. The MTC becomes more negative with control bank insertion and decreased boron concentration. A Completion Time of 24 hours provides enough time for evaluating the MTC measurement and computing the required bank withdrawal limits. 5

As cycle burnup is increased, the RCS boron concentration will be reduced. The reduced boron concentration causes the MTC to become more negative. Using physics calculations, the time in cycle life at which the calculated MTC will meet the LCO requirement can be determined. At this point in core life Condition A no longer exists. The unit is no longer in the Required Action, so the administrative withdrawal limits are no longer in effect.

(continued)

Rev. 0

BASES

ACTIONS (continued)

B.1

If the required administrative withdrawal limits at BOC are not established within 24 hours, the unit must be brought to MODE 2 with k_{eff} < 1.0 to prevent operation with an MTC that is more positive than that assumed in safety analyses.

The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging plant systems. (unit) (2)

C.1 (lower) (5)

Exceeding the EOC MTC limit means that the safety analysis assumptions for the EOC accidents that use a bounding negative MTC value may be invalid. If the EOC MTC limit is exceeded, the plant must be brought to a MODE or condition in which the LCO requirements are not applicable. To achieve this status, the unit must be brought to at least MODE 4 within 12 hours. (lower) (5) (unit) (2)

The allowed Completion Time is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging plant systems. (2)

SURVEILLANCE REQUIREMENTS

SR 3.1.~~6~~.1 (2) TSTF-136

This SR requires measurement of the MTC at BOC prior to entering MODE 1 in order to demonstrate compliance with the most positive MTC LCO. Meeting the limit prior to entering MODE 1 ensures that the limit will also be met at higher power levels.

The BOC MTC value for ARO will be inferred from isothermal temperature coefficient measurements obtained during the physics tests after refueling. The ARO value can be directly compared to the BOC MTC limit of the LCO. If required, measurement results and predicted design values can be used to establish administrative withdrawal limits for control banks. (5) (upper)

(continued)

Rev. 0

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.1.~~4~~ 3.2 ~~and SR 3.1.4.3~~ TSTF-136 TSTF-13

In similar fashion, the LCO demands that the MTC be less negative than the specified value for EOC full power conditions. This measurement may be performed at any THERMAL POWER, but its results must be extrapolated to the conditions of RTP and all banks withdrawn in order to make a proper comparison with the LCO value. Because the RTP MTC value will gradually become more negative with further core depletion and boron concentration reduction, a 300 ppm SR value of MTC should necessarily be less negative than the lower ~~EOC~~ LCO limit. The 300 ppm SR value is sufficiently less negative than the ~~EOC~~ LCO limit value to ensure that the LCO limit will be met when the 300 ppm Surveillance criterion is met. 5 5

<TSTF-136> SR 3.1.~~4~~ 3.3 is modified by three Note 5 that includes the following requirements: TSTF-13 5

lower

b. ~~a.~~ If the 300 ppm Surveillance limit is exceeded, it is possible that the ~~EOC~~ limit on MTC could be reached before the planned EOC. Because the MTC changes slowly with core depletion, the Frequency of 14 ~~effective full power days~~ EFPDs is sufficient to avoid exceeding the EOC limit. TSTF-13

c. ~~b.~~ The Surveillance limit for RTP boron concentration of 60 ppm is conservative. If the measured MTC at 60 ppm is more positive than the 60 ppm Surveillance limit, the lower ~~EOC~~ limit will not be exceeded because of the gradual manner in which MTC changes with core burnup. TSTF-13 5

REFERENCES

1. ~~10 CFR 50, Appendix A, GDC 11.~~ UFSAR, Section 3.1.7 1
2. UFSAR, Chapter ~~[15]~~. 2 4
3. ~~WCAP 9273-NP-A, "Westinghouse Reload Safety Evaluation Methodology," July 1985.~~ 2
4. ~~FSAR, Chapter [15].~~ 2

a. The SR is not required to be performed until 7 Effective Full Power Days (EFPDs) after reaching the equivalent of an equilibrium RTP all rods out (ARO) boron concentration of 300 ppm. TSTF13

VEP-FRD-42, Rev. 1A, "Reload Nuclear Design Methodology", September 1986.

Rev. 0

1. North Anna Units 1 and 2 were designed and constructed on the basis of the proposed General Design Criteria, published in 1966. Since February 20, 1971, when the General Design Criteria for Nuclear Power Plants, Appendix A to 10 CFR Part 50, were published, the Company attempted to comply with the intent of the newer criteria to the extent practical, recognizing previous design commitments. The NRC's Safety Evaluation Report for North Anna Units 1 and 2 reviewed the plant against 10 CFR Part 50, Appendix A and concluded that the facility design conforms to the intent of the newer criteria. The North Anna UFSAR contains discussions comparing the design of the plant to the 10 CFR 50, Appendix A, General Design Criteria. Bases references to the 10 CFR 50, Appendix A criteria have been replaced with references to the appropriate section of the UFSAR.

2. Changes are made (additions, deletions, and/or changes) to the ISTS which reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.

3. The criteria of the NRC Final Policy Statement on Technical Specifications Improvements have been included in 10 CFR 50.36(c)(2)(ii). Therefore, references in the ISTS Bases to the NRC Final Policy Statement are revised in the ITS Bases to reference 10 CFR 50.36.

4. The brackets have been removed and the proper plant specific information/value has been provided.

5. The ISTS Bases variously refer to the "upper MTC limit," the "BOC MTC limit," the "lower MTC limit," and the "EOC MTC limit." References to the BOC and EOC MTC limit are eliminated and "upper" and "lower" are substituted to eliminate confusion and to be consistent with the Specification.

6. The Bases are revised to change "CONTROL ROD" to "control rod." "Control Rod" is not a defined term and should not be capitalized.

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.~~5~~ 4 Rod Group Alignment Limits TSTF-136

BASES TSTF-107

BACKGROUND

The OPERABILITY (~~e.g.~~ i.e., trippability) of the shutdown and control rods is an initial assumption in all safety analyses that assume rod insertion upon reactor trip. Maximum rod misalignment is an initial assumption in the safety analysis that directly affects core power distributions and assumptions of available SDM. 8

The applicable criteria for these reactivity and power distribution design requirements are ~~10 CFR 50, Appendix A,~~ GDC 10, "Reactor Design," GDC 26, "Reactivity Control System Redundancy and ~~Protection~~ Capability" (Ref. 1), and 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Plants" (Ref. 2). 1 TSTF-331

Mechanical or electrical failures may cause a control or shutdown rod to become inoperable or to become misaligned from its group. ~~Control~~ rod inoperability or misalignment may cause increased power peaking, due to the asymmetric reactivity distribution and a reduction in the total available rod worth for reactor shutdown. Therefore, ~~control~~ rod alignment and OPERABILITY are related to core operation in design power peaking limits and the core design requirement of a minimum SDM. TSTF-331

Limits on ~~control~~ rod alignment have been established, and all rod positions are monitored and controlled during power operation to ensure that the power distribution and reactivity limits defined by the design power peaking and SDM limits are preserved.

Rod cluster control assemblies (RCCAs), or rods, are moved by their control rod drive mechanisms (CRDMs). Each CRDM moves its RCCA one step (approximately ~~5/8~~ inch) at a time, but at varying rates (steps per minute) depending on the signal output from the Rod Control System.

The RCCAs are divided 15 among control banks and shutdown banks. Each bank ~~may be~~ further subdivided into two groups to provide for precise reactivity control. A group consists of ~~two or more~~ four RCCAs that are electrically paralleled to step simultaneously. A bank of RCCAs consists of two groups 5 TSTF-331

(continued)

Rev. 0

BASES

BACKGROUND (continued)

that are moved in a staggered fashion, but always within one step of each other. All units have four control banks and at least two shutdown banks. TSTF-331 5

The shutdown banks are maintained either in the fully inserted or fully withdrawn position. The control banks are moved in an overlap pattern, using the following withdrawal sequence: When control bank A reaches a predetermined height in the core, control bank B begins to move out with control bank A. Control bank A stops at the position of maximum withdrawal, and control bank B continues to move out. When control bank B reaches a predetermined height, control bank C begins to move out with control bank B. This sequence continues until control banks A, B, and C are at the fully withdrawn position, and control bank D is approximately halfway withdrawn. The insertion sequence is the opposite of the withdrawal sequence. The control rods are arranged in a radially symmetric pattern, so that control bank motion does not introduce radial asymmetries in the core power distributions.

The axial position of shutdown rods and control rods is indicated by two separate and independent systems, which are the Bank Demand Position Indication System (commonly called group step counters) and the Digital Rod Position Indication (DRPI) System. 2

The Bank Demand Position Indication System counts the pulses from the rod control system that moves the rods. There is one step counter for each group of rods. Individual rods in a group all receive the same signal to move and should, therefore, all be at the same position indicated by the group step counter for that group. The Bank Demand Position Indication System is considered highly precise (± 1 step or ± 5/8 inch). If a rod does not move one step for each demand pulse, the step counter will still count the pulse and incorrectly reflect the position of the rod.

The DRPI System provides a highly accurate indication of actual control rod position, but at a lower precision than the step counters. This system is based on inductive analog signals from a series of coils spaced along a hollow tube with a center to center distance of 3.75 inches, which is six steps. To increase the reliability of the system, the inductive coils are connected alternately to data system A or B. Thus, if one system fails, the DRPI will go on half 2 5 TSTF-331 2

(continued)

Rev. 0

except during certain limited temperature transients

The RPI system is capable of monitoring rod position within at least +/- 12 steps. with either full accuracy or half accuracy

BASES

BACKGROUND (continued)

~~accuracy with an effective coil spacing of 7.5 inches, which is 12 steps. Therefore, the normal indication accuracy of the RPI System is ± 6 steps (± 3.75 inches), and the maximum uncertainty is ± 12 steps (± 7.5 inches). With an indicated deviation of 12 steps between the group step counter and RPI, the maximum deviation between actual rod position and the demand position could be 24 steps, or 15 inches.~~

TSTF-331

APPLICABLE SAFETY ANALYSES

Control rod misalignment accidents are analyzed in the safety analysis (Ref. 3). The acceptance criteria for addressing control rod inoperability or misalignment are that:

a. There be no violations of:

1. specified acceptable fuel design limits, or
2. Reactor Coolant System (RCS) pressure boundary integrity; and

b. The core remains subcritical after accident transients.

Two types of misalignment are distinguished. During movement of a control rod group, one rod may stop moving, while the other rods in the group continue. This condition may cause excessive power peaking. The second type of misalignment occurs if one rod fails to insert upon a reactor trip and remains stuck fully withdrawn. This condition requires an evaluation to determine that sufficient reactivity worth is held in the control rods to meet the SDM requirement, with the maximum worth rod stuck fully withdrawn.

Two types of analysis are performed and shutdown in regard to static rod misalignment (Ref. 4). With control banks at their insertion limits, one type of analysis considers the case when any one rod is completely inserted into the core. The second type of analysis considers the case of a completely withdrawn single rod from a bank inserted to its insertion limit. Satisfying limits on departure from nucleate boiling ratio in both of these cases bounds the situation when a rod is misaligned from its group by 12 steps.

(continued)

Rev. 0

BASES

APPLICABLE SAFETY ANALYSES (continued)

Another type of misalignment occurs if one RCCA fails to insert upon a reactor trip and remains stuck fully withdrawn. This condition is assumed in the evaluation to determine that the required SDM is met with the maximum worth RCCA also fully withdrawn (Ref. 5).

The Required Actions in this LCO ensure that either deviations from the alignment limits will be corrected or that THERMAL POWER will be adjusted so that excessive local linear heat rates (LHRs) will not occur, and that the requirements on SDM and ejected rod worth are preserved.

if power is reduced or

Continued operation of the reactor with a misaligned control rod is allowed if the heat flux hot channel factor ($F_Q(Z)$) rise and the nuclear enthalpy hot channel factor ($F^N_{\Delta H}$) are verified to be within their limits in the COLR and the safety analysis is verified to remain valid. When a control rod is misaligned, the assumptions that are used to determine the rod insertion limits, AFD limits, and quadrant power tilt limits are not preserved. Therefore, the limits may not preserve the design peaking factors, and $F_Q(Z)$ and $F^N_{\Delta H}$ must be verified directly by incore mapping. Bases Section 3.2 (Power Distribution Limits) contains more complete discussions of the relation of $F_Q(Z)$ and $F^N_{\Delta H}$ to the operating limits.

Shutdown and control rod OPERABILITY and alignment are directly related to power distributions and SDM, which are initial conditions assumed in safety analyses. Therefore they satisfy Criterion 2 of ~~the NRC Policy Statement~~. 10 CFR 50.36(c)(2)(ii)

LCO

The limits on shutdown or control rod alignments ensure that the assumptions in the safety analysis will remain valid. The requirements on OPERABILITY ensure that upon reactor trip, the assumed reactivity will be available and will be inserted. The OPERABILITY requirements ~~also~~ ensure that the RCCAs and banks maintain the correct power distribution and rod alignment. TSTF-107

rod

(i.e., trippability) are separate from the alignment requirements which

Insert

The requirement to maintain the rod alignment to within plus or minus 12 steps is conservative. The minimum misalignment assumed in safety analysis is 24 steps (15 inches), and in some cases a total misalignment from fully withdrawn to fully inserted is assumed.

(continued)

Rev. 0

INSERT

The rod OPERABILITY requirement is satisfied provided the rod will fully insert within the required rod drop time assumed in the safety analysis. Rod control malfunctions that result in the inability to move a rod (e.g., rod lift coil failures), but that do not impact trippability, do not result in rod inoperability.

BASES

LCO (continued)

Failure to meet the requirements of this LCO may produce unacceptable power peaking factors and LHRs, or unacceptable SDMs, all of which may constitute initial conditions inconsistent with the safety analysis.

Insert → 7

APPLICABILITY

The requirements on RCCA OPERABILITY and alignment are applicable in MODES 1 and 2 because these are the only MODES in which neutron (or fission) power is generated, and the OPERABILITY (i.e., trippability) and alignment of rods have the potential to affect the safety of the ~~plant~~ unit. 5 In MODES 3, 4, 5, ~~and~~ 6, the normally alignment limits do not apply because the ~~control~~ rods ~~are~~ bottomed and the reactor is shut down and not producing fission power. 5 In the shutdown MODES, the OPERABILITY of the shutdown and control rods has the potential to affect the required SDM, but this effect can be compensated for by an increase in the boron concentration of the RCS. See LCO 3.1.1, "SHUTDOWN MARGIN (SDM) ~~(T_{avg} > 200°F)~~," for SDM in MODES 3, 4, and 5 and LCO 3.9.1, "Boron Concentration," for boron concentration requirements during refueling. TSTF-136

ACTIONS

A.1.1 and A.1.2

When one or more rods are inoperable (i.e.) untrippable, there is a possibility that the required SDM may be adversely affected. Under these conditions, it is important to determine the SDM, and if it is less than the required value, initiate boration until the required SDM is recovered. The Completion Time of 1 hour is adequate for determining SDM and, if necessary, for initiating emergency boration and restoring SDM. TSTF-107

In this situation, SDM verification must include the worth of the untrippable rod, as well as a rod of maximum worth.

A.2

If the ~~untrippable~~ inoperable rod(s) cannot be restored to OPERABLE status, the ~~plant~~ unit must be brought to a MODE or condition in which the LCO requirements are not applicable. To achieve TSTF-107 5

(continued)

Rev. 0

INSERT

The LCO has been modified by a Note. The Note permits a wider tolerance on indicated rod position for a maximum of one hour in every 24 hours to allow stabilization of known thermal drift in the individual rod position indicator channels. This thermal soak time is available both for a continuous one hour period or several discrete intervals as long as the total time does not exceed 1 hour in any 24 hour period and the indicated rod position does not exceed 24 steps from the group step counter demand position. This allowance applies to the indicated position of the rod, not its actual position. If the actual position is known to be greater than 12 steps from the group step counter demand position, the Conditions and Required Actions of the specification must be followed.

BASES

ACTIONS

A.2 (continued)

this status, the unit must be brought to at least MODE 3 within 6 hours.

The allowed Completion Time is reasonable, based on operating experience, for reaching MODE 3 from full power conditions in an orderly manner and without challenging plant systems. Unit 5 TSTF-240

B.1

When a rod becomes misaligned, it can usually be moved and is still trippable. If the rod can be realigned within the Completion Time of 1 hour, local xenon redistribution during this short interval will not be significant, and operation may proceed without further restriction.

An alternative to realigning a single misaligned RCCA to the group average position is to align the remainder of the group to the position of the misaligned RCCA. However, this must be done without violating the bank sequence, overlap, and insertion limits specified in LCO 3.1.6, "Shutdown Bank Insertion Limits," and LCO 3.1.7, "Control Bank Insertion Limits." The Completion Time of 1 hour gives the operator sufficient time to adjust the rod positions in an orderly manner. 5 TSTF-136 TSTF-136 6

B.2.1.1 and B.2.1.2 TSTF-240

With a misaligned rod, SDM must be verified to be within limit or boration must be initiated to restore SDM to within limit.

Significantly to meet overlap requirements

In many cases, realigning the remainder of the group to the misaligned rod may not be desirable. For example, realigning control bank B to a rod that is misaligned 15 steps from the top of the core would require a significant power reduction, since control bank D must be moved fully in and control bank C must be moved in to approximately 100 to 115 steps. C 5 5

Power operation may continue with one RCCA trippable but misaligned, provided that SDM is verified within 1 hour. OPERABLE 7

(continued)

Rev. 0

BASES

ACTIONS

B.2.1.1 and B.2.1.2 (continued) TSTF-240

The Completion Time of 1 hour represents the time necessary for determining the actual unit SDM and, if necessary, aligning and starting the necessary systems and components to initiate boration.

B.2.2.1, B.2.2.3, B.2.2.4, B.2.2.5, and B.2.2.6 (3)

For continued operation with a misaligned rod, RTP must be reduced, ~~SDM must periodically be verified within limits~~ or hot channel factors ($F_Q(Z)$ and $F^N_{\Delta H}$) must be verified within limits, and the safety analyses must be re-evaluated to confirm continued operation is permissible. (9)

Reduction of power to 75% RTP ensures that local LHR increases due to a misaligned RCCA will not cause the core design criteria to be exceeded (Ref. 7). The Completion Time of 2 hours gives the operator sufficient time to accomplish an orderly power reduction without challenging the Reactor Protection System. (4) (4)

~~When a rod is known to be misaligned, there is a potential to impact the SDM.~~ Since the core conditions can change with time, periodic verification of SDM is required. A Frequency of 12 hours is sufficient to ensure this requirement continues to be met. (7)

Alternatively, Verifying that $F_Q(Z)$ and $F^N_{\Delta H}$ are within the required limits ensures that current operation ~~at 75% RTP~~ with a rod misaligned does not result in power distributions that may invalidate safety analysis assumptions ~~at full power~~. The Completion Time of 72 hours allows sufficient time to obtain flux maps of the core power distribution using the incore flux mapping system and to calculate $F_Q(Z)$ and $F^N_{\Delta H}$. (7) (8) (7)

Once current conditions have been verified acceptable, time is available to perform evaluations of accident analysis to determine that core limits will not be exceeded during a Design Basis Event for the duration of operation under these conditions. A Completion Time of 5 days is sufficient time to obtain the required input data and to perform the analysis. TSTF-331

The accident analyses presented in UFSAR Chapter 15 (Ref. 3) that may be adversely affected will be evaluated to ensure that the analysis results remain valid for the duration of continued operation under these conditions. Rev. 0

(continued)

BASES

ACTIONS (continued)

D.1.1 and C.1.2 TSTF-15

More than one control rod becoming misaligned from its group average position is not expected, and has the potential to reduce SDM. Therefore, SDM must be evaluated. One hour allows the operator adequate time to determine SDM. Restoration of the required SDM, if necessary, requires increasing the RCS boron concentration to provide negative reactivity, as described in the Bases or LCO 3.1.1. The required Completion Time of 1 hour for initiating boration is reasonable, based on the time required for potential xenon redistribution, the low probability of an accident occurring, and the steps required to complete the action. This allows the operator sufficient time to align the required valves and start the boric acid pumps. Boration will continue until the required SDM is restored. 5

D.2 TSTF-15

If more than one rod is found to be misaligned or becomes misaligned because of bank movement, the unit conditions fall outside of the accident analysis assumptions. Since automatic bank sequencing would continue to cause misalignment, the unit must be brought to a MODE or Condition in which the LCO requirements are not applicable. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours.

The allowed Completion Time is reasonable, based on operating experience, for reaching MODE 3 from full power conditions in an orderly manner and without challenging unit ~~plant~~ systems. 5

C.1 TSTF-15

Move paragraph to top of page

When Required Actions cannot be completed within their Completion Time, the unit must be brought to a MODE or Condition in which the LCO requirements are not applicable. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours, which obviates concerns about the development of undesirable xenon or power distributions. The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching MODE 3 from full power

(continued)

Rev. 0

BASES

ACTIONS

~~A~~ C.1 (continued) TSTF-15

conditions in an orderly manner and without challenging the ~~plant~~ Unit systems. 5

SURVEILLANCE REQUIREMENTS

SR 3.1.~~6~~ 4.1 TSTF-136

Verification that individual rod positions are within alignment limits at a Frequency of 12 hours provides a history that allows the operator to detect a rod that is beginning to deviate from its expected position. ~~If the rod position deviation monitor is inoperable, a Frequency of 4 hours accomplishes the same goal.~~ Insert TSTF-110 The specified Frequency takes into account other rod position information that is continuously available to the operator in the control room, so that during actual rod motion, deviations can immediately be detected.

SR 3.1.~~6~~ 4.2 TSTF-136

Verifying each ~~control~~ rod is OPERABLE would require that each rod be tripped. However, in MODES 1 and 2, tripping each ~~control~~ rod would result in radial or axial power tilts, or oscillations. Exercising each individual ~~control~~ rod every 92 days provides increased confidence that all rods continue to be OPERABLE without exceeding the alignment limit, even if they are not regularly tripped. Moving each ~~control~~ rod by 10 steps will not cause radial or axial power tilts, or oscillations, to occur. The 92 day Frequency takes into consideration other information available to the operator in the control room and SR 3.1.~~6~~ 4.1, which is performed more frequently and adds to the determination of OPERABILITY of the rods. Between required performances of SR 3.1.~~6~~ 4.2 (determination of ~~control~~ rod OPERABILITY by movement), if a ~~control~~ rod(s) is discovered to be immovable, but remains trippable ~~and aligned~~, the ~~control~~ rod(s) is considered to be OPERABLE. At any time, if a ~~control~~ rod(s) is immovable, a determination of the trippability (OPERABILITY) of the ~~control~~ rod(s) must be made, and appropriate action taken. 5 TSTF-136 TSTF-136 TSTF-107

(continued)

Rev. 0

INSERT

If an individual rod position is not within the alignment limit of the group step counter demand position, a determination must be made whether the problem is the actual rod position or the indicated rod position. If the actual rod position is not within the alignment limit, follow the Conditions and Required Actions in Specification 3.1.4. If the indicated, not actual, rod position is not within the alignment limit, follow the Conditions and Required Actions of Specification 3.1.7, Rod Position Indication.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.1.~~6~~ 4.3 TSTF-136

Verification of rod drop times allows the operator to determine that the maximum rod drop time permitted is consistent with the assumed rod drop time used in the safety analysis. Measuring rod drop times prior to reactor criticality, after reactor vessel head removal, ensures that the reactor internals and rod drive mechanism will not interfere with rod motion or rod drop time, and that no degradation in these systems has occurred that would adversely affect ~~control~~ rod motion or drop time. This testing is performed with all RCPs operating and the average moderator temperature ≥ 500°F to simulate a reactor trip under actual conditions. Insert 5 5

This Surveillance is performed during a ~~plant~~ unit outage, due to ~~the plant~~ unit conditions needed to perform the SR and the potential for an unplanned ~~plant~~ unit transient if the Surveillance were performed with the reactor at power. 5

REFERENCES

1. ~~10 CFR 50, Appendix A, GDC 10 and GDC 26.~~ 1
2. 10 CFR 50.46.
3. UFSAR, Chapter ~~[15]~~. 5 6
4. UFSAR, ~~Chapter [15]~~. 15.2.3 Section 5 6
5. UFSAR, ~~Chapter [15]~~. 4.3.1.5 5 6
6. ~~FSAR, Chapter [15].~~ 4
7. ~~FSAR, Chapter [15].~~

UFSAR, Sections 3.1.6 and 3.1.22.

Rev. 0

INSERT

The surveillance procedure for rod drop time uses a limit on rod drop time reduced from the value in SR 3.1.4.3 in order to ensure that the negative reactivity insertion rate used in the accident analyses bounds a reactor trip concurrent with a postulated seismic event.

1. North Anna Units 1 and 2 were designed and constructed on the basis of the proposed General Design Criteria, published in 1966. Since February 20, 1971, when the General Design Criteria for Nuclear Power Plants, Appendix A to 10 CFR Part 50, were published, the Company attempted to comply with the intent of the newer criteria to the extent practical, recognizing previous design commitments. The NRC's Safety Evaluation Report for North Anna Units 1 and 2 reviewed the plant against 10 CFR Part 50, Appendix A and concluded that the facility design conforms to the intent of the newer criteria. The North Anna UFSAR contains discussions comparing the design of the plant to the 10 CFR 50, Appendix A, General Design Criteria. Bases references to the 10 CFR 50, Appendix A criteria have been replaced with references to the appropriate section of the UFSAR.

2. North Anna utilizes an analog Rod Position Indication system, not a Digital Rod Position Indication System. The Bases have been changed to reflect the North Anna design.

3. The criteria of the NRC Final Policy Statement on Technical Specifications Improvements have been included in 10 CFR 50.36(c)(2)(ii). Therefore, references in the ISTS Bases to the NRC Final Policy Statement are revised in the ITS Bases to reference 10 CFR 50.36.

4. For North Anna, Reference 7 is the same as Reference 4. Reference 6 is not used within the text. Therefore, References 6 and 7 have been deleted and Reference 7 is replaced with Reference 4 within the text.

5. Changes are made (additions, deletions, and/or changes) to the ISTS which reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.

6. The brackets have been removed and the proper plant specific information/value has been provided.

7. The Bases are changed to reflect changes made to the specifications.

8. Editorial changes made to the Bases to correct grammar.

9. Editorial change made to the Bases for consistency with the remainder of the Specifications.

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.6 5 Shutdown Bank Insertion Limits TSTF-136

BASES

BACKGROUND

The insertion limits of the shutdown and control rods are initial assumptions in all safety analyses that assume rod insertion upon reactor trip. The insertion limits directly affect core power and fuel burnup distributions and assumptions of available ejected rod worth, SDM and initial reactivity insertion rate.

The applicable criteria for these reactivity and power distribution design requirements are ~~10 CFR 50, Appendix A~~ GDC 10, "Reactor Design," GDC 26, "Reactivity Control System Redundancy and Protection," GDC 28, "Reactivity Limits" (Ref. 1), and 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Reactors" (Ref. 2). Limits on control rod insertion have been established, and all rod positions are monitored and controlled during power operation to ensure that the power distribution and reactivity limits defined by the design power peaking and SDM limits are preserved. 1

The rod cluster control assemblies (RCCAs) are divided among control banks and shutdown banks. Each bank ~~may be~~ is further subdivided into two groups to provide for precise reactivity control. A group consists of ~~two or more~~ four RCCAs that are electrically paralleled to step simultaneously. A bank of RCCAs consists of two groups that are moved in a staggered fashion, but always within one step of each other. ~~All~~ There are ~~plants have~~ four control banks and ~~at least~~ two shutdown banks. See LCO 3.1.6, "Rod Group Alignment Limits," for control and shutdown rod OPERABILITY and alignment requirements, and LCO 3.1.8, "Rod Position Indication," for position indication requirements. 4 4 4 4 7 TSTF-136 TSTF-136

The control banks are used for precise reactivity control of the reactor. The positions of the control banks are normally automatically controlled by the Rod Control System, but they can also be manually controlled. They are capable of adding negative reactivity very quickly (compared to borating). The control banks must be maintained above designed insertion limits and are typically near the fully withdrawn position during normal full power operations.

(continued)

Rev. 0

 TSTF-136

BASES

BACKGROUND (continued)

Hence, they are not capable of adding a large amount of positive reactivity. Boration or dilution of the Reactor Coolant System (RCS) compensates for the reactivity changes associated with large changes in RCS temperature. The design calculations are performed with the assumption that the shutdown banks are withdrawn first. The shutdown banks can be fully withdrawn without the core going critical. This provides available negative reactivity in the event of boration errors. The shutdown banks are controlled manually by the control room operator. During normal unit operation, the shutdown banks are either fully withdrawn or fully inserted. The shutdown banks must be completely withdrawn from the core, prior to withdrawing any control banks during an approach to criticality. The shutdown banks are then left in this position until the reactor is shut down. They ~~affect core power and burnup distribution, and~~ add negative reactivity to shut down the reactor upon receipt of a reactor trip signal. 4

APPLICABLE SAFETY ANALYSES

On a reactor trip, all RCCAs (shutdown banks and control banks), except the most reactive RCCA, are assumed to insert into the core. The shutdown banks shall be at or above their insertion limits and available to insert the maximum amount of negative reactivity on a reactor trip signal. The control banks may be partially inserted in the core, as allowed by LCO 3.1.~~6~~ 6, "Control Bank Insertion Limits." The shutdown bank and control bank insertion limits are established to ensure that a sufficient amount of negative reactivity is available to shut down the reactor and maintain the required SDM (see LCO 3.1.1, "SHUTDOWN MARGIN (SDM) - T_{avg} > ~~200°F,~~ " and ~~LCO~~ 3.1.2, ~~"SHUTDOWN MARGIN (SDM) - T_{avg} ≤ 200°F"~~) following a reactor trip from full power. The combination of control banks and shutdown banks (less the most reactive RCCA, which is assumed to be fully withdrawn) is sufficient to take the reactor from full power conditions at rated temperature to zero power, and to maintain the required SDM at rated no load temperature (Ref. 3). The shutdown bank insertion limit also limits the reactivity worth of an ejected shutdown rod. TSTF-136 TSTF-136

The acceptance criteria for addressing shutdown ~~and control~~ rod bank insertion limits and inoperability or misalignment is that: 6

(continued)

BASES

APPLICABLE SAFETY ~~ANALYSES~~ (continued)

a. There be no violations of:

1. specified acceptable fuel design limits, or
2. RCS pressure boundary integrity; and

b. The core remains subcritical after accident transients.

As such, the shutdown bank insertion limits affect safety analysis involving core reactivity and SDM (Ref. 3).

The shutdown bank insertion limits preserve an initial condition assumed in the safety analyses and, as such, satisfy Criterion 2 of ~~the NRC Policy Statement.~~ 10 CFR 50.36(c)(2)(ii) 2

LCO

The shutdown banks must be within their insertion limits any time the reactor is critical or approaching criticality. This ensures that a sufficient amount of negative reactivity is available to shut down the reactor and maintain the required SDM following a reactor trip.

The shutdown bank insertion limits are defined in the COLR.

APPLICABILITY

The shutdown banks must be within their insertion limits, with the reactor in MODES 1 and 2. ~~The applicability in MODE 2 begins prior to initial control bank withdrawal, during an approach to criticality, and continues throughout MODE 2, until all control bank rods are again fully inserted by reactor trip or by shutdown.~~ TSTF-239 This ensures that a sufficient amount of negative reactivity is available to shut down the reactor and maintain the required SDM following a reactor trip. The shutdown banks do not have to be within their insertion limits in MODE 3, unless an approach to criticality is being made. In MODE 3, 4, 5 or ~~or 6~~, the shutdown banks are fully inserted in the core and contribute to the SDM. Refer to LCO 3.1.1 ~~and LCO 3.1.2~~ for SDM requirements in MODES 3, 4, and 5. LCO 3.9.1, "Boron Concentration," ensures adequate SDM in MODE 6. 4 TSTF-136

The Applicability requirements have been modified by a Note indicating the LCO requirement is suspended during SR 3.1.~~8~~4.2. This SR verifies the freedom of the rods to TSTF-136

(continued)

Rev. 0

Should the SR testing be suspended due to equipment malfunction with a rod bank below the insertion limit, the applicable Condition should be entered.

BASES

APPLICABILITY (continued)

move, and requires the shutdown bank to move below the LCO limits, which would normally violate the LCO. 6

ACTIONS

A.1.1, A.1.2 and A.2

Except as allowed by Condition B,

When one or more shutdown banks is not within insertion limits, 2 hours is allowed to restore the shutdown banks to within the insertion limits. This is necessary because the available SDM may be significantly reduced, with one or more of the shutdown banks not within their insertion limits. Also, verification of SDM or initiation of boration within 1 hour is required, since the SDM in MODES 1 and 2 is ensured by adhering to the control and shutdown bank insertion limits (see LCO 3.1.1). If shutdown banks are not within their insertion limits, then SDM will be verified by performing a reactivity balance calculation, considering the effects listed in the BASES for SR 3.1.1.1. 3

Insert

The allowed Completion Time of 2 hours provides an acceptable time for evaluating and repairing minor problems without allowing the ~~plant~~ unit to remain in an unacceptable condition for an extended period of time. 4 3

If the Required Action and associated Completion Time of Conditions A or B are not met,

C ~~B~~.1

If the shutdown banks cannot be restored to within their insertion limits within 2 hours, the unit must be brought to a MODE where the LCO is not applicable. The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging ~~plant~~ unit systems. 3 4

SURVEILLANCE REQUIREMENTS

SR 3.1.~~6~~ 5.1 TSTF-136

Verification that the shutdown banks are within their insertion limits prior to an approach to criticality ensures that when the reactor is critical, or being taken critical, the shutdown banks will be available to shut down the reactor, and the required SDM will be maintained following a reactor trip. This SR and Frequency ensure that the

(continued)

Rev: 0

INSERT

B.1, and B.2

If a shutdown bank is inserted below the insertion limits, power operation may continue for up to 72 hours provided that the bank is not inserted more than 18 steps below the insertion limits, the control and shutdown banks are within the operability and rod group alignment requirements provided in LCO 3.1.4, and the control banks are within the insertion limits provided in LCO 3.1.6. The requirement to be in compliance with LCO 3.1.4 and LCO 3.1.6 ensures that the rods are trippable, and power distribution is acceptable during the time allowed to restore the inserted rod. If any of these Conditions are not met, Condition A must be applied.

The Completion Time of 72 hours is based on operating experience and provides an acceptable time for evaluating and repairing problems with the rod control system.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.6 5.1 (continued) TSTF-136

shutdown banks are withdrawn before the control banks are withdrawn during a unit startup.

Since the shutdown banks are positioned manually by the control room operator, a verification of shutdown bank position at a Frequency of 12 hours, after the reactor is taken critical, is adequate to ensure that they are within their insertion limits. Also, the 12 hour Frequency takes into account other information available in the control room for the purpose of monitoring the status of shutdown rods.

REFERENCES

1. ~~10 CFR 50, Appendix A, GDC 10, GDC 26, and GDC 28.~~ 1
2. 10 CFR 50.46.
3. U FSAR, Chapter ~~[15]~~. 4 5

UFSAR, Sections 3.1.6, 3.1.22, and 3.1.24.

Rev. 0

1. North Anna Units 1 and 2 were designed and constructed on the basis of the proposed General Design Criteria, published in 1966. Since February 20, 1971, when the General Design Criteria for Nuclear Power Plants, Appendix A to 10 CFR Part 50, were published, the Company attempted to comply with the intent of the newer criteria to the extent practical, recognizing previous design commitments. The NRC's Safety Evaluation Report for North Anna Units 1 and 2 reviewed the plant against 10 CFR Part 50, Appendix A and concluded that the facility design conforms to the intent of the newer criteria. The North Anna UFSAR contains discussions comparing the design of the plant to the 10 CFR 50, Appendix A, General Design Criteria. Bases references to the 10 CFR 50, Appendix A criteria have been replaced with references to the appropriate section of the UFSAR.

2. The criteria of the NRC Final Policy Statement on Technical Specifications Improvements have been included in 10 CFR 50.36(c)(2)(ii). Therefore, references in the ISTS Bases to the NRC Final Policy Statement are revised in the ITS Bases to reference 10 CFR 50.36.

3. The Bases are changed to reflect the plant-specific changes made to the specifications. Bases are inserted for new Condition B and the Bases for Conditions A and C are revised to accommodate the new Condition.

4. Changes are made (additions, deletions, and/or changes) to the ISTS which reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.

5. The brackets have been removed and the proper plant specific information/value has been provided.

6. The Bases are changed to be consistent with changes made to the ITS.

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.0 (6) Control Bank Insertion Limits

BASES

BACKGROUND

The insertion limits of the shutdown and control rods are initial assumptions in all safety analyses that assume rod insertion upon reactor trip. The insertion limits directly affect core power and fuel burnup distributions and assumptions of available SDM, and initial reactivity insertion rate.

The applicable criteria for these reactivity and power distribution design requirements are ~~10 CFR 50, Appendix A~~ GDC 10, "Reactor Design," GDC 26, "Reactivity Control System Redundancy and Protection," GDC 28, "Reactivity Limits" (Ref. 1), and 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Reactors" (Ref. 2). Limits on control rod insertion have been established, and all rod positions are monitored and controlled during power operation to ensure that the power distribution and reactivity limits defined by the design power peaking and SDM limits are preserved. (1)

The rod cluster control assemblies (RCCAs) are divided among control banks and shutdown banks. Each bank ~~may be~~ is further subdivided into two groups to provide for precise reactivity control. A group consists of ~~two or more~~ four RCCAs that are electrically paralleled to step simultaneously. A bank of RCCAs consists of two groups that are moved in a staggered fashion, but always within one step of each other. ~~All~~ There are ~~plants have~~ four control banks and ~~at least~~ two shutdown banks. See LCO 3.1.~~5~~, "Rod Group Alignment Limits," for control and shutdown rod OPERABILITY and alignment requirements, and LCO 3.1.~~8~~, "Rod Position Indication," for position indication requirements. (5) (5) (5) (4) (1) TSTF-136 TSTF-136

The control bank insertion limits are specified in the COLR. An example is provided for information only in Figure B 3.1.~~0~~-1. The control banks are required to be at or above the insertion limit lines. (6) TSTF-136 (7)

Figure B 3.1.~~0~~-1 also indicates how the control banks are sequenced and moved in an overlap pattern. Overlap is the distance travelled together by two control banks. ~~The predetermined~~ (6) TSTF-136 (9)

Sequencing is the order in which the banks are moved. (7)

(continued)

Rev. 0

For example, if the fully withdrawn position is 231 steps, as in Figure B 3.1.6-1,

BASES

BACKGROUND (continued)

position of control bank C, at which control bank D will begin to move with bank C on a withdrawal, will be at ~~118~~ 128 steps for a fully withdrawn position of 231 steps. The fully withdrawn position is defined in the COLR.

when control bank C is at 9 8

The control banks are used for precise reactivity control of the reactor. The positions of the control banks are normally controlled automatically by the Rod Control System, but can also be manually controlled. They are capable of adding reactivity very quickly (compared to borating or diluting).

, as well as proper overlap and sequence, are

The power density 5 at any point in the core must be limited, so that the fuel design criteria are maintained. Together, LCO 3.1.~~6~~ 4, LCO 3.1.~~6~~ 6, "Shutdown Bank Insertion Limits," LCO 3.1.~~0~~ 6, LCO 3.2.3, "AXIAL FLUX DIFFERENCE (AFD)," and LCO 3.2.4, "QUADRANT POWER TILT RATIO (QPTR)," provide limits on control component operation and on monitored process variables, which ensure that the core operates within the fuel design criteria. } TSTF-136

The shutdown and control bank insertion and alignment limits, AFD, and QPTR are process variables that together characterize and control the three dimensional power distribution of the reactor core. Additionally, the control bank insertion limits control the reactivity that could be added in the event of a rod ejection accident, and the shutdown and control bank insertion limits ensure the required SDM is maintained.

Operation within the subject LCO limits will ~~prevent~~ limit fuel cladding failures that would breach the primary fission product barrier and release fission products to the reactor coolant in the event of a loss of coolant accident (LOCA), loss of flow, ejected rod, or other accident requiring termination by a Reactor Trip System (RTS) trip function. 5

APPLICABLE SAFETY ANALYSES

The shutdown and control bank ~~insertion~~ maintain limits, AFD, and QPTR LCOs are required to ~~prevent~~ limit power distributions that ~~could result in~~ fuel cladding failures to within acceptable limits in the event of a LOCA, loss of flow, ejected rod, or other accident requiring termination by an RTS trip function. 5

(continued)

Rev. 0

BASES

APPLICABLE SAFETY ANALYSES (continued)

The acceptance criteria for addressing ~~shutdown and~~ control bank insertion limits and inoperability or misalignment are that:

a. There be no violations of:

1. specified acceptable fuel design limits, or
2. Reactor Coolant System pressure boundary integrity; and

b. The core remains subcritical after accident transients.

As such, the shutdown and control bank insertion limits affect safety analysis involving core reactivity and power distributions (Ref. 3).

The SDM requirement is ensured by limiting the control ~~and shutdown~~ bank insertion limits so that allowable inserted worth of the RCCAs is such that sufficient reactivity is available in the rods to shut down the reactor to hot zero power with a reactivity margin that assumes the maximum worth RCCA remains fully withdrawn upon trip (Ref. ~~8~~ 3).

Operation at the insertion limits or AFD limits may approach the maximum allowable linear heat generation rate or peaking factor with the allowed QPTR present. Operation at the insertion limit may also indicate the maximum ejected RCCA worth could be equal to the limiting value in fuel cycles that have sufficiently high ejected RCCA worths.

The control ~~and shutdown~~ bank insertion limits ensure that safety analyses assumptions for SDM, ejected rod worth, and power distribution peaking factors are preserved (Ref. ~~8~~ 3).

The insertion limits satisfy Criterion 2 of the NRC Policy Statement, in that they are initial conditions assumed in the safety analysis. (10 CFR 50.36(c)(2)(ii))

LCO

The limits on control banks sequence, overlap, and physical insertion, as defined in the COLR, must be maintained because they serve the function of preserving power distribution, ensuring that the SDM is maintained, ensuring that ejected rod worth is maintained, and ensuring adequate

(continued)

Rev. 0

BASES

LCO (continued)

negative reactivity insertion is available on trip. The overlap between control banks provides more uniform rates of reactivity insertion and withdrawal and is imposed to maintain acceptable power peaking during control bank motion.

APPLICABILITY

Should the SR testing be suspended due to equipment malfunction with a rod bank below the insertion limits, the applicable Condition should be entered. (4)

The control bank sequence, overlap, and physical insertion limits shall be maintained with the reactor in MODES 1 and 2 with $k_{eff} \geq 1.0$. These limits must be maintained, since they preserve the assumed power distribution, ejected rod worth, SDM, and reactivity rate insertion assumptions. MODE 2 with $K_{eff} < 1.0$, and (8) Applicability in MODES 3, 4, and 5 is not required, since neither the power distribution nor ejected rod worth assumptions would be exceeded in these MODES.

The applicability requirements have been modified by a Note indicating the LCO requirements are suspended during the performance of SR 3.1.6.2. This SR verifies the freedom of the rods to move, and requires the control bank to move below the LCO limits, which would violate the LCO. TSTF-136 (5)

ACTIONS

A.1.1, A.1.2, A.2, B.1.1, B.1.2, and B.2

, except as allowed by Condition C

When the control banks are outside the acceptable insertion limits, they must be restored to within those limits. This restoration can occur in two ways: (4)

a. Reducing power to be consistent with rod position; or

b. Moving rods to be consistent with power. (4)

Insert from pg B3.1.43

Also, verification of SDM or initiation of boration to regain SDM is required within 1 hour, since the SDM in MODES 1 and 2 normally ensured by adhering to the control and shutdown bank insertion limits (see LCO 3.1.1, "SHUTDOWN MARGIN (SDM) (T_{avg} > 200°F)") has been upset. If control banks are not within their insertion limits, then SDM will be verified by performing a reactivity balance calculation, considering the effects listed in the BASES for SR 3.1.1.1. TSTF-136 (4)

(continued)

Rev. 0

BASES

ACTIONS

A.1.1, A.1.2, A.2, B.1.1, B.1.2, and B.2 (continued)

~~Similarly,~~ If the control banks are found to be out of sequence or in the wrong overlap configuration, they must be restored to meet the limits.

Move to pg B3.1-42

Operation beyond the LCO limits is allowed for a short time period in order to take conservative action because the simultaneous occurrence of either a LOCA, loss of flow accident, ejected rod accident, or other accident during this short time period, together with an inadequate power distribution or reactivity capability, has an acceptably low probability. 4

The allowed Completion Time of 2 hours for restoring the banks to within the insertion, sequence, and overlaps limits provides an acceptable time for evaluating and repairing minor problems without allowing the ~~plant~~ unit to remain in an unacceptable condition for an extended period of time. 5

Insert 4

D ~~A~~.1

If Required Actions A.1 and A.2, ~~or~~ B.1 and B.2 or C.1 and C.2 cannot be completed within the associated Completion Times, the ~~plant~~ unit must be brought to MODE ~~3~~ 2 with K_{eff} < 1.0, where the LCO is not applicable. The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging ~~plant~~ unit systems. 4 5 TSTF-238 5

SURVEILLANCE REQUIREMENTS

SR 3.1.~~7~~ 6.1 TSTF-136

This Surveillance is required to ensure that the reactor does not achieve criticality with the control banks below their insertion limits.

The estimated critical position (ECP) depends upon a number of factors, one of which is xenon concentration. If the ECP was calculated long before criticality, xenon concentration could change to make the ECP substantially in error. ~~Conversely, determining the ECP immediately before criticality could be an unnecessary burden. There are a number of unit parameters requiring operator attention at~~ 5

(continued)

Rev. 0

INSERT

C.1, and C.2

If Control Banks A, B, or C are inserted below the insertion limits, power operation may continue for up to 72 hours provided that the bank is not inserted more than 18 steps below the insertion limits, the control banks are within the operability and rod group alignment requirements provided in LCO 3.1.4, and the shutdown banks are within the insertion limits provided in LCO 3.1.5. The requirement to be in compliance with LCO 3.1.4 and LCO 3.1.5 ensures that the rods are trippable, and power distribution is acceptable during the time allowed to restore the inserted rod. If any of these Conditions are not met, Condition B must be applied.

The Completion Time of 72 hours is based on operating experience and provides an acceptable time for evaluating and repairing problems with the rod control system.

BASES

Verifying the predicted critical rod bank position

SURVEILLANCE REQUIREMENTS

SR 3.1.6.1 (continued) TSTF-136

~~that point. Performing the ECP calculation~~ within 4 hours prior to criticality avoids a large error from changes in xenon concentration, but allows the operator some flexibility to schedule the ~~ECP calculation~~ verification with other startup activities.

SR 3.1.6.2 TSTF 136

~~With an OPERABLE bank insertion limit monitor,~~ verification of the control bank insertion limits at a Frequency of 12 hours is sufficient ~~to ensure OPERABILITY of the bank insertion limit monitor and~~ to detect control banks that may be approaching the insertion limits since, normally, very little rod motion occurs in 12 hours. ~~If the insertion limit monitor becomes inoperable, verification of the control bank position at a Frequency of 4 hours is sufficient to detect control banks that may be approaching the insertion limits.~~ TSTF-140

SR 3.1.6.3 TSTF-136

When control banks are maintained within their insertion limits as checked by SR 3.1.6.2 above, it is unlikely that their sequence and overlap will not be in accordance with requirements provided in the COLR. A Frequency of 12 hours is consistent with the insertion limit check above in SR 3.1.6.2. TSTF-136 TSTF-136

REFERENCES

1. ~~10 CFR 50, Appendix A, GDC 10, GDC 26, GDC 28.~~ 1
2. 10 CFR 50.46.
3. FSAR, Chapter ~~[15]~~. 5 6
4. ~~FSAR, Chapter [15],~~ 2
5. ~~FSAR, Chapter [15].~~

UFSAR, Sections 3.1.6, 3.1.22, and 3.1.24.

Rev.0

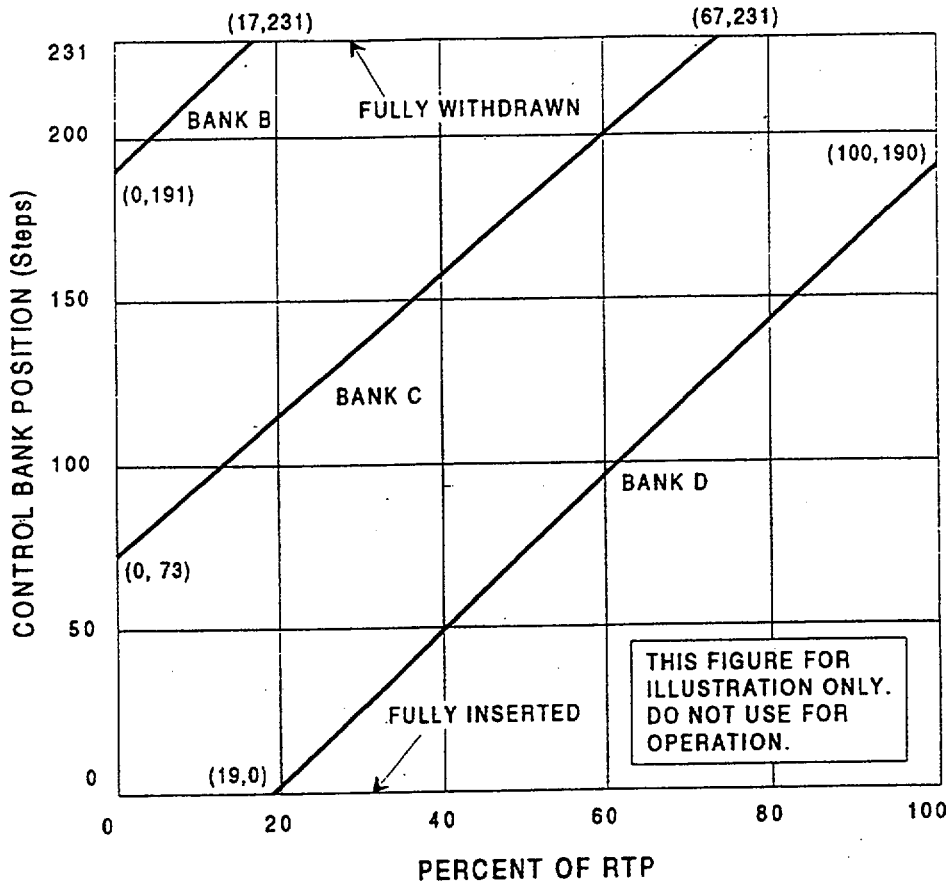


Figure B 3.1.~~0~~6-1 (page 1 of 1)
Control Bank Insertion vs. Percent RTP

TSTF-136

Rev.0

1. North Anna Units 1 and 2 were designed and constructed on the basis of the proposed General Design Criteria, published in 1966. Since February 20, 1971, when the General Design Criteria for Nuclear Power Plants, Appendix A to 10 CFR Part 50, were published, the Company attempted to comply with the intent of the newer criteria to the extent practical, recognizing previous design commitments. The NRC's Safety Evaluation Report for North Anna Units 1 and 2 reviewed the plant against 10 CFR Part 50, Appendix A and concluded that the facility design conforms to the intent of the newer criteria. The North Anna UFSAR contains discussions comparing the design of the plant to the 10 CFR 50, Appendix A, General Design Criteria. Bases references to the 10 CFR 50, Appendix A criteria have been replaced with references to the appropriate section of the UFSAR.

2. For North Anna, References 4 and 5 are the same as Reference 3. Therefore, References 4 and 5 have been deleted and Reference 3 used instead.

3. The criteria of the NRC Final Policy Statement on Technical Specifications Improvements have been included in 10 CFR 50.36(c)(2)(ii). Therefore, references in the ISTS Bases to the NRC Final Policy Statement are revised in the ITS Bases to reference 10 CFR 50.36.

4. The Bases are changed to reflect the plant-specific changes made to the specifications. Bases are inserted for new Condition C and the Bases for Conditions A, B, and D are revised to accommodate the new Condition.

5. Changes are made (additions, deletions, and/or changes) to the ISTS which reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.

6. The brackets have been removed and the proper plant specific information/value has been provided.

7. LCO 3.1.7 governs control bank insertion, sequence, and overlap limits. The Background section of the 3.1.7 Bases discusses insertion and overlap, but does not discuss sequence. A discussion of control bank sequence is added for completeness.

8. The Bases are changed to be consistent with the ITS.

9. The Bases are changed to reflect the fact that the North Anna fully withdrawn control bank position varies, and is specified in the COLR.

B 3.1 REACTIVITY CONTROL SYSTEM

B 3.1.8 7 Rod Position Indication TSTF-136

BASES

BACKGROUND

According to GDC 13 (Ref. 1), instrumentation to monitor variables and systems over their operating ranges during normal operation, anticipated operational occurrences, and accident conditions must be OPERABLE. LCO 3.1.8 is required to ensure OPERABILITY of the control rod position indicators to determine control rod positions and thereby ensure compliance with the control rod alignment and insertion limits. 7 TSTF-136 8

The OPERABILITY, including position indication, of the shutdown and control rods is an initial assumption in all safety analyses that assume rod insertion upon reactor trip. Maximum rod misalignment is an initial assumption in the safety analysis that directly affects core power distributions and assumptions of available SDM. Rod position indication is required to assess OPERABILITY and misalignment.

Mechanical or electrical failures may cause a control rod to become inoperable or to become misaligned from its group. Control rod inoperability or misalignment may cause increased power peaking, due to the asymmetric reactivity distribution and a reduction in the total available rod worth for reactor shutdown. Therefore, control rod alignment and OPERABILITY are related to core operation in design power peaking limits and the core design requirement of a minimum SDM. 8

Limits on control rod alignment and OPERABILITY have been established, and all rod positions are monitored and controlled during power operation to ensure that the power distribution and reactivity limits defined by the design power peaking and SDM limits are preserved. 8

Rod cluster control assemblies (RCCAs), or rods, are moved out of the core (up or withdrawn) or into the core (down or inserted) by their control rod drive mechanisms. The RCCAs are divided among control banks and shutdown banks. Each bank may be further subdivided into two groups to provide for precise reactivity control. 5 4 is

(continued)

Rev 0

BASES

BACKGROUND (continued)

The axial position of shutdown rods and control rods are determined by two separate and independent systems: the Bank Demand Position Indication System (commonly called group step counters) and the ~~Digital~~ Rod Position Indication (DRPI) System. 2

The Bank Demand Position Indication System counts the pulses from the Rod Control System that move the rods. There is one step counter for each group of rods. Individual rods in a group all receive the same signal to move and should, therefore, all be at the same position indicated by the group step counter for that group. The Bank Demand Position Indication System is considered highly precise (± 1 step or ± 5/8 inch). If a rod does not move one step for each demand pulse, the step counter will still count the pulse and incorrectly reflect the position of the rod.

The DRPI System provides a highly accurate indication of actual ~~control~~ rod position, but at a lower precision than the step counters. This system is based on inductive analog signals from a series of coils spaced along a hollow tube with a center to center distance of 3.75 inches, which is 6 steps. To increase the reliability of the system, the inductive coils are connected alternately to data system A or B. Thus, if one system fails, the DRPI will go on half accuracy with an effective coil spacing of 7.5 inches, which is 12 steps. Therefore, the normal indication accuracy of the DRPI System is ± 6 steps (± 3.75 inches), and the maximum uncertainty is ± 12 steps (± 7.5 inches). With an indicated deviation of 12 steps between the group step counter and DRPI, the maximum deviation between actual rod position and the demand position could be 24 steps, or 15 inches. 2 2

The RPI system is capable of monitoring rod position within at least +/- 12 steps.

APPLICABLE SAFETY ANALYSES

Control and shutdown rod position accuracy is essential during power operation. Power peaking, ejected rod worth, or SDM limits may be violated in the event of a Design Basis Accident (Ref. 2), with control or shutdown rods operating outside their limits undetected. Therefore, the acceptance criteria for rod position indication is that rod positions must be known with sufficient accuracy in order to verify the core is operating within the group sequence, overlap, design peaking limits, ejected rod worth, and with minimum SDM (LCO 3.1.~~6~~ 5, "Shutdown Bank Insertion Limits," and TSTF-136

(continued)

Rev. 0

BASES

APPLICABLE SAFETY ANALYSES (continued)

LCO 3.1.0, "Control Bank Insertion Limits"). The rod positions must also be known in order to verify the alignment limits are preserved (LCO 3.1.0, "Rod Group Alignment Limits"). Control rod positions are continuously monitored to provide operators with information that ensures the plant is operating within the bounds of the accident analysis assumptions.

The control rod position indicator channels satisfy Criterion 2 of the NRC Policy Statement. The control rod position indicators monitor control rod position, which is an initial condition of the accident.

LCO

LCO 3.1.8 specifies that one DRPI System and one Bank Demand Position Indication System be OPERABLE for each control rod. For the control rod position indicators to be OPERABLE requires meeting the SR of the LCO and the following:

a. The DRPI System indicates within 12 steps of the group step counter demand position as required by LCO 3.1.0, "Rod Group Alignment Limits";

b. For the DRPI System there are no failed coils; and

c. The Bank Demand Indication System has been calibrated either in the fully inserted position or to the DRPI System.

The 12 step agreement limit between the Bank Demand Position Indication System and the DRPI System indicates that the Bank Demand Position Indication System is adequately calibrated, and can be used for indication of the measurement of control rod bank position.

A deviation of less than the allowable limit, given in LCO 3.1.0, in position indication for a single control rod, ensures high confidence that the position uncertainty of the corresponding control rod group is within the assumed values used in the analysis (that specified control rod group insertion limits).

These requirements ensure that control rod position indication during power operation and PHYSICS TESTS is accurate, and that design assumptions are not challenged.

(continued)

Rev. 0

BASES

LCO (continued)

OPERABILITY of the position indicator channels ensures that inoperable, misaligned, or mispositioned control rods can be detected. Therefore, power peaking, ejected rod worth, and SDM can be controlled within acceptable limits. 8

APPLICABILITY

The requirements on the DRPI and step counters are only applicable in MODES 1 and 2 (consistent with LCO 3.1.5, 4 LCO 3.1.6, and LCO 3.1.7), because these are the only MODES in which power is generated, and the OPERABILITY and alignment of rods have the potential to affect the safety of the plant. In the shutdown MODES, the OPERABILITY of the shutdown and control banks has the potential to affect the required SDM, but this effect can be compensated for by an increase in the boron concentration of the Reactor Coolant System. 2 TSTF-136 4

ACTIONS

The ACTIONS table is modified by a Note indicating that a separate Condition entry is allowed for each inoperable rod position indicator per group and each demand position indicator per bank. This is acceptable because the Required Actions for each Condition provide appropriate compensatory actions for each inoperable position indicator. TSTF-234

A.1

When one DRPI channel per group fails, the position of the rod can still be determined by use of the incore movable detectors. Based on experience, normal power operation does not require excessive movement of banks. If a bank has been significantly moved, the Required Action of B.1 or B.2 below is required. Therefore, verification of RCCA position within the Completion Time of 8 hours is adequate for allowing continued full power operation, since the probability of simultaneously having a rod significantly out of position and an event sensitive to that rod position is small. 2 TSTF-234

(continued)

Rev. 0

INSERT

The Required Action may also be satisfied by ensuring at least once per 8 hours that $F_Q(Z)$ satisfies LCO 3.2.1, $F^N_{\Delta H}$ satisfies LCO 3.2.2, and SHUTDOWN MARGIN is within the limits provided in the COLR, provided the nonindicating rods have not been moved.

BASES

ACTIONS (continued)

A.2

Reduction of THERMAL POWER to ≤ 50% RTP puts the core into a condition where rod position is not significantly affecting core peaking factors (Ref. 6. 2) 7

The allowed Completion Time of 8 hours is reasonable, based on operating experience, for reducing power to ≤ 50% RTP from full power conditions without challenging plant systems and allowing for rod position determination by Required Action A.1 above. unit 4

Insert

C

B.1 and B.2

, or B.1, as applicable,

These Required Actions clarify that when one or more rods with inoperable position indicators have been moved in excess of 24 steps in one direction, since the position was last determined, the Required Actions of A.1 and A.2 are still appropriate but must be initiated promptly under Required Action B.1 to begin verifying that these rods are still properly positioned, relative to their group positions. TSTF-234

C

If, within [4] hours, the rods positions have not been determined, THERMAL POWER must be reduced to ≤ 50% RTP within 8 hours to avoid undesirable power distributions that could result from continued operation at > 50% RTP, if one or more rods are misaligned by more than 24 steps. The allowed Completion Time of [4] hours provides an acceptable period of time to verify the rod positions. 5 5

D

B.1.1 and B.1.2 TSTF-234

With one demand position indicator per bank inoperable, the rod positions can be determined by the DRPI System. Since normal power operation does not require excessive movement of rods, verification by administrative means that the rod position indicators are OPERABLE and the most withdrawn rod and the least withdrawn rod are ≤ 12 steps apart within the allowed Completion Time of once every 8 hours is adequate.

(continued)

Rev. 0

INSERT

B.1, B.2, B.3 and B.4

When more than one RPI per group fail, additional actions are necessary to ensure that acceptable power distribution limits are maintained, minimum SDM is maintained, and the potential effects of rod misalignment on associated accident analyses are limited. Placing the Rod Control System in manual assures unplanned rod motion will not occur. Together with the indirect position determination available via movable incore detectors will minimize the potential for rod misalignment. The immediate Completion Time for placing the Rod Control System in manual reflects the urgency with which unplanned rod motion must be prevented while in this Condition.

Monitoring and recording reactor coolant T_{avg} help assure that significant changes in power distribution and SDM are avoided. The once per hour Completion Time is acceptable because only minor fluctuations in RCS temperature are expected at steady state plant operating conditions.

The position of the rods may be determined indirectly by use of the movable incore detectors. The Required Action may also be satisfied by ensuring at least once per 8 hours that $F_Q(Z)$ satisfies LCO 3.2.1, $F^N_{\Delta H}$ satisfies LCO 3.2.2, and SHUTDOWN MARGIN is within the limits provided in the COLR, provided the nonindicating rods have not been moved. Verification of control rod position once per 8 hours is adequate for allowing continued full power operation for a limited, 24 hour period, since the probability of simultaneously having a rod significantly out of position and an event sensitive to that rod position is small. The 24 hour Completion Time provides sufficient time to troubleshoot and restore the RPI system to operation while avoiding the plant challenges associated with a shutdown without full rod position indication.

Based on operating experience, normal power operation does not require excessive rod movement. If one or more rods has been significantly moved, the Required Action of C.1 or C.2 below is required.

BASES

ACTIONS (continued) 0 0.2 2 TSTF-234

Reduction of THERMAL POWER to ≤ 50% RTP puts the core into a condition where rod position is not significantly affecting core peaking factor limits (Ref. 8). The allowed Completion Time of 8 hours provides an acceptable period of time to verify the rod positions per Required Actions C.1.1 and C.1.2 or reduce power to ≤ 50% RTP. 7 TSTF-234

TSTF-234

E 0.1

If the Required Actions cannot be completed within the associated Completion Time, the ~~plant~~ Unit must be brought to a MODE in which the requirement does not apply. To achieve this status, the ~~plant~~ Unit must be brought to at least MODE 3 within 6 hours. The allowed Completion Time is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging ~~plant~~ Unit systems. 4

SURVEILLANCE REQUIREMENTS SR 3.1.0 9.1 TSTF-136

Insert

~~Verification that the DRPI agrees with the demand position within [12] steps ensures that the DRPI is operating correctly. Since the DRPI does not display the actual shutdown rod positions between 18 and 210 steps, only points within the indicated ranges are required in comparison.~~

~~The [18 month] Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for unnecessary plant transients if the SR were performed with the reactor at power. Operating experience has shown these components usually pass the SR when performed at a Frequency of once every [18 months.] Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.~~ 6

REFERENCES

1. ~~10 CFR 50, Appendix A, GDC 13.~~ 1
2. UFSAR, Chapter ~~[15]~~. 4 5
3. ~~FSAR, Chapter [15].~~ 7

UFSAR Section 3.1.9.

Rev.0

INSERT

Performing a CHANNEL CALIBRATION on each RPI channel ensures that the RPI electronics are operating properly. This CHANNEL CALIBRATION involves injecting a test signal into the RPI electronics and verifying or adjusting the calibration from that point forward. The CHANNEL CALIBRATION also verifies all alarms and indications, such as the Rod Bottom lights. The CHANNEL CALIBRATION does not include the coil stack, as it cannot be adjusted. The indicated RPI position is adjusted as needed to compensate for thermal drift. The 18 month Frequency has been shown by operating experience to be adequate.

1. North Anna Units 1 and 2 were designed and constructed on the basis of the proposed General Design Criteria, published in 1966. Since February 20, 1971, when the General Design Criteria for Nuclear Power Plants, Appendix A to 10 CFR Part 50, were published, the Company attempted to comply with the intent of the newer criteria to the extent practical, recognizing previous design commitments. The NRC's Safety Evaluation Report for North Anna Units 1 and 2 reviewed the plant against 10 CFR Part 50, Appendix A and concluded that the facility design conforms to the intent of the newer criteria. The North Anna UFSAR contains discussions comparing the design of the plant to the 10 CFR 50, Appendix A, General Design Criteria. Bases references to the 10 CFR 50, Appendix A criteria have been replaced with references to the appropriate section of the UFSAR.

2. North Anna utilizes an analog Rod Position Indication system, not a Digital Rod Position Indication System. The Bases have been changed to reflect the North Anna design.

3. The criteria of the NRC Final Policy Statement on Technical Specifications Improvements have been included in 10 CFR 50.36(c)(2)(ii). Therefore, references in the ISTS Bases to the NRC Final Policy Statement are revised in the ITS Bases to reference 10 CFR 50.36.

4. Changes are made (additions, deletions, and/or changes) to the ISTS which reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.

5. The brackets have been removed and the proper plant specific information/value has been provided.

6. The Bases are changed to reflect changes made to the specifications.

7. For North Anna, Reference 3 is the same as Reference 2. Therefore, Reference 2 has been deleted and Reference 3 is replaced with Reference 2 within the text.

8. For North Anna, the term "control rod" is reserved for rods in the four banks of control rods and the term "shutdown rod" is sued to refer to the rods in the two shutdown banks. The term "rod" is used to refer to either or both. The Bases are revised to make this distinction.

1

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.8 Primary Grade Water Flow Path Isolation Valves

BASES

BACKGROUND

During MODES 3, 4, and 5 operations, the isolation valves for primary grade water flow paths that are connected to the Reactor Coolant System (RCS) must be closed to prevent unplanned boron dilution of the reactor coolant. The isolation valves must be locked, sealed, or otherwise secured in the closed position.

The Chemical and Volume Control System is capable of supplying borated and unborated water to the RCS through various flow paths. Since a positive reactivity addition made by an uncontrolled reduction of the boron concentration is inappropriate during MODES 3, 4 and 5, isolation of all primary grade water flow paths prevents an unplanned boron dilution.

APPLICABLE SAFETY ANALYSIS

The possibility of an inadvertent boron dilution event (Ref. 1) occurring during MODES 3, 4, or 5 is precluded by adherence to this LCO, which requires that the primary grade water flow path be isolated. Closing the required valves prevents the flow of significant amounts of primary grade water to the RCS. The valves are used to isolate primary grade water flow paths. These valves have the potential to indirectly allow dilution of the RCS boron concentration. By isolating primary grade water flow paths, a safety analysis for an uncontrolled boron dilution accident is not required for MODES 3, 4 or 5.

The RCS boron concentration satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

This LCO requires that primary grade water be isolated from the RCS to prevent unplanned boron dilution during MODES 3, 4, and 5.

For Unit 1, primary grade water flow paths may be isolated from the RCS by closing valve 1-CH-217 or 1-CH-220, 1-CH-241, FCV-1114B and FCV-1113B. For Unit 2, primary grade water flow paths may be isolated from the RCS by closing valve 2-CH140, or 2-CH-160, 2-CH-156, FCV-2114B, and FCV-2113B.

The LCO is modified by a Note which allows the primary grade water flow path isolation valves to be opened under administrative control for planned boron dilution or makeup activities.

APPLICABILITY

This LCO is applicable in MODES 3, 4, and 5 to prevent an inadvertent boron dilution event by ensuring closure of all primary grade water flow paths.

In MODE 6, LCO 3.9.2, "Primary Grade Water Flow Path Isolation Valves - MODE 6," requires all primary grade water isolation valves to be closed to prevent an inadvertent boron dilution.

In MODES 1 and 2, the boron dilution accident was analyzed and was found to be capable of being mitigated.

ACTIONS

A.1, A.2, and A.3

Preventing inadvertent dilution of the reactor coolant boron concentration is dependent on maintaining the primary grade water flow path isolation valves locked, sealed, or otherwise secured closed, except as allowed under administrative control by the LCO Note. Because of the possibility of an inadvertent boron dilution, Required Action A.1 prohibits other positive reactivity additions while securing the isolation valves on the primary grade water system. The Completion Time of "Immediately" for suspending positive reactivity additions reflects the importance of preventing known positive reactivity additions so that any boron dilution event can be readily identified and terminated.

The Required Action A.2 Completion Time of 15 minutes for securing the isolation valves provides sufficient time to close and secure the isolation valves on the primary grade water flow paths while minimizing the probability for an unintentional dilution during the Completion Time. Securing the valves in the closed position ensures that the valves cannot be inadvertently opened.

ACTIONS (Continued)

The performance of Surveillance 3.1.1.1 under Required Action A.3 verifies that the SDM is within the limits provided in the COLR. It is performed to verify that the required SDM still exists and any inadvertent boron dilution that may have occurred has been detected and corrected. The Completion Time of 1 hour is reasonable, based on the time required to request and analyze an RCS water sample to determine the boron concentration and to compute the SDM.

SURVEILLANCE REQUIREMENTS

SR 3.1.8.1

The primary grade water flow path isolation valves are to be locked, sealed, or otherwise secured closed to isolate possible dilution paths. The likelihood of a significant reduction in the boron concentration during MODES 3, 4, and 5 is remote due to the large mass of borated water in the RCS and the fact that the specified primary grade water flow paths are isolated, precluding a dilution. The SHUTDOWN MARGIN is verified every 24 hours during MODES 3, 4, and 5 under SR 3.1.1.1. The Frequency is based on the time required to verify that the isolation valves in the utilized flow path are locked, sealed, or otherwise secured in the closed position following a boron dilution or makeup activity.

REFERENCES

1. UFSAR, Section 15.2.4.

1. The Bases for a specification on primary grade water flow path isolation has been added to the ITS. The specification supports the North Anna boron dilution accident analysis which assumes that a boron dilution event is precluded in MODES 3, 4, 5, and 6 due to isolation of the primary grade water flow paths. In MODE 6, primary grade water flow path isolation is governed by ITS 3.9.2.

TSTF-12 ITS 3.1.9

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.9 PHYSICS TESTS Exceptions—MODE 1

BASES

BACKGROUND

The primary purpose of the MODE 1 PHYSICS TESTS exceptions is to permit relaxations of existing LCOs to allow the performance of instrumentation calibration tests and special PHYSICS TESTS. The exceptions to LCO 3.2.3, "AXIAL FLUX DIFFERENCE (AFD)," and LCO 3.2.4, "QUADRANT POWER TILT RATIO (QPTR)" are most often appropriate for xenon stability tests. The exceptions to LCO 3.1.5, "Rod Group Alignment Limits"; LCO 3.1.6, "Shutdown Bank Insertion Limit"; and LCO 3.1.7, "Control Bank Insertion Limits," may be required in the event that it is necessary or desirable to do special PHYSICS TESTS involving abnormal rod or bank configurations.

Section XI of 10 CFR 50, Appendix B (Ref. 1), requires that a test program be established to ensure that structures, systems, and components will perform satisfactorily in service. All functions necessary to ensure that the specified design conditions are not exceeded during normal operation and anticipated operational occurrences must be tested. This testing is an integral part of the design, construction, and operation of the plant. Requirements for notification of the NRC, for the purpose of conducting tests and experiments, are specified in 10 CFR 50.59 (Ref. 2).

The key objectives of a test program are to (Ref. 3):

a. Ensure that the facility has been adequately designed;

b. Validate the analytical models used in the design and analysis;

c. Verify the assumptions used to predict unit response;

d. Ensure that installation of equipment at the facility has been accomplished, in accordance with the design; and

e. Verify that the operating and emergency procedures are adequate.

To accomplish these objectives, testing is performed prior to initial criticality; during startup, low power, power

(continued)

Rev. 0

TSTF-12 ITS 3.1.9

BASES

BACKGROUND (continued)

ascension, and at power operation; and after each refueling. The PHYSICS TESTS requirements for reload fuel cycles ensure that the operating characteristics of the core are consistent with the design predictions, and that the core can be operated as designed (Ref. 4).

PHYSICS TESTS procedures are written and approved in accordance with established formats. The procedures include all information necessary to permit a detailed execution of the testing required to ensure that the design intent is met. PHYSICS TESTS are performed in accordance with these procedures, and test results are approved prior to continued power escalation and long term power operation.

The PHYSICS TESTS required for reload fuel cycles (Ref. 4) in MODE 1 are listed below:

a. Neutron Flux Symmetry;

b. Power Distribution—Intermediate Power;

c. Power Distribution—Full Power; and

d. Critical Boron Concentration—Full Power.

The first test can be performed in either MODE 1 or 2, and the last three tests are performed in MODE 1. These and other supplementary tests may be required to calibrate the nuclear instrumentation or to diagnose operational problems. These tests may cause the operating controls and process variables to deviate from their LCO requirements during their performance. The last two tests are performed at ≥ 90% RTP.

[a. The Neutron Flux Symmetry Test measures the degree of azimuthal symmetry of the core neutron flux at as low a power level as practical, depending on the method used. The Flux Distribution Method uses incore flux detectors to measure the azimuthal flux distribution at selected locations with the core at ≤ 30% RTP.

b. The Power Distribution—Intermediate Power Test measures the power distribution of the reactor core at intermediate power levels between 40% and 75% RTP. This test uses the incore flux detectors to measure core power distribution.]

(continued)

Rev. 0

TSTF-12 ITS 3.1.9

BASES

BACKGROUND (continued)

c. The Power Distribution—Full Power Test measures the power distribution of the reactor core at ≥ 90% RTP using incore flux detectors.

d. The Critical Boron Concentration—Full Power Test simply measures the critical boron concentration at > 90% RTP, with all rods fully withdrawn, the lead control bank being at or near its fully withdrawn position, and with the core at equilibrium xenon conditions.

For initial startups, there are two currently required tests that violate the referenced LCO. The pseudo ejected rod test, performed at approximately 30% RTP, and the pseudo dropped rod test, performed at approximately 50% RTP, require individual rod misalignments that exceed the limits specified in the relevant LCO.

APPLICABLE SAFETY ANALYSES

The fuel is protected by an LCO, which preserves the initial conditions of the core assumed during the safety analyses. The methods for development of the LCO, which are superseded by this LCO, are described in the Westinghouse Reload Safety Evaluation Methodology Report (Ref. 5). The above mentioned PHYSICS TESTS, and other tests that may be required to calibrate nuclear instrumentation or to diagnose operational problems, may require the operating controls or process variables to deviate from their LCO limitations.

Reference 6 defines requirements for initial testing of the facility, including PHYSICS TESTS. Tables [14.1-1 and 14.1-2] (Ref. 6) summarize the zero, low power, and power tests. Requirements for reload fuel cycle PHYSICS TESTS are defined in ANSI/ANS-19.6.1-1985 (Ref. 4). Although these PHYSICS TESTS are generally accomplished within the limits for all LCOs, conditions may occur when one or more LCOs must be suspended to make completion of PHYSICS TESTS possible or practical. This is acceptable as long as the fuel design criteria are not violated. When one or more of the requirements specified in:

LCO 3.1.5, "Rod Group Alignment Limits";
LCO 3.1.6, "Shutdown Bank Insertion Limits";
LCO 3.1.7, "Control Bank Insertion Limits";
LCO 3.2.3, "AXIAL FLUX DIFFERENCE (AFD)"; or

(continued)

Rev. 0

TSTF-12 ITS 3.1.9

BASES

APPLICABLE SAFETY ANALYSES (continued)

LCO 3.2.4, "QUADRANT POWER TILT RATIO (QPTR)"

are suspended for PHYSICS TESTS, the fuel design criteria are preserved as long as the requirements of LCO 3.2.1, "Heat Flux Hot Channel Factor ($F_Q(Z)$)," and LCO 3.2.2, "Nuclear Enthalpy Rise Hot Channel Factor ($F^N_{\Delta H}$)," are satisfied, power level is maintained ≤ 85% RTP, and SDM is ≥ [1.6]% Δk/k. Therefore, LCO 3.1.9 requires surveillance of the hot channel factors and SDM to verify that their limits are not being exceeded.

PHYSICS TESTS include measurements of core nuclear parameters or the exercise of control components that affect process variables. Among the process variables involved are AFD and QPTR, which represent initial conditions of the unit safety analyses. Also involved are the movable control components (control and shutdown rods), which are required to shut down the reactor. The limits for these variables are specified for each fuel cycle in the COLR.

PHYSICS TESTS meet the criteria for inclusion in the Technical Specifications, since the component and process variable LCOs suspended during PHYSICS TESTS meet Criteria 1, 2, and 3 of the NRC Policy Statement.

Reference 7 allows special test exceptions to be included as part of the LCO that they affect. However, it was decided to retain this special test exception as a separate LCO because it was less cumbersome and provided additional clarity.

LCO

This LCO allows selected control rods and shutdown rods to be positioned outside their specified alignment limits and insertion limits to conduct PHYSICS TESTS in MODE 1, to verify certain core physics parameters. The power level is limited to ≤ 85% RTP and the power range neutron flux trip setpoint is set at 10% RTP above the PHYSICS TESTS power level with a maximum setting of 90% RTP. Violation of LCO 3.1.5, LCO 3.1.6, LCO 3.1.7, LCO 3.2.3, or LCO 3.2.4, during the performance of PHYSICS TESTS does not pose any threat to the integrity of the fuel as long as the requirements of LCO 3.2.1 and LCO 3.2.2 are satisfied and provided:

(continued)

Rev.0

TSTF-12 ITS 3.1.9

BASES

LCO (continued)

a. THERMAL POWER is maintained ≤ 85% RTP;

b. Power Range Neutron Flux—High trip setpoints are ≤ 10% RTP above the THERMAL POWER at which the test is performed, with a maximum setting of 90% RTP; and

c. SDM is ≥ [1.6]% Δk/k.

Operation with THERMAL POWER ≤ 85% RTP during PHYSICS TESTS provides an acceptable thermal margin when one or more of the applicable LCOs is out of specification. The Power Range Neutron Flux—High trip setpoint is reduced so that a similar margin exists between the steady state condition and the trip setpoint that exists during normal operation at RTP.

APPLICABILITY

This LCO is applicable in MODE 1 when performing PHYSICS TESTS. The applicable PHYSICS TESTS are performed at ≤ 85% RTP. Other PHYSICS TESTS are performed at full power but do not require violation of any existing LCO, and therefore do not require a PHYSICS TESTS exception. The PHYSICS TESTS performed in MODE 2 are covered by LCO 3.1.10, "PHYSICS TESTS Exceptions—MODE 2."

ACTIONS

A.1 and A.2

If the SDM requirement is not met, boration must be initiated promptly. A Completion Time of 15 minutes is adequate for an operator to correctly align and start the required systems and components. The operator should begin boration with the best source available for the plant conditions. Boration will be continued until SDM is within limit.

Suspension of PHYSICS TESTS exceptions requires restoration of each of the applicable LCOs to within specification.

(continued)

Rev.0

TSTF-12 ITS 3.1.9

BASES

ACTIONS (continued)

B.1 and B.2

When THERMAL POWER is > 85% RTP, the only acceptable actions are to reduce THERMAL POWER to ≤ 85% RTP or to suspend the PHYSICS TESTS exceptions. With the PHYSICS TESTS exceptions suspended, the PHYSICS TESTS may proceed if all other LCO requirements are met. Fuel integrity may be challenged with control rods or shutdown rods misaligned and THERMAL POWER > 85% RTP. The allowed Completion Time of 1 hour is reasonable, based on operating experience, for completing the Required Actions in an orderly manner and without challenging plant systems. This Completion Time is also consistent with the Required Actions of the LCOs that are suspended by the PHYSICS TESTS.

C.1 and C.2

When the Power Range Neutron Flux—High trip setpoints are > 10% RTP above the PHYSICS TESTS power level or > 90% RTP, the Reactor Trip System (RTS) may not provide the required degree of core protection if the trip setpoint is greater than the specified value.

The only acceptable actions are to restore the trip setpoint to the allowed value or to suspend the performance of the PHYSICS TESTS exceptions. The Completion Time of 1 hour is based on the practical amount of time it may take to restore the Neutron Flux—High trip setpoints to the correct value, consistent with operating plant safety. This Completion Time is consistent with the Required Actions of the LCOs that are suspended by the PHYSICS TESTS.

SURVEILLANCE REQUIREMENTS

SR 3.1.9.1

Verification that the THERMAL POWER level is ≤ 85% RTP will ensure that the required core protection is provided during the performance of PHYSICS TESTS. Control of the reactor power level is a vital parameter and is closely monitored during the performance of PHYSICS TESTS. A Frequency of 1 hour is sufficient for ensuring that the power level does not exceed the limit.

(continued)

Rev.0

TSTF-12 ITS 3.1.9

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.1.9.2

Verification of the Power Range Neutron Flux—High trip setpoints within 8 hours prior to initiation of the PHYSICS TESTS will ensure that the RTS is properly set to perform PHYSICS TESTS.

SR 3.1.9.3

The performance of SR 3.2.1.1 and SR 3.2.2.1 measures the core $F_Q(Z)$ and the $F^N_{\Delta H}$, respectively. If the requirements of these LCOs are met, the core has adequate protection from exceeding its design limits, while other LCO requirements are suspended. The Frequency of 12 hours is based on operating experience and the practical amount of time that it may take to run an incore flux map and calculate the hot channel factors.

SR 3.1.9.4

The SDM is verified by performing a reactivity balance calculation, considering the following reactivity effects:

a. Reactor Coolant System (RCS) boron concentration;

b. Control bank position;

c. RCS average temperature;

d. Fuel burnup based on gross thermal energy generation;

e. Xenon concentration;

f. Samarium concentration; and

g. Isothermal temperature coefficient (ITC).

Using the ITC accounts for Doppler reactivity in the calculation because the reactor is subcritical, and the fuel temperature will be changing at the same rate as the RCS. The Frequency of 24 hours is based on the generally slow change in required boron concentration and on the low probability of an accident without the required SDM.

(continued)

Rev. 0

TSTF-12 ITS 3.1.9

BASES (continued)

REFERENCES

1. 10 CFR 50, Appendix B, Section XI.
2. 10 CFR 50.59.
3. Regulatory Guide 1.68, Revision 2, August 1978.
4. ANSI/ANS-19.6.1-1985, December 13, 1985.
5. WCAP-9273-NP-A, "Westinghouse Reload Safety Evaluation Methodology Report", July 1985.
6. FSAR, Section [14].
7. WCAP-11618, November 1987, and Addendum 1, April 1989.

Rev. 0

 TSTF-12 TSTF-136

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.10 9 PHYSICS TESTS Exceptions—MODE 2 TSTF-12 TSTF-136

BASES

BACKGROUND

The primary purpose of the MODE 2 PHYSICS TESTS exceptions is to permit relaxations of existing LCOs to allow certain PHYSICS TESTS to be performed.

Section XI of 10 CFR 50, Appendix B (Ref. 1), requires that a test program be established to ensure that structures, systems, and components will perform satisfactorily in service. All functions necessary to ensure that the specified design conditions are not exceeded during normal operation and anticipated operational occurrences must be tested. This testing is an integral part of the design, construction, and operation of the plant. Requirements for notification of the NRC, for the purpose of conducting tests and experiments, are specified in 10 CFR 50.59 (Ref. 2). unit 2

The key objectives of a test program are to (Ref. 3):

a. Ensure that the facility has been adequately designed;

b. Validate the analytical models used in the design and analysis;

c. Verify the assumptions used to predict unit response;

d. Ensure that installation of equipment in the facility has been accomplished in accordance with the design; and

e. Verify that the operating and emergency procedures are adequate.

To accomplish these objectives, testing is performed prior to initial criticality, during startup, during low power operations, during power ascension, at high power, and after each refueling. The PHYSICS TESTS requirements for reload fuel cycles ensure that the operating characteristics of the core are consistent with the design predictions and that the core can be operated as designed (Ref. 4).

PHYSICS TESTS procedures are written and approved in accordance with established formats. The procedures include

(continued)

Rev. 0

BASES

BACKGROUND (continued)

all information necessary to permit a detailed execution of the testing required to ensure that the design intent is met. PHYSICS TESTS are performed in accordance with these procedures and test results are approved prior to continued power escalation and long term power operation.

The PHYSICS TESTS required for reload fuel cycles (Ref. 4) in MODE 2 are listed below:

a. Critical Boron Concentration—Control Rods Withdrawn;

b. Critical Boron Concentration—Control Rods Inserted;

c. Control Rod Worth:

d. Isothermal Temperature Coefficient (ITC); and

e. Neutron Flux Symmetry.

The first four tests are performed in MODE 2, and the last test can be performed in either MODE 1 or 2. These and other supplementary tests may be required to calibrate the nuclear instrumentation or to diagnose operational problems. These tests may cause the operating controls and process variables to deviate from their LCO requirements during their performance.

a. The Critical Boron Concentration—Control Rods Withdrawn Test measures the critical boron concentration at hot zero power (HZP). With all rods out, the lead control bank is at or near its fully withdrawn position. HZP is where the core is critical (k_{eff} = 1.0), and the Reactor Coolant System (RCS) is at design temperature and pressure for zero power. Performance of this test should not violate any of the referenced LCOs.

b. The Critical Boron Concentration—Control Rods Inserted Test measures the critical boron concentration at HZP, with a bank having a worth of at least 1% Δk/k when fully inserted into the core. This test is used to measure the boron reactivity coefficient. With the core at HZP and all banks fully withdrawn, the boron concentration of the reactor coolant is gradually lowered in a continuous manner. The selected bank is then inserted to make up for the decreasing boron

(continued)

Rev.0

INSERT

The Differential Boron Worth Test determines if the measured differential boron worth is consistent with the predicted value. With the core at HZP, the change in equilibrium boron concentration is determined at different rod bank positions. As the rod bank or banks are moved, the reactivity change is measured using a reactivity computer. The measured reactivity change is divided by the difference in measured critical boron concentrations to determine the differential boron worth. The insertion of the rod bank could result in violation LCO 3.1.4, "Rod Group Alignment Limits"; LCO 3.1.5, "Shutdown Bank Insertion Limits"; or LCO 3.1.6, "Control Bank Insertion Limits."

TSTF-12
TSTF-136

BASES

BACKGROUND (continued)

concentration until the selected bank has been moved over its entire range of travel. The reactivity resulting from each incremental bank movement is measured with a reactivity computer. The difference between the measured critical boron concentration with all rods fully withdrawn and with the bank inserted is determined. The boron reactivity coefficient is determined by dividing the measured bank worth by the measured boron concentration difference. Performance of this test could violate LCO 3.1.5, "Rod Group Alignment Limits"; LCO 3.1.6, "Shutdown Bank Insertion Limit"; or LCO 3.1.7, "Control Bank Insertion Limits."

c. The Control Rod Worth Test is used to measure the reactivity worth of selected control banks. This test is performed at HZP and has three alternative methods of performance. The first method, the Boron Exchange Method, varies the reactor coolant boron concentration and moves the selected control bank in response to the changing boron concentration. The reactivity changes are measured with a reactivity computer. This sequence is repeated for the remaining control banks. The second method, the Rod Swap Method, measures the worth of a predetermined reference bank using the Boron Exchange Method above. The reference bank is then nearly fully inserted into the core. The selected bank is then inserted into the core as the reference bank is withdrawn. The HZP critical conditions are then determined with the selected bank fully inserted into the core. The worth of the selected bank is inferred, based on the position of the reference bank with respect to the selected bank. This sequence is repeated as necessary for the remaining control banks. The third method, the Boron Endpoint Method, moves the selected control bank over its entire length of travel and then varies the reactor coolant boron concentration to achieve HZP criticality again. The difference in boron concentration is the worth of the selected control bank. This sequence is repeated for the remaining control banks. Performance of this test could violate LCO 3.1.4, LCO 3.1.5, or LCO 3.1.6.

Bank

TSTF-136

d. The ITC Test measures the ITC of the reactor. This test is performed at HZP and has two methods of

(continued)

Rev.0

BASES

BACKGROUND (continued)

performance. The first method, the Slope Method, varies RCS temperature in a slow and continuous manner. The reactivity change is measured with a reactivity computer as a function of the temperature change. The ITC is the slope of the reactivity versus the temperature plot. The test is repeated by reversing the direction of the temperature change, and the final ITC is the average of the two calculated ITCs. The second method, the Endpoint Method, changes the RCS temperature and measures the reactivity at the beginning and end of the temperature change. The ITC is the total reactivity change divided by the total temperature change. The test is repeated by reversing the direction of the temperature change, and the final ITC is the average of the two calculated ITCs. Performance of this test could violate LCO 3.4.2, "RCS Minimum Temperature for Criticality."

or more

or more

e. The Flux Symmetry Test measures the degree of azimuthal symmetry of the neutron flux at as low a power level as practical, depending on the test method employed. This test can be performed at HZP (Control Rod Worth Symmetry Method) or at ≤ 30% RTP (Flux Distribution Method). The Control Rod Worth Symmetry Method inserts a control bank, which can then be withdrawn to compensate for the insertion of a single control rod from a symmetric set. The symmetric rods of each set are then tested to evaluate the symmetry of the control rod worth and neutron flux (power distribution). A reactivity computer is used to measure the control rod worths. Performance of this test could violate LCO 3.1.5, LCO 3.1.6, or LCO 3.1.7. The Flux Distribution Method uses the incore flux detectors to measure the azimuthal flux distribution at selected locations with the core at ≤ 30% RTP.

APPLICABLE SAFETY ANALYSES

The fuel is protected by LCOs that preserve the initial conditions of the core assumed during the safety analyses. The methods for development of the LCOs that are excepted by this LCO are described in the Westinghouse Reload Safety Evaluation Methodology Report (Ref. 5). The above mentioned PHYSICS TESTS, and other tests that may be required to calibrate nuclear instrumentation or to diagnose operational

(continued)

Rev. 0

TSTF-12
TSTF-136

BASES

APPLICABLE SAFETY ANALYSES (continued)

problems, may require the operating control or process variables to deviate from their LCO limitations.

The FSAR defines requirements for initial testing of the facility, including PHYSICS TESTS. Tables 14.1-1 14.1-2 and 14.1-2 summarize the zero, low power, and power tests. Requirements for reload fuel cycle PHYSICS TESTS are defined in ANSI/ANS-19.6.1-1985 (Ref. 4). Although these PHYSICS TESTS are generally accomplished within the limits for all LCOs, conditions may occur when one or more LCOs must be suspended to make completion of PHYSICS TESTS possible or practical. This is acceptable as long as the fuel design criteria are not violated. When one or more of the requirements specified in LCO 3.1.6, "Moderator Temperature Coefficient (MTC)," LCO 3.1.8, LCO 3.1.6, LCO 3.1.2, and LCO 3.4.2 are suspended for PHYSICS TESTS, the fuel design criteria are preserved as long as the power level is limited to ≤ 5% RTP, the reactor coolant temperature is kept ≥ 531°F, and SDM is ≥ [1.6]% Δk/k. within the limits provided in the COLR

TSTF-136

TSTF-9

The PHYSICS TESTS include measurement of core nuclear parameters or the exercise of control components that affect process variables. Among the process variables involved are AFD and QPTR, which represent initial conditions of the unit safety analyses. Also involved are the movable control components (control and shutdown rods), which are required to shut down the reactor. The limits for these variables are specified for each fuel cycle in the COLR. PHYSICS TESTS meet the criteria for inclusion in the Technical Specifications, since the components and process variable LCOs suspended during PHYSICS TESTS meet Criteria 1, 2, and 3 of the NRC Policy Statement.

banks

Insert

TSTF-154

Reference 8 allows special test exceptions (STEs) to be included as part of the LCO that they affect. It was decided, however, to retain this STE as a separate LCO because it was less cumbersome and provided additional clarity.

LCO

This LCO allows the reactor parameters of MTC and minimum temperature for criticality to be outside their specified limits. In addition, it allows selected control and shutdown rods to be positioned outside of their specified alignment and insertion limits. Operation beyond specified

banks

(continued)

TSTF-315

One Power Range Neutron Flux channel may be bypassed, reducing the number of required channels from "4" to "3," to provide input to the reactivity computer.

Rev 0

INSERT

As described in LCO 3.0.7, compliance with Test Exception LCOs is optional and, therefore, no criteria of 10 CFR 50.36(c)(2)(ii) apply. Test Exception LCOs provide flexibility to perform certain operations by appropriately modifying requirements of other LCOs. A discussion of the criteria satisfied for the other LCOs is provided in their respective Bases.

 TSTF-12 TSTF-136

BASES

LCO (continued)

limits is permitted for the purpose of performing PHYSICS TESTS and poses no threat to fuel integrity, provided the SRs are met.

The requirements of LCO 3.1.~~4~~ 3, LCO 3.1.~~5~~ 4, LCO 3.1.~~6~~ 5, LCO 3.1.~~7~~ 6, and LCO 3.4.2 may be suspended during the performance of PHYSICS TESTS provided: } TSTF-136

a. RCS lowest loop average temperature is ≥ ~~[531]~~ °F; ~~and~~ 4 TSTF-14

b. SDM is ~~≥ [1.6]% Δk/k~~ within the limit provided in the COLR; and TSTF-9 TSTF-14

c. THERMAL POWER is ≤ 5% RTP. TSTF-14

APPLICABILITY

This LCO is applicable ~~in MODE 2~~ when performing low power PHYSICS TESTS. ~~The applicable PHYSICS TESTS are performed in MODE 2 at NZP. Other PHYSICS TESTS are performed in MODE 1 and are addressed in LCO 3.1.9, "PHYSICS TESTS Exceptions—MODE 1."~~ } TSTF-256

Insert

TSTF-12

ACTIONS

A.1 and A.2

If the SDM requirement is not met, boration must be initiated promptly. A Completion Time of 15 minutes is adequate for an operator to correctly align and start the required systems and components. The operator should begin boration with the best source available for the ~~plant~~ unit conditions. Boration will be continued until SDM is within limit. 2

Suspension of PHYSICS TESTS exceptions requires restoration of each of the applicable LCOs to within specification.

B.1

When THERMAL POWER is > 5% RTP, the only acceptable action is to open the reactor trip breakers (RTBs) to prevent operation of the reactor beyond its design limits. Immediately opening the RTBs will shut down the reactor and prevent operation of the reactor outside of its design limits.

(continued)

Rev.0

INSERT

The Applicability is states as "during PHYSICS TESTS initiated in MODE 2" to ensure that the 5% RTP maximum power level is not exceeded. Should the THERMAL POWER exceed 5% RTP and, consequently, enter MODE 1, this Applicability statement prevents exiting the Specification and its Required Action.

BASES

ACTIONS (continued)

C.1

When the RCS lowest T_{avg} is < 531°F, the appropriate action is to restore T_{avg} to within its specified limit. The allowed Completion Time of 15 minutes provides time for restoring T_{avg} to within limits without allowing the ~~plant~~ unit 2 to remain in an unacceptable condition for an extended period of time. Operation with the reactor critical and with temperature below 531°F could violate the assumptions for accidents analyzed in the safety analyses.

D.1

If the Required Actions cannot be completed within the associated Completion Time, the ~~plant~~ unit must be brought to a MODE in which the requirement does not apply. To achieve this status, the ~~plant~~ unit must be brought to at least MODE 3 within an additional 15 minutes. The Completion Time of 15 additional minutes is reasonable, based on operating experience, for reaching MODE 3 in an orderly manner and without challenging ~~plant~~ unit 2 systems.

SURVEILLANCE REQUIREMENTS

SR 3.1.~~10~~ 9.1 TSTF-12 TSTF-136

The power range and intermediate range neutron detectors must be verified to be OPERABLE in MODE 2 by LCO 3.3.1, "Reactor Trip System (RTS) Instrumentation." A CHANNEL OPERATIONAL TEST is performed on each power range and intermediate range channel ~~within 12 hours~~ prior to initiation of the PHYSICS TESTS. This will ensure that the RTS is properly aligned to provide the required degree of core protection during the performance of the PHYSICS TESTS. TSTF-108

~~The 12 hour time limit is sufficient to ensure that the instrumentation is OPERABLE shortly before initiating PHYSICS TESTS.~~ TSTF-108 Insert 5

SR 3.1.~~10~~ 9.2 TSTF-12 TSTF-136

Verification that the RCS lowest loop T_{avg} is ≥ 531°F will ensure that the unit is not operating in a condition that could invalidate the safety analyses. Verification of the RCS temperature at a Frequency of 30 minutes during the

(continued)

Rev. 0

INSERT

Performance of the normally scheduled COT is sufficient to ensure the equipment is OPERABLE. LCO 3.3.1 requires a COT on the power range and intermediate range channels every 92 days. These Frequencies have been determined to be sufficient for verification that the equipment is working properly. Because initiation of PHYSICS TESTS does not affect the ability of the equipment to perform its function or the RTS trip capability, and does not invalidate the previous Surveillances, requiring the testing to be performed at a fixed time prior to the initiation of PHYSICS TESTS has no benefit.

TSTF-12
TSTF-136

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.~~10~~ 9.2 (continued)

TSTF-12
TSTF-136

performance of the PHYSICS TESTS will ensure that the initial conditions of the safety analyses are not violated.

TSTF-14

Insert

SR 3.1.~~10~~ 9.~~2~~ 4

TSTF-12
TSTF-136
TSTF-14

The SDM is verified by performing a reactivity balance calculation, considering the following reactivity effects:

a. RCS boron concentration;

b. ~~Control~~ Rod bank position; 1

c. RCS average temperature;

d. Fuel burnup based on gross thermal energy generation;

e. Xenon concentration;

f. Samarium concentration; ~~and~~

g. Isothermal temperature coefficient (ITC), when below the point of adding heat (POAH);

h. Moderator Defect when above the POAH; and

i. Doppler Defect when above the POAH.

TSTF-249

Using the ITC accounts for Doppler reactivity in this calculation ~~because~~ when the reactor is subcritical or critical but below the POAH, and the fuel temperature will be changing at the same rate as the RCS.

The Frequency of 24 hours is based on the generally slow change in required boron concentration and on the low probability of an accident occurring without the required SDM.

REFERENCES

1. 10 CFR 50, Appendix B, Section XI.

2. 10 CFR 50.59.

3. Regulatory Guide 1.68, Revision 2, August, 1978.

4. ANSI/ANS-19.6.1-~~1985~~ 1997, ~~December 13, 1985~~ August 22, 1997. 1

(continued)

Rev.0

INSERT

SR 3.1.9.3

Verification that the THERMAL POWER is ≤ 5% RTP will ensure that the unit is not operating in a condition that could invalidate the safety analyses. Verification of the THERMAL POWER at a Frequency of 30 minutes during the performance of PHYSICS TESTS will ensure that the initial conditions of the safety analyses are not violated.

TSTF-12
TSTF-136

BASES

REFERENCES (continued)

~~5.~~ 6 ~~WCAP-9273-NP-A, "Westinghouse Reload Safety Evaluation Methodology Report," July 1985.~~ } 2

~~6.~~ 7 WCAP-11618, including Addendum 1, April 1989. 1

VEP-FRD-42, Rev. 1A, "Reload Nuclear Design Methodology," September 1986.

5. Letter from W.L. Stewart to NRC, "Virginia Electric and Power Company, Surry Power Station, Units 1 and 2, North Anna Power station, Units 1 and 2, Modification of Startup Physics Testing Program Inspector Follow-Up Item 280, 281/88-29-01," dated 12/8/89.

Rev. 0

TSTF-12 ITS 3.1.9

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.11 SHUTDOWN MARGIN (SDM) Test Exception

BASES

BACKGROUND

The primary purpose of the SDM test exception is to permit relaxation of the SDM requirements during the measurement of control rod worths in MODE 2 during PHYSICS TESTS.

Section XI of 10 CFR 50, Appendix B (Ref. 1), requires that a test program be established to ensure that structures, systems, and components will perform satisfactorily in service. All functions necessary to ensure that the specified design conditions are not exceeded during normal operation and anticipated operational occurrences must be tested. This testing is an integral part of the design, construction, and operation of the plant. Requirements for notification of the NRC, for the purpose of conducting tests and experiments, are specified in 10 CFR 50.59 (Ref. 2).

The key objectives of a test program are to (Ref. 3):

a. Ensure that the facility has been adequately designed;

b. Validate the analytical models used in the design and analysis;

c. Verify the assumptions used to predict unit response;

d. Ensure that installation of equipment at the facility has been accomplished in accordance with the design; and

e. Verify that operating and emergency procedures are adequate.

To achieve these objectives, testing is performed prior to initial criticality, during startup, low power, power ascension, and at power operation, and after each refueling. The PHYSICS TESTS requirements for reload fuel cycles ensure that the operating characteristics of the core are consistent with the design predictions and that the core can be operated as designed (Ref. 4).

PHYSICS TEST procedures are written and approved, in accordance with established formats. The procedures include

(continued)

Rev. 0

TSTF-12 ITS 3.1.9

BASES

BACKGROUND (continued)

all information necessary to permit a detailed execution of the testing required to ensure that the design intent is met. PHYSICS TESTS are performed in accordance with these procedures, and test results are approved prior to continued power escalation and long term power operation.

During the PHYSICS TESTS measurements of control rod worth, it may be necessary to align individual rods and banks in certain configurations and utilize boron concentrations that do not provide sufficient SDM to meet the normal requirements. In this situation, it is necessary to invoke special test exceptions (STEs) to allow the necessary PHYSICS TESTS to be completed.

APPLICABLE SAFETY ANALYSES

Special PHYSICS TESTS may require operating the core under controlled conditions for short periods of time with less than the normally required SDM. As such, these tests are not covered by any safety analysis calculations.

Under the acceptance criteria to allow suspension of certain LCOs for PHYSICS TESTS, fuel damage criteria are not to be exceeded. Even if an accident occurs during PHYSICS TESTS with one or more LCOs suspended, fuel damage criteria are preserved because adequate limits on power distribution and shutdown capability are maintained during PHYSICS TESTS.

Reference 5 defines the requirements for initial testing of the facility, including PHYSICS TESTS. Requirements for reload fuel cycle PHYSICS TESTS are defined in ANSI/ANS-19.6.1-1985 (Ref. 4). PHYSICS TESTS for reload fuel cycles are given in Table 1 of ANSI/ANS-19-6.1-1985. Although these PHYSICS TESTS are generally accomplished within the limits of all LCOs, Conditions may occur when one or more LCOs must be suspended to make completion of PHYSICS TESTS possible or practical. This is acceptable as long as the fuel design criteria are not violated. As long as the linear heat rate remains within its limit, fuel design criteria are preserved.

PHYSICS TESTS meet the criteria for inclusion in the Technical Specifications, since the components and process variable LCOs suspended during PHYSICS TESTS meet Criteria 1, 2, and 3 of the NRC Policy Statement.

(continued)

Rev. 0

TSTF-12 ITS 3.1.9

BASES (continued)

LCO

This LCO provides an exemption to the SDM requirements under controlled conditions. These conditions require that at least the highest estimated control rod worths be available for trip insertion. It is assumed that this available negative reactivity will be sufficient to shut down the core if required, assuming there is not a concurrent boron dilution or cooldown event. This exemption is allowed even though there are no bounding safety analyses, because the tests are performed under close supervision and provide valuable information on control rod worth and core SDM.

APPLICABILITY

This LCO is only applicable in MODE 2, and then only during actual measurement of control rod worths because this is the only time the exception is required.

ACTIONS

A.1

If one or more control rods are not fully inserted and the available trip reactivity from OPERABLE control rods is less than the highest estimated control rod worth, the SDM, assumed for the test conditions, may not be available. Under these conditions, it is necessary to promptly restore the SDM to within limits.

The allowed Completion Time of 15 minutes ensures prompt action and provides an acceptable time for initiating boration to restore SDM, without allowing the core to remain in an unacceptable condition for an extended period of time.

B.1

If all control rods are fully inserted, and the reactor is subcritical by less than the highest estimated control rod worth, the SDM, assumed for the test conditions, may not be available. Under these conditions, it is necessary to promptly restore the SDM to within limits.

The allowed Completion Time of 15 minutes provides an acceptable time for initiating boration to restore SDM, without allowing the core to remain in an unacceptable condition for an extended period of time.

(continued)

Rev.0

TSTF-12 ITS 3.1.9

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.1.11.1

In order to establish an acceptable SDM during the measurement of control rod worths, it is necessary to know the position of each control rod. A test Frequency of 2 hours is reasonable, based on normal control rod motion during control rod worth measurements.

SR 3.1.11.1 has been modified by a Note establishing that the position of only those control rods not fully inserted must be determined. It is assumed that the position and worth of fully inserted control rods is known.

SR 3.1.11.2

One of the assumptions made in granting an STE for SDM, is that all control rods not fully inserted will fully insert when tripped. This Surveillance is performed to verify that fact.

The Frequency of 24 hours prior to reducing the plant SDM below the normal requirements is acceptable, based on the assumption that the control rods will remain OPERABLE and trippable for 24 hours and during the performance of the test.

SR 3.1.11.2 has been modified by a Note establishing that this Surveillance is only required for control rods not fully inserted. During the performance of control rod worth measurements, certain control rods remain fully inserted. Since these rods are not relied on to trip, there is no need to demonstrate that they will fully insert when tripped.

REFERENCES

1. 10 CFR 50, Appendix B, Section XI.
2. 10 CFR 50.59.
3. Regulatory Guide 1.68, Revision 2, August 1978.
4. ANSI/ANS-19.6.1-1985, December 13, 1985.
5. FSAR, Chapter [14].

Rev.0

1. The description of PHYSICS TESTS required for reload fuel cycles is revised to be consistent with the current guidance, ANSI/ANS 19.6.1-1997, and the Company startup physics testing program.

2. Changes are made (additions, deletions, and/or changes) to the ISTS which reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.

3. The criteria of the NRC Final Policy Statement on Technical Specifications Improvements have been included in 10 CFR 50.36(c)(2)(ii). Therefore, references in the ISTS Bases to the NRC Final Policy Statement are revised in the ITS Bases to reference 10 CFR 50.36.

4. The brackets have been removed and the proper plant specific information/value has been provided.

5. The Bases are revised to be consistent with the ITS.

SECTION 3.1 - REACTIVITY CONTROL SYSTEMS

CURRENT TECHNICAL SPECIFICATIONS

MARKUP AND DISCUSSION OF CHANGES

UNIT 1

ITS 3.1.1

A.1

9-9-85

ITS

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

SHUTDOWN MARGIN ~~- T_{avg} > 200°F~~ A.2

LIMITING CONDITION FOR OPERATION A.3

LCO 3.1.1

3.1.1.1 The SHUTDOWN MARGIN shall be ~~≥ 1.77% Δk/k~~. within the limits provided in the COLR LA.1

APPLICABILITY: MODES 1, 2#, 3, and 4. LA.1 A.4

with K_{eff} < 1.0

ACTION: not within limit within 15 minutes L.1

Action A

With the SHUTDOWN MARGIN ~~< 1.77% Δk/k~~, ~~immediately~~ initiate ~~and continue~~ boration ~~at ≤ 10 gpm of 12,950 ppm boric acid solution or equivalent~~ until the required SHUTDOWN MARGIN is restored. L.2

SURVEILLANCE REQUIREMENTS

SR 3.1.1.1

4.1.1.1.1 Verify The SHUTDOWN MARGIN ~~shall be determined to be ≥ 1.77% Δk/k~~: is within limit LA.1

Action 3.1.4.A.1.1
Action 3.1.4.B.1.1
SPM definition

a. Within one hour after detection of an inoperable control rod(s) and at least once per 12 hours thereafter while the rod(s) is inoperable. If the inoperable control rod 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 control rod(s). ⟨See ITS 3.1.4⟩

b. When in MODES 1 or 2#, at least once per 12 hours by verifying that control bank withdrawal is within the 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 control rod position is within the limits of Specification 3.1.3.6. ⟨See ITS 3.1.6⟩

~~*See Special Test Exception 3.10.1~~ A.4

#With $K_{eff} \geq 1.0$

##With K_{eff} <1.0 ⟨See ITS 3.1.6⟩

page 1 of 3

Rev. 0

ITS 3.1.1

A.1

ITS

REACTIVITY CONTROL SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

d. Prior to initial operation above 5% RATED THERMAL POWER after each fuel loading, by consideration of the factors of e below, with the control banks at the maximum insertion limit of Specification 3.1.3.6.

L.3

SR3.1.1.1

e. When in MODES 3 or 4, at least once per 24 hours by consideration of the following factors:

M.1

1. Reactor coolant system boron concentration,
2. Control rod position,
3. Reactor coolant system average temperature,
4. Fuel burnup based on gross thermal energy generation,
5. Xenon concentration, and
6. Samarium concentration.

LA.2

4.1.1.1.2 The overall core reactivity balance shall be compared to predicted values to demonstrate agreement within ± 1% Δk/k at least once per 31 Effective Full Power Days (EFPD). This comparison shall consider at least those factors stated in Specification 4.1.1.1.1.e, above. The predicted reactivity values shall be adjusted (normalized) to correspond to the actual core conditions prior to exceeding a fuel burnup of 60 Effective Full Power Days after each fuel loading.

See ITS 3.1.2

A.1

ITS 3.1.1

9-9-85

ITS

REACTIVITY CONTROL SYSTEMS

SHUTDOWN MARGIN ~~- T_{avg} ≤ 200°F~~

A.2

LIMITING CONDITION FOR OPERATION

LCO 3.1.1

3.1.1.2 The SHUTDOWN MARGIN shall be ~~≥ 1.77% Δk/k~~ within the limits provided in the COLR LA.1

APPLICABILITY: MODE 5.

ACTION: not within limit LA.1

Action A

With the SHUTDOWN MARGIN ~~< 1.77% Δk/k~~, ~~immediately~~ within 15 minutes initiate ~~and continue~~ boration ~~at ≥ 10 gpm of 12,950 ppm boric acid solution or equivalent~~ until the required SHUTDOWN MARGIN is restored. L.1 L.2

SURVEILLANCE REQUIREMENTS

SR 3.1.1.1

4.1.1.2 Verify The SHUTDOWN MARGIN ~~shall be determined to be ≥ 1.77% Δk/k~~: is within limit LA.1

a. Within one hour after detection of an inoperable control rod(s) and at least once per 12 hours thereafter while the rod(s) is inoperable. If the inoperable control rod is immovable or untrippable, the SHUTDOWN MARGIN shall be increased by an amount at least equal to the withdrawn worth of the immovable or untrippable control rod(s). ⟨see ITS 3.1.4⟩

SR 3.1.1.1

b. ~~At least once per 24 hours by consideration of the following factors:~~

~~1. Reactor coolant system boron concentration,~~

~~2. Control rod position,~~

~~3. Reactor coolant system average temperature,~~

~~4. Fuel burnup based on gross thermal energy generation,~~

~~5. Xenon concentration, and~~

~~6. Samarium concentration.~~

LA.2

UNIT 2

A.1

ITS 3.1.1

9-9-05

ITS

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

SHUTDOWN MARGIN - T_{avg} GREATER THAN 200°F

A.2

A.3

LIMITING CONDITION FOR OPERATION

LA.1

LCO 3.1.1

3.1.1.1 The SHUTDOWN MARGIN shall be greater than or equal to 1.77% Δk/k. within the limits provided in the COLR

A.4

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

with $K_{eff} < 1.0$

LA.1

ACTION:

not within limit

within 15 minutes

L.1

Action A

With the SHUTDOWN MARGIN less than 1.77% delta K/k, immediately initiate and continue boration at greater than or equal to 10 gpm of a solution containing greater than or equal to 12,950 ppm boron or equivalent until the required SHUTDOWN MARGIN is restored.

L.2

SURVEILLANCE REQUIREMENTS

SR 3.1.1

Verify

4.1.1.1.1 The SHUTDOWN MARGIN shall be determined to be greater than or equal to 1.77% delta K/k: is within limit

LA.1

a. Within one hour after detection of an inoperable control rod(s) and at least once per 12 hours thereafter while the rod(s) is inoperable. If the inoperable control rod 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 control rod(s).

<See ITS 3.1.4>

b. When in MODE 1 or MODE 2 with K_{eff} greater than or equal to 1.0, at least once per 12 hours by verifying that control bank withdrawal is within the limits of Specification 3.1.3.6.

c. When in MODE 2 with K_{eff} less than 1.0, within 4 hours prior to achieving reactor criticality by verifying that the predicted critical control rod position is within the limits of Specification 3.1.3.6.

<See ITS 3.1.6>

~~*See Special Test Exception 3.10.1~~

A.4

page 1 of 3

Rev. 6

ITS

REACTIVITY CONTROL SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

d. Prior to initial operation above 5% RATED THERMAL POWER after each fuel loading, by consideration of the factors of e below, with the control banks at the maximum insertion limit of Specification 3.1.3.6.

L.3

M.1

SR 3.1.1.1

e. When in MODES 3 or 4, at least once per 24 hours by consideration of the following factors:

1. Reactor coolant system boron concentration,
2. Control rod position,
3. Reactor coolant system average temperature,
4. Fuel burnup based on gross thermal energy generation,
5. Xenon concentration, and
6. Samarium concentration.

LA.2

4.1.1.1.2 The overall core reactivity balance shall be compared to predicted values to demonstrate agreement within ± 1% Δk/k at least once per 31 Effective Full Power Days (EFPD). This comparison shall consider at least those factors stated in Specification 4.1.1.1.1.e, above. The predicted reactivity values shall be adjusted (normalized) to correspond to the actual core conditions prior to exceeding a fuel burnup of 60 Effective Full Power Days after each fuel loading.

See ITS 3.1.2

ITS

REACTIVITY CONTROL SYSTEMS

SHUTDOWN MARGIN - T_{avg} LESS THAN OR EQUAL TO 200°F

A.2

SURVEILLANCE REQUIREMENTS

LA.1

LCO 3.1.1 3.1.1.2 The SHUTDOWN MARGIN shall be greater than or equal to 1.77% delta k/k. within the limits provided in the COLR

APPLICABILITY: MODE 5.

ACTION: not within limit within 15 minutes

L.1

Action A With the SHUTDOWN MARGIN less than 1.77% delta k/k, immediately initiate and continue boration at greater than or equal to 10 gpm of a solution containing greater than or equal to 12,950 ppm boron or equivalent until the required SHUTDOWN MARGIN is restored.

L.2

SURVEILLANCE REQUIREMENTS

SR 3.1.1 Verify

4.1.1.2 The SHUTDOWN MARGIN shall be determined to be greater than or equal to 1.77% delta k/k: is within limit LA.1

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

(See ITS 3.1.4)

SR 3.1.1.1 b. At least once per 24 hours by consideration of the following factors:

1. Reactor coolant system boron concentration,
2. Control rod position,
3. Reactor coolant system average temperature,
4. Fuel burnup based on gross thermal energy generation,
5. Xenon concentration, and
6. Samarium concentration.

LA.2

ADMINISTRATIVE CHANGES

A.1 In the conversion of the North Anna Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG-1431, Rev. 1, "Standard Technical Specifications-Westinghouse Plants" (ISTS).

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A.2 CTS 3.1.1.1 provides SHUTDOWN MARGIN (SDM) requirements in MODES 1, 2, 3 and 4. CTS 3.1.1.2 provides SDM requirements in MODE 5. ITS 3.1.1 provides SDM requirements in MODE 2 with $K_{eff} < 1.0$ and MODES 3, 4, and 5. This changes the CTS by combining the SDM requirements for MODE 2 with $K_{eff} < 1.0$ and MODES 3, 4, and 5. The change in Applicability for MODE 1 and MODE 2 with $K_{eff} \geq 1.0$ are described in DOC A.3.

This change is acceptable because the requirements have not changed. Combining the specifications is an editorial change. Any technical changes resulting from this combination are discussed in other DOCs. This change is designated as administrative because it does not result in a technical change to the specification.

A.3 CTS 3.1.1.1 provides SHUTDOWN MARGIN (SDM) requirements in MODES 1, 2, 3 and 4. Surveillance 4.1.1.1.1.b states that when in MODES 1 and 2 with $K_{eff} \geq 1.0$, SDM is verified by verifying that the control banks are within the insertion requirements of CTS 3.1.3.6, Control Rod Insertion Limits. ITS 3.1.1 is Applicable in MODE 2 with $K_{eff} < 1.0$ and MODES 3, 4, and 5. ITS 3.1.5 contains the control bank insertion requirements. This changes the CTS by dividing the SDM requirements and placing those applicable in MODE 2 with $K_{eff} < 1.0$ $\Delta k/k$ and MODES 3, 4, and 5 in ITS 3.1.1 and placing those applicable in MODE 1 and MODE 2 with $K_{eff} \geq 1.0$ in the control bank specifications.

The purpose of CTS 3.1.1.1 is to ensure that the SDM assumed in the accident analyses is available. When the reactor is critical, SDM is verified by ensuring that the control rods are above the rod insertion limits. The Applicability Bases to ITS 3.1.1 states that in MODES 1 and 2, SDM is ensured by complying with LCO 3.1.5, Shutdown Bank Insertion Limits" and LCO 3.1.6, "Control Bank Insertion Limits." This change is acceptable because the SDM requirements have not changed. Even though CTS 3.1.1.1 is applicable in MODES 1 and 2, the CTS Surveillances state that it is verified by meeting the rod insertion limits. The ITS also verifies SDM in MODES 1 and 2 via the rod insertion limits. Any changes to the rod insertion limit requirements will be discussed in DOCs for those specifications. This change is designated as administrative because it does not result in a technical change to the specification.

A.4 The Applicability of CTS 3.1.1.1 is MODES 1, 2, 3, and 4 with a footnote stating, "See Special Test Exception 3.10.1." ITS 3.1.1 Applicability does not contain the footnote or a reference to the Special Test Exception.

The purpose of the footnote reference is to alert the reader that a Special Test Exception exists which may modify the Applicability of the specification. It is an ITS convention to not include these types of footnotes or cross-references. This change is designated as administrative as it incorporates an ITS convention with no technical change to the Technical Specifications.

MORE RESTRICTIVE CHANGES

M.1 CTS 4.1.1.1.1.e and CTS 4.1.1.2.b requires SDM to be determined to be within its limit every 24 hours when in MODES 3, 4, and 5. ITS SR 3.1.1.1 requires SDM to be determined to be within its limit in MODE 2 with $K_{eff} < 1.0$, and MODES 3, 4, and 5. This changes the CTS by expanding the applicability of the Surveillance to include MODE 2 with $K_{eff} < 1.0$.

The purpose of the CTS 4.1.1.1.1.e and CTS 4.1.1.2.b Surveillances is to verify that sufficient SDM is available. CTS 4.1.1.1.1.b states that when the reactor is in MODE 1 and MODE 2 with $K_{eff} \geq 1.0$, SDM is verified by determining that the control rods are above the rod insertion limits. In MODE 2 with $K_{eff} < 1.0$, CTS 4.1.1.1.1.c verifies SDM by determining that the predicted critical position is within the rod insertion limits. This change is acceptable because the ITS requires specific verification that the SDM is within the limit specified in the COLR when in MODE 2 with $K_{eff} < 1.0$. This change is designated as more restrictive because it expands the conditions under which a Surveillance must be performed.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

LA.1 *(Type 5 – Removal of Cycle-Specific Parameter Limits from the Technical Specifications to the Core Operating Limits Report)* CTS 3.1.1.1 states that the SHUTDOWN MARGIN shall be ≥ 1.77% Δk/k. CTS 3.1.1.2 states that the SHUTDOWN MARGIN shall be ≥ 1.77% Δk/k. The specific value of 1.77% Δk/k also appears in the CTS 3.1.1.1 and CTS 3.1.1.2 Action, and in Surveillance 4.1.1.1.1 and 4.1.1.2. ITS 3.1.1 states that SHUTDOWN MARGIN shall be within the limits provided in the COLR. The Actions and Surveillance Requirements of ITS 3.1.1 also reference SDM values located in the

COLR. This changes the CTS by relocating the SHUTDOWN MARGIN parameter limits to the Core Operating Limits Report (COLR).

The removal of these cycle-specific parameter limits from the Technical Specifications and their relocation into the COLR is acceptable because these limits are developed or utilized under NRC-approved methodologies. The NRC documented in Generic Letter 88-16, Removal of Cycle-Specific Parameter Limits From the Technical Specifications, that this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains requirements and Surveillances that verify that the cycle-specific parameter limits are being met. ITS 3.1.1, SHUTDOWN MARGIN, continues to require that the SDM limits located in the COLR are met. SR 3.1.1.1 requires periodic verification that SDM is within the limits provided in the COLR. The method of determining or utilizing the SDM parameter limit has not changed. Also, this change is acceptable because the removed information will be adequately controlled in the COLR under the requirements provided in ITS 5.6.5, Core Operating Limits Report. ITS 5.6.5 ensures that the applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems limits, and nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met. This change is designated as a less restrictive removal of detail change because information relating to cycle-specific parameter limits is being removed from the Technical Specifications.

LA.2 *(Type 3 – Removing Procedural Details for Meeting TS Requirements and Related Reporting Problems)* CTS Surveillances 4.1.1.1.1.e, and 4.1.1.2.b require determination that the SDM is within limit and specifically require the consideration of the following factors: reactor coolant system boron concentration, control rod position, reactor coolant system average temperature, fuel burnup based on gross thermal energy generation, xenon concentration, and samarium concentration. ITS SR 3.1.1.1 requires determination that SDM is within limit but does not describe the factors that must be considered in the calculation. This information is relocated to the Surveillance Bases. This changes the CTS by removing details on how the SDM calculation is performed from the specifications and placing the information in the Bases.

The removal of these details for performing surveillance requirements from the Technical Specifications is acceptable because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains the requirement that the SDM be within limit. The details of how SDM is calculated does not need to appear in the specification in order for the requirement to apply. Also, this change is acceptable because these types of procedural details will be adequately controlled in the ITS Bases. Changes to the Bases are controlled by the Technical Specification Bases Control Program in Chapter 5. This program provides for the evaluation of changes to ensure the Bases are properly controlled. This change is designated as a less restrictive removal of detail change because procedural details for meeting Technical Specification requirements are being removed from the Technical Specifications.

LESS RESTRICTIVE CHANGES

L.1 *(Category 3 – Relaxation of Completion Time)* CTS 3.1.1.1 and CTS 3.1.1.2 Actions state that when the SDM is less than the limit, boration must be initiated immediately. ITS 3.1.1 Action A states that when SDM is less than the limit, boration must be initiated within 15 minutes. This changes the CTS by relaxing the Completion Time from "immediately" to 15 minutes.

The purpose of CTS 3.1.1.1 and CTS 3.1.1.2 Actions is to restore the SDM to within its limit promptly. This change is acceptable because the Completion Time is consistent with safe operation under the specified Condition, considering the operability status of the redundant systems of required features, the capacity and capability of remaining features, a reasonable time for repairs or replacement of required features, and the low probability of a DBA occurring during the allowed Completion Time. The ITS Completion Time of 15 minutes is adequate for an operator to correctly align and start the required systems and components. Fifteen minutes is the shortest specified Completion Time used in the ITS. This change is designated as less restrictive because additional time is allowed to restore parameters to within the LCO limits than was allowed in the CTS.

L.2 *(Category 4 – Relaxation of Required Action)* CTS 3.1.1.1 and CTS 3.1.1.2 Actions state that when the SDM is not within its limit, boration must be initiated and continued at ≥ 10 gpm of 12,950 ppm boric acid solution or equivalent until the required SDM is restored. ITS 3.1.1 Action A states that with the SDM not within limit, initiate boration to restore SDM to within limit. This changes the CTS by eliminating the specific values of flow rate and boron concentration that must be used to restore compliance from the Required Action.

The purpose of the CTS 3.1.1.1 and CTS 3.1.1.2 Actions is to restore the SDM to within its limit. This change is acceptable because the Required Actions are used to establish remedial measures that must be taken in response to the degraded conditions in order to minimize risk associated with continued operation while providing time to repair inoperable features. The Required Actions are consistent with safe operation under the specified Condition, considering the operability status of the redundant systems of required features, the capacity and capability of remaining features, a reasonable time for repairs or replacement of required features, and the low probability of a DBA occurring during the repair period. Removing the specific values of flow rate and boron concentration from the Action provides flexibility in the restoration of the SDM and eliminates conflicts between the SDM value in the COLR and the specific boration values in the Action. As stated in the ITS Bases for the Action, "In the determination of the required combination of boration flow rate and boron concentration, there is no unique requirement that must be satisfied. Since it is imperative to raise the boron concentration of the RCS as soon as possible, the boron concentration should be a highly concentrated solution, such as that normally found in the boric acid storage tank, or the borated water

storage tank. The operator should borate with the best source available for the plant conditions." Specifying a specific flow rate and concentration in the Action may not accomplish the objective of raising the RCS boron concentration as soon as possible. This change is designated as less restrictive because less stringent Required Actions are being applied in the ITS than were applied in the CTS.

L.3 *(Category 5 – Deletion of Surveillance Requirement)* CTS Surveillance 4.1.1.1.1.d requires verification that SDM is within its limit, "Prior to initial operation above 5% RATED THERMAL POWER after each fuel loading, by consideration of the factors of e below, with the control banks at the maximum insertion limit of Specification 3.1.3.6." The ITS does not contain a similar requirement.

The purpose of CTS Surveillance 4.1.1.1.1.d is to verify the core design predictions by determining the SDM with the control rods at the insertion limits. This change is acceptable because the deleted Surveillance Requirement is not necessary to verify that the parameter used to meet the LCO is within limit. Thus, the parameter continues to be tested in a manner and at a frequency necessary to give confidence that the parameter is within limit. The core design predictions, such as rod worth, boron worth, and critical boron concentration, are verified during the startup physics test program. The critical boron concentration is verified periodically by ITS 3.1.2. Therefore, the core design parameters upon which SDM relies are verified before exceeding 5% RTP after each refueling outage. This change is designated as less restrictive because Surveillances which are required in the CTS will not be required in the ITS.

UNIT 1

ITS

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

SHUTDOWN MARGIN - T_{avg} > 200°F

LIMITING CONDITION FOR OPERATION

3.1.1.1 The SHUTDOWN MARGIN shall be ≥ 1.77% Δk/k. (See ITS 3.1.1)

3.1.2 Applicability

APPLICABILITY: MODES 1, 2*, 3, and 4. (L.1)

ACTION:

With the SHUTDOWN MARGIN < 1.77% Δk/k, immediately initiate and continue boration at ≥ 10 gpm of 12,950 ppm boric acid solution or equivalent until the required SHUTDOWN MARGIN is restored. (See ITS 3.1.1)

SURVEILLANCE REQUIREMENTS

4.1.1.1.1 The SHUTDOWN MARGIN shall be determined to be ≥ 1.77% Δk/k:

a. Within one hour after detection of an inoperable control rod(s) and at least once per 12 hours thereafter while the rod(s) is inoperable. If the inoperable control rod 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 control rod(s). (See ITS 3.1.4)

b. When in MODES 1 or 2#, at least once per 12 hours by verifying that control bank withdrawal is within the 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 control rod position is within the limits of Specification 3.1.3.6. (See ITS 3.1.6)

See Special Test Exception 3.10.1 (See ITS 3.1.1)

#With K_{eff} ≥ 1.0

##With K_{eff} <1.0 (See ITS 3.1.6)

A.1

ITS 3.1.2

REACTIVITY CONTROL SYSTEMS

ITS

SURVEILLANCE REQUIREMENTS (Continued)

d. Prior to initial operation above 5% RATED THERMAL POWER after each fuel loading, by consideration of the factors of e below, with the control banks at the maximum insertion limit of Specification 3.1.3.6.

e. When in MODES 3 or 4, at least once per 24 hours by consideration of the following factors:

1. Reactor coolant system boron concentration,
2. Control rod position,
3. Reactor coolant system average temperature,
4. Fuel burnup based on gross thermal energy generation,
5. Xenon concentration, and
6. Samarium concentration.

(See ITS 3.1.1)

Once prior to entering MODE 1 after each refueling and

M.1

SR 3.1.2.1

4.1.1.1.2 The overall core reactivity balance shall be compared to predicted values to demonstrate agreement within ± 1% Δk/k at least once per 31 Effective Full Power Days (EFPD). This comparison shall consider at least those factors stated in Specification 4.1.1.1.1.e. above. The predicted reactivity values shall be adjusted (normalized) to correspond to the actual core conditions prior to exceeding a fuel burnup of 60 Effective Full Power Days after each fuel loading.

LA.1

SR 3.1.2.1 SR NOTE

L.3

after 60 EFPD

LCO 3.1.2

Insert proposed LCO

A.2

3.1.2 Actions

Insert proposed Actions

L.2

Rev. 0

page 2 of 2

UNIT 2

9-9-95

ITS 3.1.2

A.1

ITS

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

SHUTDOWN MARGIN - T_{avg} GREATER THAN 200°F

<see ITS 3.1.1>

LIMITING CONDITION FOR OPERATION

3.1.1.1 The SHUTDOWN MARGIN shall be greater than or equal to 1.77% Δk/k.

3.1.2 Applicability

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

L.1

ACTION:

With the SHUTDOWN MARGIN less than 1.77% delta k/k, immediately initiate and continue boration at greater than or equal to 10 gpm of a solution containing greater than or equal to 12,950 ppm boron or equivalent until the required SHUTDOWN MARGIN is restored.

<see ITS 3.1.1>

SURVEILLANCE REQUIREMENTS

4.1.1.1.1 The SHUTDOWN MARGIN shall be determined to be greater than or equal to 1.77% delta k/k:

a. Within one hour after detection of an inoperable control rod(s) and at least once per 12 hours thereafter while the rod(s) is inoperable. If the inoperable control rod 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 control rod(s).

<see ITS 3.1.4>

b. When in MODE 1 or MODE 2 with K_{eff} greater than or equal to 1.0, at least once per 12 hours by verifying that control bank withdrawal is within the limits of Specification 3.1.3.6.

c. When in MODE 2 with K_{eff} less than 1.0, within 4 hours prior to achieving reactor criticality by verifying that the predicted critical control rod position is within the limits of Specification 3.1.3.6.

<see ITS 3.1.6>

*See Special Test Exception 3.10.1

<see ITS 3.1.1>

(A.1) ITS 3.1.2

REACTIVITY CONTROL SYSTEMS

ITS

SURVEILLANCE REQUIREMENTS (Continued)

d. Prior to initial operation above 5% RATED THERMAL POWER after each fuel loading, by consideration of the factors of e below, with the control banks at the maximum insertion limit of Specification 3.1.3.6.

e. When in MODES 3 or 4, at least once per 24 hours by consideration of the following factors:

1. Reactor coolant system boron concentration,
2. Control rod position,
3. Reactor coolant system average temperature,
4. Fuel burnup based on gross thermal energy generation,
5. Xenon concentration, and
6. Samarium concentration.

(See ITS 3.1.1)

Once prior to entering MODE 1 after each refueling and (M.1)

SR 3.1.2.1 4.1.1.1.2 The overall core reactivity balance shall be compared to predicted values to demonstrate agreement within ± 1% Δk/k at least once per 31 Effective Full Power Days (EFPD). ~~This comparison shall consider at least those factors stated in Specification 4.1.1.1.1.e, above.~~ The predicted reactivity values shall be adjusted (normalized) to correspond to the actual core conditions prior to exceeding a fuel burnup of 60 Effective Full Power Days after each fuel loading. (LA.1)

SR 3.1.2.1 Surveillance Note

after 60 EFPD (L.3)

LCO 3.1.2 Insert proposed LCO (A.2)

3.1.2 Actions Insert proposed Actions (L.2)

ADMINISTRATIVE CHANGES

A.1 In the conversion of the North Anna Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG-1431, Rev. 1, "Standard Technical Specifications-Westinghouse Plants" (ISTS).

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A.2 CTS Surveillance 4.1.1.1.2 requires the overall core reactivity balance be compared to predicted values to demonstrate agreement within +/- 1% Δk/k . ITS LCO 3.1.2 requires the measured core reactivity to be within +/- 1% Δk/k of predicted values. This changes the CTS by replacing the Surveillance requirement with an LCO.

This change is acceptable because the requirements have not changed. Converting the requirement from a Surveillance in the SHUTDOWN MARGIN specification to an LCO is consistent with the ITS format and content guidance. Any technical changed resulting from this change are discussed in other DOCs. This change is designated as administrative because it does not result in a technical change to the specification.

MORE RESTRICTIVE CHANGES

M.1 ITS SR 3.1.2.1 requires the core reactivity balance to be determined to be within 1% Δk/k of the predicted value once prior to entering MODE 1 after each refueling. The CTS does not contain a similar requirement. This changes the CTS by adding an additional performance requirement for the core reactivity balance SR.

This change is acceptable because it requires a test which demonstrates agreement between the core design and the core design predictions prior to raising core power above 5%. This verification, which is currently performed as part of the startup physics testing program, gives additional confidence that the core design is acceptable for operation at full power. This change is designated as more restrictive because it adds a Surveillance Requirement which does not appear in the CTS.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

LA.1 *(Type 3 – Removing Procedural Details for Meeting TS Requirements and Related Reporting Problems)* CTS Surveillances 4.1.1.1.1.2 requires comparison of the actual and predicted core reactivity balance and specifically requires consideration of at least those factors stated in Specification 4.1.1.1.1.e. CTS 4.1.1.1.1.e requires determination of SDM and require the consideration of the following factors: reactor coolant system boron concentration, control rod position, reactor coolant system average temperature, fuel burnup based on gross thermal energy generation, xenon concentration, and samarium concentration. ITS SR 3.1.2.1 requires comparison of the actual and predicted core reactivity balance but does not describe the factors that must be considered in the calculation. This information is relocated to the Surveillance Bases. This changes the CTS by removing details on how the core reactivity balance comparison calculation is performed from the specifications and placing the information in the Bases.

The removal of these details for performing surveillance requirements from the Technical Specifications is acceptable because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains the requirement that the core reactivity balance comparison be within 1% $\Delta k/k$. The details of how this comparison is calculated does not need to appear in the specification in order for the requirement to apply. Also, this change is acceptable because these types of procedural details will be adequately controlled in the ITS Bases. Changes to the Bases are controlled by the Technical Specification Bases Control Program in the Technical Specifications Administrative Controls section. This program provides for the evaluation of changes to ensure the Bases are properly controlled. This change is designated as a less restrictive removal of detail change because procedural details for meeting Technical Specification requirements are being removed from the Technical Specifications.

LESS RESTRICTIVE CHANGES

L.1 *(Category 2 – Relaxation of Applicability)* CTS 3.1.1.1 is applicable in MODES 1, 2, 3, and 4. ITS 3.1.2 is applicable in MODES 1 and 2. This changes the CTS by reducing the applicable MODES in which the core reactivity requirement must be met.

The purpose of CTS Surveillance 4.1.1.1.2 is to verify the core design by comparing the actual and predicted core reactivity. This change is acceptable because the requirements continue to ensure that the process variables are maintained in the MODES and other specified conditions assumed in the safety analyses and licensing basis The core reactivity balance can only be determined when the reactor is critical (MODES 1 and 2). Therefore, reducing the applicable MODES from MODES 1, 2, 3 and 4 to MODES 1 and 2 does not result in a reduction of the verification of this important measure of core design accuracy. This change is designated as less restrictive because the LCO requirements are applicable in fewer operating conditions than in the CTS.

L.2 *(Category 4 – Relaxation of Required Action)* CTS 3.1.1.1 does not contain Actions to follow if the core reactivity balance Surveillance is not met. If the core reactivity balance Surveillance was not met, LCO 3.0.3 would be entered. LCO 3.0.3 requires the plant to be in MODE 3 within 7 hours, MODE 4 within 13 hours, and MODE 5 within 37 hours. ITS 3.1.2 contains Actions to follow if the core reactivity balance LCO is not met. If the LCO is not met, 7 days is provided to re-evaluate the core design and safety analysis, and determine that the reactor core is acceptable for continued operation and to establish appropriate operating restrictions and SRs. If these actions are not completed within the AOT, the plant must be in MODE 3 within 6 hours. This changes the CTS by providing 7 days to evaluate and provide compensatory measures for not meeting the core reactivity balance requirement and then requiring entry into MODE 3 instead of requiring an immediate shutdown and entry into MODE 5.

The purpose of CTS 4.1.1.1.2 is to verify the accuracy of the core design by comparing the predicted and actual core reactivity throughout core life. This change is acceptable because the Required Actions are used to establish remedial measures that must be taken in response to the degraded conditions in order to minimize risk associated with continued operation while providing time to repair inoperable features. The Required Actions are consistent with safe operation under the specified Condition, considering the operability status of the redundant systems of required features, the capacity and capability of remaining features, a reasonable time for repairs or replacement of required features, and the low probability of a DBA occurring during the repair period. Should the core reactivity balance requirement not be met, time is required to determine the cause of the disagreement and what, if any, adjustments are needed to the operating conditions of the core. The startup physics testing program is used to verify most of the critical core design parameters, such as control rod worth, boron worth, and moderator temperature coefficient. In addition, there is considerable conservatism in the application of these values in the accident analysis. Therefore, allowing a time to evaluate the difference and make any adjustments to the operational controls is acceptable. The 7 day Completion Time is reasonable considering the complexity of the evaluations and the time to meet administrative requirements, such as 10 CFR 50.59 safety evaluation preparation and approval. If it cannot be determined within 7 days that the core is acceptable for continued operation, the unit must be shutdown. This change is designated as less restrictive because less stringent Required Actions are being applied in the ITS than were applied in the CTS.

L.3 *(Category 7 – Relaxation Of Surveillance Frequency)* CTS Surveillance 4.1.1.1.2 requires the overall core reactivity balance to be compared with the predicted value once per 31 EFPD. The CTS also requires the predicted reactivity values to be adjusted (normalized) to the actual core conditions prior to exceeding a fuel burnup of 60 EFPD after each fuel loading. ITS SR 3.1.2.1 also requires the measured core reactivity to be compared to the predicted values every 31 EFPD, but the ITS SR is only required after 60 EFPD of core burnup. The ITS also allows the adjustment of the predicted values to the actual values prior to exceeding a fuel burnup of 60 EFPD after each fuel loading. This

changes the CTS by not requiring the at-power core reactivity comparison until core burnup reaches 60 EFPD.

The purpose of CTS Surveillance 4.1.1.1.2 is to verify the agreement between the actual and predicted core reactivity. This change is acceptable because the new Surveillance Frequency has been evaluated to ensure that it provides an acceptable level of equipment reliability. The CTS and the ITS allows the predicted core reactivity values to be normalized to the actual values prior to exceeding 60 EFPD of core burnup. This allows sufficient time for core conditions to reach steady state, but prevents operation for a large fraction of the fuel cycle without establishing a benchmark for the design calculations. The required subsequent Frequency of 31 EFPD, following the initial 60 EFPD after fuel loading, is acceptable, based on the slow rate of core changes due to fuel depletion and the presence of other indicators (QPTR, AFD, etc.) for prompt indication of an anomaly. This change is designated as less restrictive because Surveillances will be performed less frequently under the ITS than under the CTS.

UNIT 1

A.1

ITS 3.1.3

MODERATOR TEMPERATURE COEFFICIENT

ITS

LIMITING CONDITION FOR OPERATION

LCO 3.1.3

3.1.1.4 The moderator temperature coefficient (MTC) shall be within the limits specified in the CORE OPERATING LIMITS REPORT (COLR). The maximum upper limit shall be $\leq 0.6 \times 10^{-4}$ Δk/k/°F below 70 percent RATED THERMAL POWER and $\leq 0.0 \times 10^{-4}$ Δk/k/°F at or above 70 percent RATED THERMAL POWER.

A.2

APPLICABILITY: ~~Beginning of Cycle (BOC)~~ Upper Limit - MODES 1 and 2* only#

~~End of Cycle (EOC)~~ Lower Limit - MODES 1, 2 and 3 only#

A.3 A.4

ACTION:

a. With the MTC more positive than the ~~BOC~~ Upper limit specified in the CORE OPERATING LIMITS REPORT: A.4

1. Establish and maintain control rod withdrawal limits MODE 2 with Keff < 1.0 sufficient to restore the MTC to within its limit within 24 hours or be in HOT STANDBY within the next 6 hours. ~~These withdrawal limits shall be in addition to the insertion limits of Specification 3.1.3.6.~~ A.5 A.6

Action A
Action B

2. ~~Maintain the control rods within the withdrawal limits established above until subsequent measurement verifies that the MTC has been restored to within its limit for the all rods withdrawn condition.~~ L.2

3. ~~Prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within 10 days, describing the value of the measured MTC, the interim control rod withdrawal limits and the predicted average core burnup necessary for restoring the positive MTC to within its limit for the all rods withdrawn condition.~~ L.1

4. With the MTC more negative than the ~~EOC~~ lower limit specified in the CORE OPERATING LIMITS REPORT, be in HOT SHUTDOWN within 12 hours.

Action C

A.4

*With $K_{eff} \geq 1.0$

~~#See Special Test Exception 3.10.3~~

A.3

Page 1 of 2

Rev. 0

A.1

ITS 3.1.3

ITS

SURVEILLANCE REQUIREMENTS

4.1.1.4 The MTC shall be determined to be within its limits during each fuel cycle as follows: upper A.4

SR 3.1.3.1

a. The MTC shall be measured and compared to the BOC limit specified in the CORE OPERATING LIMITS REPORT, prior to initial operation above 5% of RATED THERMAL POWER, after each fuel loading.

SR 3.1.3.2 Note 1

b. The MTC shall be measured at any THERMAL POWER and compared to the 300 ppm surveillance limit specified in the CORE OPERATING LIMITS REPORT (all rods withdrawn, RATED THERMAL POWER condition) within 7 EFPD after reaching an equilibrium boron concentration of 300 ppm. In the event this comparison indicated the MTC is more negative than the 300 ppm surveillance limit, the MTC shall be remeasured, and compared to the EOC MTC limit specified in the CORE OPERATING LIMITS REPORT, at least once per 14 EFPD during the remainder of the fuel cycle.(1)

SR 3.1.3.2 Note 2

lower A.4

(1) Once the equilibrium boron concentration (all rods withdrawn, RATED THERMAL POWER condition) is 60 ppm or less, further measurement of the MTC in accordance with 4.1.1.4.b may be suspended providing that the measured MTC at an equilibrium boron concentration of ≤ 60 ppm is less negative than the 60 ppm surveillance limit specified in the CORE OPERATING LIMITS REPORT.

SR 3.1.3.2 Note 3

UNIT 2

A.1

ITS 3.1.3

ITS

MODERATOR TEMPERATURE COEFFICIENT

LIMITING CONDITION FOR OPERATION

LCO 3.1.3

3.1.1.4 The moderator temperature coefficient (MTC) shall be within the limits specified in the CORE OPERATING LIMITS REPORT (COLR). The maximum upper limit shall be $\leq 0.6 \times 10^{-4}$ Δk/k/°F below 70 percent RATED THERMAL POWER and $\leq 0.0 \times 10^{-4}$ Δk/k/°F at or above 70 percent RATED THERMAL POWER.

A.2

Upper

APPLICABILITY: Beginning of Cycle (BOC) Limit - MODES 1 and 2* only#

End of Cycle (EOC) Limit - MODES 1, 2 and 3 only#

A.3 A.4

lower

ACTION:

a. With the MTC more positive than the BOC limit specified in the CORE OPERATING LIMITS REPORT, operations in MODES 1 and 2 may proceed provided:

upper

A.4

Action A

Action B

1. Control rod withdrawal limits are established and maintained sufficient to restore the MTC to within its limit within 24 hours or be in HOT STANDBY within the next 6 hours. These withdrawal limits shall be in addition to the insertion limits of Specification 3.1.3.6.

MODE 2 with Keff ≥ 1.0

A.5

A.6

2. The control rods are maintained within the withdrawal limits established above until subsequent measurement verifies that the MTC has been restored to within its limit for the all rods withdrawn condition.

L.2

3. Prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within 10 days, describing the value of the measured MTC, the interim control rod withdrawal limits and the predicted average core burnup necessary for restoring the positive MTC to within its limit for the all rods withdrawn condition.

L.1

Action C

4. With the MTC more negative than the EOC limit specified in the CORE OPERATING LIMITS REPORT, be in HOT SHUTDOWN within 12 hours.

A.4

lower

*With $K_{eff} \geq 1.0$

#See Special Test Exception 3.10.3

A.3

page 1 of 2

Rev. 0

A.1

ITS 3.1.3

ITS

SURVEILLANCE REQUIREMENTS

4.1.1.4 The MTC shall be determined to be within its limits during each fuel cycle as follows: upper A.4

SR 3.1.3.1

a. The MTC shall be measured and compared to the BOC limit specified in the CORE OPERATING LIMITS REPORT, prior to initial operation above 5% of RATED THERMAL POWER, after each fuel loading.

SR 3.1.3.2 Note1

b. The MTC shall be measured at any THERMAL POWER and compared to the 300 ppm surveillance limit specified in the CORE OPERATING LIMITS REPORT (all rods withdrawn, RATED THERMAL POWER condition) within 7 EFPD after reaching an equilibrium boron concentration of 300 ppm. In the event this comparison indicated the MTC is more negative than the 300 ppm surveillance limit, the MTC shall be remeasured, and compared to the EOC MTC limit specified in the CORE OPERATING LIMITS REPORT, at least once per 14 EFPD during the remainder of the fuel cycle.(1) A.4

SR 3.1.3.2 Note2

lower

SR 3.1.3.2 Note3

(1) Once the equilibrium boron concentration (all rods withdrawn, RATED THERMAL POWER condition) is 60 ppm or less, further measurement of the MTC in accordance with 4.1.1.4.b may be suspended providing that the measured MTC at an equilibrium boron concentration of ≤ 60 ppm is less negative than the 60 ppm surveillance limit specified in the CORE OPERATING LIMITS REPORT.

ADMINISTRATIVE CHANGES

A.1 In the conversion of the North Anna Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG-1431, Rev. 1, "Standard Technical Specifications-Westinghouse Plants" (ISTS).

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A.2 CTS 3.1.1.4 states that the maximum MTC upper limit shall be ≤ 0.6 x 10-4 Δk/k/°F below 70% RTP and ≤ 0.0 x 10^{-4} Δk/k/°/F at or above 70% RTP. ITS 3.1.3 states that the maximum MTC upper limit shall be ≤ 0.6 x 10^{-4} Δk/k/°F when < 70% RTP, and ≤ 0.0 Δk/k/°F when ≥ 70% RTP. This changes the CTS by designating the maximum MTC upper limit at ≥ 70% RTP as 0.0 Δk/k/°F instead of 0.0 x 10^{-4} Δk/k/°F.

This change is acceptable because the requirements have not changed. The maximum upper limit for MTC when ≥ 70% RTP is zero. Presenting the limit as 0.0 instead of 0.0 x 10^{-4} is less confusing and consistent with how similar valves are presented in the ITS. This change is designated as administrative because it does not result in a technical change to the specification.

A.3 The Applicability of CTS 3.1.1.4 is modified by a footnote, designated "#", stating, "See Special Test Exception 3.10.3." ITS 3.1.3 Applicability does not contain the footnote or a reference to the Special Test Exception.

The purpose of the footnote reference is to alert the reader that a Special Test Exception exists which may modify the Applicability of the specification. It is an ITS convention to not include these types of footnotes or cross-references. This change is designated as administrative as it incorporates an ITS convention with no technical change to the Technical Specifications.

A.4 CTS 3.1.1.4 refers to the Beginning of Cycle (BOC) MTC limit and the End of Cycle (EOC) MTC limit. ITS 3.1.3 refers to these values as the upper MTC limit and lower MTC limit, respectively.

This change is acceptable because the requirements have not changed. The BOC MTC value is the most positive, upper limit and the EOC MTC value is the most negative, lower limit. The terminology used in the ITS is an editorial preference selected for consistency with that used in NUREG-1431. This change is designated as administrative as it incorporates an ITS convention with no technical change to the Technical Specifications.

A.5 CTS 3.1.1.4, Action a.1, states that if the MTC is more positive than the BOC (e.g., upper) limit, control rod withdrawal limits must be imposed within 24 hours or be in HOT STANDBY within 6 hours. ITS 3.1.3, ACTION A, states that with the MTC not within the upper limit, establish control rod withdrawal limits with 24 hours or be in MODE 2 with $K_{eff} < 1.0$ within 6 hours. This changes the CTS by requiring the plant to be in MODE 2 with $K_{eff} < 1.0$ instead of HOT SHUTDOWN (i.e.; MODE 3).

This change is acceptable because the requirements have not changed. In accordance with CTS LCO 3.0.1, Actions are only required to be followed while in the mode of applicability. The CTS upper MTC limit is applicable in MODES 1 and 2 with $K_{eff} \geq 1.0$. Therefore, under the CTS, the unit does not have to enter MODE 3 because the applicability of the action ends when in MODE 2 with $K_{eff} < 1.0$. As a result, there is no difference between the CTS and ITS requirements. This change is designated as administrative because it does not result in a technical change to the specification.

A.6 CTS 3.1.1.4, Action a.1, states that when the MTC is more positive than the BOC limit, control rod withdrawal limits must be established. It also states, "these withdrawal limits shall be in addition to the insertion limits of Specification 3.1.3.6." The ITS does not include this sentence.

This change is acceptable because the requirements have not changed. The CTS reference to Specification 3.1.3.6 is an "information only" statement that neither adds, eliminates, or modifies requirements. The ITS convention is to not include these types of statements. This change is designated as administrative because it does not result in a technical change to the specification.

MORE RESTRICTIVE CHANGES

None

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

None

LESS RESTRICTIVE CHANGES

L.1 *(Category 8 – Deletion of Reporting Requirements)* CTS 3.1.1.4 Action a.3 requires that a Special Report be prepared and submitted to the NRC within 10 days if the measured MTC is more positive than the BOC limit. The Special Report must describe the value of

the measured MTC, the interim control rod withdrawal limits, and the predicted average core burnup necessary for restoring the positive MTC to within its limit for the all rods withdrawn condition. ITS 3.1.3 does not include this requirement.

The purpose of CTS 3.1.1.4 Action a.3 is to provide information on the event to the NRC. This change is acceptable because the regulations provide adequate reporting requirements, or the reports do not affect continued plant operation. A Licensee Event Report is required to be submitted by 10 CFR 50.73(a)(2)(i)(B) for any operation or condition outside of the plant's Technical Specifications. Therefore, a report to the NRC is still required. This change is designated as less restrictive because reports that would be submitted under the CTS will not be required under the ITS.

L.2 *(Category 5 – Deletion of Surveillance Requirement)* CTS 3.1.1.4, Action a.2, states that when the measured MTC is more positive than the limit, the control rod withdrawal limits established in Action a.1 must be maintained until subsequent measurement verifies that the MTC has been restored to within its limits for the all rods withdrawn condition. ITS 3.1.3 does not contain a requirement that the control rod withdrawal limits be maintained until MTC is confirmed to be within its limit by measurement. However, LCO 3.0.2 states that the Required Actions shall be followed until the LCO is met or no longer applicable. The ITS Bases state that physics calculations may be used to determine the time in cycle life at which the calculated MTC will meet the LCO requirement and at this point in core life, the condition may be exited and the control rod withdrawal limits removed. This changes the CTS by eliminating the Surveillance Requirement verifying the MTC to be within its limit before removing the control rod withdrawal limits.

The purpose of CTS 3.1.1.4.a.2 is to ensure that the additional operational restrictions required to maintain the MTC within the assumptions in the safety analysis are maintained until the MTC value without the restrictions is within the LCO limits. This change is acceptable because the deleted Surveillance Requirement is not necessary to verify that the values used to meet the LCO are consistent with the safety analysis. Thus, appropriate values continue to be tested in a manner and at a frequency necessary to give confidence that the assumptions in the safety analysis are protected. The measurement of the MTC, boron worth, and control rod worth prior to entering MODE 1 is sufficient to verify the nuclear design so that it can be accurately predicted when the all rods out, full power equilibrium MTC is within the LCO limit. Performing another measurement of beginning of cycle MTC to confirm this prediction is not necessary to give confidence that MTC is within its limit. This change is designated as less restrictive because Surveillances which are required in the CTS will not be required in the ITS.

UNIT 1

ITS

REACTIVITY CONTROL SYSTEMS

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

GROUP HEIGHT

LIMITING CONDITION FOR OPERATION

LCO 3.1.4

3.1.3.1 All shutdown and control rods shall be OPERABLE and positioned within ± 12 steps* of their group step counter demand position.

APPLICABILITY: MODES 1 and 2. A.2

ACTION: L.1

Action A

a. With one or more rods ~~untrippable~~ inoperable determine within one hour that the SHUTDOWN MARGIN requirement ~~of Specification 3.1.1.1~~ provided in the COLR is satisfied and be in HOT STANDBY within 6 hours. LA.1

Insert ITS ACTION A.1.2 L.2

Action D

b. With more than one rod misaligned from the group step counter demand position by more than the above alignment requirements, determine within one hour that the SHUTDOWN MARGIN requirement ~~of Specification 3.1.1.1~~ provided in the COLR is satisfied and be in HOT STANDBY within 6 hours. LA.1

Insert Action D.1.2 L.2

c. With a maximum of one rod misaligned from the group step counter demand position by more than the above alignment requirements, POWER OPERATION may continue provided that within one hour, either:

Action B.1.1

~~1. The rod is restored to OPERABLE status within the above alignment requirements, or~~ A.3

Action B.1.2

2. ~~The rod is declared inoperable and~~ the SHUTDOWN MARGIN requirement ~~of Specification 3.1.1.1~~ provided in the COLR is satisfied. POWER OPERATION may then continue provided that: L.1 LA.1 L.2

Insert ACTION B.1.2

Action B.3

a) A reevaluation of the ~~each~~ accident analysis ~~of Table 3.1-1~~ is performed within 5 days. This reevaluation shall confirm that the previous analyzed results of these accidents remain valid for the duration of operation under these conditions, and L.3

LCO 3.1.4 Note

* For power levels below 50% of RATED THERMAL POWER, the position of each rod as determined by its individual rod position indicator may be more than ± 12 steps from its group step counter demand position for a maximum of one hour in every 24. During this hour, the indicated position of each rod may be no more than ± 24 steps from its demand position. The ± 24 step/hour limit is not applicable when control rod position is known to be greater than 12 steps from the rod group step counter demand position indication.

~~** See Special Test Exceptions 3.10.2 and 3.10.3.~~ A.2

A.1

ITS 3.1.4

ITS

07-28-94

REACTIVITY CONTROL SYSTEMS

LIMITING CONDITION FOR OPERATION (Continued) provided in the COLR

Action B.1.1

b) The SHUTDOWN MARGIN requirement ~~of Specification 3.1.1.1~~ is determined at least once per 12 hours, and } LA.1

Action B.2.2.1 & B.2.2.2

c) A power distribution map is obtained from the movable incore detectors and $F_Q(Z)$ and F^N_{AH} are verified to be within their limits within 72 hours, or

Action B.2.1

d) ~~Either~~ the THERMAL POWER level is reduced to ≤ 75% of RATED THERMAL POWER within ~~one~~ two hour~~s~~ and within the next 4 hours the high neutron flux trip setpoint is reduced to ≤ 85% of RATED THERMAL POWER, or L.4 L.5

Action C

~~e) The remainder of the rods in the group with the inoperable rod are aligned to within ± 12 steps of the inoperable rod within the hour while maintaining the thermal power, rod sequence, and insertion limits of Specification 3.1.3.6 during subsequent operation.~~ A.4

Insert Action C

M.1

SURVEILLANCE REQUIREMENTS

SR 3.1.4.1

4.1.3.1.1 The position of each rod shall be determined to be within the group demand limit by verifying the individual rod positions at least once per 12 hours ~~except during time intervals when the Rod Position Deviation Monitor is inoperable, then verify the group positions at least once per 4 hours.~~ L.8

SR 3.1.4.2

4.1.3.1.2 Each rod not fully inserted in the core shall be determined to be OPERABLE by movement of at least 10 steps in any one direction at least once per 92 days.

ITS 3.1.4

12-28-79

TABLE 3.1-1

ACCIDENT ANALYSES REQUIRING REEVALUATION IN THE EVENT OF AN INOPERABLE FULL LENGTH ROD

Rod Cluster Control Assembly Insertion Characteristics

Rod Cluster Control Assembly Misalignment

Loss of Reactor Coolant From Small Ruptured Pipes Or From Cracks In Large Pipes Which Actuates The Emergency Core Cooling System

Single Rod Cluster Control Assembly Withdrawal At Full Power

Major Reactor Coolant System Pipe Rupture (Loss of Coolant Accident)

Major Secondary System Pipe Rupture

Rupture of a Control Rod Drive Mechanism Housing (Rod Cluster Control Assembly Ejection)

L.3

ITS

REACTIVITY CONTROL SYSTEMS

ROD DROP TIME

LIMITING CONDITION FOR OPERATION

SR 3.1.4.3

3.1.3.4 Fully The individual full length (shutdown and control) rod drop time from the ~~229 STEP~~ withdrawn position shall be ≤ 2.7 seconds from beginning of decay of stationary gripper coil voltage to dashpot entry with: L.9

a. $T_{avg} \geq 500°F$, and

b. All reactor coolant pumps operating.

APPLICABILITY: MODES 1 and 2.

ACTION:

a. ~~With the drop time of any full length rod determined to exceed the above limit, restore the rod drop time to within the above limit prior to proceeding to MODE 1 or 2.~~ A.5

b. ~~With the rod drop times within limits but determined with 2 reactor coolant pumps operating, operation may proceed provided THERMAL POWER is restricted to:~~ A.6

1. ~~≤ 66% of RATED THERMAL POWER when the reactor coolant stop valves in the nonoperating loop are open, or~~

2. ~~≤ 71% of RATED THERMAL POWER when the reactor coolant stop valves in the nonoperating loop are closed.~~

SURVEILLANCE REQUIREMENTS

SR 3.1.4.3

4.1.3.4 The rod drop time of full length rods shall be demonstrated through measurement prior to reactor criticality:

a. For all rods following each removal of the reactor vessel head,

b. ~~For specifically affected individual rods following any maintenance on or modification to the control rod drive system which could affect the drop time of those specific rods, and~~ L.6

c. ~~At least once per 18 months.~~ L.7

A.1

ITS 3.1.4

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

SHUTDOWN MARGIN - T_{avg} > 200°F

LIMITING CONDITION FOR OPERATION

<(See ITS 3.1.1)>

3.1.1.1 The SHUTDOWN MARGIN shall be ≥ 1.77% Δk/k.

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

ACTION:

With the SHUTDOWN MARGIN < 1.77% Δk/k, immediately initiate and continue boration at ≥ 10 gpm of 12,950 ppm boric acid solution or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.1.1 The SHUTDOWN MARGIN shall be determined to be ≥ 1.77% Δk/k:

a. Within one hour after detection of an inoperable control rod(s) and at least once per 12 hours thereafter while the rod(s) is inoperable. If the inoperable control rod 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 control rod(s).

A.7

b. When in MODES 1 or 2#, at least once per 12 hours by verifying that control bank withdrawal is within the 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 control rod position is within the limits of Specification 3.1.3.6.

<(See ITS 3.1.6)>

*See Special Test Exception 3.10.1 <(See ITS 3.1.1)>

#With K_{eff} ≥ 1.0

##With K_{eff} <1.0

<(See ITS 3.1.6)>

A.1

ITS 3.1.4

9-9-85

REACTIVITY CONTROL SYSTEMS

SHUTDOWN MARGIN - $T_{avg} \leq 200°F$

LIMITING CONDITION FOR OPERATION

3.1.1.2 The SHUTDOWN MARGIN shall be $\geq$ 1.77% Δk/k.

APPLICABILITY: MODE 5.

ACTION:

With the SHUTDOWN MARGIN < 1.77% Δk/k, immediately initiate and continue boration at $\geq$ 10 gpm of 12,950 ppm boric acid solution or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.2 The SHUTDOWN MARGIN shall be determined to be $\geq$ 1.77% Δk/k:

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

b. At least once per 24 hours by consideration of the following factors:

1. Reactor coolant system boron concentration,
2. Control rod position,
3. Reactor coolant system average temperature,
4. Fuel burnup based on gross thermal energy generation,
5. Xenon concentration, and
6. Samarium concentration.

See ITS 3.1.1

A.7

See ITS 3.1.1

UNIT 2

A.1

ITS 3.1.4

ITS

REACTIVITY CONTROL SYSTEMS

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

GROUP HEIGHT

LIMITING CONDITION FOR OPERATION

LCO 3.1.4

3.1.3.1 All shutdown and control rods shall be OPERABLE and positioned within ± 12 steps* of their group step counter demand position.

APPLICABILITY: MODES 1 and 2.

A.2

ACTION:

inoperable

provided in the COLR

L.1

Action A

a. With one or more rods untrippable, determine within one hour that the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is satisfied and be in HOT STANDBY within 6 hours.

LA.1

Insert ITS Action A.1.2

L.2

Action D

b. With more than one rod misaligned from the group step counter demand position by more than the above alignment requirements, determine within one hour that the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is satisfied and be in HOT STANDBY within 6 hours.

LA.1

provided in the COLR

Insert Action D.1.2

L.2

Action B.1.1

c. With a maximum of one rod misaligned from the group step counter demand position by more than the above alignment requirements, POWER OPERATION may continue provided that within one hour, either:

1. The rod is restored to OPERABLE status within the above alignment requirements, or

A.3

provided in the COLR

2. The rod is declared inoperable and the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is satisfied. POWER OPERATION may then continue provided that:

L.1

LA.1

Action B.1.2

Insert Action B.1.2

L.2

the

Action B.3

a) A reevaluation of each accident analysis of Table 3.1-1 is performed within 5 days. This reevaluation shall confirm that the previous analyzed results of these accidents remain valid for the duration of operation under these conditions, and

L.3

LCO 3.1.4 NOTE

* For power levels below 50% of RATED THERMAL POWER, the position of each rod as determined by its individual rod position indicator may be more than ± 12 steps from its group step counter demand position for a maximum of one hour in every 24. During this hour, the indicated position of each rod may be no more than ± 24 steps from its demand position. The ± 24 step/hour limit is not applicable when control rod position is known to be greater than 12 steps from the rod group step counter demand position indication.

** See Special Test Exceptions 3.10.2 and 3.10.3.

A.2

page 1 of 6

Rev 0

A.1

ITS 3.1.4

07-28-94

ITS

REACTIVITY CONTROL SYSTEMS

LIMITING CONDITION FOR OPERATION (Continued)

provided in the COLR

Action B.1.1

b) The SHUTDOWN MARGIN requirement ~~of Specification 3.1.1.1~~ is determined at least once per 12 hours, and — LA.1

Action B.2.1 + B.2.2.2

c) A power distribution map is obtained from the movable incore detectors and $F_Q(Z)$ and $F^N_{\Delta H}$ are verified to be within their limits within 72 hours, or — A.4

d) ~~Either:~~ — L.4

Action B.2.1

1) The THERMAL POWER level is reduced to less than or equal to 75% of RATED THERMAL POWER within ~~one hour~~ two and within the next 4 hours the high neutron flux trip setpoint is reduced to less than or equal to 85% of RATED THERMAL POWER, or — L.5

2) The remainder of the rods in the group with the inoperable rod are aligned to within ± 12 steps of the inoperable rod within the hour while maintaining the thermal power, rod sequence, and insertion limits of Specification 3.1.3.6 during subsequent operation. — A.4

Action C — Insert Action C — M.1

SURVEILLANCE REQUIREMENTS

SR 3.1.4.1

4.1.3.1.1 The position of each rod shall be determined to be within the group demand limit by verifying the individual rod positions at least once per 12 hours ~~except during time intervals when the Rod Position Deviation Monitor is inoperable, then verify the group positions at least once per 4 hours.~~ — L.8

SR 3.1.4.2

4.1.3.1.2 Each rod not fully inserted in the core shall be determined to be OPERABLE by movement of at least 10 steps in any one direction at least once per 92 days.

8-21-80

TABLE 3.1-1

ACCIDENT ANALYSES REQUIRING REEVALUATION IN THE EVENT OF AN INOPERABLE ROD

Rod Cluster Control Assembly Insertion Characteristics

Rod Cluster Control Assembly Misalignment

Loss of Reactor Coolant From Small Ruptured Pipes Or From Cracks In Large Pipes Which Actuates The Emergency Core Cooling System

Single Rod Cluster Control Assembly Withdrawal At Full Power

Major Reactor Coolant System Pipe Rupture (Loss of Coolant Accident)

Major Secondary Pipe Rupture

Rupture of a Control Rod Drive Mechanism Housing (Rod Cluster Control Assembly Ejection)

L.3

A.1

ITS 3.1.4

11-22-91

ITS

REACTIVITY CONTROL SYSTEMS

ROD DROP TIME

LIMITING CONDITION FOR OPERATION

SR 3.1.4.3

3.1.3.4 fully The individual full length (shutdown and control) rod drop time from the 228 STEP withdrawn position shall be less than or equal to 2.7 seconds from beginning of decay of stationary gripper coil voltage to dashpot entry with: L.9

a. T_{avg} greater than or equal to 500°F, and

b. All reactor coolant pumps operating.

APPLICABILITY: MODES 1 and 2.

ACTION:

a. With the drop time of any full length rod determined to exceed the above limit, restore the rod drop time to within the above limit prior to proceeding to MODE 1 or 2. A.5

b. With the rod drop times within limits but determined with 2 reactor coolant pumps operating, operation may proceed provided THERMAL POWER is restricted to: A.6

1. Less than or equal to 66% of RATED THERMAL POWER when the reactor coolant stop valves in the nonoperating loop are open, or

2. Less than or equal to 71% of RATED THERMAL POWER when the reactor coolant stop valves in the nonoperating loop are closed.

SURVEILLANCE REQUIREMENTS

4.1.3.4 The rod drop time of full length rods shall be demonstrated through measurement prior to reactor criticality:

SR 3.1.4.3

a. For all rods following each removal of the reactor vessel head,

b. For specifically affected individual rods following any maintenance on or modification to the control rod drive system which could affect the drop time of those specific rods, and L.6

c. At least once per 18 months. L.7

A.1

ITS 3.1.4

9-9-85

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

SHUTDOWN MARGIN - T_{avg} GREATER THAN 200°F

LIMITING CONDITION FOR OPERATION

3.1.1.1 The SHUTDOWN MARGIN shall be greater than or equal to 1.77% Δk/k.

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

ACTION:

With the SHUTDOWN MARGIN less than 1.77% delta k/k, immediately initiate and continue boration at greater than or equal to 10 gpm of a solution containing greater than or equal to 12,950 ppm boron or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.1.1 The SHUTDOWN MARGIN shall be determined to be greater than or equal to 1.77% delta k/k:

a. Within one hour after detection of an inoperable control rod(s) and at least once per 12 hours thereafter while the rod(s) is inoperable. If the inoperable control rod 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 control rod(s).

b. When in MODE 1 or MODE 2 with K_{eff} greater than or equal to 1.0, at least once per 12 hours by verifying that control bank withdrawal is within the limits of Specification 3.1.3.6.

c. When in MODE 2 with K_{eff} less than 1.0, within 4 hours prior to achieving reactor criticality by verifying that the predicted critical control rod position is within the limits of Specification 3.1.3.6.

*See Special Test Exception 3.10.1

(See ITS 3.1.1)

(See ITS 3.1.1)

(A.7)

(See ITS 3.1.6)

A.1

ITS 3.1.4

9-9-85

REACTIVITY CONTROL SYSTEMS

SHUTDOWN MARGIN - T_{avg} LESS THAN OR EQUAL TO 200°F

SURVEILLANCE REQUIREMENTS

3.1.1.2 The SHUTDOWN MARGIN shall be greater than or equal to 1.77% delta k/k.

APPLICABILITY: MODE 5.

ACTION:

With the SHUTDOWN MARGIN less than 1.77% delta k/k, immediately initiate and continue boration at greater than or equal to 10 gpm of a solution containing greater than or equal to 12,950 ppm boron or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.2 The SHUTDOWN MARGIN shall be determined to be greater than or equal to 1.77% delta k/k:

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

A.7

b. At least once per 24 hours by consideration of the following factors:

1. Reactor coolant system boron concentration,
2. Control rod position,
3. Reactor coolant system average temperature,
4. Fuel burnup based on gross thermal energy generation,
5. Xenon concentration, and
6. Samarium concentration.

See ITS 3.1.1

See ITS 3.1.1

ADMINISTRATIVE CHANGES

A.1 In the conversion of the North Anna Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG-1431, Rev. 1, "Standard Technical Specifications-Westinghouse Plants" (ISTS).

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A.2 The Applicability of CTS 3.1.3.1 is modified by a footnote, designated "**", stating, "See Special Test Exceptions 3.10.2 and 3.10.3." ITS 3.1.4 Applicability does not contain the footnote or a reference to the Special Test Exception.

The purpose of the footnote reference is to alert the reader that a Special Test Exception exists which may modify the Applicability of the specification. It is an ITS convention to not include these types of footnotes or cross-references. This change is designated as administrative because it does not result in technical changes to the specifications.

A.3 CTS 3.1.3.1, Action c.1, states that with a maximum of one rod misaligned from the group step counter demand position by more than the alignment requirements, POWER OPERATION may continue provided that within one hour, the rod is restored to OPERABLE status within the above alignment limits, or other compensatory measures described in the specification are taken. ITS 3.1.4 does not contain a Required Action stating that the rod must be restored to OPERABLE status within the alignment limits.

This change is acceptable because the technical requirements have not changed. Restoration of compliance with the LCO is always an available Required Action and it is the convention in the ITS to not state such "restore" options explicitly unless it is the only action or is required for clarity. This change is designated as administrative because it does not result in technical changes to the specifications.

A.4 CTS 3.1.3.1, Action c.2.e), states that with a maximum of one rod misaligned from the group step counter demand position by more than the alignment requirements, POWER OPERATION may continue provided that the remainder of the rods in the group are aligned to within +/- 12 steps of the misaligned rod within 1 hour while maintaining the thermal power, rod sequence, and insertion limits of Specification 3.1.3.6 during subsequent operation. ITS 3.1.4 does not contain a Required Action stating that the remainder of the rods in the group must be aligned with the misaligned rod.

This change is acceptable because the technical requirements have not changed. Moving the remainder of the rods in a group to within the LCO limit of the misaligned rod while maintaining compliance with all other rod position requirements is simply restoring compliance with the LCO. Restoration of compliance with the LCO is always an

available Required Action and it is the convention in the ITS to not state such "restore" options explicitly unless it is the only action or is required for clarity. This change is designated as administrative because it does not result in technical changes to the specifications.

A.5 CTS 3.1.3.4, Action a, states that with the rod drop time of any full length rod determined to exceed the rod drop time limit, restore the rod drop time to within limit prior to proceeding to MODE 1 or 2. CTS 3.1.3.4 is applicable in MODES 1 and 2. The ITS does not have a similar requirement.

CTS 4.0.4 and ITS SR 3.0.4 require verification that Surveillances are met prior to entering the MODE in which they apply. CTS 4.0.4 and ITS SR 3.0.4 also prohibit entering a MODE or condition with the Surveillance not met and while relying on Actions. Therefore, the Action prohibiting entry into MODES 1 and 2 with the rod drop time requirements not met is redundant to CTS 4.0.4 and ITS SR 3.0.4. This change is acceptable because the technical requirements have not changed. This change is designated as administrative because it does not result in technical changes to the specifications.

A.6 CTS 3.1.3.4, Action b, contains actions to follow if the rod drop times are measured with less than three reactor coolant loops in service and provide restrictions on power operation with less than all three reactor coolant loops in service. The ITS does not contain similar restrictions.

This change is acceptable because operation in MODES 1 and 2 is prohibited with less than three reactor coolant loops in operation. Therefore, the options in this Action cannot be used. This change is designated as administrative as a provision of the CTS which cannot be used is eliminated.

A.7 CTS 4.1.1.1.1.a and 4.1.1.2.a require verification of SHUTDOWN MARGIN within one hour after detection of an inoperable control rod(s) and at least once per 12 hours thereafter while the rod(s) is inoperable. This duplicates the requirements in CTS 3.1.3.1, Action c.2 and Action c.2.b and is eliminated. CTS 4.1.1.1.1.a and 4.1.1.2.a also state that if the inoperable control rod is immovable or untrippable, the SHUTDOWN MARGIN shall be increased by the amount at least equal to the withdrawn worth of the immovable or untrippable control rod(s). The ITS definition of "SHUTDOWN MARGIN" states, "With any RCCA not capable of being fully inserted, the reactivity worth of the RCCA must be accounted for in the determination of SDM." This changes the CTS by eliminating duplicated requirements and moving information from the Specifications to the definitions.

This change is acceptable because the requirements have not changed. The elimination of duplicated requirements does not affect the technical requirements of the specifications. Moving information from the specifications to the definitions does not affect the technical

requirements of the specifications. This change is designated as administrative because it does not result in technical changes to the specifications.

MORE RESTRICTIVE CHANGES

M.1 CTS 3.1.3.1, Action c, states that with one rod misaligned, POWER OPERATION may continue provided that certain actions are completed within one hour. If those actions are not complete, CTS 3.0.3 would be entered which requires entry into MODE 3 within 7 hours, for a total time from condition discovery to entry into MODE 3 of 8 hours. ITS 3.1.4, Action C, states that if the Required Actions and associated Completion Times of Condition B, one rod not within alignment limits, are not met, the unit must be in MODE 3 in 6 hours. The shortest Completion Time in ITS Condition B is one hour. Therefore, under the ITS, the time from discovery of the condition to entry into MODE 3 is 7 hours. This changes the CTS by providing one less hour for entry into MODE 3 following discovery of a misaligned rod.

The purpose of requiring a shutdown when a rod misalignment cannot be corrected is to bring the unit to a subcritical condition prior to the build up of an undesirable xenon or power distribution. This change is acceptable because is provides an adequate period of time to correct the condition or be in a MODE in which the requirement does not apply. The Completion Time of 6 hours is reasonable, based on operating experience, for reaching MODE 3 from full power in an orderly manner and without challenging plant systems.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

LA.1 *(Type 5 – Removal of Cycle-Specific Parameter Limits from the Technical Specifications to the Core Operating Limits Report)* CTS 3.1.3.1, Actions a, b, c.2, and c.2.b) require satisfying the SHUTDOWN MARGIN requirement in accordance with Specification 3.1.1.1. In the same conditions, ITS 3.1.4 requires verification that the SHUTDOWN MARGIN is within the limit provided in the COLR. This changes the CTS by relocating the SHUTDOWN MARGIN value to be met from the specifications to the Core Operating Limits Report (COLR).

The removal of these cycle-specific parameter limits from the Technical Specifications and their relocation into the COLR is acceptable because these limits are developed or utilized under NRC-approved methodologies. The NRC documented in Generic Letter 88-16, Removal of Cycle-Specific Parameter Limits From the Technical Specifications, that this type of information is not necessary to be included in the Technical

Specifications to provide adequate protection of public health and safety. The ITS still retains requirements and Surveillances that verify that the cycle-specific parameter limits are being met. The requirement to verify that the SHUTDOWN MARGIN assumptions are met when shutdown or control rods are inoperable or misaligned has not changed. Also, this change is acceptable because the removed information will be adequately controlled in the COLR under the requirements provided in ITS 5.6.5, Core Operating Limits Report. ITS 5.6.5 ensures that the applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems limits, and nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met. This change is designated as a less restrictive removal of detail change because information relating to cycle-specific parameter limits is being removed from the Technical Specifications.

LESS RESTRICTIVE CHANGES

L.1 *(Category 1 – Relaxation of LCO Requirements)* CTS LCO 3.1.3.1 states, "All shutdown and control rods shall be OPERABLE and positioned within +/- 12 steps of their group step counter demand position." CTS 3.1.3.1, Action c.2), states that a misaligned rod must be declared inoperable. ITS LCO 3.1.4 states, "All shutdown and control rods shall be OPERABLE AND Individual indicated rod position shall be within 12 steps of their group step counter demand position." This changes the CTS by considering shutdown and control rods that are trippable but misaligned to be OPERABLE. The term "untrippable" in CTS 3.1.3.1, Action a, is replaced with "inoperable" and the requirement to declare a misaligned rod inoperable in CTS 3.1.3.1, Action c.2, is deleted.

The purpose of ITS 3.1.4 is to ensure that the RCCAs are capable of performing their safety function of inserting into the core when required. A secondary function of the control rods is to maintain alignment so that the core power distribution is consistent with the analysis. This change is acceptable because the LCO requirements continue to ensure that the structures, systems, and components are maintained consistent with the safety analyses and licensing basis. In the ITS, rod OPERABILITY is related only to trippability and a misaligned rod is not considered inoperable if it can be tripped. Misalignment is addressed by Required Actions, but is separate from OPERABILITY. In both cases, trippability and misalignment, the ITS continues to provide appropriate compensatory measures. This change is designated as less restrictive because less stringent LCO requirements are being applied in the ITS than were applied in the CTS.

L.2 *(Category 4 – Relaxation of Required Action)* CTS 3.1.3.1, Actions a, b, c.2, and c.2.b) require satisfying the SHUTDOWN MARGIN requirement in accordance with Specification 3.1.1.1. In the same conditions, ITS 3.1.4 requires verification that the SHUTDOWN MARGIN is within the limit provided in the COLR or initiating boration to restore SDM to within the limit. This changes the CTS by providing the option to initiate action to establish compliance with the SDM requirement within 1 hour instead of declaring the Required Action not met and following LCO 3.0.3. The change from

referencing Specification 3.1.1.1 to referencing a value in the COLR is discussed in DOC LA.1.

The purpose of the referenced CTS 3.1.3.1 actions is to ensure that adequate SHUTDOWN MARGIN exists. Following misalignment of a rod, boration may be required to reestablish compliance with the SHUTDOWN MARGIN requirements. This change is acceptable because the Required Actions are used to establish remedial measures that must be taken in response to the degraded conditions in order to minimize risk associated with continued operation while providing time to repair inoperable features. The Required Actions are consistent with safe operation under the specified Condition, considering the operability status of the redundant systems of required features, the capacity and capability of remaining features, a reasonable time for repairs or replacement of required features, and the low probability of a DBA occurring during the repair period. Providing a short period of time to reestablish the SHUTDOWN MARGIN requirement instead of entering LCO 3.0.3 is justified because of the existing conservatisms in the SHUTDOWN MARGIN calculations and the fact that the rod is still trippable. This change is designated as less restrictive because less stringent Required Actions are being applied in the ITS than were applied in the CTS.

L.3 *(Category 4 – Relaxation of Required Action)* CTS 3.1.3.1, Action c.2.a), states that when a rod is misaligned, POWER OPERATION may continue if a reevaluation of each accident analysis of Table 3.1-1 is performed within 5 days. This re-evaluation shall confirm that the previous analyzed results of these accidents remain valid for the duration of operation under these conditions. ITS 3.1.4, Condition B, states that when one rod misaligned, re-evaluate the safety analyses and confirm results remain valid for the duration of operation under these conditions. This changes the CTS by eliminating Table 3.1-1, which lists the specific events to be re-evaluated, and the Action to evaluate those specific events.

The purpose of CTS 3.1.3.1, Action c.2.a) is to ensure that the accident analyses performed for the reload core continue to be applicable during operation with a misaligned rod. This change is acceptable because the Required Actions are used to establish remedial measures that must be taken in response to the degraded conditions in order to minimize risk associated with continued operation while providing time to repair inoperable features. The Required Actions are consistent with safe operation under the specified Condition, considering the operability status of the redundant systems of required features, the capacity and capability of remaining features, a reasonable time for repairs or replacement of required features, and the low probability of a DBA occurring during the repair period. The elimination of a specific set of events to be re-evaluated does not change the requirement to verify continued operation is acceptable and places the responsibility on the licensee to re-evaluate all accident analyses which may be affected by a misaligned rod. This change is designated as less restrictive because less stringent Required Actions are being applied in the ITS than were applied in the CTS.

L.4 *(Category 3 – Relaxation of Completion Time)* CTS 3.1.3.1, Action c.2.d) states that with one rod misaligned, reduce the THERMAL POWER level to ≤ 75% of RATED THERMAL POWER within one hour. ITS 3.1.4, Required Action B.2.1, requires THERMAL POWER to be reduced to ≤ 75% RTP within 2 hours. This changes the CTS by changing the Completion Time from one hour to two hours.

The purpose of CTS 3.1.3.1, Action c.2.d) is to reduce core power to ensure that the increases in linear heat rate due to misalignment of a rod does not result in exceeding the design limits. This change is acceptable because the Completion Time is consistent with safe operation under the specified Condition, considering the operability status of the redundant systems of required features, the capacity and capability of remaining features, a reasonable time for repairs or replacement of required features, and the low probability of a DBA occurring during the allowed Completion Time. The Completion Time of 2 hours gives the operator sufficient time to accomplish an orderly power reduction without challenging the Reactor Protection System. This change is designated as less restrictive because additional time is allowed to restore parameters to within the LCO limits than was allowed in the CTS.

L.5 *(Category 4 – Relaxation of Required Action)* CTS 3.1.3.1, Action c.2.d) states that with one rod misaligned, reduce the THERMAL POWER level to ≤ 75% of RATED THERMAL POWER and reduce the high neutron flux trip setpoint to ≤ 85% of RTP within the next 4 hours. ITS 3.1.4, Required Action B.2.1, requires THERMAL POWER to be reduced to ≤ 75% RTP, but does not require the high neutron flux trip setpoint to be reduced. This changes the CTS by eliminating the Required Action to reduce the high neutron flux trip setpoint.

The purpose of CTS 3.1.3.1, Action c.2.d) is to reduce core power to ensure that the increases in linear heat rate due to misalignment of a rod does not result in exceeding the design limits. This change is acceptable because the Required Actions are used to establish remedial measures that must be taken in response to the degraded conditions in order to minimize risk associated with continued operation while providing time to repair inoperable features. The Required Actions are consistent with safe operation under the specified Condition, considering the operability status of the redundant systems of required features, the capacity and capability of remaining features, a reasonable time for repairs or replacement of required features, and the low probability of a DBA occurring during the repair period. Lowering the high neutron flux trip setpoint increases the chance for an inadvertent reactor trip due to the changes being made to the Reactor Protection System without providing a commensurate amount of added safety. Administrative methods of maintaining reactor power below that allowed by the Required Action are sufficient to protect the core. This change is designated as less restrictive because less stringent Required Actions are being applied in the ITS than were applied in the CTS.

L.6 *(Category 5 – Deletion of Surveillance Requirement)* CTS 4.1.3.4 requires the rod drop time of full length rods to be demonstrated through measurement prior to reactor criticality for specifically affected individual rods following any maintenance on or modification to the control rod drive system which could affect the drop time of those specific rods. The ITS does not include this testing requirement.

The purpose of Surveillance 4.1.3.4 is to verify OPERABILITY of the control rods following maintenance that could alter their operation. This change is acceptable because the deleted Surveillance Requirement is not necessary to verify that the equipment used to meet the LCO can perform its required functions. Thus, appropriate equipment continues to be tested in a manner and at a frequency necessary to give confidence that the equipment can perform its assumed safety function. Any time the OPERABILITY of a system or component has been affected by repair, maintenance, modification, or replacement of a component, post maintenance testing is required to demonstrate the OPERABILITY of the system or component. This is described in the Bases for ITS SR 3.0.1 and required under SR 3.0.1. The OPERABILITY requirements for the rod control system are described in the Bases for Specification 3.1.4. In addition, the requirements of 10 CFR 50, Appendix B, Section XI (Test Control) provide adequate controls for test programs to ensure that testing incorporates applicable acceptance criteria. Compliance with 10 CFR 50, Appendix B is required under the unit operating license. As a result, post-maintenance testing will continue to be performed and an explicit requirement in the Technical Specifications is not necessary. This change is designated as less restrictive because Surveillances which are required in the CTS will not be required in the ITS.

L.7 *(Category 7 – Relaxation Of Surveillance Frequency)* CTS 4.1.3.4 requires the rod drop time of full length rods to be demonstrated through measurement prior to reactor criticality at least once per 18 months. The ITS does not include this testing requirement.

The purpose of Surveillance 4.1.3.4 is to periodically verify OPERABILITY of the control rods. This change is acceptable because the Surveillance Frequency has been evaluated to ensure that it provides an acceptable level of equipment reliability. The CTS and ITS Frequency for performing the rod drop timing tests of "for all rods following each removal of the reactor vessel head" is adequate to ensure the operability of the rods. The refueling frequency of North Anna is 18 months. Therefore, the fixed Frequency of every 18 months does not normally result in testing being performed in addition to the Frequency of "after removal of the reactor vessel head." This change is designated as less restrictive because Surveillances will be performed less frequently under the ITS than under the CTS.

L.8 *(Category 7 – Relaxation Of Surveillance Frequency)* CTS 4.1.3.1.1 requires the position of each rod to be determined to be within the group demand limit by verifying the individual rod positions at lease once per 12 hours except during time intervals when the Rod Position Deviation Monitor is inoperable, then verify the group positions at least once per 4 hours. ITS SR 3.1.4.1 requires verification that the individual rod positions are within the alignment limit every 12 hours. This changes the CTS by eliminating the

requirement to verify the individual rod positions to be within the alignment limit every 4 hours when the Rod Position Deviation Monitor is inoperable.

The purpose of Surveillance 4.1.3.1.1 is to periodically verify that the rods are within the alignment limit specified in the LCO. This change is acceptable because the Surveillance Frequency has been evaluated to ensure that it provides an acceptable level of equipment reliability. Increasing the frequency of rod position verification when the Rod Position Deviation Monitor is inoperable is unnecessary as inoperability of the alarm does not increase the probability that the rods are misaligned. The Rod Position Deviation Monitor alarm is for indication only. Its use is not credited in any safety analysis. This change is designated as less restrictive because Surveillances will be performed less frequently under the ITS than under the CTS.

L.9 *(Category 6 – Relaxation Of Surveillance Requirement Acceptance Criteria)* CTS 3.1.3.4 states that the rod drop time must be measured from the 229 step withdrawn position. ITS 3.1.4.3 states the rod drop time must be verified from the fully withdrawn position. This changes the CTS by eliminating the rod step position equivalent to the fully withdrawn position.

The purpose of CTS 3.1.3.4 is to verify that the rod drop times are consistent with those assumed in the accident analyses. This change is acceptable because it has been determined that the relaxed Surveillance Requirement acceptance criteria are not necessary for verification that the equipment used to meet the LCO can perform its required functions. The North Anna fully withdrawn control rod position is varied to reduce fretting of the control rods. This Surveillance is to verify that the rod drop times for that cycle are bounded by the accident analysis. Therefore, the specific all rods out value for the subject cycle does not need to be specified in the Technical Specifications as long as the rod drop times are consistent with the accident analyses for the cycle. This change is designated as less restrictive because less stringent Surveillance Requirements are being applied in the ITS than were applied in the CTS.

UNIT 1

A.1

ITS 3.1.5

3-1-94

Insert Applicability Note

ITS

A.3

REACTIVITY CONTROL SYSTEMS

SHUTDOWN ROD INSERTION LIMIT

LIMITING CONDITION FOR OPERATION

3.1.5

Each

bank

3.1.3.5 All shutdown rods shall be limited in physical insertion as specified in the CORE OPERATING LIMITS REPORT.

L.1

APPLICABILITY: MODES 1 and 2.

A.2

ACTION:

M.1

Insert proposed Condition A

a. With a maximum of one shutdown rod inserted beyond the insertion limit specified in the CORE OPERATING LIMITS REPORT, except for surveillance testing pursuant to Specification 4.1.3.1.2, within one hour either:

L.3

1. Restore the rod to within the insertion limit specified in the CORE OPERATING LIMITS REPORT, or

L.1

2. Declare the rod to be misaligned and apply Specification 3.1.3.1

Condition B

b. With a maximum of one shutdown bank inserted beyond the insertion limit specified in the CORE OPERATING LIMITS REPORT during surveillance testing pursuant to Specification 4.1.3.1.2 and immovable due to malfunctions in the rod control system, POWER OPERATION may continue provided that:

A.3

Condition B

1. the shutdown bank is inserted no more than 18 steps below the insertion limit as measured by the group step counter demand position indicators,

Condition B

2. the affected bank is trippable,

Each control and shutdown bank within the limits of LCO 3.1.4

Condition B

3. each shutdown and control rod is aligned to within ± 12 steps of its respective group step counter demand position,

A.4

Condition B

4. the insertion limits of Specification 3.1.3.6 are met for each control bank,

Action B.1

5. the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is determined to be met at least once per 12 hours, and

Action B.2

6. the shutdown bank is restored to within the insertion limit specified in the CORE OPERATING LIMITS REPORT within 72 hours.

Action C

Otherwise, be in HOT STANDBY within the next 6 hours.

~~* See Special Test Exceptions 3.10.2 and 3.10.3~~

~~# With Keff ≥ 1.0~~

A.2

M.1

page 1 of 2

Rev. 0

A.1

ITS 3.1.5

3-1-94

ITS

SURVEILLANCE REQUIREMENTS

4.1.3.5 Each shutdown rod shall be determined to be within the insertion limit specified in the CORE OPERATING LIMITS REPORT

a. ~~Within 15 minutes prior to initial control rod bank withdrawal during an approach to reactor criticality, and~~

b. At least once per 12 hours ~~thereafter~~

L.2

SR 3.1.5.1

page 2 of 2

Rev. 0

UNIT 2

A.1

ITS 3.1.5

Insert Applicability Note

3-1-94

A.3

REACTIVITY CONTROL SYSTEMS

ITS 3.1.5

SHUTDOWN ROD INSERTION LIMIT

LIMITING CONDITION FOR OPERATION

Each bank

3.1.3.5 All shutdown rods shall be limited in physical insertion as specified in the CORE OPERATING LIMITS REPORT. L.1

APPLICABILITY: MODES 1* and 2#. A.2 M.1

ACTION:

Insert Proposed Condition A

a. With a maximum of one shutdown rod inserted beyond the insertion limit specified in the CORE OPERATING LIMITS REPORT, except for surveillance testing pursuant to Specification 4.1.3.1.2, within one hour either: L.3 L.1

1. Restore the rod to within the insertion limit specified in the CORE OPERATING LIMITS REPORT, or

2. Declare the rod to be misaligned and apply Specification 3.1.3.1

Condition B

b. With a maximum of one shutdown bank inserted beyond the insertion limit specified in the CORE OPERATING LIMITS REPORT during surveillance testing pursuant to Specification 4.1.3.1.2 and immovable due to malfunctions in the rod control system, POWER OPERATION may continue provided that: A.3

Condition B

1. the shutdown bank is inserted no more than 18 steps below the insertion limit as measured by the group step counter demand position indicators,

Condition B

2. the affected bank is trippable, Each control and shutdown bank within the limits of LCO 3.1.4

3. each shutdown and control rod is aligned to within ± 12 steps of its respective group step counter demand position, A.4

Condition B

4. the insertion limits of Specification 3.1.3.6 are met for each control bank,

Action B.1

5. the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is determined to be met at least once per 12 hours, and

Action B.2

6. the shutdown bank is restored to within the insertion limit specified in the CORE OPERATING LIMITS REPORT within 72 hours.

Action C

Otherwise, be in HOT STANDBY within the next 6 hours.

~~* See Special Test Exceptions 3.10.2 and 3.10.3.~~ A.2

~~# With Keff greater than or equal to 1.0~~ M.1

page 1 of 2

Rev. 0

A.1

ITS 3.1.5

3-1-94

ITS

SURVEILLANCE REQUIREMENTS

4.1.3.5 Each shutdown rod shall be determined to be within the insertion limit specified in the CORE OPERATING LIMITS REPORT

SR 3.1.5.1

a. ~~Within 15 minutes prior to initial control rod bank withdrawal during an approach to reactor criticality, and~~

b. At least once per 12 hours ~~thereafter~~

L.2

page 2 of 2

Rev. 0

ADMINISTRATIVE CHANGES

A.1 In the conversion of the North Anna Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG-1431, Rev. 1, "Standard Technical Specifications-Westinghouse Plants" (ISTS).

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A.2 The Applicability of CTS 3.1.3.5 is modified by a footnote, designated "*", stating, "See Special Test Exceptions 3.10.2 and 3.10.3." ITS 3.1.5 Applicability does not contain the footnote or a reference to the Special Test Exceptions.

The purpose of the footnote reference is to alert the reader that Special Test Exceptions exist which may modify the Applicability of the specification. This change is acceptable because it is an ITS convention to not include these types of footnotes or cross-references. This change is designated as administrative as it incorporates an ITS convention with no technical change to the Specifications.

A.3 CTS 3.1.3.5, Action b, states that power operation may continue with a maximum of one shutdown bank inserted beyond the insertion limit during surveillance testing pursuant to Specification 4.1.3.1.2 and immovable due to malfunctions in the rod control system. ITS 3.1.5, Condition B, states, in part, "One shutdown bank inserted ≤ 18 steps below the insertion limit and immovable." This changes the CTS by eliminating the qualification, "during surveillance testing pursuant to Specification 4.1.3.1.2" and immovable "due to malfunctions in the rod control system."

This change is acceptable because the requirements have not changed. The shutdown banks are required to be fully withdrawn in the MODES in which the specification is applicable. The only time the shutdown banks are inserted while in the applicable MODES is during performance of the rod freedom test, CTS Surveillance 4.1.3.1.2. Therefore, stating that the malfunction occurred during that test is unnecessary. Further, ITS LCO 3.1.5 is not applicable during the rod freedom test, ITS SR 3.1.4.2, under the ITS 3.1.5 Applicability Note. Referencing the SR within the specification would be confusing. The qualification that a bank is immovable "due to malfunctions in the rod control system" is unnecessary. If a bank is immovable, it is either due to mechanical binding or a malfunction of the control rod system. If the problem is mechanical binding, the bank would not be trippable and LCO 3.1.4 would apply. This Condition can only apply during a malfunction of the rod control system. Therefore, specifying that the bank is immovable due to malfunctions in the rod control system is not necessary. This change is designated as administrative because it does not result in a technical change to the specifications.

A.4 CTS 3.1.3.5, Action b, states, in part, that "With a maximum of one shutdown bank inserted beyond the insertion limit specified in the CORE OPERATING LIMITS REPORT during surveillance testing pursuant to Specification 4.1.3.1.2 and immovable due to malfunctions in the rod control system, POWER OPERATION may continue provided that: . . . . 2. the affected bank is trippable, 3. each shutdown and control rod is aligned to within +/- 12 steps of its respective group step counter demand position . . ." ITS 3.1.5, Condition B, states, in part, "One shutdown bank inserted ≤ 18 steps below the insertion limit and immovable AND each control and shutdown bank within the limits of LCO 3.1.4." ITS LCO 3.1.4 requires that all shutdown and control banks be OPERABLE (which is defined as "trippable,") and individual indicated rod positions be within 12 steps of their group step counter demand position. This changes the CTS by substituting a reference to LCO 3.1.4 for the explicit requirements in the CTS action.

This change is acceptable because the requirements have not changed. The CTS requirements have been rearranged. This change is designated as administrative as the technical requirements have not changed.

MORE RESTRICTIVE CHANGES

M.1 CTS 3.1.3.5 is applicable in MODE 1 and MODE 2 with $k_{eff} \geq 1.0$. ITS 3.1.5 is applicable in MODES 1 and 2. This changes the CTS by expanding the applicability from MODE 2 with the reactor critical to all of MODE 2. This has the effect of expanding the applicability of the requirements.

The purpose of CTS 3.1.3.5 is to ensure that the shutdown banks are fully withdrawn prior to withdrawing the control banks in order to ensure that there is sufficient shutdown margin available to quickly shutdown the reactor. This change is acceptable because applying that requirement prior to removing the control banks and bringing the reactor critical ensures that the shutdown margin is available and is consistent with plant operation, in that the shutdown banks are completely withdrawn before beginning to withdraw the control banks and approaching criticality. This change is designated as more restrictive because it increases the conditions under which technical specification controls will be applied.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

None

LESS RESTRICTIVE CHANGES

L.1 *(Category 1 – Relaxation of LCO Requirements)* CTS LCO 3.1.3.5 states, "All shutdown rods shall be limited in physical insertion as specified in the CORE OPERATING LIMITS REPORT." CTS 3.1.3.5, Action a, applies when one shutdown rod is inserted beyond the insertion limits and requires, within one hour, restoration of the rod to within the insertion limits or declaration of the rod to be misaligned and application of Specification 3.1.3.1. ITS LCO 3.1.5 states, "Each shutdown bank shall be within insertion limits specified in the COLR." ITS 3.1.5 does not contain actions for a single rod inserted below the insertion limit and single rod misalignment greater than 12 steps would fall under the requirement of ITS LCO 3.1.4. LCO 3.1.4 requires the rods to be aligned within 12 steps. This changes the CTS by eliminating the CTS 3.1.3.5 requirement to declare a single shutdown rod below the insertion limits misaligned, even if the rod is within 12 steps of the group alignment limits.

The purpose of CTS 3.1.3.5 is to ensure that the shutdown banks are fully withdrawn in order to ensure that there is sufficient shutdown margin available to quickly shutdown the reactor. This change is acceptable because the LCO requirements continue to ensure that the process variables are maintained consistent with the safety analyses and licensing basis. A single shutdown rod below the insertion limit but less than 12 steps from the group position will not have a significant effect on the available shutdown margin. Should the shutdown rod be misaligned by more than 12 steps, the Required Actions of ITS LCO 3.1.4 are applied. This change is designated as less restrictive because less stringent LCO requirements are being applied in the ITS than were applied in the CTS.

L.2 *(Category 5 – Deletion of Surveillance Requirement)* CTS Surveillance 4.1.3.5 requires verification that each shutdown rod is within the insertion limit specified in the CORE OPERATING LIMITS REPORT within 15 minutes prior to initial control rod bank withdrawal during an approach to reactor criticality. ITS 3.1.5 does not require verification that the shutdown rods are above the insertion limits within 15 minutes prior to initial control bank withdrawal. This changes the CTS by eliminating the requirement that the shutdown banks be verified to be above the insertion limit within 15 minutes prior to withdrawing the first control bank.

The purpose of CTS Surveillance 4.1.3.5.a is to verify that the shutdown banks are withdrawn above the insertion limit prior to withdrawing the control banks. This change is acceptable because the deleted Surveillance Requirement is not necessary to verify that the equipment used to meet the LCO can perform its required functions. Thus, appropriate equipment continues to be tested in a manner and at a frequency necessary to give confidence that the equipment can perform its assumed safety function. Under the

ITS Applicability of "MODE 2 with any control bank not fully inserted" and LCO 3.0.4, the shutdown banks must be above the insertion limit prior to entering the ITS Applicability of "MODE 2 with any control bank not fully inserted." However, it is not required to verify compliance within a specified time prior to initial control bank withdrawal. Specifying a time is not necessary to ensure that the shutdown banks are above the insertion limit prior to initial control bank withdrawal as long as the shutdown banks are withdrawn before withdrawing the control banks. This change is designated as less restrictive because Surveillances which are required in the CTS will not be required in the ITS.

L.3 *(Category 4 – Relaxation of Required Action)* CTS 3.1.3.5 does not contain an Action for a shutdown bank not within the insertion limit except Action b, which contains a number of qualifying conditions. Under the CTS, a shutdown bank not within the insertion limits and not meeting the qualifying conditions in CTS Action b, would result in an CTS 3.0.3 entry. CTS 3.0.3 allows one hour to prepare for a shutdown and requires the plant to be in MODE 3 within 7 hours. ITS 3.1.5, Condition A, applies with one or more shutdown banks not within limits for reasons other than Condition B (which is the same as CTS Action b). It allows 2 hours to restore the bank to within the insertion limits and then requires the plant to be in MODE 3 in 6 hours. This changes the CTS by allowing an additional hour (from 7 hours to 8 hours) to be in MODE 3 under this condition.

The purpose of CTS 3.1.3.5 is to ensure that the shutdown banks are fully withdrawn in order to ensure that there is sufficient shutdown margin available to quickly shutdown the reactor. This change is acceptable because the Required Actions are used to establish remedial measures that must be taken in response to the degraded conditions in order to minimize risk associated with continued operation while providing time to repair inoperable features. The Required Actions are consistent with safe operation under the specified Condition, considering the operability status of the redundant systems of required features, the capacity and capability of remaining features, a reasonable time for repairs or replacement of required features, and the low probability of a DBA occurring during the repair period. Allowing an additional hour to restore a shutdown bank inserted below the insertion limit is appropriate as it avoids a shutdown, a plant transient, while the rod control system is not in fully working order. The ITS requires verification that the shutdown margin requirement is met or actions to restore the shutdown margin to within its limit within 1 hour, so all safety analysis assumptions are being met. This change is designated as less restrictive because less stringent Required Actions are being applied in the ITS than were applied in the CTS.

UNIT 1

A.1

ITS 3.1.6

ITS

REACTIVITY CONTROL SYSTEMS

CONTROL ROD INSERTION LIMITS

LIMITING CONDITION FOR OPERATION

, sequence, and overlap limits — M.1

LCO 3.1.6

3.1.3.6 The control banks shall be limited in physical insertion as specified in the CORE OPERATING LIMITS REPORT.

APPLICABILITY: MODES 1 and 2. — A.2

Insert Applicability Note — A.3

Action A

ACTION:

Insert Action A

a. With the control banks inserted beyond the insertion limits, except for surveillance testing pursuant to Specification 4.1.3.1.2, either: — A.1 (For reasons other than Condition C) — A.3

Action B.2

1. Restore the control banks to within the insertion limits within two hours, or — M.2

Insert Actions B.1.1 and B.1.2

2. Reduce THERMAL POWER within two hours to less than or equal to that fraction of RATED THERMAL POWER which is allowed by the rod group step counter demand position using the insertion limits specified in the CORE OPERATING LIMITS REPORT, or — A.6

Action D

3. Be in HOT STANDBY within 6 hours.

Condition C

b. With a maximum of one control bank inserted beyond the insertion limit specified in the CORE OPERATING LIMITS REPORT during surveillance testing pursuant to Specification 4.1.3.1.2 and immovable due to malfunctions in the rod control system, POWER OPERATION** may continue provided that: — A.3 — A.4

Condition C

1. the control bank is inserted no more than 18 steps below the insertion limit as measured by the group step counter demand position indicators,

Condition C

2. the affected bank is trippable,

3. each shutdown and control rod is aligned to within ± 12 steps of its respective group step counter demand position, — Each control and shutdown bank within the limits of LCO 3.1.4 — A.5

Condition C

4. the insertion limits of Specification 3.1.3.5 are met for each shutdown bank,

Applicability

* See Special Test Exceptions 3.10.2 and 3.10.3. — A.2

\# With Keff ≥ 1.0.

Condition C

** Provision for continued POWER OPERATION does not apply to Control Bank D inserted beyond the insertion limit.

page 1 of 3

Rev 0

ITS

LIMITING CONDITION FOR OPERATION (cont'd.)

Action C.1

5. the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is determined to be met at least once per 12 hours, and

Action C.2

6. the control bank is restored to within the insertion limit specified in the CORE OPERATING LIMITS REPORT within 72 hours.

Action D

Otherwise, be in HOT STANDBY within the next 6 hours.

SURVEILLANCE REQUIREMENTS

SR 3.1.6.2

4.1.3.6 The position of each control bank shall be determined to be within the insertion limits at least once per 12 hours except during time intervals when the Rod Insertion Limit Monitor is inoperable, then verify either the individual rod positions (indicated positions) or the group step counter demand position of each rod group to be within the insertion limits at least once per 4 hours.

L.1

SR 3.1.6.3

Insert proposed SR 3.1.6.3

M.1

A.1

ITS 3.1.6

9-9-85

ITS

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

SHUTDOWN MARGIN - T_{avg} > 200°F

LIMITING CONDITION FOR OPERATION

<see ITS 3.1.1>

3.1.1.1 The SHUTDOWN MARGIN shall be ≥ 1.77% Δk/k.

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

ACTION:

With the SHUTDOWN MARGIN < 1.77% Δk/k, immediately initiate and continue boration at ≥ 10 gpm of 12,950 ppm boric acid solution or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.1.1 The SHUTDOWN MARGIN shall be determined to be ≥ 1.77% Δk/k:

<see ITS 3.1.4>

a. Within one hour after detection of an inoperable control rod(s) and at least once per 12 hours thereafter while the rod(s) is inoperable. If the inoperable control rod 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 control rod(s).

SR 3.1.6.2

b. When in MODES 1 or 2#, at least once per 12 hours by verifying that control bank withdrawal is within the limits of Specification 3.1.3.6.

SR 3.1.6.1

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

*See Special Test Exception 3.10.1 <see ITS 3.1.1>

#With K_{eff} ≥ 1.0

##With K_{eff} <1.0

UNIT 2

A.1 ITS 3.1.6

REACTIVITY CONTROL SYSTEMS

CONTROL ROD INSERTION LIMITS

LIMITING CONDITION FOR OPERATION

ITS

LCO 3.1.6

3.1.3.6 The control banks shall be limited in physical insertion, sequence, and overlap limits as specified in the CORE OPERATING LIMITS REPORT. M.1

APPLICABILITY: MODES ~~1~~ and ~~2~~*. A.2

Insert Applicability Note A.3

Action A

ACTION:

Insert Action A

a. With the control banks inserted beyond the insertion limits, ~~except for surveillance testing pursuant to Specification 4.1.3.1.2,~~ for reasons other Condition C A.3 A.1 either:

1. Restore the control banks to within the insertion limits within two hours, or M.2

Insert Actions B.1.1 + B.1.2

2. ~~Reduce THERMAL POWER within two hours to less than or equal to that fraction of RATED THERMAL POWER which is allowed by the rod group step counter demand position using the insertion limits specified in the CORE OPERATING LIMITS REPORT, or~~ A.6

Action D

3. Be in HOT STANDBY within 6 hours.

Condition C

b. With a maximum of one control bank inserted beyond the insertion limit specified in the CORE OPERATING LIMITS REPORT ~~during surveillance testing pursuant to Specification 4.1.3.1.2~~ and immovable ~~due to malfunctions in the rod control system,~~ A.3 A.4 POWER OPERATION## may continue provided that:

Condition C

1. the control bank is inserted no more than 18 steps below the insertion limit as measured by the group step counter demand position indicators,

Condition C

2. ~~the affected bank is trippable,~~ Each control and shutdown bank within the limits of LCO 3.1.4

Condition C

3. ~~each shutdown and control rod is aligned to within ± 12 steps of its respective group step counter demand position,~~ A.5

Condition C

4. the insertion limits of Specification 3.1.3.5 are met for each shutdown bank,

Applicability Condition C

~~* See Special Test Exceptions 3.10.2 and 3.10.3.~~

\# With $K_{eff} \geq 1.0$. A.2

\# \# Provision for continued POWER OPERATION does not apply to Control Bank D inserted beyond the insertion limit.

A.1

ITS 3.1.6

ITS

LIMITING CONDITION FOR OPERATION (cont'd.)

Action C.1

5. the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is determined to be met at least once per 12 hours, and

Action C.2

6. the control bank is restored to within the insertion limit specified in the CORE OPERATING LIMITS REPORT within 72 hours.

Action D

Otherwise, be in HOT STANDBY within the next 6 hours.

SURVEILLANCE REQUIREMENTS

SR 3.1.6.2

4.1.3.6 The position of each control bank shall be determined to be within the insertion limits at least once per 12 hours except during time intervals when the Rod Insertion Limit Monitor is inoperable, then verify either the individual rod positions (indicated positions) or the group step counter demand position of each rod group to be within the insertion limits at least once per 4 hours.

L.1

SR 3.1.6.3

Insert proposed SR 3.1.6.3

M.1

Rev. 0

A.1

ITS 3.1.6

9-9-85

ITS

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

SHUTDOWN MARGIN - T_{avg} GREATER THAN 200°F

<See ITS 3.1.1>

LIMITING CONDITION FOR OPERATION

3.1.1.1 The SHUTDOWN MARGIN shall be greater than or equal to 1.77% Δk/k.

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

ACTION:

With the SHUTDOWN MARGIN less than 1.77% delta k/k, immediately initiate and continue boration at greater than or equal to 10 gpm of a solution containing greater than or equal to 12,950 ppm boron or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.1.1 The SHUTDOWN MARGIN shall be determined to be greater than or equal to 1.77% delta k/k:

a. Within one hour after detection of an inoperable control rod(s) and at least once per 12 hours thereafter while the rod(s) is inoperable. If the inoperable control rod 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 control rod(s).

<See ITS 3.1.4>

SR 3.1.6.2

b. When in MODE 1 or MODE 2 with K_{eff} greater than or equal to 1.0, at least once per 12 hours by verifying that control bank withdrawal is within the limits of Specification 3.1.3.6.

SR 3.1.6.1

c. When in MODE 2 with K_{eff} less than 1.0, within 4 hours prior to achieving reactor criticality by verifying that the predicted critical control rod position is within the limits of Specification 3.1.3.6.

*See Special Test Exception 3.10.1

<See ITS 3.1.1>

ADMINISTRATIVE CHANGES

A.1 In the conversion of the North Anna Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG-1431, Rev. 1, "Standard Technical Specifications-Westinghouse Plants" (ISTS).

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A.2 The Applicability of CTS 3.1.3.6 is modified by a footnote, designated "*", stating, "See Special Test Exceptions 3.10.2 and 3.10.3." ITS 3.1.6 Applicability does not contain the footnote or a reference to the Special Test Exceptions.

The purpose of the footnote reference is to alert the reader that Special Test Exceptions exist which may modify the Applicability of the specification. It is an ITS convention to not include these types of footnotes or cross-references as they are not required. The referenced items apply whether or not they are cross-referenced. This change is designated as administrative because it does not result in a technical change to the specifications.

A.3 CTS 3.1.3.6, Action a, states, in part, "With the control banks inserted beyond the insertion limits, except for surveillance testing pursuant to Specification 4.1.3.1.2" and CTS 3.1.3.6, Action b, states, in part, "With a maximum of one control bank inserted beyond the insertion limits specified in the CORE OPERATING LIMITS REPORT during surveillance testing pursuant to Specification 4.1.3.1.2." ITS 3.1.6, Applicability Note, states, "The LCO is not applicable while performing SR 3.1.4.2." This changes the CTS by moving the qualifications, "during surveillance testing pursuant to Specification 4.1.3.1.2" to an Applicability Note.

This change is acceptable because the requirements have not changed. The only time the control banks are inserted below the insertion limits while in the applicable MODES is during performance of the rod freedom test, CTS Surveillance 4.1.3.1.2. Therefore, stating that the malfunction occurred during that test is unnecessary. Further, ITS LCO 3.1.6 is not applicable during the rod freedom test, ITS SR 3.1.4.2, under the ITS 3.1.6 Applicability Note. Referencing the SR within the specification would be confusing. This change is designated as administrative because it does not result in a technical change to the specifications.

A.4 CTS 3.1.3.6, Action b, states, in part, "With a maximum of one control bank inserted beyond the insertion limit specified in the CORE OPERATING LIMITS REPORT during surveillance testing pursuant to Specification 4.1.3.1.2 and immovable due to malfunctions in the rod control system, POWER OPERATION may continue . . ." ITS 3.1.6, Condition C, states, in part, "Control bank A, B, or C inserted ≤ 18 steps below the

insertion limit and immovable." This changes the CTS by eliminating a qualification, immovable "due to malfunctions in the rod control system." Other changes to CTS 3.1.3.6, Action b, are described in DOC A.3.

This change is acceptable because the requirements have not changed. The qualification that a bank is immovable "due to malfunctions in the rod control system" is unnecessary. If a bank is immovable, it is either due to mechanical binding or a malfunction of the control rod system. If the problem is mechanical binding, the bank would not be trippable and LCO 3.1.4 would apply. This Condition can only apply during a malfunction of the rod control system. Therefore, specifying that the bank is immovable due to malfunctions in the rod control system is not necessary. This change is designated as administrative because it does not result in a technical change to the specifications.

A.5 CTS 3.1.3.6, Action b, states, in part, that "With a maximum of one control bank inserted beyond the insertion limit specified in the CORE OPERATING LIMITS REPORT during surveillance testing pursuant to Specification 4.1.3.1.2 and immovable due to malfunctions in the rod control system, POWER OPERATION may continue provided that: . . . . 2. the affected bank is trippable, 3. each shutdown and control rod is aligned to within +/- 12 steps of its respective group step counter demand position . . ." ITS 3.1.6, Condition C, states, in part, "One control bank inserted ≤ 18 steps below the insertion limit and immovable AND each control and shutdown bank within the limits of LCO 3.1.4." ITS LCO 3.1.4 requires that all shutdown and control banks be OPERABLE (which is defined as "trippable,") and individual indicated rod positions be within 12 steps of their group step counter demand position. This changes the CTS by substituting a reference to LCO 3.1.4 for the explicit requirements in the CTS action.

This change is acceptable because the requirements have not changed. The CTS requirements have been rearranged. This change is designated as administrative as the technical requirements have not changed.

A.6 CTS 3.1.3.6, Action a.1 and a.2 state that with the control banks inserted beyond the insertion limits, restore the control banks to within the insertion limits within two hours or reduce the THERMAL POWER within 2 hours to less than or equal to that fraction of RATED THERMAL POWER which is allowed by the rod group step counter demand position using the insertion limits specified in the CORE OPERATING LIMITS REPORT. ITS 3.1.6, Action B.2, requires the control bank to be restored to within limits within 2 hours. This changes the CTS by eliminating the explicit statement that compliance with the LCO can be restored in order to exit the Action.

This change is acceptable because the requirements have not changed. Reducing THERMAL POWER so that the insertion limits, which are a function of power, are lowered and the control bank inserted below the insertion limits comes within the limit is the same as the CTS Action a.1 option to "restore the control banks to within the insertion limit." This change is considered administrative because the technical requirements have not changed.

MORE RESTRICTIVE CHANGES

M.1 CTS LCO 3.1.3.6 requires the control banks to be limited in physical insertion as specified in the CORE OPERATING LIMITS REPORT. ITS LCO 3.1.6 requires the control banks to be within the insertion, sequence, and overlap limits specified in the COLR. ITS Condition A provides Actions for not meeting the overlap and sequence requirements, and ITS SR 3.1.6.3 requires verification of the overlap and sequence every 12 hours. This changes the CTS by adding requirements on the overlap and sequence to the Technical Specifications.

This change is acceptable because the control bank sequence and overlap are important assumptions in the core power distribution analyses and must be adhered to in order to maintain the core power within the initial assumptions of the accident analyses. The addition of these requirements, Actions, and Surveillance provide assurance that the core power distribution is maintained within the design predictions. This change is designated as more restrictive because new requirements are added to the CTS.

M.2 CTS 3.1.3.6, Action a, requires control banks inserted beyond the insertion limits to be restored within 2 hours or the plant to be in HOT SHUTDOWN within 6 hours. ITS 3.1.6, Condition B, contains the same requirements and adds the requirement to verify the SDM is within the limits specified in the COLR or initiate boration to restore SDM to within the limit within 1 hour. This changes the CTS by adding the requirement to verify SDM or boration to restore the required SDM within one hour when control banks are below the insertion limits.

This change is acceptable because it verifies that the initial conditions of the accident analyses are maintained. In MODE 1 and MODE 2 with $K_{eff} \geq 1.0$, SDM is normally ensured by adhering to the control and shutdown bank insertion limits. If the control banks are not within their insertion limits, then SDM must be verified to be within limit or actions must be initiated to restore SDM to within its limit. This change is designated as more restrictive because requirements are added to the CTS.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

None

LESS RESTRICTIVE CHANGES

L.1 *(Category 7 – Relaxation Of Surveillance Frequency)* CTS 4.1.3.6 requires the position of each control bank to be determined to be within the insertion limits at lease once per 12 hours except during time intervals when the Rod Insertion Limit Monitor is inoperable, then verify the individual rod positions (indicated positions) or the group step counter demand position of each rod group to be within the insertion limits at least once per 4 hours. ITS SR 3.1.6.2 requires verification that each control bank insertion is within the limits in the COLR every 12 hours. This changes the CTS by eliminating the requirement to verify the control bank insertion to be within limits every 4 hours when the Rod Insertion Limit Monitor is inoperable.

The purpose of Surveillance 4.1.3.6 is to periodically verify that the rods are within the alignment limit specified in the LCO. This change is acceptable because the Surveillance Frequency has been evaluated to ensure that it provides an acceptable level of equipment reliability. Increasing the frequency of rod position verification when the Rod Insertion Limit Monitor is inoperable is unnecessary as inoperability of the alarm does not increase the probability that the control banks are inserted below the limits. The Rod Insertion Limit Monitor alarm is for indication only. Its use is not credited in any safety analysis. This change is designated as less restrictive because Surveillances will be performed less frequently under the ITS than under the CTS.

UNIT 1

A.1

ITS 3.1.7

8-27-90

REACTIVITY CONTROL SYSTEMS

POSITION INDICATOR CHANNELS - OPERATING

ITS

LIMITING CONDITION FOR OPERATION

and Demand Position Indication System

LCO 3.1.7

3.1.3.2 The shutdown and control rod position indicating system shall be OPERABLE with:

a. Each individual rod position indicator channel, 1 per rod, accurate to within ± 12 steps* of actual rod position, and — A.5

b. Each demand position indicator, 1 per group, accurate to within ± 2 steps of demand position, and — L.1

c. The Automatic Rod Position Deviation Monitor with the alarm setpoint < 12 steps. — L.2

L.1

APPLICABILITY: MODES 1 and 2.

ACTION: Insert proposed Action Note — Insert proposed Action B — L.5

a. With a maximum of one individual rod position indicator channel per group inoperable, either: — A.3

Action A.1

1. Determine the position of the non-indicating rod within 4 hours indirectly by the movable incore detectors at least once per 8 hours and immediately after any motion of the non-indicating rod which exceeds 24 steps in one direction since the last determination of the rod's position as well as verify that the rod position requirements of Specification 3.1.3.1 are satisfied, or — L.3

Action C.1

Action A.2 + C.2

2. Reduce THERMAL POWER to < 50% of RATED THERMAL POWER within 8 hours and verify that the requirements of Specification 3.1.3.1 are satisfied. — A.2 — A.2

b. With a maximum of one demand position indicator per bank inoperable, either:

by administrative means

Action D.1.1

Action D.1.2

1. Verify that all individual rod position indicators for the affected bank are OPERABLE and that the most withdrawn rod and the least withdrawn rod of the bank are within a maximum of 12 steps of each other at least once per 8 hours, or — L.3

Action D.2

2. Reduce THERMAL POWER to < 50% of RATED THERMAL POWER within 8 hours and verify that the requirements of Specification 3.1.3.1 are satisfied. — A.2

c. With the Automatic Rod Position Deviation Monitor inoperable, compare the demand position indicators and the individual rod position indicator channels at least once per 4 hours to ensure that rod position indication is within the above tolerance requirements. The provisions of Specification 3.0.4 are not applicable. — L.2

* Below 50% power each individual rod position indicator may be more than ± 12 steps from its group step-counter demand position for a maximum of one hour in every 24. During this hour, each individual rod position indicator may be no more than ± 24 steps from its demand position. If either the one hour period or the ± 24 step limit is exceeded, immediately declare the individual rod position indicator channel inoperable. — A.5 — A.4

Insert proposed Action E — M.1

Action D

page 1 of 2

Rev 0

A.1

ITS 3.1.7

8-27-90

ITS

REACTIVITY CONTROL SYSTEMS

POSITION INDICATOR CHANNELS - OPERATING

SURVEILLANCE REQUIREMENTS

SR 3.1.7.1

4.1.3.2.1 Each individual rod position indicator shall be determined to be OPERABLE by:

a. Performing a CHANNEL CHECK* by intercomparison of each individual rod position indicator and its corresponding demand position indicator at least once per 12 hours, and

b. Performing a CHANNEL FUNCTIONAL TEST and CHANNEL CALIBRATION at least once per 18 months.

L.4

4.1.3.2.2 Each demand position indicator shall be determined to be OPERABLE by:

a. Performing a CHANNEL CHECK of the demand position indicators within a bank at least once per 7 days, and

b. Performing a CHANNEL CHECK by an intercomparison of the control bank benchboard demand position indicators and the rod control system logic cabinet bank overlap indicator or the rod position indicator cabinet P/A indicators, and determining their agreement within ± 2 steps, at least once per 92 days.

L.1

4.1.3.2.3 The Automatic Rod Position Deviation Monitor shall be determined to be OPERABLE by performing a functional test of the process computer alarm to demonstrate the process computer remains capable of recognizing a deviation of 12 steps or more at least once per 7 days.

L.2

* Below 50% power each individual rod position indicator may be more than ± 12 steps from its group step counter demand position for a maximum of one hour in every 24. During this hour, each individual rod position indicator may be no more than ± 24 steps from its demand position. If either the one hour period or the ± 24 step limit is exceeded, immediately declare the individual rod position indicator channel inoperable. A scan frequency of approximately once per minute, by either the plant computer or a data acquisition system, is acceptable for determining the total time that a rod is position indicator has deviated more than ± 12 steps but no more than ± 24. A rod position indicator which is found to be so deviated is assumed to have been deviated for the entire scanning period. When the scanner is unavailable to sum deviated time, the tolerance reverts to ± 12 steps.

L.4

UNIT 2

A.1

ITS 3.1.7

6-27-90

REACTIVITY CONTROL SYSTEMS

POSITION INDICATOR CHANNELS - OPERATING

ITS LCO 3.1.7

LIMITING CONDITION FOR OPERATION

and Demand Position Indication System

3.1.3.2 The shutdown and control rod position indicating system shall be OPERABLE with: L.1

a. Each individual rod position indicator channel, 1 per rod, accurate to within ± 12 steps* of actual rod position, and A.5

b. Each demand position indicator, 1 per group, accurate to within ± 2 steps of demand position, and L.1

c. The Automatic Rod Position Deviation Monitor with the alarm setpoint < 12 steps. L.2

APPLICABILITY: MODES 1 and 2

ACTION: Insert proposed Action Note

Insert proposed Action B L.5 A.3

a. With a maximum of one individual rod position indicator channel per group inoperable, either:

Action A.1

Action C.1

1. Determine the position of the non-indicating rod within 4 hours indirectly by the movable incore detectors at least once per 8 hours and immediately after any motion of the non-indicating rod which exceeds 24 steps in one direction since the last determination of the rod's position as well as verify that the rod position requirements of Specification 3.1.3.1 are satisfied, or L.3 A.2

Action A.2+C.2

2. Reduce THERMAL POWER to < 50% of RATED THERMAL POWER within 8 hours and verify that the requirements of Specification 3.1.3.1 are satisfied. A.2

b. With a maximum of one demand position indicator per bank inoperable either: L.3

Action D.1.1

Action D.1.2

1. Verify by administrative means that all individual rod position indicators for the affected bank are OPERABLE and that the most withdrawn rod and the least withdrawn rod of the bank are within a maximum of 12 steps of each other at least once per 8 hours, or

Action D.2

2. Reduce THERMAL POWER to < 50% of RATED THERMAL POWER within 8 hours and verify that the requirements of Specification 3.1.3.1 are satisfied. A.2

c. With the Automatic Rod Position Deviation Monitor inoperable, compare the demand position indicators and the individual rod position indicator channels at least once per 4 hours to ensure that rod position indication is within the above tolerance requirements. The provisions of Specification 3.0.4 are not applicable. L.2

* Below 50% power each individual rod position indicator may be more than ± 12 steps from its group step counter demand position for a maximum of one hour in every 24. During this hour, each individual rod position indicator may be no more than ± 24 steps from its demand position. If either the one hour period or the ± 24 step limit is exceeded, immediately declare the individual rod position indicator channel inoperable. A.5 A.4

Insert proposed Action E M.1

Action D

Rev. 0

page 1 of 2

REACTIVITY CONTROL SYSTEMS

POSITION INDICATOR CHANNELS - OPERATING

ITS

SURVEILLANCE REQUIREMENTS

4.1.3.2.1 Each individual rod position indicator shall be determined to be OPERABLE by:

a. Performing a CHANNEL CHECK* by intercomparison of each individual rod position indicator and its corresponding demand position indicator at least once per 12 hours, and

b. Performing a CHANNEL FUNCTIONAL TEST and CHANNEL CALIBRATION at least once per 18 months.

SR 3.1.7.1

L.4

4.1.3.2.2 Each demand position indicator shall be determined to be OPERABLE by:

a. Performing a CHANNEL CHECK of the demand position indicators within a bank at least once per 7 days, and

b. Performing a CHANNEL CHECK by an intercomparison of the control bank benchboard demand position indicators and the rod control system logic cabinet bank overlap indicator or the rod position indicator cabinet P/A indicators, and determining their agreement within ± 2 steps, at least once per 92 days.

L.1

4.1.3.2.3 The Automatic Rod Position Deviation Monitor shall be determined to be OPERABLE by performing a functional test of the process computer alarm to demonstrate the process computer remains capable of recognizing a deviation of 12 steps or more at least once per 7 days.

L.2

* Below 50% power each individual rod position indicator may be more than ± 12 steps from its group step counter demand position for a maximum of one hour in every 24. During this hour, each individual rod position indicator may be no more than ± 24 steps from its demand position. If either the one hour period or the ± 24 step limit is exceeded, immediately declare the individual rod position indicator channel inoperable. A scan frequency of approximately once per minute, by either the plant computer or a data acquisition system, is acceptable for determining the total time that a rod position indicator has deviated more than ± 12 steps but no more than ± 24. A rod position indicator which is found to be so deviated is assumed to have been deviated for the entire scanning period. When the scanner is unavailable to sum deviated time, the tolerance reverts to ± 12 steps.

L.4

ADMINISTRATIVE CHANGES

A.1 In the conversion of the North Anna Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG-1431, Rev. 1, "Standard Technical Specifications-Westinghouse Plants" (ISTS).

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A.2 CTS Action a.1, a.2, and b.2 require verification that the requirements of CTS 3.1.3.1 are satisfied. CTS 3.1.3.1 is equivalent to ITS LCO 3.1.5. The ITS does not contain a requirement in ITS 3.1.7 to verify that ITS LCO 3.1.5 is satisfied.

This change is acceptable because the requirements have not changed. CTS specification 3.1.3.1 applies and its Actions must be followed whenever the LCO is not met. Cross-referencing between specifications is inconsistent with the ITS conventions and does not create, modify, or eliminate requirements. Specifications apply in their Applicabilities, as described in ITS LCO 3.0.1, whether or not a cross-reference exists. Therefore, elimination of the cross-referencing does not result in a technical change to the specifications. This change is designated as administrative because the technical requirements have not changed.

A.3 ITS 3.1.7 Actions are modified by a Note which states, "Separate Condition entry is allowed for each inoperable rod position indicator and each demand position indicator." The CTS does not have a similar statement.

This change is acceptable because the technical requirements have not changed. The CTS Actions are worded such that separate condition entry can be made. It is the ITS convention to include a Note like the one modifying the ITS 3.1.7 Actions in this condition. This change is designated as administrative because the technical requirements have not changed.

A.4 CTS 3.1.3.2 contains a Note, designated "*", which allows individual rod position indication to be up to +/- 24 steps, vice +/- 12 steps, for up to one hour per 24 hours when reactor power is ≤ 50% RTP. It contains the statement, "If either the one hour period or the +/- 24 step limit is exceeded, immediately declare the individual rod position indicator channel inoperable." The ITS does not contain a similar statement.

This change is acceptable because the technical requirements have not changed. If the rod position is outside the +/- 12 step tolerance given in the CTS LCO and ITS SR 3.1.7.1 and the conditions allowing the wider 24 steps tolerance are not met, and the rod position indication is inoperable. It is unnecessary to state that the rod position indicator must be declared inoperable as the normal Use and Applicability rules require the rod position

indicator to be declared inoperable if the Surveillance is not met. This change is designated as administrative because it does not result in a technical change to the specifications.

A.5 CTS 3.1.3.2.a states "Each individual rod position indicator channel, 1 per rod, accurate to within +/- 12 steps* of actual rod position." Footnote "*" states, "Below 50% power each individual rod position indicator may be more than +/- 12 steps from its group step counter demand position for a maximum of one hour in every 24. During this hour, each individual rod position indicator may be no more than +/- 24 steps from its demand position." ITS 3.1.7 states, "The Rod Position Indication (RPI) system and the Demand Position Indication System shall be OPERABLE." ITS LCO 3.1.4 states, "All shutdown and control rods shall be OPERABLE AND individual indicated rod positions shall be within 12 steps of their group step counter demand position." ITS LCO 3.1.4 is modified by a Note which states, "When THERMAL POWER is ≤ 50% RTP, the indicated position of each rod as determined by its individual rod position indicator may be within 24 steps from its group step counter demand position for up to 1 hour per 24 hours. This NOTE is not applicable for control rods known to be greater than 12 steps from the rod group step counter demand position." This changes the CTS by moving the requirement that the RPI indicate within 12 or 24 steps of the actual position to LCO 3.1.4.

This change is acceptable because the technical requirements have not changed. Both the CTS and the ITS requires the RPI system to indicate the rod position within 12 steps. This change is designated as administrative because it does not result in a technical change to the specifications.

MORE RESTRICTIVE CHANGES

M.1 CTS 3.1.3.2 does not contain an Action to follow if the provided Actions cannot be met. Therefore, CTS 3.0.3 would be entered which would allow 1 hour to plan a shutdown and be in MODE 3 within 7 hours. ITS 3.1.7 contains Action E which states that the plant must be in MODE 3 if the Required Actions and associated Completion Times are not met. This changes the CTS by eliminating the one hour to plan a shutdown and, consequently, allowing one hour less for the unit to be in MODE 3.

This change is acceptable because it provides an appropriate compensatory measure for the described conditions. If the rod position indicators cannot be restored to OPERABLE status within the time allowed, the plant must be placed in a MODE in which the LCO does not apply. The LCO is applicable in MODES 1 and 2. Requiring a shutdown to MODE 3 is appropriate in this condition. The one hour allowed by CTS 3.0.3 to prepare for a shutdown is not needed in this Condition because the operators have had time to prepare for the shutdown while attempting to follow the Required Actions and associated Completion Times. This change is designated as more restrictive because it allows less time to shutdown than does the CTS.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

None

LESS RESTRICTIVE CHANGES

L.1 *(Category 1 – Relaxation of LCO Requirements)* CTS 3.1.3.2 states, "The shutdown and control rod position indicating system shall be OPERABLE with . . each demand position indicator, 1 per group, accurate to within +/- 2 steps of demand position" CTS SR 4.1.3.2.2 requires each demand position indicator to be demonstrated OPERABLE by performing CHANNEL CHECKS every 7 days and every 92 days. ITS LCO 3.1.7 states, "The Rod Position Indication (RPI) System and the Demand Position Indication System shall be OPERABLE." This changes the CTS by eliminating the specific tolerance requirement and CHANNEL CHECK Surveillances on the demand position indicators.

The purpose of ITS 3.1.7 is to ensure that the RPI channels are capable of indicating the actual rod position within the required accuracy. This change is acceptable because the LCO requirements continue to ensure that the structures, systems, and components are maintained consistent with the safety analyses and licensing basis. The demand position indicators do not display the actual rod positions, but only the position requested by the control system. The demand position indication system is used for operator information only. There are no DBA or Transient analyses which assume operator action based on the demand position indication system. This change is designated as less restrictive because less stringent LCO requirements are being applied in the ITS than were applied in the CTS.

L.2 *(Category 1 – Relaxation of LCO Requirements)* CTS 3.1.3.2 states, "The shutdown and control rod position indicating system shall be OPERABLE with . . .the Automatic Rod Position Deviation Monitor with the alarm setpoint < 12 steps." ITS LCO 3.1.7 states, "The Rod Position Indication (RPI) System and the Demand Position Indication System shall be OPERABLE." This changes the CTS by eliminating the requirements on the Automatic Rod Position Deviation Monitor.

The purpose of ITS 3.1.7 is to ensure that the RPI channels are capable of indicating the actual rod position within the required accuracy. This change is acceptable because the LCO requirements continue to ensure that the structures, systems, and components are maintained consistent with the safety analyses and licensing basis. The Automatic Rod Position Deviation Monitor is used for operator information only. There are no DBA or

Transient analyses which assume operator action based on the Automatic Rod Position Deviation Monitor. This change is designated as less restrictive because less stringent LCO requirements are being applied in the ITS than were applied in the CTS.

L.3 *(Category 3 – Relaxation of Completion Time)* CTS 3.1.3.2 Action a.1 states that with a maximum of one individual rod position indicator channel per group inoperable, determine the position of the non-indicating rod indirectly by the moveable incore detectors at least once per 8 hours and immediately after any motion of the non-indicating rod which exceeds 24 steps in one direction since the last determination of the rod's position. ITS 3.1.7, Action C.1 states, "One or more rods with inoperable position indicators have been moved in excess of 24 steps in one direction since the last determination of the rod's position, verify the position of the rods with inoperable position indicators by using the moveable incore detectors within 4 hours. This changes the CTS by allowing 4 hours to verify the rod position instead of requiring the verification immediately.

The purpose of CTS 3.1.3.2, Action a.1, is to verify rod position using the moveable incore detector system after the rods have been moved significantly. This change is acceptable because the Completion Time is consistent with safe operation under the specified Condition, considering the operability status of the redundant systems of required features, the capacity and capability of remaining features, a reasonable time for repairs or replacement of required features, and the low probability of a DBA occurring during the allowed Completion Time. Using the moveable incore detector system to determine the position of a rod cannot be performed immediately. Four hours is a reasonable time to use the moveable incore detector system to measure the core flux around the control rod and analyze the data to determine the control rod position. This short period of time to determine the position will not result in significant perturbation of the core power distribution if the rod is misaligned and the probability of a DBA or Transient that would be affected by the potentially misaligned rod is very low for the short period of time allowed to determine the rod position. This change is designated as less restrictive because additional time is allowed to restore parameters to within the LCO limits than was allowed in the CTS.

L.4 *(Category 5 – Deletion of Surveillance Requirement)* CTS 4.1.3.2 requires each rod position indicator to be determined OPERABLE by performing a CHANNEL CHECK every 12 hours and a CHANNEL FUNCTIONAL TEST and CHANNEL CALIBRATION at least once per 18 months. ITS SR 3.1.7.1 requires a CHANNEL CALIBRATION every 18 months. This changes the CTS by eliminating the CHANNEL CHECK and CHANNEL FUNCTIONAL TEST requirements.

The purpose of CTS 4.1.3.2.1 is to verify that the Rod Position Indication system is OPERABLE. This change is acceptable because the deleted Surveillance Requirement is not necessary to verify that the equipment used to meet the LCO can perform its required functions. Thus, appropriate equipment continues to be tested in a manner and at a frequency necessary to give confidence that the equipment can perform its assumed safety

function. The CHANNEL CALIBRATION verifies that the RPI instrumentation is operating correctly. The RPI position is adjusted, as needed, to account for the thermal drift characteristics of the RPI coil stack. The RPIs continue to indicate movement of the control rods, only the absolute position indication is affected, and LCO 3.1.5 and 3.1.6 provide requirements on the accuracy of the RPIs. This change is designated as less restrictive because Surveillances which are required in the CTS will not be required in the ITS.

L.5 *(Category 4 – Relaxation of Required Action)* CTS 3.1.3.2 does not have an action for more than one Rod Position Indicator Channel is inoperable per group. CTS 3.0.3 would be entered in this condition. CTS 3.0.3 requires a shutdown to MODE 3 within 7 hours. ITS 3.1.7, Condition B, applies when more than one RPI per group is inoperable and requires the rods to be placed under manual control immediately, monitoring and recording of RCS T_{avg} once per hour, verification of rod position using the movable incore detectors once per 8 hours, and restoration of all but one RPI to OPERABLE status within 24 hours. This changes the CTS by allowing operation for an additional 24 hours with more than one RPI per group inoperable.

The purpose of ITS 3.1.7, Condition B, is to provide time to repair inoperable RPIs before requiring a plant shutdown. This change is acceptable because the Required Actions are used to establish remedial measures that must be taken in response to the degraded conditions in order to minimize risk associated with continued operation while providing time to repair inoperable features. The Required Actions are consistent with safe operation under the specified Condition, considering the OPERABLE status of the redundant indications. This includes the capacity and capability of remaining systems or features, a reasonable time for repairs or replacement, and the low probability of a DBA occurring during the repair period. Providing time to repair multiple inoperable RPIs before requiring a shutdown is reasonable as the safest course of action with inoperable RPIs is to not move the control rods. The compensatory measures ensure that the rods are not moved unintentionally and monitor rod position using other indications. This change is designated as less restrictive because less stringent Required Actions are being applied in the ITS than were applied in the CTS.

UNIT 1

A.1

ITS 3.1.8

4-1-78

REACTIVITY CONTROL SYSTEMS

BORON DILUTION

VALVE POSITION

ITS

Insert proposed LCO 3.1.8
Insert proposed LCO 3.1.8 Note

LIMITING CONDITION FOR OPERATION

LCO 3.1.8

3.1.1.3.2 The following valves shall be locked, sealed or otherwise secured in the closed position except during planned boron dilution or makeup activities

A.2

a. 1-CH-217 or

b. 1-CH-220, 1-CH-241, FCV-1114B and FCV-1113B.

LA.2

APPLICABILITY: MODES 3, 4, 5, and 6 <See ITS 3.9.2>

ACTION:

With the above valves not locked, sealed or otherwise secured in the closed position:

a. In MODES 3 and 4 be in COLD SHUTDOWN within 30 hours

L.1

Action A.1 b. In MODES 5 and 6 suspend all operations involving positive reactivity changes or CORE ALTERATIONS and lock, seal or otherwise secure the valves in the closed position within 15 minutes.

Action A.2

A.3

Action A.3

Perform SR 3.1.1.1 within 1 hour

M.1

SURVEILLANCE REQUIREMENTS

SR 3.1.8.1

4.1.1.3.2 The above listed valves shall be verified to be locked, sealed or otherwise secured in the closed position within 15 minutes after a planned boron dilution or makeup activity.

Rev. 0

UNIT 2

A.1

ITS 3.1.8

8-27-90

REACTIVITY CONTROL SYSTEM

BOREN DILUTION

VALVE POSITION

Insert proposed LCO 3.1.8
Insert proposed LCO 3.1.8 Note

ITS

LIMITING CONDITION FOR OPERATION

LCO 3.1.8

3.1.1.3.2 The following valves shall be locked, sealed or otherwise secured in the closed position except during planned boron dilution or makeup activities: A.2

a. 2-CH-140 or

b. 2-CH-160, 2-CH-156, FCV-2114B and FCV-2113B. LA.2

APPLICABILITY: MODES 3, 4, 5, and 6 <See ITS 3.9.2>

ACTION:

Action A.1 Action A2 Action A3

With the above valves not locked, sealed or otherwise secured in the closed position: 1) suspend all operations involving positive reactivity changes or CORE ALTERATIONS, 2) lock, seal or otherwise secure the valves in the closed position within 15 minutes, and 3) verify that the SHUTDOWN MARGIN is greater than or equal to 1.77% delta k/k within 60 minutes. A.3

Perform SR 3.1.1.1 within 1 hour LA.1

SURVEILLANCE REQUIREMENTS

SR 3.1.8.1

4.1.1.3.2 The above listed valves shall be verified to be locked, sealed or otherwise secured in the closed position within 15 minutes after a planned boron dilution or makeup activity.

Rev. 0

ADMINISTRATIVE CHANGES

A.1 In the conversion of the North Anna Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG-1431, Rev. 1, "Standard Technical Specifications-Westinghouse Plants" (ISTS).

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A.2 CTS 3.1.1.3.2 states, "The following valves shall be locked, sealed or otherwise secured in the closed position except during planned boron dilution or makeup activities." ITS LCO 3.1.8 states, "Each valve used to isolate primary grade water flow paths shall be secured in the closed position." A Note to the LCO states, "Primary grade water flow path isolation valves may be opened under administrative control for planned boron dilution or makeup activities." ITS SR 3.1.8.1 states, "Verify each valve that isolates primary grade water flow paths is locked, sealed, or otherwise secured in the closed position."

This change is acceptable because the technical requirements have not changed. In the ITS, requirements that valves be locked, sealed, or otherwise secured are located in the Surveillances, not the LCO. Under SR 3.0.1, the SRs provide requirements necessary to meet the LCO. Therefore, moving the requirement from the LCO to the SR has no effect on the application of the requirements. The addition of the phrase "under administrative control" to the LCO Note is consistent with the ITS conventions and does not change the application of the Note. This change is designated as administrative because it does not result in a technical change to the specifications.

A.3 CTS 3.1.1.3.2 is applicable in MODES 3, 4, 5 and 6. The CTS Action states that with the valves not locked, sealed, or otherwise secured in the closed position, suspend CORE ALTERATIONS. ITS 3.1.8 is applicable in MODES 3, 4, and 5 and does not contain this Action.

This change is acceptable because CORE ALTERATIONS cannot occur in MODES 3, 4, or 5. ITS 3.9.2 provides similar requirements on primary grade water flow path in MODE 6 and that specification will address Actions in that MODE. Any technical changes in the Actions in MODE 6 will be addressed in the DOCs for that specification. This change is designated as administrative because it divides Actions according the applicable MODE with no technical change to the specifications.

MORE RESTRICTIVE CHANGES

M.1 Unit 1 CTS 3.1.1.3.2 states that when the primary grade water flow path isolation valves are not locked, sealed, or otherwise secured in the closed position in MODES 3 and 4, the plant must be in COLD SHUTDOWN within 30 hours. If in MODE 5 or 6, all operations involving positive reactivity changes or CORE ALTERATIONS must be suspended, and the valves must be locked, sealed, or secured in the closed position within 15 minutes. Unit 2 CTS 3.1.1.3.2 states that when the primary grade water flow path isolation valves are not locked, sealed, or otherwise secured in the closed position, all operations involving positive reactivity changes or CORE ALTERATIONS must be suspended, the isolation valves must be locked, sealed, or otherwise secured in the closed position within 15 minutes, and SHUTDOWN MARGIN must be verified greater than or equal to 1.77% $\Delta k/k$ within 60 minutes. ITS 3.1.8 Actions state than when the primary grade water flow paths are not isolated, positive reactivity additions must be suspended immediately, the primary grade water flow paths must be isolated within 15 minutes and SR 3.1.1.1 must be performed within 1 hours. This changes the Unit 1 CTS by adding a requirement to verify the shutdown margin within 1 hour. The other changes to CTS 3.1.1.3.2 are discussed in DOCs A.3, L.1, and LA.1.

This change is acceptable because it establishes reasonable compensatory measures for a failure to close the primary grade water flow path isolation valves. SR 3.1.1.1 requires verification that the SHUTDOWN MARGIN is within the limits provided in the COLR. This involves determining the primary system boron concentration. It is performed to verify that the required SDM still exists and any inadvertent boron dilution that may have occurred has been detected and corrected. The Completion Time of 1 hour is reasonable, based on the time required to request and have analyzed an RCS water sample to determine the boron concentration and to compute the SDM. This change also makes the Unit 1 and Unit 2 requirements the same. This change is designated as more restrictive because it adds requirements to the Unit 1 CTS.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

LA.1 *(Type 5 – Removal of Cycle-Specific Parameter Limits from the Technical Specifications to the Core Operating Limits Report)* Unit 2 CTS 3.1.1.3.2 Action states that with the primary grade water flow path isolation valves not locked, sealed, or otherwise secured in the closed position, verify the SHUTDOWN MARGIN is greater than or equal to 1.77% $\Delta k/k$ within 60 minutes. ITS 3.1.8, Action A.3, states this requirement as, "Perform SR 3.1.1.1" within 1 hour. ITS 3.1.1.1 requires verification that the SHUTDOWN MARGIN

is within the limit provided in the COLR. This changes the CTS by moving the SHUTDOWN MARGIN value to the COLR.

The removal of these cycle-specific parameter limits from the Technical Specifications and their relocation into the COLR is acceptable because these limits are developed or utilized under NRC-approved methodologies. The NRC documented in Generic Letter 88-16, Removal of Cycle-Specific Parameter Limits From the Technical Specifications, that this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains requirements and Surveillances that verify that the cycle-specific parameter limits are being met. ITS 3.1.1, SHUTDOWN MARGIN, continues to require that the SDM limits located in the COLR are met. SR 3.1.1.1 requires periodic verification that SDM is within the limits provided in the COLR. The method of determining or utilizing the SDM parameter limit has not changed. Also, this change is acceptable because the removed information will be adequately controlled in the COLR under the requirements provided in ITS 5.6.5, Core Operating Limits Report. ITS 5.6.5 ensures that the applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems limits, and nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met. This change is designated as a less restrictive removal of detail change because information relating to cycle-specific parameter limits is being removed from the Technical Specifications.

LA.2 *(Type 1 – Removing Details of System Design and System Description, Including Design Limits)* Unit 1 CTS 3.1.1.3.2 states "The following valves shall be locked, sealed, or otherwise secured in the closed position except during planned boron dilution or makeup activities: a. 1-CH-217 or b. 1-CH-220, 1 CH-241, FCV 1114B and FCV-1113B." Unit 2 CTS 3.1.1.3.2 states "The following valves shall be locked, sealed, or otherwise secured in the closed position except during planned boron dilution or makeup activities: a. 2-CH-140 or b. 2-CH-160, 2 CH-156, FCV 2114B and FCV-2113B." ITS 3.1.8 states, "Each valve used to isolate primary grade water flow path shall be secured in the closed position." ITS 3.1.8 LCO Note states, "Primary grade water flow path isolation valves may be opened under administrative control for planned boron dilution or makeup activities." This changes the CTS by relocating the list of primary grade water flow path isolation valves to the ITS Bases. The other changes in CTS 3.1.1.3.2 are discussed in DOC A.2.

The removal of these details, which are related to system design, from the Technical Specifications is acceptable because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains the requirement that the primary grade water flow path isolation valves be closed and the valves be verified to be locked, sealed, or otherwise secured. Listing the valves in the LCO is inconsistent with the ITS conventions. Also, this change is acceptable because the removed information will be adequately controlled in the ITS Bases. Changes to the Bases are controlled by the Technical Specification Bases Control Program in the Technical Specifications Administrative Controls section.

This program provides for the evaluation of changes to ensure the Bases are properly controlled. This change is designated as a less restrictive removal of detail change because information relating to system design is being removed from the Technical Specifications.

LESS RESTRICTIVE CHANGES

L.1 *(Category 4 – Relaxation of Required Action)* Unit 1 CTS 3.1.1.3.2 states that when the primary grade water flow path isolation valves are not locked, sealed, or otherwise secured in the closed position in MODES 3 and 4, the plant must be in COLD SHUTDOWN within 30 hours. If in MODE 5 or 6, all operations involving positive reactivity changes or CORE ALTERATIONS must be suspended, and the valves must be locked, sealed, or secured in the closed position within 15 minutes. ITS 3.1.8 Actions state than when the primary grade water flow path are not isolated, positive reactivity additions must be suspended immediately, the primary grade water flow path must be isolated within 15 minutes and SR 3.1.1.1 must be performed within 1 hours. This changes the CTS by eliminating the Unit 1 Action that a unit in MODES 3 or 4 be shutdown to MODE 5 within 30 hours. The other changes to CTS 3.1.1.3.2 are discussed in DOCs A.3, M.1, and LA.1.

The purpose of CTS 3.1.1.3.2 is to minimize the risk of a boron dilution accident while the primary grade water flow path isolation valves are open. This change is acceptable because the Required Actions are used to establish remedial measures that must be taken in response to the degraded conditions in order to minimize risk associated with continued operation while providing time to repair inoperable features. The Required Actions are consistent with safe operation under the specified Condition, considering the operability status of the redundant systems of required features, the capacity and capability of remaining features, a reasonable time for repairs or replacement of required features, and the low probability of a DBA occurring during the repair period. A change from MODES 3 or 4 to MODE 5 will require boration to offset the change in temperature defect as the reactor is cooled down. Requiring use of the boration system when the primary grade water flow path isolation valves cannot be closed per the LCO is unwise, as it increases the risk of a boron dilution event. This change also makes the Unit 1 and Unit 2 requirements the same. This change is designated as less restrictive because less stringent Required Actions are being applied in the ITS than were applied in the CTS.

UNIT 1

SPECIAL TEST EXCEPTIONS

PHYSICS TESTS

3.1.3, 3.1.4, 3.1.5, 3.1.6, and 3.4.2 A.1

ITS

LIMITING CONDITION FOR OPERATION

LCO 3.1.9

LCO 3.1.9.C

3.10.3 The limitations of Specifications ~~3.1.1.4~~, 3.1.3.1, ~~3.1.3.5 and 3.1.3.6~~ may be suspended during the performance of PHYSICS TESTS provided:

a. The THERMAL POWER does not exceed 5% of RATED THERMAL POWER,

b. ~~The reactor trip setpoints on the OPERABLE Intermediate Range Channels are set at less than or equal to 35% of RATED THERMAL POWER, and~~

c. ~~The reactor trip setpoints on the OPERABLE Power Range Channels are set at less than or equal to 25% of RATED THERMAL POWER.~~

A.2

APPLICABILITY: ~~MODE 2~~ During PHYSICS TESTS initiated in MODE 2. A.3

ACTION:

Action B

ACTIONS A, C, D

With the THERMAL POWER > 5% of RATED THERMAL POWER, immediately open the reactor trip breakers. Insert proposed Action A M.3

SURVEILLANCE REQUIREMENTS Insert proposed Actions C + D M.4

SR 3.1.9.3

4.10.3.1 The THERMAL POWER shall be determined to be ≤ 5% of RATED THERMAL POWER at least once per ~~hour~~ 30 minutes during PHYSICS TESTS. M.5

SR 3.1.9.1

4.10.3.2 Each Intermediate and Power Range Channel shall be subjected to a CHANNEL FUNCTIONAL TEST ~~within 12 hours~~ prior to initiating PHYSICS TESTS. L.1

and the number of required channels for LCO 3.3.1, "RTS Instrumentation," Functions 2, 3, 6, and 18.d, may be reduced to "3" required channels, L.2

LCO 3.1.9.a

LCO 3.1.9.b

RCS lowest loop average temperature is ≥ 531°F; and SDM is within the limits provided in the COLR M.4 M.3

SR 3.1.9.2

Insert proposed SR 3.1.9.2 M.4

SR 3.1.9.4

Insert proposed SR 3.1.9.4 M.3

3/4.10 SPECIAL TEST EXCEPTIONS

SHUTDOWN MARGIN

LIMITING CONDITION FOR OPERATION

3.10.1 The SHUTDOWN MARGIN requirement of Specification 3.1.1.1 may be suspended for measurement of control rod worth and SHUTDOWN MARGIN provided the reactivity equivalent to at least the highest estimated control rod worth is available for trip insertion from OPERABLE control rod(s).

APPLICABILITY: MODE 2.

ACTION:

a. With any full length control rod not fully inserted and with less than the above reactivity equivalent available for trip insertion, initiate and continue boration at ≥ 10 gpm of at least 12,950 ppm boric acid solution or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

b. With all full length control rods inserted and the reactor subcritical by less than the above reactivity equivalent, immediately initiate and continue boration at ≥ 10 gpm of at least 12,950 ppm boric acid solution or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

M.1

SURVEILLANCE REQUIREMENTS

4.10.1.1 The position of each full length rod either partially or FULLY WITHDRAWN shall be determined at least once per 2 hours.

4.10.1.2 Each full length rod that is not fully inserted shall be demonstrated capable of full insertion when tripped from at least 50% withdrawn position within 24 hours prior to reducing the SHUTDOWN MARGIN to less than the limits of Specification 3.1.1.1.

M.2

SPECIAL TEST EXCEPTIONS

GROUP HEIGHT, INSERTION AND POWER DISTRIBUTION LIMITS

LIMITING CONDITION FOR OPERATION

3.10.2 The group height, insertion and power distribution limits of Specifications 3.1.3.1, 3.1.3.5, 3.1.3.6, and 3.2.4 may be suspended during the performance of PHYSICS TESTS provided:

a. The THERMAL POWER is maintained ≤ 85% of RATED THERMAL POWER, and

b. The limits of Specifications 3.2.2 and 3.2.3 are maintained and determined at the frequencies specified in Specification 4.10.2.2 below.

APPLICABILITY: MODE 1.

ACTION:

With any of the limits of Specifications 3.2.2 or 3.2.3 being exceeded while the requirements of Specifications 3.1.3.1, 3.1.3.5, 3.1.3.6, and 3.2.4 are suspended, either:

a. Reduce THERMAL POWER sufficient to satisfy the ACTION requirements of Specifications 3.2.2 and 3.2.3, or

b. Be in HOT STANDBY within 6 hours.

SURVEILLANCE REQUIREMENTS

4.10.2.1 The THERMAL POWER shall be determined to be ≤ 85% of RATED THERMAL POWER at least once per hour during PHYSICS TESTS.

4.10.2.2 The Surveillance Requirements of Specifications 4.2.2 and 4.2.3 shall be performed at the following frequencies during PHYSICS TESTS:

a. Specification 4.2.2 - At least once per 12 hours.

b. Specification 4.2.3 - At least once per 12 hours.

UNIT 2

and the number of required channels for LCO 3.3.1, "RTS Instrumentation," Functions 2, 3, 6, and 18.d, may be reduced to "3" required channels. (A.1)

SPECIAL TEST EXCEPTIONS

PHYSICS TESTS

ITS

LIMITING CONDITION FOR OPERATION 3.1.3, 3.1.4, 3.1.5, and 3.4.2 (A.1)

LCO 3.1.9

3.10.3 The limitations of Specifications ~~3.1.1.4~~, 3.1.1.5, 3.1.3.1, ~~3.1~~.3.5 and ~~3.1.3.6~~ may be suspended during the performance of PHYSICS TESTS provided: (L.2)

LCO 3.1.9.c

a. The THERMAL POWER does not exceed 5% of RATED THERMAL POWER, (M.3)

SDM is within the limits provided in the COLR

~~b. The reactor trip setpoints on the OPERABLE Intermediate Range Channels are set at less than or equal to 35% of RATED THERMAL POWER,~~ (A.2)

~~c. The reactor trip setpoints on the OPERABLE Power Range Channels are set at less than or equal to 25% of RATED THERMAL POWER, and~~

LCO 3.1.9.b

LCO 3.1.9.a

d. The Reactor Coolant System lowest operating loop temperature (Tavg) is greater than or equal to 531°F.

APPLICABILITY: ~~MODE 2.~~ During PHYSICS TESTS initiated in MODE 2. (A.3)

ACTION:

Action B

a. With the THERMAL POWER greater than 5% of RATED THERMAL POWER, immediately open the reactor trip breakers.

Action C & D

b. With a Reactor Coolant System operating loop temperature (T_{avg}) less than 531°F, restore T_{avg} to within its limit within 15 minutes or be in at least HOT STANDBY within the next 15 minutes.

Action A

Insert proposed Action A (M.3)

SURVEILLANCE REQUIREMENTS

SR 3.1.9.3

4.10.3.1 The THERMAL POWER shall be determined to be less than or equal to 5% of RATED THERMAL POWER at least once ~~per hour~~ during PHYSICS TESTS. every 30 minutes (M.5)

SR 3.1.9.1

4.10.3.2 Each Intermediate and Power Range Channel shall be subjected to a CHANNEL FUNCTIONAL TEST ~~within 12 hours~~ prior to initiating PHYSICS TESTS. (L.1)

SR 3.1.9.2

4.10.3.3 The Reactor Coolant System temperature (T_{avg}) shall be determined to be greater than or equal to 531°F at least once per 30 minutes during PHYSICS TESTS.

SR 3.1.9.4 Insert proposed SR 3.1.9.4 (M.3)

M.1

3/4.10 SPECIAL TEST EXCEPTIONS

SHUTDOWN MARGIN

LIMITING CONDITION FOR OPERATION

3.10.1 The SHUTDOWN MARGIN requirement of Specification 3.1.1.1 may be suspended for measurement of control rod worth and SHUTDOWN MARGIN provided the reactivity equivalent to at least the highest estimated control rod worth is available for trip insertion from OPERABLE control rod(s).

APPLICABILITY: MODE 2.

ACTION:

a. With any full length control rod not fully inserted and with less than the above reactivity equivalent available for trip insertion, initiate and continue boration at greater than or equal to 10 gpm of a solution containing at least 12,950 ppm boron or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

b. With all full length control rods inserted and the reactor subcritical by less than the above reactivity equivalent, immediately initiate and continue boration at greater than or equal to 10 gpm of a solution containing at least 12,950 ppm boron or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

SURVEILLANCE REQUIREMENTS

4.10.1.1 The position of each control rod either partially or FULLY WITHDRAWN shall be determined at least once per 2 hours.

4.10.1.2 Each control rod that is not fully inserted shall be demonstrated capable of full insertion when tripped from at least 50% withdrawn position within 24 hours prior to reducing the SHUTDOWN MARGIN to less than the limits of Specification 3.1.1.1.

SPECIAL TEST EXCEPTIONS

GROUP HEIGHT, INSERTION AND POWER DISTRIBUTION LIMITS

LIMITING CONDITION FOR OPERATION

3.10.2 The group height, insertion and power distribution limits of Specifications 3.1.3.1, 3.1.3.5, 3.1.3.6, and 3.2.4 may be suspended during the performance of PHYSICS TESTS provided:

a. The THERMAL POWER is maintained less than or equal to 85% of RATED THERMAL POWER, and

b. The limits of Specifications 3.2.2 and 3.2.3 are maintained and determined at the frequencies specified in Specification 4.10.2.2 below.

APPLICABILITY: MODE 1.

M.2

ACTION:

With any of the limits of Specifications 3.2.2 or 3.2.3 being exceeded while the requirements of Specifications 3.1.3.1, 3.1.3.5, 3.1.3.6, and 3.2.4 are suspended, either:

a. Reduce THERMAL POWER sufficient to satisfy the ACTION requirements of Specifications 3.2.2 and 3.2.3, or

b. Be in HOT STANDBY within 6 hours.

SURVEILLANCE REQUIREMENTS

4.10.2.1 The THERMAL POWER shall be determined to be less than or equal to 85% of RATED THERMAL POWER at least once per hour during PHYSICS TESTS.

4.10.2.2 The Surveillance Requirements of the below listed Specifications shall be performed at least once per 12 hours during PHYSICS TESTS.

a. Specification 4.2.2.2 and 4.2.2.3

b. Specification 4.2.3.1 and 4.2.3.2.

ADMINISTRATIVE CHANGES

A.1 In the conversion of the North Anna Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG-1431, Rev. 1, "Standard Technical Specifications-Westinghouse Plants" (ISTS).

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

A.2 CTS 3.10.3 states that the limitations of Specification 3.1.1.4, 3.1.3.1, 3.1.3.5, and 3.1.3.6 may be suspended during the performance of PHYSICS TESTS provided the Reactor Trip Setpoints on the OPERABLE Intermediate and Power Range Channels are set ≤ 35% and ≤ 25% of RATED THERMAL POWER, respectively. Other requirements are also imposed. ITS 3.1.9 states that the requirement of LCO 3.1.3, LCO 3.1.4, LCO 3.1.5, LCO 3.1.6, and LCO 3.4.2 may be suspended, but contains no requirements on the Intermediate and Power Range Channels. The ITS contains the same requirements on the Intermediate and Power Range Channels in ITS LCO 3.3.1. This changes the CTS by eliminating the requirement that the Reactor Trip Setpoints on the OPERABLE Intermediate and Power Range Channels are set ≤ 35% and ≤ 25% of RATED THERMAL POWER, respectively, from the test exception.

This change is acceptable because the Reactor Trip Setpoints on the OPERABLE Intermediate and Power Range Channels are contained in LCO 3.3.1, RTS Instrumentation. Repeating that requirement in the test exception LCO is unnecessary. This change is designated administrative as it eliminates a repeated requirement from the CTS, resulting in no technical change to the Technical Specifications.

A.3 CTS 3.10.3 is applicable in MODE 2. ITS 3.1.9 is applicable, "During PHYSICS TESTS initiated in MODE 2."

The purpose of the ITS 3.1.9 Applicability is to ensure that the Actions contained in the specification are followed. The wording of CTS 3.10.3 appears to be contradictory because when THERMAL POWER exceeds 5%, the test exception specification applicability is exited and the Actions no longer apply. However, it is clear that the CTS 3.10.3 Action should be applied if THERMAL POWER exceed 5%. The ITS Applicability eliminates this apparent contradiction and allows the test exception Conditions and Required Actions to be applied when the LCO is not met. This is consistent with the wording of the CTS Action. This change is designated as administrative because it clarifies the current wording of the specification with no change in intent.

MORE RESTRICTIVE CHANGES

M.1 CTS 3.10.1 provides an exception to the SHUTDOWN MARGIN requirements in CTS 3.1.1.1 for the purpose of performing rod worth measurement in the N-1 configuration (all rods inserted into the core except 1). The ITS does not contain the test exception. This changes the CTS by eliminating a test exception.

This change is acceptable because the N-1 rod worth test is no longer used in physics test programs. As a result, the CTS test exception is not needed. Other rod worth measurement techniques which do not violate the SHUTDOWN MARGIN requirements are used. ANSI/ANS 19.6.1-1997, section 5(4), specifically states that physics tests do not violate the SHUTDOWN MARGIN requirements of the core. This change is designated as more restrictive because an exception to the CTS is being deleted.

M.2 CTS 3.10.2 provides an exception to the rod group height, rod insertion, and power distribution limits for the purpose of performing the control rod pseudo ejection test, control rod pseudo drop and misalignment test, and xenon stability measurements. The ITS does not contain the test exception. This changes the CTS by eliminating a test exception.

This change is acceptable because the control rod pseudo ejection test, control rod pseudo drop and misalignment test, and xenon stability test are only performed during initial plant start test programs. These tests are never performed during post-refueling physics tests. As a result, the CTS test exception is not needed. This change is designated as more restrictive because an exception to the CTS is being deleted.

M.3 CTS 3.10.3 provides an exception to CTS 3.1.1.4, 3.1.3.1, 3.1.3.5, and 3.1.3.6 during the performance of PHYSICS TESTS and provides restrictions that must be followed when utilizing the exception. ITS 3.1.9 provides an exception to the equivalent ITS LCOs and to the restrictions that must be followed adds a requirement that SHUTDOWN MARGIN must be within the limits provided in the COLR. A Surveillance to verify the SHUTDOWN MARGIN every 24 hours and ACTIONS to follow if the SHUTDOWN MARGIN limit is not met are also added to the CTS. This changes the CTS by imposing an additional requirement on the application of the test exception LCO.

This change is acceptable because it imposes reasonable restrictions on the performance of PHYSICS TESTS when the control rod and RCS minimum temperature Specifications are allowed to be violated. The Bases for ITS 3.1.1, SHUTDOWN MARGIN, states that in MODE 1 and MODE 2 with $K_{eff} > 1.0$, the SHUTDOWN MARGIN is ensured by compliance with the rod insertion limit specifications. Under the test exception, those control rod insertion limits are allowed to be violated. Therefore, additional actions must be taken to ensure that sufficient SHUTDOWN MARGIN is available to shutdown the reactor and keep it subcritical if needed. This change is designated as more restrictive because it imposes additional restrictions not found in the CTS.

M.4 Unit 1 CTS 3.10.3 provides an exception to CTS 3.1.1.4, 3.1.3.1, 3.1.3.5, and 3.1.3.6 during the performance of PHYSICS TESTS and provides restrictions that must be followed when utilizing the exception. ITS 3.1.9 provides an exception to the equivalent ITS LCOs and to the restrictions that must be followed adds a requirement that RCS lowest loop average temperature be ≥ 531 °F. A Surveillance to verify the RCS lowest loop average temperature is ≥ 531 °F and ACTIONS to follow if the RCS lowest loop average temperature is not within limit are also added to the CTS. This changes the CTS by imposing an additional requirement on the application of the test exception LCO. The LCO requirement, Action, and Surveillance being added to the Unit 1 CTS exists in the Unit 2 CTS.

This change is acceptable because it imposes reasonable restrictions on the performance of PHYSICS TESTS when the control rod and RCS minimum temperature Specifications are allowed to be violated. The test exception specification allows RCS temperature to drop below the minimum temperature for criticality provided in LCO 3.4.2 in order to facilitate the performance of certain tests, such as determination of the Isothermal Temperature Coefficient. However, a lower limit on RCS average temperature is provided in the test exception LCO to ensure that the RCS temperature stays within the analyzed range. This change is designated as more restrictive because it imposes additional restrictions not found in the CTS.

M.5 CTS 4.10.3.1 requires THERMAL POWER to be verified to be ≤ 5% once per hour. ITS SR 3.1.9.3 requires the verification be performed every 30 minutes. This changes the CTS by increasing the Frequency of the THERMAL POWER verification.

This change is acceptable because the increased Frequency is consistent with similar verifications performed in the specification. ITS SR 3.1.9.2, which verifies that the RCS lowest loop average temperature is ≥ 531 °F, is also performed every 30 minutes. THERMAL POWER is a parameter readily available in the control room, so imposition of this more stringent requirement will have no effect on safety. This change is designated as more restrictive because a Surveillance will be performed more frequently in the ITS than in the CTS.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

None

LESS RESTRICTIVE CHANGES

L.1 *(Category 7 – Relaxation Of Surveillance Frequency)* CTS 4.10.3.2 requires that tests be performed on each Intermediate and Power Range channel within 12 hours prior to initiating PHYSICS TESTS. ITS SR 3.1.9.1 requires that the testing be performed prior to initiation of PHYSICS TESTS. This changes the CTS by eliminating the time period prior to initiation of PHYSICS TESTS within which the testing must be performed.

The purpose of CTS 3.10.3 and ITS 3.1.9 is to allow the performance of PHYSICS TESTS on the reactor. This change is acceptable because the new Surveillance Frequency has been evaluated to ensure that it provides an acceptable level of equipment reliability. The performance of the normally scheduled CHANNEL OPERATIONAL TEST is sufficient to ensure the equipment is OPERABLE. LCO 3.3.1 requires a CHANNEL OPERATIONAL TEST on the Intermediate and Power Range channels every 92 days (SR 3.3.1.7 and SR 3.3.1.9). These Frequencies have been determined to be sufficient for verification that the equipment is working properly. The initiation of PHYSICS TESTS does not affect the ability of the equipment to perform its function, does not affect the trip setpoints or the RTS trip capability and does not invalidate the previous surveillances. Therefore, requiring this testing to be performed at a fixed time before the initiation of PHYSICS TESTS has no benefit. This change is designated as less restrictive because Surveillances will be performed less frequently under the ITS than under the CTS.

L.2 *(Category 1 – Relaxation of LCO Requirements)* ITS 3.9.1 states that the number of required channels for LCO 3.3.1, "RTS Instrumentation," Functions 2, 3, 6, and 18.d, may be reduced to "3" required channels, during the performance of PHYSICS TESTS. CTS 3.10.3 does not contain this allowance. This changes the CTS by reducing LCO requirements for the number of Power Range Neutron Flux channels from "4" to "3" during PHYSICS TESTS initiated in MODE 2.

The purpose of CTS 3.10.3 is provide the necessary allowances to perform PHYSICS TESTS in MODE 2 to verify the fundamental nuclear design of the core. This change is acceptable because the LCO requirements continue to ensure that the structures, systems, and components are maintained consistent with the safety analyses and licensing basis. During the performance of PHYSICS TESTS, one Power Range Neutron Flux channel is used to provide input to the reactivity computer. When this channel is used, the channel is usually placed in a tripped condition, which places the RTS trip logic in a one-out-of-three logic status. Any spurious signals received on one channel will result in a reactor trip. The proposed change allows the channel used to provide input to the reactivity computer to be placed in bypass instead of trip. This will place the RTS trip logic in a two-out-of-three logic status, substantially reducing the chance of a spurious reactor trip. During PHYSICS TESTS, reactor power is limited to 5% and the Power Range and Intermediate Range trip setpoints are set at reduced values. Therefore, the risk of a power excursion with no reactor trip is small. This change is designated as less restrictive

because less stringent LCO requirements are being applied in the ITS than were applied in the CTS.

UNIT 1

CTS 3.1.1.3.1

REACTIVITY CONTROL SYSTEMS

BORON DILUTION

REACTOR COOLANT FLOW

LIMITING CONDITION FOR OPERATION

3.1.1.3.1 The flow rate of reactor coolant through the reactor coolant system shall be ≥ 3000 gpm whenever a reduction in Reactor Coolant System boron concentration is being made.

APPLICABILITY: All MODES.

ACTION:

With the flow rate of reactor coolant through the reactor coolant system < 3000 gpm, immediately suspend all operations involving a reduction in boron concentration of the Reactor Coolant System.

SURVEILLANCE REQUIREMENTS

4.1.1.3.1 The flow rate of reactor coolant through the reactor coolant system shall be determined to be ≥ 3000 gpm within one hour prior to the start of and at least once per hour during a reduction in the Reactor Coolant System boron concentration by either:

a. Verifying at least one reactor coolant pump is in operation, or

b. Verifying that at least one RHR pump is in operation and supplying ≥ 3000 gpm through the reactor coolant system.

R.1

page 1 of 1

Rev 0

UNIT 2

CTS 3.1.1.3.1

8-27-90

REACTIVITY CONTROL SYSTEM

3/4.1.1.3 BORON DILUTION

REACTOR COOLANT FLOW

LIMITING CONDITIONS FOR OPERATION

3.1.1.3.1 The flow rate of reactor coolant through the reactor coolant system shall be ≥3000 gpm whenever a reduction in Reactor Coolant System boron concentration is being made.

APPLICABILITY: All MODES

ACTION: With the flow rate of reactor coolant through the reactor coolant system <3000 gpm, immediately suspend all operations involving a reduction in boron concentration of the Reactor Coolant System.

R.1

SURVEILLANCE REQUIREMENTS

4.1.1.3.1 The flow of reactor coolant through the reactor coolant system shall be determined to be ≥ 3000 gpm within one hour prior to the start of and at least once per hour during a reduction in the Reactor Coolant System boron concentration by either:

a. Verifying at least one reactor coolant pump is in operation,

or

b. Verifying that at least one RHR pump is in operation and supplying ≥3000 gpm through the reactor coolant system.

Rev. 0

RELOCATED SPECIFICATIONS

R.1 CTS 3.1.1.3.1 requires a minimum reactor coolant system flow of 3000 gpm in all MODES. Various accident analyses assume adequate reactor coolant flow for heat removal and boron mixing. However, a specific flow rate is not assumed as an initial condition of any design basis accident or transient and is not credited for mitigation of any design basis accident or transient. Other specifications in the ITS contains adequate controls to ensure that RCS flow meets the general accident analysis assumption. In MODES 1, 2, and 3, at least one Reactor Coolant Pump (RCP) is required to be in operation, which provides flow in excess of 3000 gpm. In MODE 4, either an RCP or Residual Heat Removal (RHR) train is required to be in operation, and in MODES 5 and 6, at least one RHR train is required to be in operation. The ITS Bases state that when an RHR train is required to provide RCS flow, the flow rate must be sufficient for decay heat removal and boron mixing. The LCO does not meet the criteria for retention in the ITS; therefore, it will be retained in the Technical Requirements Manual.

This change is acceptable because CTS 3.1.1.3.1 does not meet the 10 CFR 50.36(c)(2)(ii) criteria for inclusion into the ITS.

10 CFR 50.36(c)(2)(ii) Criteria Evaluation:

1. Reactor coolant flow is not installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary. Reactor coolant flow does not satisfy criterion 1.

2. Reactor coolant flow is not a process variable, design feature, or operating restriction that is an initial condition of a DBA or Transient Analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. Reactor coolant flow does not satisfy criterion 2.

3. Reactor coolant flow is not a structure, system or component that is part of the primary success path and which functions or actuates to mitigate a DBA or Transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. Reactor coolant flow does not satisfy criterion 3.

4. Reactor coolant flow was not evaluated in WCAP-11618. An evaluation performed by the Company determined that reactor coolant flow is a non-significant risk contributor to core damage frequency and offsite releases. The reactor coolant flow specification is not important for any scenarios modeled in the North Anna Power Station site-specific PRAs. Reactor coolant flow does not meet criterion 4.

Since the 10 CFR 50.36(c)(2)(ii) criteria have not been met, the reactor coolant flow LCO and associated Applicability, Actions, and Surveillances may be relocated out of the Technical Specifications. The reactor coolant flow specification will be relocated to the TRM. Changes to the TRM will be controlled by the provisions of 10 CFR 50.59. This change is designated as relocation because the LCO did not meet the criteria in 10 CFR 50.36(c)(2)(ii) and has been relocated to the TRM.

UNIT 1

CTS 3.1.2.1

9-9-85

REACTIVITY CONTROL SYSTEMS

3/4.1.2 BORATION SYSTEMS

FLOW PATHS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.1 As a minimum, one of the following boron injection flow paths shall be OPERABLE:

a. A flow path from the boric acid tanks via a boric acid transfer pump through a charging pump to the Reactor Coolant System if only the boric acid storage tank in Specification 3.1.2.7a is OPERABLE, or

b. The flow path from the refueling water storage tank via a charging pump to the Reactor Coolant System if only the refueling water storage tank in Specification 3.1.2.7b is OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTION:

With none of the above flow paths OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes until at least one injection path is restored to OPERABLE status.

R.1

SURVEILLANCE REQUIREMENTS

4.1.2.1 At least one 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 is ≥ 115°F when a flow path from the boric acid tanks is used.

b. At least once per 31 days be 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.

page 1 of 1

Rev D

UNIT 2

CTS 3.1.2.1

9-9-85

REACTIVITY CONTROL SYSTEMS

3/4.1.2 BORATION SYSTEMS

FLOW PATHS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.1 As a minimum, one of the following boron injection flow paths shall be OPERABLE:

a. A flow path from the boric acid tanks via a boric acid transfer pump through a charging pump to the Reactor Coolant System if only the boric acid storage tank in Specification 3.1.2.7.a. is OPERABLE, or

b. The flow path from the refueling water storage tank via a charging pump to the Reactor Coolant System if only the refueling water storage tank in Specification 3.1.2.7.b. is OPERABLE.

R.1

APPLICABILITY: MODES 5 and 6.

ACTION:

With none of the above flow paths OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes until at least one injection path is restored to OPERABLE status.

SURVEILLANCE REQUIREMENTS

4.1.2.1 At least one 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 is greater than or equal to 115°F when a flow path from the boric acid tanks is used.

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.

RELOCATED SPECIFICATIONS

R.1 CTS 3.1.2.1 provides requirements on the boration systems flow paths during shutdown. The boration systems are part of the Chemical and Volume Control System (CVCS) and provide the means to control the chemical neutron absorber (boron) concentration in the RCS and to help maintain the shutdown margin. The boration system is not assumed to be OPERABLE to mitigate the consequences of a design basis accident or transient. In the case of the boron dilution accident, the accident is addressed by preventing its occurrence or by terminating the event before the required shutdown margin is lost, not by boration. This LCO does not meet the criteria for retention in the ITS; therefore, it will be retained in the Technical Requirements Manual.

This change is acceptable because CTS 3.1.2.1 does not meet the 10 CFR 50.36(c)(2)(ii) criteria for inclusion into the ITS.

10 CFR 50.36(c)(2)(ii) Criteria Evaluation:

1. The boration systems flow paths - shutdown are not installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary. The boration systems flow paths - shutdown do not satisfy criterion 1.

2. The boration systems flow paths - shutdown are not a process variable, design feature, or operating restriction that is an initial condition of a DBA or Transient Analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The boration systems flow paths - shutdown do not satisfy criterion 2.

3. The boration systems flow paths - shutdown are not a structure, system or component that is part of the primary success path and which functions or actuates to mitigate a DBA or Transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The boration systems flow paths - shutdown do not satisfy criterion 3.

4. As discussed in Section 4.0, (Appendix A, page A-6) of WCAP-11618, the boration systems flow paths - shutdown were found to be a non-significant risk contributor to core damage frequency and offsite releases. The Company has reviewed this evaluation, considers it applicable to the North Anna Power Station, and concurs with this assessment. The boration systems flow paths - shutdown are not important for any scenarios modeled in the North Anna Power Station site-specific PRAs. The boration systems flow paths - shutdown do not meet criterion 4.

Since the 10 CFR 50.36(c)(2)(ii) criteria have not been met, the boration systems flow paths - shutdown LCO and associated Applicability, Actions, and Surveillances may be relocated out of the Technical Specifications. The boration systems flow paths - shutdown specification will be relocated to the TRM. Changes to the TRM will be controlled by the provisions of 10 CFR 50.59. This change is designated as relocation because the LCO did not meet the criteria in 10 CFR 50.36(c)(2)(ii) and has been relocated to the TRM.

UNIT 1

CTS 3.1.2.2

10-05-94

REACTIVITY CONTROL SYSTEMS

FLOW PATHS – OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.2 Each of the following boron injection flow paths shall be OPERABLE:

a. The flow path from the boric acid tanks via a boric acid transfer pump and a charging pump to the Reactor Coolant System, and

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

APPLICABILITY: MODES 1, 2, 3 AND 4#.

ACTION:

a. With the flow path from the boric acid tanks inoperable, restore the inoperable flow path to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to at least 1.77% Δk/k at 200°F within the next 6 hours; restore the flow path to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

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

R.1

SURVEILLANCE REQUIREMENTS

4.1.2.2 Each 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 boric acid tanks is ≥ 115°F.

Only one boron injection flow path is required to be OPERABLE whenever the temperature of one or more of the RCS cold legs is less than or equal to 235°F.

page 1 of 2

Rev. 0

CTS 3.1.2.2

REACTIVITY CONTROL SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

R.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 each automatic valve in the flow path actuates to its correct position on a safety injection test signal.

UNIT 2

CTS 3.1.2.2

10-05-94

REACTIVITY CONTROL SYSTEMS

FLOW PATHS – OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.2 At least two of the following boron injection flow paths shall be OPERABLE:

a. The flow path from the boric acid tanks via a boric acid transfer pump and a charging pump to the Reactor Coolant System.

b. Two flow paths from the refueling water storage tank via charging pumps 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 1.77% 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.

R.1

SURVEILLANCE REQUIREMENTS

4.1.2.2 Each 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 boric acid tanks is greater than or equal to 115°F when it is a required water source.

Only one boron injection flow path is required to be OPERABLE whenever the temperature of one or more of the RCS cold legs is less than or equal to 270°F.

REACTIVITY CONTROL SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

R.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 each automatic valve in the flow path actuates to its correct position on a safety injection test signal.

RELOCATED SPECIFICATIONS

R.1 CTS 3.1.2.2 provides requirements on the boration systems flow paths during operation. The boration systems are part of the Chemical and Volume Control System (CVCS) and provides the means to control the chemical neutron absorber (boron) concentration in the RCS and to help maintain the shutdown margin. The boration system is not assumed to be OPERABLE to mitigate the consequences of a design basis accident or transient. The Emergency Core Cooling System (ECCS) and Refueling Water Storage Tank are credited in the accident analyses. In the case of the boron dilution accident, the accident is addressed by preventing its occurrence or by terminating the event before the required shutdown margin is lost, not by boration. This LCO does not meet the criteria for retention in the ITS; therefore, it will be retained in the Technical Requirements Manual.

This change is acceptable because CTS 3.1.2.2 does not meet the 10 CFR 50.36(c)(2)(ii) criteria for inclusion into the ITS.

10 CFR 50.36(c)(2)(ii) Criteria Evaluation:

1. The boration systems flow paths - operating are not installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary. The boration systems flow paths - operating do not satisfy criterion 1.

2. The boration systems flow paths - operating are not a process variable, design feature, or operating restriction that is an initial condition of a DBA or Transient Analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The boration systems flow paths - operating do not satisfy criterion 2.

3. The boration systems flow paths - operating are not a structure, system or component that is part of the primary success path and which functions or actuates to mitigate a DBA or Transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The boration systems flow paths - operating do not satisfy criterion 3.

4. As discussed in Section 4.0, (Appendix A, page A-8) of WCAP-11618, the boration systems flow paths - operating were found to be a non-significant risk contributor to core damage frequency and offsite releases. The Company has reviewed this evaluation, considers it applicable to the North Anna Power Station, and concurs with this assessment. The boration systems flow paths - operating are not important for any scenarios modeled in the North Anna Power Station site-specific PRAs. The boration systems flow paths - operating do not meet criterion 4.

Since the 10 CFR 50.36(c)(2)(ii) criteria have not been met, the boration systems flow paths - operating LCO and associated Applicability, Actions, and Surveillances may be relocated out of the Technical Specifications. The boration systems flow paths - operating specification will be relocated to the TRM. Changes to the TRM will be controlled by the provisions of 10 CFR 50.59. This change is designated as relocation because the LCO did not meet the criteria in 10 CFR 50.36(c)(2)(ii) and has been relocated to the TRM.

UNIT 1

CTS 3.1.2.3

07-24-96

REACTIVITY CONTROL SYSTEMS

CHARGING PUMP – SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.3 One charging pump in the boron injection flow path required by Specification 3.1.2.1 shall be OPERABLE.

APPLICABILITY: MODES 5 and 6

ACTION:

a. With no charging pump OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes until one charging pump is restored to OPERABLE status.

b. With no charging pump OPERABLE and the opposite unit in MODE 1, 2, 3 or 4, immediately initiate corrective action to restore at least one charging pump to OPERABLE status as soon as possible.

R.1

SURVEILLANCE REQUIREMENTS

4.1.2.3.1 The above required charging pump shall be demonstrated OPERABLE by verifying, that on recirculation flow, the pump develops a discharge pressure of greater than or equal to 2410 psig when tested pursuant to Specification 4.0.5.

4.1.2.3.2 At least once per 12 hours, verify that a maximum of one charging pump is OPERABLE and capable of injecting into the RCS.*

* Two charging pumps may be OPERABLE and capable of injecting into the RCS during pump switching operations.

page 1 of 1

Rev. 0

UNIT 2

CTS 3.1.2.3

07-24-96

REACTIVITY CONTROL SYSTEMS

CHARGING PUMP – SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.3 One charging pump in the boron injection flow path required by Specification 3.1.2.1 shall be OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTION:

a. With no charging pump OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes until one charging pump is restored to OPERABLE status.

b. With no charging pump OPERABLE and the opposite unit in MODE 1, 2, 3 or 4, immediately initiate corrective action to restore at least one charging pump to OPERABLE status as soon as possible.

SURVEILLANCE REQUIREMENTS

R-1

4.1.2.3.1 The above required charging pump shall be demonstrated OPERABLE by verifying, that on recirculation flow, the pump develops a discharge pressure of greater than or equal to 2410 psig when tested pursuant to Specification 4.0.5.

4.1.2.3.2 At least once per 12 hours, verify that a maximum of one charging pump is OPERABLE and capable of injecting into the RCS.*

* Two charging pumps may be OPERABLE and capable of injecting into the RCS during pump switching operations.

page 1 of 1

Rev. 0

RELOCATED SPECIFICATIONS

R.1 CTS 3.1.2.3 provides requirements on the charging pumps during shutdown when used as part of the boration system. The charging pumps in the boration system are part of the Chemical and Volume Control System (CVCS) and provide the means to control the chemical neutron absorber (boron) concentration in the RCS and to help maintain the shutdown margin. The charging pumps in the boration system are not assumed to be OPERABLE to mitigate the consequences of a design basis accident or transient. In the case of the boron dilution accident, the accident is addressed by preventing its occurrence or by terminating the event before the required shutdown margin is lost, not by boration. OPERABILITY of the charging pumps is required as part of the Emergency Core Cooling System, which is addressed in other specifications. This LCO does not meet the criteria for retention in the ITS; therefore, it will be retained in the Technical Requirements Manual.

This change is acceptable because CTS 3.1.2.3 does not meet the 10 CFR 50.36(c)(2)(ii) criteria for inclusion into the ITS.

10 CFR 50.36(c)(2)(ii) Criteria Evaluation:

1. The charging pumps - shutdown are not installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary. The charging pumps - shutdown do not satisfy criterion 1.

2. The charging pumps - shutdown are not a process variable, design feature, or operating restriction that is an initial condition of a DBA or Transient Analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The charging pumps - shutdown do not satisfy criterion 2.

3. The charging pumps - shutdown are not a structure, system or component that is part of the primary success path and which functions or actuates to mitigate a DBA or Transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The charging pumps - shutdown do not satisfy criterion 3.

4. As discussed in Section 4.0, (Appendix A, page A-6) of WCAP-11618, the charging pumps - shutdown were found to be a non-significant risk contributor to core damage frequency and offsite releases. The Company has reviewed this evaluation, considers it applicable to the North Anna Power Station, and concurs with this assessment. The charging pumps - shutdown are not important for any scenarios modeled in the North Anna Power Station site-specific PRAs. The charging pumps - shutdown do not meet criterion 4.

Since the 10 CFR 50.36(c)(2)(ii) criteria have not been met, the charging pumps - shutdown LCO and associated Applicability, Actions, and Surveillances may be relocated out of the Technical Specifications. The charging pumps - shutdown specification will be relocated to the TRM. Changes to the TRM will be controlled by the provisions of 10 CFR 50.59. This change is designated as relocation because the LCO did not meet the criteria in 10 CFR 50.36(c)(2)(ii) and has been relocated to the TRM.

UNIT 1

CTS 3.1.2.4

07-24-96

REACTIVITY CONTROL SYSTEMS

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 a second charging pump to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to at least 1.77% Δk/k at 200°F within the next 6 hours; restore a second charging pump to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours. The provisions of Specification 3.0.4 are not applicable for one hour following heatup above 235°F or prior to cooldown below 235°F.

R.1

SURVEILLANCE REQUIREMENTS

4.1.2.4.1 The above required charging pumps shall be demonstrated OPERABLE by verifying, that on recirculation flow, each pump develops a discharge pressure of greater than or equal to 2410 psig when tested pursuant to Specification 4.0.5.

4.1.2.4.2 At least once per 12 hours, verify that a maximum of one charging pump is OPERABLE and capable of injecting into the RCS whenever the temperature of one or more of the RCS cold legs is less than or equal to 235°F.**

---

* A maximum of one charging pump shall be OPERABLE and capable of injecting into the RCS whenever the temperature of one or more of the RCS cold legs is less than or equal to 235°F.

** Two charging pumps may be OPERABLE and capable of injecting into the RCS during pump switching operations.

page 1 of 1

Rev 0

UNIT 2

CTS 3.1.2.4

07-24-96

REACTIVITY CONTROL SYSTEMS

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 a second charging pump to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to at least 1.77% delta k/k at 200°F within the next 6 hours; restore a second charging pump to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours. The provisions of Specification 3.0.4 are not applicable for one hour following heatup above 270°F or prior to cooldown below 270°F.

SURVEILLANCE REQUIREMENTS

4.1.2.4.1 The above required charging pumps shall be demonstrated OPERABLE by verifying, that on recirculation flow, each pump develops a discharge pressure of greater than or equal to 2410 psig when tested pursuant to Specification 4.0.5.

4.1.2.4.2 At least once per 12 hours, verify that a maximum of one charging pump is OPERABLE and capable of injecting into the RCS whenever the temperature of one or more of the RCS cold legs is less than or equal to 270°F.##

R.1

A maximum of one charging pump shall be OPERABLE and capable of injecting into the RCS whenever the temperature of one or more of the RCS cold legs is less than or equal to 270°F.

Two charging pumps may be OPERABLE and capable of injecting into the RCS during pump switching operations.

Rev. 0

page 1 of 1

RELOCATED SPECIFICATIONS

R.1 CTS 3.1.2.4 provides requirements on the charging pumps during operation when used as part of the boration system. The charging pumps in the boration system are part of the Chemical and Volume Control System (CVCS) and provide the means to control the chemical neutron absorber (boron) concentration in the RCS and to help maintain the shutdown margin. The charging pumps in the boration system are not assumed to be OPERABLE to mitigate the consequences of a design basis accident or transient. The Emergency Core Cooling System (ECCS) is and Refueling Water Storage Tank are credited in the accident analyses. In the case of the boron dilution accident, the accident is addressed by preventing its occurrence or by terminating the event before the required shutdown margin is lost, not by boration. OPERABILITY of the charging pumps is required as part of the Emergency Core Cooling System, which is addressed in other specifications. This LCO does not meet the criteria for retention in the ITS; therefore, it will be retained in the Technical Requirements Manual.

This change is acceptable because CTS 3.1.2.4 does not meet the 10 CFR 50.36(c)(2)(ii) criteria for inclusion into the ITS.

10 CFR 50.36(c)(2)(ii) Criteria Evaluation:

1. The charging pumps - operating are not installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary. The charging pumps - operating do not satisfy criterion 1.

2. The charging pumps - operating are not a process variable, design feature, or operating restriction that is an initial condition of a DBA or Transient Analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The charging pumps - operating do not satisfy criterion 2.

3. The charging pumps - operating are not a structure, system or component that is part of the primary success path and which functions or actuates to mitigate a DBA or Transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The charging pumps - operating do not satisfy criterion 3.

4. As discussed in Section 4.0, (Appendix A, page A-8) of WCAP-11618, the charging pumps - operating were found to be a non-significant risk contributor to core damage frequency and offsite releases. The Company has reviewed this evaluation, considers it applicable to the North Anna Power Station, and concurs with this assessment. The charging pumps - operating are not

important for any scenarios modeled in the North Anna Power Station site-specific PRAs. The charging pumps - operating do not meet criterion 4.

Since the 10 CFR 50.36(c)(2)(ii) criteria have not been met, the charging pump - operating LCO and associated Applicability, Actions, and Surveillances may be relocated out of the Technical Specifications. The charging pump - operating specification will be relocated to the TRM. Changes to the TRM will be controlled by the provisions of 10 CFR 50.59. This change is designated as relocation because the LCO did not meet the criteria in 10 CFR 50.36(c)(2)(ii) and has been relocated to the TRM.

UNIT 1

CTS 3.1.2.5

11-26-77

REACTIVITY CONTROL SYSTEMS

BORIC ACID TRANSFER PUMPS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.5 At least one boric acid transfer pump shall be OPERABLE if only the flow path through the boric acid transfer pump of Specification 3.1.2.1a is OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no boric acid transfer pump OPERABLE as required to complete the flow path of Specification 3.1.2.1a, suspend all operations involving CORE ALTERATIONS or positive reactivity changes until at least one boric acid transfer pump is restored to OPERABLE status.

R.1

SURVEILLANCE REQUIREMENTS

4.1.2.5 The above required boric acid transfer pump shall be demonstrated OPERABLE by verifying, that on recirculation flow, the pump develops a discharge pressure of $\geq$ 109 psig when tested pursuant to Specification 4.0.5.

Rev. 0

RELOCATED SPECIFICATIONS

R.1 Unit 1 CTS 3.1.2.5 provides requirements on the boric acid transfer pumps during shutdown. The boric acid transfer pumps are part of the Chemical and Volume Control System (CVCS) and provides the means to control the chemical neutron absorber (boron) concentration in the RCS and to help maintain the shutdown margin. The boric acid transfer pumps are not assumed to be OPERABLE to mitigate the consequences of a design basis accident or transient. In the case of the boron dilution accident, the accident is addressed by preventing its occurrence or by terminating the event before the required shutdown margin is lost, not by boration. This LCO does not meet the criteria for retention in the ITS; therefore, it will be retained in the Technical Requirements Manual.

This change is acceptable because CTS 3.1.2.5 does not meet the 10 CFR 50.36(c)(2)(ii) criteria for inclusion into the ITS.

10 CFR 50.36(c)(2)(ii) Criteria Evaluation:

1. The boric acid transfer pumps - shutdown are not installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary. The boric acid transfer pumps - shutdown do not satisfy criterion 1.

2. The boric acid transfer pumps - shutdown are not a process variable, design feature, or operating restriction that is an initial condition of a DBA or Transient Analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The boric acid transfer pumps - shutdown do not satisfy criterion 2.

3. The boric acid transfer pumps - shutdown are not a structure, system or component that is part of the primary success path and which functions or actuates to mitigate a DBA or Transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The boric acid transfer pumps - shutdown do not satisfy criterion 3.

4. As discussed in Section 4.0, (Appendix A, page A-6) of WCAP-11618, the boric acid transfer pumps - shutdown, as a part of the boration flow path - shutdown, were found to be a non-significant risk contributor to core damage frequency and offsite releases. The Company has reviewed this evaluation, considers it applicable to the North Anna Power Station, and concurs with this assessment. The boric acid transfer pumps - shutdown are not important for any scenarios modeled in the North Anna Power Station site-specific PRAs. The boric acid transfer pumps - shutdown do not meet criterion 4.

Since the 10 CFR 50.36(c)(2)(ii) criteria have not been met, the boric acid transfer pumps - shutdown LCO and associated Applicability, Actions, and Surveillances may be relocated out of the Unit 1 Technical Specifications. The boric acid transfer pumps - shutdown specification will be relocated to the TRM. Changes to the TRM will be controlled by the provisions of 10 CFR 50.59. This change is designated as relocation because the LCO did not meet the criteria in 10 CFR 50.36(c)(2)(ii) and has been relocated to the TRM.

UNIT 1

CTS 3.1.2.6

11-26-77

REACTIVITY CONTROL SYSTEMS

BORIC ACID TRANSFER PUMPS - OPERATING

R.1

LIMITING CONDITION FOR OPERATION

3.1.2.6 At least one boric acid transfer pump in the boron injection flow path required by Specification 3.1.2.2a shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With no boric acid transfer pump OPERABLE, restore at least one boric acid transfer 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 1.77% $\Delta k/k$ at 200°F; restore at least one boric acid transfer pump to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.6 The above required boric acid transfer pump shall be demonstrated OPERABLE by verifying that on recirculation flow the pump develops a discharge pressure of $\geq$ 109 psig when tested pursuant to Specification 4.0.5.

page 1 of 1

Rev. 0

RELOCATED SPECIFICATIONS

R.1 Unit 1 CTS 3.1.2.6 provides requirements on the boric acid transfer pumps during operation. The boric acid transfer pumps are part of the Chemical and Volume Control System (CVCS) and provides the means to control the chemical neutron absorber (boron) concentration in the RCS and to help maintain the shutdown margin. The boric acid transfer pumps are not assumed to be OPERABLE to mitigate the consequences of a design basis accident or transient. The Emergency Core Cooling System (ECCS) and Refueling Water Storage Tank are credited in the accident analyses. In the case of the boron dilution accident, the accident is addressed by preventing its occurrence or by terminating the event before the required shutdown margin is lost, not by boration. This LCO does not meet the criteria for retention in the ITS; therefore, it will be retained in the Technical Requirements Manual.

This change is acceptable because CTS 3.1.2.6 does not meet the 10 CFR 50.36(c)(2)(ii) criteria for inclusion into the ITS.

10 CFR 50.36(c)(2)(ii) Criteria Evaluation:

1. The boric acid transfer pumps - operating are not installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary. The boric acid transfer pumps - operating do not satisfy criterion 1.

2. The boric acid transfer pumps - operating are not a process variable, design feature, or operating restriction that is an initial condition of a DBA or Transient Analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The boric acid transfer pumps - operating do not satisfy criterion 2.

3. The boric acid transfer pumps - operating are not a structure, system or component that is part of the primary success path and which functions or actuates to mitigate a DBA or Transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The boric acid transfer pumps - operating do not satisfy criterion 3.

4. As discussed in Section 4.0, (Appendix A, page A-8) of WCAP-11618, the boric acid transfer pumps - operating, as a part of the boration flow path - operating, were found to be a non-significant risk contributor to core damage frequency and offsite releases. The Company has reviewed this evaluation, considers it applicable to the North Anna Power Station, and concurs with this assessment. The boric acid transfer pumps - operating are not important for any scenarios modeled in the North Anna Power Station site-specific PRAs. The boric acid transfer pumps - operating do not meet criterion 4.

Since the 10 CFR 50.36(c)(2)(ii) criteria have not been met, the boric acid transfer pumps - operating LCO and associated Applicability, Actions, and Surveillances may be relocated out of the Unit 1 Technical Specifications. The boric acid transfer pumps - operating specification will be relocated to the TRM. Changes to the TRM will be controlled by the provisions of 10 CFR 50.59. This change is designated as relocation because the LCO did not meet the criteria in 10 CFR 50.36(c)(2)(ii) and has been relocated to the TRM.

UNIT 1

CTS 3.1.2.7

REACTIVITY CONTROL SYSTEMS

BORATED WATER SOURCES - SHUTDOWN

LIMITING CONDITION FOR OPERATION

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

a. A boric acid storage system and associated heat tracing with:

1. A minimum contained borated water volume of 1378 gallons,
2. Between 12,950 and 15,750 ppm of boron, and
3. A minimum solution temperature of 115°F.

b. The refueling water storage tank with:

1. A minimum contained borated water volume of 51,000 gallons,
2. Between 2300 and 2400 ppm of boron, and
3. A minimum solution temperature of 35°F.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no borated water source OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes until at least one borated water source is restored to OPERABLE status.

R.1

SURVEILLANCE REQUIREMENTS

4.1.2.7 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 of the tank, 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 RWST temperature when it is the source of borated water and the outside air temperature is < 35°F.

Rev. 0

UNIT 2

REACTIVITY CONTROL SYSTEMS

BORATED WATER SOURCES - SHUTDOWN

LIMITING CONDITION FOR OPERATION

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

a. A boric acid storage system and at least one associated heat tracing system with:

1. A minimum contained borated water volume of 1378 gallons,

2. Between 12,950 and 15,750 ppm of boron, and

3. A minimum solution temperature of 115°F.

b. The refueling water storage tank with:

1. A minimum contained borated water volume of 51,000 gallons,

2. Between 2300 and 2400 ppm of boron, and

3. A minimum solution temperature of 35°F.

R.1

APPLICABILITY: MODES 5 and 6.

ACTION:

With no borated water source OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes until at least one borated water source is restored to OPERABLE status.

SURVEILLANCE REQUIREMENTS

4.1.2.7 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 of the tank, 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 RWST temperature when it is the source of borated water and the outside air temperature is less than 35°F.

RELOCATED SPECIFICATIONS

R.1 CTS 3.1.2.7 provides requirements on the borated water sources during shutdown. The borated water sources - shutdown are part of the Chemical and Volume Control System (CVCS) and provide the means to control the chemical neutron absorber (boron) concentration in the RCS and to help maintain the shutdown margin. The borated water sources are not assumed to be OPERABLE to mitigate the consequences of a design basis accident or transient. In the case of the boron dilution accident, the accident is addressed by preventing its occurrence or by terminating the event before the required shutdown margin is lost, not by boration. This LCO does not meet the criteria for retention in the ITS; therefore, it will be retained in the Technical Requirements Manual.

This change is acceptable because CTS 3.1.2.7 does not meet the 10 CFR 50.36(c)(2)(ii) criteria for inclusion into the ITS.

10 CFR 50.36(c)(2)(ii) Criteria Evaluation:

1. The borated water sources - shutdown are not installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary. The borated water sources - shutdown do not satisfy criterion 1.

2. The borated water sources - shutdown are not a process variable, design feature, or operating restriction that is an initial condition of a DBA or Transient Analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The borated water sources - shutdown do not satisfy criterion 2.

3. The borated water sources - shutdown are not a structure, system or component that is part of the primary success path and which functions or actuates to mitigate a DBA or Transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The borated water sources - shutdown do not satisfy criterion 3.

4. As discussed in Section 4.0, (Appendix A, page A-10) of WCAP-11618, the borated water sources - shutdown were found to be a non-significant risk contributor to core damage frequency and offsite releases. The Company has reviewed this evaluation, considers it applicable to the North Anna Power Station, and concurs with this assessment. The borated water sources - shutdown are not important for any scenarios modeled in the North Anna Power Station site-specific PRAs. The borated water sources - shutdown do not meet criterion 4.

Since the 10 CFR 50.36(c)(2)(ii) criteria have not been met, the borated water sources - shutdown LCO and associated Applicability, Actions, and Surveillances may be relocated out of the Technical Specifications. The borated water sources - shutdown specification will be relocated to the TRM. Changes to the TRM will be controlled by the provisions of 10 CFR 50.59. This change is designated as relocation because the LCO did not meet the criteria in 10 CFR 50.36(c)(2)(ii) and has been relocated to the TRM.

UNIT 1

CTS 3.1.2.8

6-4-91

REACTIVITY CONTROL SYSTEMS

BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.8 Each of the following borated water sources shall be OPERABLE:

a. A boric acid storage system and associated heat tracing with:

1. A contained borated water volume of between 6000 and 16,280 gallons,
2. Between 12,950 and 15,750 ppm of boron, and
3. A minimum solution temperature of 115°F.

b. The refueling water storage tank with:

1. A contained borated water volume of between 466,200 and 487,000 gallons,
2. Between 2300 and 2400 ppm of boron, and
3. A solution temperature between 40°F and 50°F.

APPLICABILITY: MODES 1, 2, 3 and 4.

R.1

ACTION:

a. With the boric acid storage system inoperable, restore the storage 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 1.77% Δk/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 one hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.8 Each borated water source shall be demonstrated OPERABLE:

REACTIVITY CONTROL SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

a. At least once per 7 days by:

1. Verifying the boron concentration in each water source,

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

3. Verifying the boric acid storage system solution temperature.

b. At least once per 24 hours by verifying the RWST temperature.

R.1

UNIT 2

REACTIVITY CONTROL SYSTEMS

BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.8 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 and at least one associated heat tracing system with:

1. A contained borated water volume of between 6000 and 16,280 gallons,

2. Between 12,950 and 15,750 ppm of boron, and

3. A minimum solution temperature of 115°F.

b. The refueling water storage tank with:

1. A contained borated water volume of between 466,200 and 487,000 gallons,

2. Between 2300 and 2400 ppm of boron, and

3. A solution temperature between 40°F and 50°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 storage 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 1.77% Δk/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 one hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

REACTIVITY CONTROL SYSTEMS

SURVEILLANCE REQUIREMENTS

4.1.2.8 Each borated water source 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 of each water source, and
   3. Verifying the boric acid storage system solution temperature.

b. At least once per 24 hours by verifying the RWST temperature.

R.1

RELOCATED SPECIFICATIONS

R.1 CTS 3.1.2.8 provides requirements on the borated water sources during operation. The borated water sources - operating are part of the Chemical and Volume Control System (CVCS) and provide the means to control the chemical neutron absorber (boron) concentration in the RCS and to help maintain the shutdown margin. The borated water sources are not assumed to be OPERABLE to mitigate the consequences of a design basis accident or transient. The Emergency Core Cooling System (ECCS) and Refueling Water Storage Tank are credited in the accident analyses and are required by other specifications. In the case of the boron dilution accident, the accident is addressed by preventing its occurrence or by terminating the event before the required shutdown margin is lost, not by boration. This LCO does not meet the criteria for retention in the ITS; therefore, it will be retained in the Technical Requirements Manual.

This change is acceptable because CTS 3.1.2.8 does not meet the 10 CFR 50.36(c)(2)(ii) criteria for inclusion into the ITS.

10 CFR 50.36(c)(2)(ii) Criteria Evaluation:

1. The borated water sources - operating are not installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary. The borated water sources - operating do not satisfy criterion 1.

2. The borated water sources - operating are not a process variable, design feature, or operating restriction that is an initial condition of a DBA or Transient Analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The borated water sources - operating do not satisfy criterion 2.

3. The borated water sources - operating are not a structure, system or component that is part of the primary success path and which functions or actuates to mitigate a DBA or Transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The borated water sources - operating do not satisfy criterion 3.

4. As discussed in Section 4.0, (Appendix A, page A-10) of WCAP-11618, the borated water sources - operating were found to be a non-significant risk contributor to core damage frequency and offsite releases. The Company has reviewed this evaluation, considers it applicable to the North Anna Power Station, and concurs with this assessment. The borated water sources - operating are not important for any scenarios modeled in the North Anna Power Station site-specific PRAs. The borated water sources - operating do not meet criterion 4.

Since the 10 CFR 50.36(c)(2)(ii) criteria have not been met, the borated water sources - operating LCO and associated Applicability, Actions, and Surveillances may be relocated out of the Technical Specifications. The borated water sources - operating specification will be relocated to the TRM. Changes to the TRM will be controlled by the provisions of 10 CFR 50.59. This change is designated as relocation because the LCO did not meet the criteria in 10 CFR 50.36(c)(2)(ii) and has been relocated to the TRM.

UNIT 1

CTS 3.1.3.3

REACTIVITY CONTROL SYSTEMS

POSITION INDICATOR CHANNELS-SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.3.3 The rod group step counter demand position indicator shall be OPERABLE and accurate to within ± 2 steps of the demand position from the logic cabinet for each shutdown or control rod group not fully inserted.

APPLICABILITY: MODES 3* , 4* and 5* .

ACTION:

With less than the above required demand position indicators OPERABLE, open the reactor trip system breakers within 15 minutes.

R.1

SURVEILLANCE REQUIREMENTS

4.1.3.3 Each of the above required demand position indicators shall be determined to be OPERABLE by:

a. Performing a CHANNEL CHECK of the demand position indicators within a bank at least once per 7 days, and

b. Performing a CHANNEL CHECK by an intercomparison of the control bank benchboard demand position indicators and the rod control system logic cabinet bank overlap indicator or the rod position indicator cabinet P/A indicators, and determining their agreement within ± 2 steps, at least once per 92 days.

c. The provisions of Specification 4.0.4 are not applicable.

*With the reactor trip system breakers in the closed position.

page 1 of 1

Rev. 0

UNIT 2

CTS 3.1.3.3

8-27-90

REACTIVITY CONTROL SYSTEMS

POSITION INDICATOR CHANNELS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.3.3 The rod group step counter demand position indicator shall be OPERABLE and accurate to within ± 2 steps of the demand position from the logic cabinet for each shutdown or control rod group not fully inserted.

APPLICABILITY: MODES 3*, 4* and 5*.

ACTION:

With less than the above required demand position indicators OPERABLE, open the reactor trip system breakers within 15 minutes.

SURVEILLANCE REQUIREMENTS

R.1

4.1.3.3 Each of the above required demand position indicators shall be determined to be OPERABLE by:

a. Performing a CHANNEL CHECK of the demand position indicators within a bank at least once per 7 days, and

b. Performing a CHANNEL CHECK by an intercomparison of the control bank benchboard demand position indicators and the rod control system logic cabinet bank overlap indicator or the rod position indicator cabinet P/A indicators, and determining their agreement within ± 2 steps, at least once per 92 days.

c. The provisions of Specification 4.0.4 are not applicable.

* With the reactor trip system breakers in the closed position.

page 1 of 1

Rev 0

RELOCATED SPECIFICATIONS

R.1 CTS 3.1.3.3 provides requirements on the rod position indicator channels during shutdown (MODES 3, 4, and 5 with the reactor trip system breakers in the closed position). The control rod position indicator channels provide indicator of rod position to the operator. This indicator is used by the operator to verify that the rods are correctly positioned, and to verify the rods are inserted into the core following a reactor trip. Rod position indicator is also used during reactor startup. However, no DBA or Transient initiated in MODES 3, 4, or 5 with the reactor trip system breakers in the closed position assumes operator action to manually trip the reactor or to take some alternative action if an automatic reactor trip does not occur. With the reactor critical, rod position indicator is used to verify that the insertion, sequence, and overlap limits are met. These are related to SHUTDOWN MARGIN and core power distribution limits. This LCO does not meet the criteria for retention in the ITS; therefore, it will be retained in the Technical Requirements Manual.

This change is acceptable because CTS 3.1.3.3 does not meet the 10 CFR 50.36(c)(2)(ii) criteria for inclusion into the ITS.

10 CFR 50.36(c)(2)(ii) Criteria Evaluation:

1. The rod position indicator channels - shutdown are not installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary. The rod position indicator channels - shutdown do not satisfy criterion 1.

2. The rod position indicator channels - shutdown are not a process variable, design feature, or operating restriction that is an initial condition of a DBA or Transient Analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The rod position indicator channels - shutdown do not satisfy criterion 2.

3. The rod position indicator channels - shutdown are not a structure, system or component that is part of the primary success path and which functions or actuates to mitigate a DBA or Transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The rod position indicator channels - shutdown do not satisfy criterion 3.

4. As discussed in Section 4.0, (Appendix A, page A-12) of WCAP-11618, the rod position indicator channels - shutdown were found to be a non-significant risk contributor to core damage frequency and offsite releases. The Company has reviewed this evaluation, considers it applicable to the North Anna Power Station, and concurs with this assessment. The rod position indicator channels - shutdown are not important for any scenarios modeled in the North Anna

Power Station site-specific PRAs. The rod position indicator channels - shutdown do not meet criterion 4.

Since the 10 CFR 50.36(c)(2)(ii) criteria have not been met, the rod position indicator channels - shutdown LCO and associated Applicability, Actions, and Surveillances may be relocated out of the Technical Specifications. The rod position indicator channels - shutdown specification will be relocated to the TRM. Changes to the TRM will be controlled by the provisions of 10 CFR 50.59. This change is designated as relocation because the LCO did not meet the criteria in 10 CFR 50.36(c)(2)(ii) and has been relocated to the TRM.

SECTION 3.1 - REACTIVITY CONTROL SYSTEMS

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS

GENERIC NSHCs

10 CFR 50.92 EVALUATION
FOR
ADMINISTRATIVE CHANGES

The North Anna Power Station is converting to the Improved Technical Specifications (ITS) as outlined in NUREG-1431, "Standard Technical Specifications, Westinghouse Plants." Some of the proposed changes involve reformatting, renumbering, and rewording of Technical Specifications with no change in intent. These changes, since they do not involve technical changes to the Technical Specifications, are administrative.

This type of change is connected with the movement of requirements within the current requirements, or with the modification of wording that does not affect the technical content of the current Technical Specifications. These changes will also include nontechnical modifications of requirements to conform to the Writer's Guide or provide consistency with the Improved Standard Technical Specifications in NUREG-1431. Administrative changes are not intended to add, delete, or relocate any technical requirements of the current Technical Specifications.

In accordance with the criteria set forth in 10 CFR 50.92, the Company has evaluated these proposed Technical Specification changes and determined they do not represent a significant hazards consideration. The following is provided in support of this conclusion.

1. **Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?**

   The proposed change involves reformatting, renumbering, and rewording the existing Technical Specifications. The reformatting, renumbering, and rewording process involves no technical changes to the existing Technical Specifications. As such, this change is administrative in nature and does not affect initiators of analyzed events or assumed mitigation of accident or transient events. Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?**

   The proposed change does not involve a physical alteration of the plant (no new or different type of equipment will be installed) or changes in methods governing normal plant operation. The proposed change will not impose any new or eliminate any old requirements. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

The proposed change will not reduce a margin of safety because it has no effect on any safety analyses assumptions. This change is administrative in nature. Therefore, the change does not involve a significant reduction in a margin of safety.

10 CFR 50.92 EVALUATION
FOR
MORE RESTRICTIVE CHANGES

The North Anna Power Station is converting to the Improved Technical Specifications (ITS) as outlined in NUREG-1431, "Standard Technical Specifications, Westinghouse Plants." Some of the proposed changes involve adding more restrictive requirements to the existing Technical Specifications by either making current requirements more stringent or by adding new requirements that currently do not exist.

These changes include additional commitments that decrease allowed outage times, increase the frequency of surveillances, impose additional surveillances, increase the scope of specifications to include additional plant equipment, increase the applicability of specifications, or provide additional actions. These changes are generally made to conform with NUREG-1431 and have been evaluated to not be detrimental to plant safety.

In accordance with the criteria set forth in 10 CFR 50.92, the Company has evaluated these proposed Technical Specification changes and determined they do not represent a significant hazards consideration. The following is provided in support of this conclusion.

1. **Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?**

   The proposed change provides more stringent requirements for operation of the facility. These more stringent requirements do not result in operation that will increase the probability of initiating an analyzed event and do not alter assumptions relative to mitigation of an accident or transient event. The more restrictive requirements continue to ensure process variables, structures, systems, and components are maintained consistent with the safety analyses and licensing basis. Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?**

   The proposed change does not involve a physical alteration of the plant (no new or different type of equipment will be installed) or changes in methods governing normal plant operation. The proposed change does impose different requirements. However, these changes are consistent with the assumptions in the safety analyses and licensing basis. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

The imposition of more restrictive requirements either has no effect on or increases the margin of plant safety. As provided in the discussion of change, each change in this category is, by definition, providing additional restrictions to enhance plant safety. The change maintains requirements within the safety analyses and licensing basis. Therefore, this change does not involve a significant reduction in a margin of safety.

10 CFR 50.92 EVALUATION
FOR
RELOCATED SPECIFICATIONS

The North Anna Power Station is converting to the Improved Technical Specifications (ITS) as outlined in NUREG-1431, "Standard Technical Specifications, Westinghouse Plants." Some of the proposed changes involve relocating existing Technical Specification LCOs to licensee controlled documents.

The the Company has evaluated the current Technical Specifications using the criteria set forth in 10 CFR 50.36. Specifications identified by this evaluation that did not meet the retention requirements specified in the regulation are not included in the Improved Technical Specifications (ITS) submittal. These specifications have been relocated from the current Technical Specifications to the Technical Requirements Manual.

In accordance with the criteria set forth in 10 CFR 50.92, the Company has evaluated these proposed Technical Specification changes and determined they do not represent a significant hazards consideration. The following is provided in support of this conclusion.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

The proposed change relocates requirements and surveillances for structures, systems, components or variables that do not meet the criteria of 10 CFR 50.36 (c)(2)(ii) for inclusion in Technical Specifications as identified in the Application of Selection Criteria to the North Anna Technical Specifications. The affected structures, systems, components or variables are not assumed to be initiators of analyzed events and are not assumed to mitigate accident or transient events. The requirements and surveillances for these affected structures, systems, components or variables will be relocated from the Technical Specifications to the Technical Requirements Manual, which will be maintained pursuant to 10 CFR 50.59. In addition, the affected structures, systems, components or variables are addressed in existing surveillance procedures which are also controlled by 10 CFR.50.59 and subject to the change control provisions imposed by plant administrative procedures, which endorse applicable regulations and standards. Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

The proposed change does not involve a physical alteration of the plant (no new or different type of equipment will be installed) or change in the methods governing normal plant operation. The proposed change will not impose or eliminate any requirements and adequate control of existing requirements will be maintained. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

The proposed change will not reduce a margin of safety because it has no significant effect on any safety analyses assumptions, as indicated by the fact that the requirements do not meet the 10 CFR 50.36 criteria for retention. In addition, the relocated requirements are moved without change and any future changes to these requirements will be evaluated per 10 CFR 50.59.

NRC prior review and approval of changes to these relocated requirements, in accordance with 10 CFR 50.92, will no longer be required. This review and approval does not provide a specific margin of safety which can be evaluated. However, since the proposed change is consistent with the Westinghouse Standard Technical Specifications, NUREG-1431 issued by the NRC, revising the Technical Specifications to reflect the approved level of detail gives assurance that this relocation does not result in a significant reduction in the margin of safety.

10 CFR 50.92 EVALUATION
FOR
LESS RESTRICTIVE CHANGES - REMOVED DETAIL

The North Anna Power Station is converting to the Improved Technical Specifications (ITS) as outlined in NUREG-1431, "Standard Technical Specifications, Westinghouse Plants." Some of the proposed changes involve moving details out of the Technical Specifications and into the Technical Specifications Bases, the UFSAR, the TRM or other documents under regulatory control such as the Quality Assurance Program Topical Report. The removal of this information is considered to be less restrictive because it is no longer controlled by the Technical Specification change process. Typically, the information moved is descriptive in nature and its removal conforms with NUREG-1431 for format and content.

In accordance with the criteria set forth in 10 CFR 50.92, the Company has evaluated these proposed Technical Specification changes and determined they do not represent a significant hazards consideration. The following is provided in support of this conclusion.

1. **Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?**

   The proposed change relocates certain details from the Technical Specifications to other documents under regulatory control. The Bases, UFSAR, and Technical Requirement Manual will be maintained in accordance with 10 CFR 50.59. In addition to 10 CFR 50.59 provisions, the Technical Specification Bases are subject to the change control provisions in the Administrative Controls Chapter of the Technical Specifications. The UFSAR is subject to the change control provisions of 10 CFR 50.71(e). Other documents are subject to controls imposed by Technical Specifications or regulations. Since any changes to these documents will be evaluated, no significant increase in the probability or consequences of an accident previously evaluated will be allowed. Therefore this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?**

   The proposed change does not involve a physical alteration of the plant (no new or different type of equipment will be installed) or a change in the methods governing normal plant operations. The proposed change will not impose or eliminate any requirements, and adequate control of the information will be maintained. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. **Does this change involve a significant reduction in a margin of safety?**

   The proposed change will not reduce a margin of safety because it has no effect on any safety analysis assumptions. In addition, the details to be moved from the Technical Specifications to other documents are not being changed. Since any future changes to these details will be evaluated under the applicable regulatory change control mechanism,

no significant reduction in a margin of safety will be allowed. A significant reduction in the margin of safety is not associated with the elimination of the 10 CFR 50.92 requirement for NRC review and approval of future changes to the relocated details. The proposed change is consistent with the Westinghouse Standard Technical Specifications, NUREG-1431, issued by the NRC Staff, revising the Technical Specifications to reflect the approved level of detail, which indicates that there is no significant reduction in the margin of safety.

10 CFR 50.92 EVALUATION
FOR
LESS RESTRICTIVE CHANGES – CATEGORY 1
RELAXATION OF LCO REQUIREMENTS

The North Anna Power Station is converting to the Improved Technical Specifications (ITS) as outlined in NUREG-1431, "Standard Technical Specifications, Westinghouse Plants." Some of the proposed changes involve relaxation of the current Technical Specification (CTS) Limiting Conditions for Operation (LCOs) by the elimination of specific items from the LCO or Tables referenced in the LCO, or the addition of exceptions to the LCO.

These changes reflect the ISTS approach to provide LCO requirements that specify the protective conditions that are required to meet safety analysis assumptions for required features. These conditions replace the lists of specific devices used in the CTS to describe the requirements needed to meet the safety analysis assumptions. The ITS also includes LCO Notes which allow exceptions to the LCO for the performance of testing or other operational needs. The ITS provides the protection required by the safety analysis and provides flexibility for meeting the conditions without adversely affecting operations since equivalent features are required to be OPERABLE. The ITS is also consistent with the plant current licensing basis, as may be modified in the discussion of individual changes. These changes are generally made to conform with NUREG-1431 and have been evaluated to not be detrimental to plant safety.

In accordance with the criteria set forth in 10 CFR 50.92, the Company has evaluated these proposed Technical Specification changes and determined they do not represent a significant hazards consideration. The following is provided in support of this conclusion.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

The proposed change provides less restrictive LCO requirements for operation of the facility. These less restrictive LCO requirements do not result in operation that will increase the probability of initiating an analyzed event and do not alter assumptions relative to mitigation of an accident or transient event in that the requirements continue to ensure process variables, structures, systems, and components are maintained consistent with the current safety analyses and licensing basis. Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

The proposed change does not involve a physical alteration of the plant (no new or different type of equipment will be installed) or a change in the methods governing normal plant operation. The proposed change does impose different requirements. However, the change is consistent with the assumptions in the current safety analyses and licensing basis. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

The imposition of less restrictive LCO requirements does not involve a significant reduction in the margin of safety. As provided in the discussion of change, this change has been evaluated to ensure that the current safety analyses and licensing basis requirements are maintained. Therefore, this change does not involve a significant reduction in a margin of safety.

10 CFR 50.92 EVALUATION
FOR
LESS RESTRICTIVE CHANGES – CATEGORY 2
RELAXATION OF APPLICABILITY

The North Anna Nuclear Power Station is converting to the Improved Technical Specifications (ITS) as outlined in NUREG-1431, "Standard Technical Specifications, Westinghouse Plants." Some of the proposed changes involve relaxation of the applicability of current Technical Specification (CTS) Limiting Conditions for Operation (LCOs) by reducing the conditions under which the LCO requirements must be met.

Reactor operating conditions are used in CTS to define when the LCO features are required to be OPERABLE. CTS Applicabilities can be specific defined terms of reactor conditions or more general such as, "all MODES" or "any operating MODE." Generalized applicability conditions are not contained in ITS, therefore the ITS eliminates CTS requirements such as "all MODES" or "any operating MODE," replacing them with ITS defined MODES or applicable conditions that are consistent with the application of the plant safety analysis assumptions for operability of the required features.

CTS requirements may also be eliminated during conditions for which the safety function of the specified safety system is met because the feature is performing its intended safety function. Deleting applicability requirements that are indeterminate or which are inconsistent with application of accident analyses assumptions is acceptable because when LCOs cannot be met, the TS may be satisfied by exiting the applicability which takes the plant out of the conditions that require the safety system to be OPERABLE.

This change provides the protection required by the safety analysis and provides flexibility for meeting limits by restricting the application of the limits to the conditions assumed in the safety analyses. The ITS is also consistent with the plant current licensing basis, as may be modified in the discussion of individual changes. The change is generally made to conform with NUREG-1431 and has been evaluated to not be detrimental to plant safety.

In accordance with the criteria set forth in 10 CFR 50.92, the Company has evaluated these proposed Technical Specification changes and determined they do not represent a significant hazards consideration. The following is provided in support of this conclusion.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

The proposed change relaxes the conditions under which the LCO requirements for operation of the facility must be met. These less restrictive applicability requirements for the LCOs do not result in operation that will increase the probability of initiating an analyzed event and do not alter assumptions relative to mitigation of an accident or transient event in that the requirements continue to ensure that process variables, structures, systems, and components are maintained in the MODES and other specified conditions assumed in the safety analyses and licensing basis. Therefore, this change

does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?**

   The proposed change does not involve a physical alteration of the plant (no new or different type of equipment will be installed) or a change in the methods governing normal plant operation. The proposed change does impose different requirements. However, the requirements are consistent with the assumptions in the safety analyses and licensing basis. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. **Does this change involve a significant reduction in a margin of safety?**

   The relaxed applicability of LCO requirements does not involve a significant reduction in the margin of safety. As provided in the discussion of change, this change has been evaluated to ensure that the LCO requirements are applied in the MODES and specified conditions assumed in the safety analyses and licensing basis. Therefore, this change does not involve a significant reduction in a margin of safety.

10 CFR 50.92 EVALUATION
FOR
LESS RESTRICTIVE CHANGES – CATEGORY 3
RELAXATION OF COMPLETION TIME

The North Anna Power Station is converting to the Improved Technical Specifications (ITS) as outlined in NUREG-1431, "Standard Technical Specifications, Westinghouse Plants." Some of the proposed changes involve relaxation of the Completion Times for Required Actions in the current Technical Specifications (CTS).

Upon discovery of a failure to meet an LCO, the ITS specifies times for completing Required Actions of the associated TS Conditions. Required Actions of the associated Conditions are used to establish remedial measures that must be taken within specified Completion Times (referred to as Allowed Outage Times (AOTs) in the CTS). These times define limits during which operation in a degraded condition is permitted. Adopting Completion Times from the ITS is acceptable because the Completion Times take into account the operability status of the redundant systems of required features, the capacity and capability of remaining features, a reasonable time for repairs or replacement of required features, and the low probability of a DBA occurring during the repair period. In addition, the ITS provides consistent Completion Times for similar conditions. These changes are generally made to conform with NUREG-1431 and have been evaluated to not be detrimental to plant safety.

In accordance with the criteria set forth in 10 CFR 50.92, the Company has evaluated these proposed Technical Specification changes and determined they do not represent a significant hazards consideration. The following is provided in support of this conclusion.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

The proposed change relaxes the Completion Time for a Required Action. Required Actions and their associated Completion Times are not initiating conditions for any accident previously evaluated and the accident analyses do not assume that required equipment is out of service prior to the analyzed event. Consequently, the relaxed Completion Time does not significantly increase the probability of any accident previously evaluated. The consequences of an analyzed accident during the relaxed Completion Time are the same as the consequences during the existing AOT. As a result, the consequences of any accident previously evaluated are not significantly increased. Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

The proposed change does not involve a physical alteration of the plant (no new or different type of equipment will be installed) or a change in the method governing normal plant operation. The Required Actions and associated Completion Times in the ITS have been evaluated to ensure that no new accident initiators are introduced. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

The relaxed Completion Time for a Required Action does not involve a significant reduction in the margin of safety. As provided in the discussion of change, the change has been evaluated to ensure that the allowed Completion Time is consistent with safe operation under the specified Condition, considering the operability status of the redundant systems of required features, the capacity and capability of remaining features, a reasonable time for repairs or replacement of required features, and the low probability of a DBA occurring during the repair period. Therefore, this change does not involve a significant reduction in a margin of safety.

10 CFR 50.92 EVALUATION
FOR
LESS RESTRICTIVE CHANGES – CATEGORY 4
RELAXATION OF REQUIRED ACTION

The North Anna Power Station is converting to the Improved Technical Specifications (ITS) as outlined in NUREG-1431, "Standard Technical Specifications, Westinghouse Plants." Some of the proposed changes involve relaxation of the Required Actions in the current Technical Specifications (CTS).

Upon discovery of a failure to meet an LCO, the ITS specifies Required Actions to complete for the associated Conditions. Required Actions of the associated Conditions are used to establish remedial measures that must be taken in response to the degraded conditions. These actions minimize the risk associated with continued operation while providing time to repair inoperable features. Some of the Required Actions are modified to place the plant in a MODE in which the LCO does not apply. Adopting Required Actions from the ISTS is acceptable because the Required Actions take into account the operability status of redundant systems of required features, the capacity and capability of the remaining features, and the compensatory attributes of the Required Actions as compared to the LCO requirements. These changes are generally made to conform with NUREG-1431 and have been evaluated to not be detrimental to plant safety.

In accordance with the criteria set forth in 10 CFR 50.92, the Company has evaluated these proposed Technical Specification changes and determined they do not represent a significant hazards consideration. The following is provided in support of this conclusion.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

The proposed change relaxes Required Actions. Required Actions and their associated Completion Times are not initiating conditions for any accident previously evaluated and the accident analyses do not assume that required equipment is out of service prior to the analyzed event. Consequently, the relaxed Required Actions do not significantly increase the probability of any accident previously evaluated. The Required Actions in the ITS have been developed to provide appropriate remedial actions to be taken in response to the degraded condition considering the operability status of the redundant systems of required features, and the capacity and capability of remaining features while minimizing the risk associated with continued operation. As a result, the consequences of any accident previously evaluated are not significantly increased. Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

The proposed change does not involve a physical alteration of the plant (no new or different type of equipment will be installed) or a change in the methods governing normal plant operation. The Required Actions and associated Completion Times in the ITS have been evaluated to ensure that no new accident initiators are introduced. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

The relaxed Required Actions do not involve a significant reduction in the margin of safety. As provided in the discussion of change, this change has been evaluated to minimize the risk of continued operation under the specified Condition, considering the operability status of the redundant systems of required features, the capacity and capability of remaining features, a reasonable time for repairs or replacement of required features, and the low probability of a DBA occurring during the repair period. Therefore, this change does not involve a significant reduction in a margin of safety.

10 CFR 50.92 EVALUATION
FOR
LESS RESTRICTIVE CHANGES – CATEGORY 5
DELETION OF SURVEILLANCE REQUIREMENT

The North Anna Power Station is converting to the Improved Technical Specifications (ITS) as outlined in NUREG-1431, "Standard Technical Specifications, Westinghouse Plants." Some of the proposed changes involve deletion of Surveillance Requirements in the current Technical Specifications (CTS).

The CTS require safety systems to be tested and verified Operable prior to entering applicable operating conditions. The ITS eliminates unnecessary CTS Surveillance Requirements that do not contribute to verification that the equipment used to meet the LCO can perform its required functions. Thus, appropriate equipment continues to be tested in a manner and at a frequency necessary to give confidence that the equipment can perform its assumed safety function. These changes are generally made to conform with NUREG-1431 and have been evaluated to not be detrimental to plant safety.

In accordance with the criteria set forth in 10 CFR 50.92, the Company has evaluated these proposed Technical Specification changes and determined they do not represent a significant hazards consideration. The following is provided in support of this conclusion.

1. **Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?**

   The proposed change deletes Surveillance Requirements. Surveillances are not initiators to any accident previously evaluated. Consequently, the probability of an accident previously evaluated is not significantly increased. The equipment being tested is still required to be Operable and capable of performing the accident mitigation functions assumed in the accident analysis. As a result, the consequences of any accident previously evaluated are not significantly affected. Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?**

   The proposed change does not involve a physical alteration of the plant (no new or different type of equipment will be installed) or a change in the methods governing normal plant operation. The remaining Surveillance Requirements are consistent with industry practice and are considered to be sufficient to prevent the removal of the subject Surveillances from creating a new or different type of accident. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

The deleted Surveillance Requirements do not result in a significant reduction in the margin of safety. As provided in the discussion of change, the change has been evaluated to ensure that the deleted Surveillance Requirements are not necessary for verification that the equipment used to meet the LCO can perform its required functions. Thus, appropriate equipment continues to be tested in a manner and at a frequency necessary to give confidence that the equipment can perform its assumed safety function. Therefore, this change does not involve a significant reduction in a margin of safety.

10 CFR 50.92 EVALUATION
FOR
LESS RESTRICTIVE CHANGES – CATEGORY 6
RELAXATION OF SURVEILLANCE REQUIREMENT ACCEPTANCE CRITERIA

The North Anna Power Station is converting to the Improved Technical Specifications (ITS) as outlined in NUREG-1431, "Standard Technical Specifications, Westinghouse Plants." Some of the proposed changes involve the relaxation of Surveillance Requirements acceptance criteria in the current Technical Specifications (CTS).

The CTS require safety systems to be tested and verified Operable prior to entering applicable operating conditions. The ITS eliminates or relaxes the Surveillance Requirement acceptance criteria that do not contribute to verification that the equipment used to meet the LCO can perform its required functions. For example, the ITS allows some Surveillance Requirements to verify Operability under actual or test conditions. Adopting the ITS allowance for "actual" conditions is acceptable because required features cannot distinguish between an "actual" signal or a "test" signal. Also included are changes to CTS requirements that are replaced in the ITS with separate and distinct testing requirements which, when combined, include Operability verification of all TS required components for the features specified in the CTS. Adopting this format preference in the ISTS is acceptable because Surveillance Requirements that remain include testing of all previous features required to be verified OPERABLE. Changes which provide exceptions to Surveillance Requirements to provide for variations which do not affect the results of the test are also included in this category. These changes are generally made to conform with NUREG-1431 and have been evaluated to not be detrimental to plant safety.

In accordance with the criteria set forth in 10 CFR 50.92, the Company has evaluated these proposed Technical Specification changes and determined they do not represent a significant hazards consideration. The following is provided in support of this conclusion.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

The proposed change relaxes the acceptance criteria of Surveillance Requirements. Surveillances are not initiators to any accident previously evaluated. Consequently, the probability of an accident previously evaluated is not significantly increased. The equipment being tested is still required to be Operable and capable of performing the accident mitigation functions assumed in the accident analysis. As a result, the consequences of any accident previously evaluated are not significantly affected. Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

The proposed change does not involve a physical alteration of the plant (no new or different type of equipment will be installed) or a change in the methods governing normal plant operation. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

The relaxed acceptance criteria for Surveillance Requirements do not result in a significant reduction in the margin of safety. As provided in the discussion of change, the relaxed Surveillance Requirement acceptance criteria have been evaluated to ensure that they are sufficient to verify that the equipment used to meet the LCO can perform its required functions. Thus, appropriate equipment continues to be tested in a manner that gives confidence that the equipment can perform its assumed safety function. Therefore, this change does not involve a significant reduction in a margin of safety.

10 CFR 50.92 EVALUATION
FOR
LESS RESTRICTIVE CHANGES – CATEGORY 7
RELAXATION OF SURVEILLANCE FREQUENCY

The North Anna Power Station is converting to the Improved Technical Specifications (ITS) as outlined in NUREG-1431, "Standard Technical Specifications, Westinghouse Plants." Some of the proposed changes involve the relaxation of Surveillance Frequencies in the current Technical Specifications (CTS).

CTS and ITS Surveillance Frequencies specify time interval requirements for performing surveillance testing. Increasing the time interval between Surveillance tests in the ITS results in decreased equipment unavailability due to testing which also increases equipment availability. In general, the ITS contain test frequencies that are consistent with industry practice or industry standards for achieving acceptable levels of equipment reliability. Adopting testing practices specified in the ITS is acceptable based on similar design, like-component testing for the system application and the availability of other Technical Specification requirements which provide regular checks to ensure limits are met. Relaxation of Surveillance Frequency can also include the addition of Surveillance Notes which allow testing to be delayed until appropriate unit conditions for the test are established, or exempt testing in certain MODES or specified conditions in which the testing can not be performed.

Reduced testing can result in a safety enhancement because the unavailability due to testing is reduced and; in turn, reliability of the affected structure, system or component should remain constant or increase. Reduced testing is acceptable where operating experience, industry practice or the industry standards such as manufacturers' recommendations have shown that these components usually pass the Surveillance when performed at the specified interval, thus the frequency is acceptable from a reliability standpoint. Surveillance Frequency changes to incorporate alternate train testing have been shown to be acceptable where other qualitative or quantitative test requirements are required which are established predictors of system performance. Surveillance Frequency extensions can be based on NRC-approved topical reports. The NRC staff has accepted topical report analyses that bound the plant-specific design and component reliability assumptions. These changes are generally made to conform with NUREG-1431 and have been evaluated to not be detrimental to plant safety.

In accordance with the criteria set forth in 10 CFR 50.92, the Company has evaluated these proposed Technical Specification changes and determined they do not represent a significant hazards consideration. The following is provided in support of this conclusion.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

The proposed change relaxes Surveillance Frequencies. The relaxed Surveillance Frequencies have been established based on achieving acceptable levels of equipment reliability. Consequently, equipment which could initiate an accident previously evaluated will continue to operate as expected and the probability of the initiation of any accident previously evaluated will not be significantly increased. The equipment being

tested is still required to be Operable and capable of performing any accident mitigation functions assumed in the accident analysis. As a result, the consequences of any accident previously evaluated are not significantly affected. Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

The proposed change does not involve a physical alteration of the plant (no new or different type of equipment will be installed) or a change in the methods governing normal plant operation. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

The relaxed Surveillance Frequencies do not result in a significant reduction in the margin of safety. As provided in the discussion of change, the relaxation in the Surveillance Frequency has been evaluated to ensure that it provides an acceptable level of equipment reliability. Thus, appropriate equipment continues to be tested at a Frequency that gives confidence that the equipment can perform its assumed safety function when required. Therefore, this change does not involve a significant reduction in a margin of safety.

10 CFR 50.92 EVALUATION
FOR
LESS RESTRICTIVE CHANGES – CATEGORY 8
DELETION OF REPORTING REQUIREMENTS

The North Anna Power Station is converting to the Improved Technical Specifications (ITS) as outlined in NUREG-1431, "Standard Technical Specifications, Westinghouse Plants." Some of the proposed changes involve the deletion of requirements in the current Technical Specifications (CTS) to send reports to the NRC.

The CTS includes requirements to submit reports to the NRC under certain circumstances. However, the ITS eliminates these requirements for many such reports and, in many cases, relies on the reporting requirements of 10 CFR 50.73 or other regulatory requirements. The ITS changes to reporting requirements are acceptable because the regulations provide adequate reporting requirements, or the reports do not affect continued plant operation. Therefore, this change has no effect on the safe operation of the plant. These changes are generally made to conform with NUREG-1431 and have been evaluated to not be detrimental to plant safety.

In accordance with the criteria set forth in 10 CFR 50.92, the Company has evaluated these proposed Technical Specification changes and determined they do not represent a significant hazards consideration. The following is provided in support of this conclusion.

1. **Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?**

   The proposed change deletes reporting requirements. Sending reports to the NRC is not an initiator to any accident previously evaluated. Consequently, the probability of any accident previously evaluated is not significantly increased. Sending reports to the NRC has no effect on the ability of equipment to mitigate an accident previously evaluated. As a result, the consequences of any accident previously evaluated is not significantly affected. Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?**

   The proposed change does not involve a physical alteration of the plant (no new or different type of equipment will be installed) or a change in the methods governing normal plant operation. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

The deletion of reporting requirements does not result in a significant reduction in the margin of safety. The ITS eliminates the requirements for many such reports and, in many cases, relies on the reporting requirements of 10 CFR 50.73 or other regulatory requirements. The change to reporting requirements does not affect the margin of safety because the regulations provide adequate reporting requirements, or the reports do not affect continued plant operation. Therefore, this change does not involve a significant reduction in a margin of safety.

This proposed Technical Specification change has been evaluated against the criteria for and identification of licensing and regulatory actions requiring environmental assessment in accordance with 10 CFR 51.21. It has been determined that the proposed change meets the criteria for categorical exclusion as provided for under 10 CFR 51.22(c)(9). The following is a discussion of how the proposed Technical Specification change meets the criteria for categorical exclusion.

10 CFR 51.22(c)(9): Although the proposed change involves changes to requirements with respect to inspection or surveillance requirements,

(i) proposed change involves No Significant Hazards Considerations (refer to the Determination of No Significant Hazards Considerations section of this Technical Specification Change Request);

(ii) there is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite since the proposed changes do not affect the generation of any radioactive effluents nor do they affect any of the permitted release paths; and

(iii) there is no significant increase in individual or cumulative occupational radiation exposure.

Accordingly, the proposed change meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Based on the aforementioned and pursuant to 10 CFR 51.22 (b), no environmental assessment or environmental affect statement need be prepared in connection with issuance of an amendment to the Technical Specifications incorporating the proposed change of this request.

SECTION 3.1 - REACTIVITY CONTROL SYSTEMS

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS

SPECIFIC NSHCs

There are no specific NSHC discussions for this Section.