NORTH ANNA POWER STATION

Section 3.5
Emergency Core Cooling Systems
(ECCS)

VOLUME 13
Improved Technical Specifications

Dominion

NORTH ANNA POWER STATION

IMPROVED TECHNICAL SPECIFICATION CONVERSION

SECTION 3.5 - EMERGENCY CORE COOLING SYSTEMS (ECCS)

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IMPROVED TECHNICAL SPECIFICATIONS

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.1 Accumulators

LCO 3.5.1 Three ECCS accumulators shall be OPERABLE.

APPLICABILITY: MODES 1 and 2,
MODE 3 with RCS pressure > 1000 psig.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One accumulator inoperable due to boron concentration not within limits.	A.1 Restore boron concentration to within limits.	72 hours
B. One accumulator inoperable for reasons other than Condition A.	B.1 Restore accumulator to OPERABLE status.	1 hour
C. Required Action and associated Completion Time of Condition A or B not met.	C.1 Be in MODE 3. AND C.2 Reduce RCS pressure to ≤ 1000 psig.	6 hours 12 hours
D. Two or more accumulators inoperable.	D.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.1.1	Verify each accumulator isolation valve is fully open.	12 hours
SR 3.5.1.2	Verify borated water volume in each accumulator is ≥ 7580 gallons and ≤ 7756 gallons.	12 hours
SR 3.5.1.3	Verify nitrogen cover pressure in each accumulator is ≥ 599 psig and ≤ 667 psig.	12 hours
SR 3.5.1.4	Verify boron concentration in each accumulator is ≥ 2200 ppm and ≤ 2400 ppm.	31 days <u>AND</u> -----NOTE------ Only required to be performed for affected accumulators --------------- Once within 6 hours after each solution volume increase of ≥ 50% of indicated level that is not the result of addition from the refueling water storage tank
SR 3.5.1.5	Verify power is removed from each accumulator isolation valve operator when RCS pressure is ≥ 2000 psig.	31 days

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.2 ECCS—Operating

LCO 3.5.2 Two ECCS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more trains inoperable.	A.1 Restore train(s) to OPERABLE status.	72 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	6 hours 12 hours
C. Less than 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available.	C.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify the following valves are in the listed position with power to the valve operator removed. Unit 1 Number / Position / Function 1-SI-MOV-1890A / Closed / LHSI to Hot Leg 1-SI-MOV-1890B / Closed / LHSI to Hot Leg 1-SI-MOV-1836 / Closed / HHSI Pump to Cold Leg 1-SI-MOV-1869A / Closed / HHSI Pump to Hot Leg 1-SI-MOV-1869B / Closed / HHSI Pump to Hot Leg Unit 2 Number / Position / Function 2-SI-MOV-2890A / Closed / LHSI to Hot Leg 2-SI-MOV-2890B / Closed / LHSI to Hot Leg 2-SI-MOV-2836 / Closed / HHSI Pump to Cold Leg 2-SI-MOV-2869A / Closed / HHSI Pump to Hot Leg 2-SI-MOV-2869B / Closed / HHSI Pump to Hot Leg	12 hours
SR 3.5.2.2	Verify each ECCS manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
SR 3.5.2.3	Verify ECCS piping is sufficiently full of water.	92 days
SR 3.5.2.4	Verify each ECCS pump's developed head at the test flow point is greater than or equal to the required developed head.	In accordance with the Inservice Testing Program

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.5	Verify each ECCS automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	18 months
SR 3.5.2.6	Verify each ECCS pump capable of starting automatically starts automatically on an actual or simulated actuation signal.	18 months
SR 3.5.2.7	Verify each ECCS throttle valve listed below is secured in the correct position. Unit 1 Valve Number / Unit 2 Valve Number 1-SI-188 / 2-SI-89 1-SI-191 / 2-SI-97 1-SI-193 / 2-SI-103 1-SI-203 / 2-SI-116 1-SI-204 / 2-SI-111 1-SI-205 / 2-SI-123	18 months
SR 3.5.2.8	Verify, by visual inspection, each ECCS train containment sump suction inlet is not restricted by debris and the suction inlet trash racks and screens show no evidence of structural distress or abnormal corrosion.	18 months

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3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.3 ECCS—Shutdown

LCO 3.5.3 One ECCS train shall be OPERABLE.

APPLICABILITY: MODE 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS train inoperable.	A.1 Restore required ECCS train to OPERABLE status.	1 hour
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 5.	24 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.3.1	The following SRs are applicable for all equipment required to be OPERABLE: SR 3.5.2.1 SR 3.5.2.7 SR 3.5.2.3 SR 3.5.2.8 SR 3.5.2.4	In accordance with applicable SRs

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3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.4 Refueling Water Storage Tank (RWST)

LCO 3.5.4 The RWST shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. RWST boron concentration not within limits. <u>OR</u> RWST borated water temperature not within limits.	A.1 Restore RWST to OPERABLE status.	8 hours
B. RWST inoperable for reasons other than Condition A.	B.1 Restore RWST to OPERABLE status.	1 hour
C. Required Action and associated Completion Time not met.	C.1 Be in MODE 3. <u>AND</u> C.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.4.1	Verify RWST borated water temperature is ≥ 40°F and ≤ 50°F.	24 hours
SR 3.5.4.2	Verify RWST borated water volume is ≥ 466,200 gallons and ≤ 487,000 gallons.	7 days
SR 3.5.4.3	Verify RWST boron concentration is ≥ 2300 ppm and ≤ 2400 ppm.	7 days

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.5 Seal Injection Flow

LCO 3.5.5 Reactor coolant pump seal injection flow shall be ≤ 30 gpm with RCS pressure ≥ 2215 psig and ≤ 2255 psig and the seal injection hand control valve full open.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Seal injection flow not within limit.	A.1 Adjust manual seal injection throttle valves to give a flow within limit with RCS pressure ≥ 2215 psig and ≤ 2255 psig and the seal injection hand control valve full open.	4 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	6 hours
	<u>AND</u>	
	B.2 Be in MODE 4.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.5.1	-------------------NOTE-------------------- Not required to be performed until 4 hours after the Reactor Coolant System pressure stabilizes at ≥ 2215 psig and ≤ 2255 psig. --- Verify manual seal injection throttle valves are adjusted to give a flow within limit with RCS pressure ≥ 2215 psig and ≤ 2255 psig and the seal injection hand control valve full open.	31 days

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.6 Boron Injection Tank (BIT)

LCO 3.5.6 The BIT shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. BIT inoperable.	A.1 Restore BIT to OPERABLE status.	1 hour
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 3.	6 hours
	AND	
	B.2 Borate to an SDM within the limit provided in the COLR.	6 hours
	AND	
	B.3 Restore BIT to OPERABLE status.	7 days
C. Required Action and associated Completion Time of Condition B not met.	C.1 Be in MODE 4.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.6.1	Verify BIT borated water temperature is ≥ 115°F.	24 hours
SR 3.5.6.2	Verify BIT borated water volume is ≥ 900 gallons.	7 days
SR 3.5.6.3	Verify BIT boron concentration is ≥ 12,950 ppm and ≤ 15,750 ppm.	7 days

SECTION 3.5 - EMERGENCY CORE COOLING SYSTEMS (ECCS)

IMPROVED TECHNICAL SPECIFICATIONS BASES

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.1 Accumulators

BASES

BACKGROUND

The functions of the ECCS accumulators are to supply water to the reactor vessel during the blowdown phase of a loss of coolant accident (LOCA), to provide inventory to help accomplish the refill phase that follows thereafter, and to provide Reactor Coolant System (RCS) makeup for a small break LOCA.

The blowdown phase of a large break LOCA is the initial period of the transient during which the RCS departs from equilibrium conditions, and heat from fission product decay, hot internals, and the vessel continues to be transferred to the reactor coolant. The blowdown phase of the transient ends when the RCS pressure falls to a value approaching that of the containment atmosphere.

In the refill phase of a large break LOCA, which immediately follows the blowdown phase, reactor coolant inventory has vacated the core through steam flashing and ejection out through the break. The core is essentially in adiabatic heatup. The balance of accumulator inventory is then available to help fill voids in the lower plenum and reactor vessel downcomer so as to establish a recovery level at the bottom of the core and ongoing reflood of the core with the addition of safety injection (SI) water.

The accumulators are pressure vessels partially filled with borated water and pressurized with nitrogen gas. The accumulators are passive components, since no operator or control actions are required in order for them to perform their function. Internal accumulator tank pressure is sufficient to discharge the accumulator contents to the RCS, if RCS pressure decreases below the accumulator pressure.

Each accumulator is piped into an RCS cold leg via an accumulator line and is isolated from the RCS by a motor operated isolation valve and two check valves in series.

The accumulator size, water volume, and nitrogen cover pressure are selected so that two of the three accumulators are sufficient to partially cover the core before significant clad melting or zirconium water reaction can

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BASES

BACKGROUND (continued)	occur following a large break LOCA. The need to ensure that two accumulators are adequate for this function is consistent with the large break LOCA assumption that the entire contents of one accumulator will be lost via the RCS pipe break during the blowdown phase of the large break LOCA.

APPLICABLE SAFETY ANALYSES

The accumulators are assumed OPERABLE in both the large and small break LOCA analyses at full power (Ref. 1). These are the Design Basis Accidents (DBAs) that establish the acceptance limits for the accumulators. Reference to the analyses for these DBAs is used to assess changes in the accumulators as they relate to the acceptance limits.

In performing the LOCA calculations, conservative assumptions are made concerning the availability of ECCS flow. In the early stages of a large break LOCA, with or without a loss of offsite power, the accumulators provide the sole source of makeup water to the RCS. The assumption of loss of offsite power is required by regulations and conservatively imposes a delay wherein the ECCS pumps cannot deliver flow until the emergency diesel generators start, come to rated speed, and energize their respective buses. In cold leg large break scenarios, the entire contents of one accumulator are assumed to be lost through the break.

The limiting large break LOCA is a double ended guillotine break at the discharge of the reactor coolant pump. During this event, the accumulators discharge to the RCS as soon as RCS pressure decreases to below accumulator pressure.

As a conservative estimate, no credit is taken for ECCS pump flow until an effective delay has elapsed. This delay accounts for the diesels starting and the pumps being loaded and delivering full flow. The delay time is conservatively set with an additional 2 seconds to account for SI signal generation. During this time, the accumulators are analyzed as providing the sole source of emergency core cooling. No operator action is assumed during the blowdown stage of a large break LOCA.

The worst case small break LOCA analyses also assume a time delay before pumped flow reaches the core. For the larger range of small breaks, the rate of blowdown is such that the increase in fuel clad temperature is terminated solely by the accumulators, with pumped flow then providing continued cooling. As break size decreases, the accumulators and High

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BASES

APPLICABLE SAFETY ANALYSES (continued)

Head Safety Injection (HHSI) pumps both play a part in terminating the rise in clad temperature. As break size continues to decrease, the role of the accumulators continues to decrease until they are not required and the HHSI pumps become solely responsible for terminating the temperature increase.

This LCO helps to ensure that the following acceptance criteria established for the ECCS by 10 CFR 50.46 (Ref. 2) will be met following a LOCA:

a. Maximum fuel element cladding temperature is ≤ 2200°F;

b. Maximum cladding oxidation is ≤ 0.17 times the total cladding thickness before oxidation;

c. Maximum hydrogen generation from a zirconium water reaction is ≤ 0.01 times the hypothetical amount that would be generated if all of the metal in the cladding cylinders surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react; and

d. Core is maintained in a coolable geometry.

Since the accumulators discharge during the blowdown phase of a LBLOCA, they do not contribute to the long term cooling requirements of 10 CFR 50.46.

For both the large and small break LOCA analyses, a nominal contained accumulator water volume is used. For small breaks, the accumulator water volume only affects the mass flow rate of water into the RCS since the tanks do not empty for most break sizes analyzed. The assumed water volume has an insignificant effect upon the peak clad temperature. For large breaks, an increase in water volume can be either a peak clad temperature penalty or benefit, depending on downcomer filling and subsequent spill through the break during the core reflooding portion of the transient. The safety analysis supports operation with a contained water volume of between 7580 gallons and 7756 gallons per accumulator.

The minimum boron concentration setpoint is used in the post LOCA boron concentration calculation. The calculation is performed to assure reactor subcriticality in a post LOCA

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BASES

APPLICABLE SAFETY ANALYSES (continued)

environment. Of particular interest is the large break LOCA, since no credit is taken for control rod assembly insertion.

A reduction in the accumulator minimum boron concentration would produce a subsequent reduction in the available containment sump concentration for post LOCA shutdown and an increase in the maximum sump pH. The maximum boron concentration is used in determining the cold leg to hot leg recirculation injection switchover time and minimum sump pH.

The large and small break LOCA peak clad temperature analyses are performed at the minimum nitrogen cover pressure, since sensitivity analyses have demonstrated that higher nitrogen cover pressure results in a computed peak clad temperature benefit. The maximum nitrogen cover pressure limit prevents accumulator relief valve actuation, and ultimately preserves accumulator integrity.

The effects on containment mass and energy releases from the accumulators are accounted for in the appropriate analyses (Ref. 1). The large break LOCA containment analyses assume that the accumulator nitrogen is discharged into the containment, which affects transient subatmospheric pressure.

The accumulators satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The LCO establishes the minimum conditions required to ensure that the accumulators are available to accomplish their core cooling safety function following a LOCA. Three accumulators are required to ensure that 100% of the contents of two of the accumulators will reach the core during a large break LOCA. This is consistent with the assumption that the contents of one accumulator spill through the break. If less than two accumulators are injected during the blowdown phase of a large break LOCA, the ECCS acceptance criteria of 10 CFR 50.46 (Ref. 2) could be violated.

For an accumulator to be considered OPERABLE, the isolation valve must be fully open, power removed above 2000 psig, and the limits established in the SRs for contained volume, boron concentration, and nitrogen cover pressure must be met.

BASES

APPLICABILITY

In MODES 1 and 2, and in MODE 3 with RCS pressure > 1000 psig, the accumulator OPERABILITY requirements are based on full power operation. Although cooling requirements decrease as power decreases, the accumulators are still required to provide core cooling as long as elevated RCS pressures and temperatures exist.

This LCO is only applicable at pressures > 1000 psig. At pressures ≤ 1000 psig, the rate of RCS blowdown is such that the ECCS pumps can provide adequate injection to ensure that peak clad temperature remains below the 10 CFR 50.46 (Ref. 2) limit of 2200°F.

In MODE 3, with RCS pressure ≤ 1000 psig, and in MODES 4, 5, and 6, the accumulator motor operated isolation valves are closed to isolate the accumulators from the RCS. This allows RCS cooldown and depressurization without discharging the accumulators into the RCS or requiring depressurization of the accumulators.

ACTIONS

A.1

If the boron concentration of one accumulator is not within limits, it must be returned to within the limits within 72 hours. In this Condition, ability to maintain subcriticality or minimum boron precipitation time may be reduced. The boron in the accumulators contributes to the assumption that the combined ECCS water in the partially recovered core during the early reflooding phase of a large break LOCA is sufficient to keep that portion of the core subcritical. One accumulator below the minimum boron concentration limit, however, will have no effect on available ECCS water and an insignificant effect on core subcriticality during reflood. Boiling of ECCS water in the core during reflood concentrates boron in the saturated liquid that remains in the core. In addition, the accumulators do not discharge following a large main steam line break. Thus, 72 hours is allowed to return the boron concentration to within limits.

B.1

If one accumulator is inoperable for a reason other than boron concentration, the accumulator must be returned to OPERABLE status within 1 hour. In this Condition, the required contents of two accumulators cannot be assumed to

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BASES

ACTIONS

B.1 (continued)

reach the core during a large break LOCA. Due to the severity of the consequences should a large break LOCA occur in these conditions, the 1 hour Completion Time to open the valve, remove power to the valve, or restore the proper water volume or nitrogen cover pressure ensures that prompt action will be taken to return the inoperable accumulator to OPERABLE status. The Completion Time minimizes the time the unit is exposed to a LOCA under these conditions.

C.1 and C.2

If the accumulator cannot be returned to OPERABLE status within the associated Completion Time, 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 MODE 3 within 6 hours and RCS pressure reduced to ≤ 1000 psig within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

D.1

If more than one accumulator is inoperable, the unit is in a condition outside the accident analyses; therefore, LCO 3.0.3 must be entered immediately.

SURVEILLANCE REQUIREMENTS

SR 3.5.1.1

Each accumulator isolation valve should be verified to be fully open every 12 hours. This verification ensures that the accumulators are available for injection and ensures timely discovery if a valve should be less than fully open. If an isolation valve is not fully open, the rate of injection to the RCS would be reduced. Although a motor operated valve position should not change with power removed, a closed valve could result in not meeting accident analyses assumptions. This Frequency is considered reasonable in view of other administrative controls that ensure a mispositioned isolation valve is unlikely.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.1.2 and SR 3.5.1.3

Every 12 hours, borated water volume and nitrogen cover pressure are verified for each accumulator. This Frequency is sufficient to ensure adequate injection during a LOCA. Because of the static design of the accumulator, a 12 hour Frequency usually allows the operator to identify changes before limits are reached. Operating experience has shown this Frequency to be appropriate for early detection and correction of off normal trends.

SR 3.5.1.4

The boron concentration should be verified to be within required limits for each accumulator every 31 days since the static design of the accumulators limits the ways in which the concentration can be changed. The 31 day Frequency is adequate to identify changes that could occur from mechanisms such as stratification or inleakage. Sampling the affected accumulator within 6 hours after a 50% increase of indicated level will identify whether inleakage has caused a reduction in boron concentration to below the required limit. It is not necessary to verify boron concentration if the added water inventory is from the refueling water storage tank (RWST), because the water contained in the RWST is within the accumulator boron concentration requirements. This is consistent with the recommendation of NUREG-1366 (Ref. 3).

Although the run of piping between the two accumulator discharge check valves is credited in demonstrating compliance with Technical Specification 3.5.1 minimum accumulator volume requirement, the minimum boron concentration requirement does not apply to this run of piping. Applicable accident analyses have explicitly considered in-leakage from the RCS, and the resulting reduction in boron concentration in this run of piping, which is not sampled.

SR 3.5.1.5

Verification every 31 days that power is removed from each accumulator isolation valve operator when the RCS pressure is ≥ 2000 psig ensures that an active failure could not result in the closure of an accumulator motor operated isolation valve. If this were to occur, only one accumulator would be available for injection given a single failure

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.1.5 (continued)

coincident with a LOCA. Since power is removed under administrative control, the 31 day Frequency will provide adequate assurance that power is removed.

This SR allows power to be supplied to the motor operated isolation valves when RCS pressure is < 2000 psig, thus allowing operational flexibility by avoiding unnecessary delays to manipulate the breakers during unit startups or shutdowns.

REFERENCES

1. UFSAR, Chapter 6 and Chapter 15.

2. 10 CFR 50.46.

3. NUREG-1366, February 1990.

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.2 ECCS—Operating

BASES

BACKGROUND

The function of the ECCS is to provide core cooling and negative reactivity to ensure that the reactor core is protected after any of the following accidents:

a. Loss of coolant accident (LOCA), coolant leakage greater than the capability of the normal charging system;

b. Rupture of a control rod drive mechanism-control rod assembly ejection accident;

c. Loss of secondary coolant accident, including uncontrolled steam release or loss of feedwater; and

d. Steam generator tube rupture (SGTR).

The addition of negative reactivity is designed primarily for the MSLB where primary cooldown could add enough positive reactivity to achieve criticality and return to significant power.

There are three phases of ECCS operation: injection, cold leg recirculation, and hot leg recirculation. In the injection phase, water is taken from the refueling water storage tank (RWST) and injected into the Reactor Coolant System (RCS) through the cold legs. When sufficient water is removed from the RWST to ensure that enough boron has been added to maintain the reactor subcritical and the containment sumps have enough water to supply the required net positive suction head to the ECCS pumps, suction is switched to the containment sump for cold leg recirculation. After approximately 10 hours, the ECCS flow is shifted to the hot leg recirculation phase to provide a backflush, which would reduce the boiling in the top of the core and any resulting boron precipitation.

The ECCS consists of two separate subsystems: High Head Safety Injection (HHSI) and Low Head Safety Injection (LHSI). Each subsystem consists of two redundant, 100% capacity trains. The ECCS accumulators and the RWST are also part of the ECCS, but are not considered part of an ECCS flow path as described by this LCO.

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BASES

BACKGROUND (continued)

The ECCS flow paths consist of piping, valves, and pumps such that water from the RWST can be injected into the RCS following the accidents described in this LCO. The major components of each subsystem are the HHSI pumps and the LHSI pumps. Each of the two subsystems consists of two 100% capacity trains that are interconnected and redundant such that either train is capable of supplying 100% of the flow required to mitigate the accident consequences. This interconnecting and redundant subsystem design provides the operators with the ability to utilize components from opposite trains to achieve the required 100% flow to the core.

During the injection phase of LOCA recovery, a suction header supplies water from the RWST to the ECCS pumps. Water from the supply header enters the LHSI pumps through parallel, normally open, motor operated valves. Water to the HHSI pumps is supplied via parallel motor operated valves to ensure that at least one valve opens on receipt of a safety injection actuation signal. The supply header then branches to the three HHSI pumps through normally open, motor operated valves. The discharge from the HHSI pumps combines prior to entering the boron injection tank (BIT) and then divides again into three supply lines, each of which feeds the injection line to one RCS cold leg. The discharge from the LHSI pumps combine and then divide into three supply lines, each of which feeds the injection line to one RCS cold leg. Control valves in the HHSI lines are set to balance the flow to the RCS. This balance ensures sufficient flow to the core to meet the analysis assumptions following a LOCA in one of the RCS cold legs and preclude pump runout.

For LOCAs that are too small to depressurize the RCS below the shutoff head of the LHSI pumps, the HHSI pumps supply water until the RCS pressure decreases below the LHSI pump shutoff head. During this period, the steam generators are used to provide part of the core cooling function.

During the recirculation phase of LOCA recovery, LHSI pump suction is transferred to the containment sump. The LHSI pumps then supply the HHSI pumps. Initially, recirculation is through the same paths as the injection phase. Subsequently, recirculation alternates injection between the hot and cold legs.

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BASES

BACKGROUND (continued)

The HHSI subsystem of the ECCS also functions to supply borated water to the reactor core following increased heat removal events, such as an MSLB. The limiting design conditions occur when the negative moderator temperature coefficient is highly negative, such as at the end of each cycle.

HHSI pumps A and B are capable of being automatically started and are powered from separate emergency buses. HHSI pump C can only be manually started, but can be powered from either of the emergency buses that HHSI pumps A and B are powered from. An interlock prevents HHSI pump C from being powered from both emergency buses simultaneously. For HHSI pump C to be OPERABLE, it must be running since it does not start automatically. In the event of a Safety Injection signal coincident with a loss of offsite power, interlocks prevent automatic operation of two HHSI pumps on the same emergency bus to prevent overloading the emergency diesel generators. HHSI pump C is normally either running, or available but not running. HHSI pump C is normally running if either HHSI pump A or B is inoperable or both are otherwise preferred to not be in operation. HHSI pump C is normally available but not running when either HHSI pump A or B is running.

The ECCS subsystems are actuated upon receipt of an SI signal. The actuation of safeguard loads is accomplished in a programmed time sequence. If offsite power is available, the safeguard loads start immediately in the programmed sequence. If offsite power is not available, the Engineered Safety Feature (ESF) buses shed normal operating loads and are connected to the emergency diesel generators (EDGs). Safeguard loads are then actuated in the programmed time sequence. The time delay associated with diesel starting and pump starting determines the time required before pumped flow is available to the core following a LOCA.

The active ECCS components, along with the passive accumulators and the RWST covered in LCO 3.5.1, "Accumulators," and LCO 3.5.4, "Refueling Water Storage Tank (RWST)," provide the cooling water necessary to meet Reference 1.

BASES

APPLICABLE SAFETY ANALYSES

The LCO helps to ensure that the following acceptance criteria for the ECCS, established by 10 CFR 50.46 (Ref. 2), will be met following a LOCA:

a. Maximum fuel element cladding temperature is ≤ 2200°F;

b. Maximum cladding oxidation is ≤ 0.17 times the total cladding thickness before oxidation;

c. Maximum hydrogen generation from a zirconium water reaction is ≤ 0.01 times the hypothetical amount generated if all of the metal in the cladding cylinders surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react;

d. Core is maintained in a coolable geometry; and

e. Adequate long term core cooling capability is maintained.

The LCO also limits the magnitude of post trip return to power following an MSLB event and ensures that containment temperature limits are met.

Each ECCS subsystem is taken credit for in a large break LOCA event at full power (Refs. 3 and 4). This event establishes the maximum flow requirement for the ECCS pumps. The HHSI pumps are credited in a small break LOCA event. This event relies upon the flow and discharge head of the HHSI pumps. The SGTR and MSLB events also credit the HHSI pumps. The OPERABILITY requirements for the ECCS are based on the following LOCA analysis assumptions:

a. A large break LOCA event, with loss of offsite power and a single failure disabling one LHSI pump (both EDG trains are assumed to operate due to requirements for modeling full active containment heat removal system operation); and

b. A small break LOCA event, with a loss of offsite power and a single failure disabling one Emergency Diesel Generator.

During the blowdown stage of a large break LOCA, the RCS depressurizes as primary coolant is ejected through the break into the containment. The nuclear reaction is terminated either by moderator voiding during large breaks

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BASES

APPLICABLE SAFETY ANALYSES (continued)

or control rod insertion for small breaks. Following depressurization, emergency cooling water is injected into the cold legs, flows into the downcomer, fills the lower plenum, and refloods the core.

The effects on containment mass and energy releases are accounted for in appropriate analysis (Ref. 3). The LCO ensures that an ECCS train will deliver sufficient water to match boiloff rates soon enough to minimize the consequences of the core being uncovered following a large LOCA. It also ensures that the HHSI pumps will deliver sufficient water and boron during a small LOCA to maintain core subcriticality. For smaller LOCAs, the HHSI pump delivers sufficient fluid to maintain RCS inventory. For a small break LOCA, the steam generators continue to serve as the heat sink, providing part of the required core cooling.

The ECCS trains satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

In MODES 1, 2, and 3, two independent (and redundant) ECCS trains are required to ensure that sufficient ECCS flow is available, assuming a single failure affecting either train. Additionally, individual components within the ECCS trains may be called upon to mitigate the consequences of other transients and accidents.

In MODES 1, 2, and 3, an ECCS train consists of an HHSI subsystem and a LHSI subsystem. Each train includes the piping, instruments, and controls to ensure an OPERABLE flow path capable of taking suction from the RWST upon an SI signal and automatically transferring suction to the containment sump.

During an event requiring ECCS actuation, a flow path is required to provide an abundant supply of water from the RWST to the RCS via the ECCS pumps and their respective supply headers to each of the three cold leg injection nozzles. In the long term, this flow path may be switched to take its supply from the containment sump and to supply its flow to the RCS hot and cold legs.

The flow path for each train must maintain its designed independence to ensure that no single failure can disable both ECCS trains.

BASES

APPLICABILITY

In MODES 1, 2, and 3, the ECCS OPERABILITY requirements for the limiting Design Basis Accident, a large break LOCA, are based on full power operation. Although reduced power would not require the same level of performance, the accident analysis does not provide for reduced cooling requirements in the lower MODES. MODE 2 and MODE 3 requirements are bounded by the MODE 1 analysis.

This LCO is only applicable in MODE 3 and above. Below MODE 3, the SI signal setpoint has already been manually bypassed by operator control, and system functional requirements are relaxed as described in LCO 3.5.3, "ECCS—Shutdown."

In MODES 5 and 6, unit conditions are such that the probability of an event requiring ECCS injection is extremely low. Core cooling requirements in MODE 5 are addressed by LCO 3.4.7, "RCS Loops—MODE 5, Loops Filled," and LCO 3.4.8, "RCS Loops—MODE 5, Loops Not Filled." MODE 6 core cooling requirements are addressed by LCO 3.9.5, "Residual Heat Removal (RHR) and Coolant Circulation—High Water Level," and LCO 3.9.6, "Residual Heat Removal (RHR) and Coolant Circulation—Low Water Level."

ACTIONS

A.1

With one or more trains inoperable and at least 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available, the inoperable components must be returned to OPERABLE status within 72 hours. The 72 hour Completion Time is based on an NRC reliability evaluation (Ref. 5) and is a reasonable time for repair of many ECCS components.

An ECCS train is inoperable if it is not capable of delivering design flow to the RCS. Individual components are inoperable if they are not capable of performing their design function or supporting systems are not available.

The LCO requires the OPERABILITY of a number of independent subsystems. Due to the redundancy of trains and the diversity of subsystems, the inoperability of one active component in a train does not render the ECCS incapable of performing its function. Neither does the inoperability of two different components, each in a different train, necessarily result in a loss of function for the ECCS (e.g., an inoperable HHSI pump in one train, and an inoperable LHSI

(continued)

BASES

ACTIONS

A.1 (continued)

pump in the other). This allows increased flexibility in unit operations under circumstances when components in opposite trains are inoperable.

An event accompanied by a loss of offsite power and the failure of an EDG can disable one ECCS train until power is restored. A reliability analysis (Ref. 5) has shown that the impact of having one full ECCS train inoperable is sufficiently small to justify continued operation for 72 hours.

B.1 and B.2

If the inoperable trains cannot be returned to OPERABLE status within the associated Completion Time, 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 MODE 3 within 6 hours and MODE 4 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

C.1

Condition A is applicable with one or more trains inoperable. The allowed Completion Time is based on the assumption that at least 100% of the ECCS flow equivalent to a single OPERABLE ECCS train is available. With less than 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available, the facility is in a condition outside of the accident analyses. Therefore, LCO 3.0.3 must be entered immediately.

SURVEILLANCE REQUIREMENTS

SR 3.5.2.1

Verification of proper valve position ensures that the flow path from the ECCS pumps to the RCS is maintained. Misalignment of these valves could render both ECCS trains inoperable. Securing these valves in position by removal of power or by key locking the control in the correct position ensures that they cannot change position as a result of an active failure or be inadvertently misaligned. These valves are of the type that can disable the function of both ECCS

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.2.1 (continued)

trains and invalidate the accident analyses. A 12 hour Frequency is considered reasonable in view of other administrative controls that will ensure a mispositioned valve is unlikely.

SR 3.5.2.2

Verifying the correct alignment for manual, power operated, and automatic valves in the ECCS flow paths provides assurance that the proper flow paths will exist for ECCS operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since these were verified to be in the correct position prior to locking, sealing, or securing. A valve that receives an actuation signal is allowed to be in a nonaccident position provided the valve will automatically reposition within the proper stroke time. This Surveillance does not require any testing or valve manipulation. Rather, it involves verification that those valves capable of being mispositioned are in the correct position. The 31 day Frequency is appropriate because the valves are operated under administrative control, and an improper valve position would only affect a single train. This Frequency has been shown to be acceptable through operating experience.

SR 3.5.2.3

With the exception of the operating charging pump, the ECCS pumps are normally in a standby nonoperating mode. As such, some flow path piping has the potential to develop pockets of entrained gases. Plant operating experience and analysis has shown that after proper system filling (following maintenance or refueling outages), some entrained noncondensable gases remain. These gases will form small voids, which remain stable in the system in both normal and transient operation. Mechanisms postulated to increase the void size are gradual in nature, and the system is operated in accordance with procedures to preclude growth in these voids.

To provide additional assurances that the system will function, a verification is performed every 92 days that the system is sufficiently full of water. The system is sufficiently full of water when the voids and pockets of entrained gases in the ECCS piping are small enough in size

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.2.3 (continued)

and number so as to not interfere with the proper operation of the ECCS. Verification that the ECCS piping is sufficiently full of water can be performed by venting the necessary high point ECCS vents outside containment, using NDE, or using other Engineering-justified means. Maintaining the piping from the ECCS pumps to the RCS sufficiently full of water ensures that the system will perform properly, injecting its full capacity into the RCS upon demand. This will also prevent water hammer, pump cavitation, and pumping of excess noncondensable gas (e.g., air, nitrogen, or hydrogen) into the reactor vessel following an SI signal or during shutdown cooling. The 92 day frequency takes into consideration the gradual nature of the postulated void generation mechanism.

SR 3.5.2.4

Periodic surveillance testing of ECCS pumps to detect gross degradation caused by impeller structural damage or other hydraulic component problems is required by Section XI of the ASME Code. This type of testing may be accomplished by measuring the pump developed head at only one point of the pump characteristic curve. This verifies both that the measured performance is within an acceptable tolerance of the original pump baseline performance and that the performance at the test flow is greater than or equal to the performance assumed in the safety analysis. SRs are specified in the Inservice Testing Program, which encompasses Section XI of the ASME Code. Section XI of the ASME Code provides the activities and Frequencies necessary to satisfy the requirements.

SR 3.5.2.5 and SR 3.5.2.6

These Surveillances demonstrate that each automatic ECCS valve actuates to the required position on an actual or simulated SI signal and that each ECCS pump capable of starting automatically starts on receipt of an actual or simulated SI signal. This Surveillance is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative controls. The 18 month Frequency is based on the need to perform these Surveillances under the conditions that apply during a unit outage and the potential for unplanned unit transients if the Surveillances were performed with the reactor at power.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.2.5 and SR 3.5.2.6 (continued)

The 18 month Frequency is also acceptable based on consideration of the design reliability (and confirming operating experience) of the equipment. The actuation logic is tested as part of ESF Actuation System testing, and equipment performance is monitored as part of the Inservice Testing Program.

SR 3.5.2.7

Proper throttle valve position is necessary for proper ECCS performance and to prevent pump runout and subsequent component damage. The Surveillance verifies each listed ECCS throttle valve is secured in the correct position. The 18 month Frequency is based on the same reasons as those stated in SR 3.5.2.5 and SR 3.5.2.6.

SR 3.5.2.8

Periodic inspections of the containment sump suction inlet ensure that it is unrestricted and stays in proper operating condition. The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and on the need to have access to the location. This Frequency has been found to be sufficient to detect abnormal degradation and is confirmed by operating experience.

REFERENCES

1. UFSAR, Section 3.1.31.
2. 10 CFR 50.46.
3. UFSAR, Section 15.4.1.
4. UFSAR, Section 6.2 and Chapter 15.
5. NRC Memorandum to V. Stello, Jr., from R.L. Baer, "Recommended Interim Revisions to LCOs for ECCS Components," December 1, 1975.

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.3 ECCS–Shutdown

BASES

BACKGROUND

The Background section for Bases 3.5.2, "ECCS–Operating," is applicable to these Bases, with the following modifications.

In MODE 4, the required ECCS train consists of two separate subsystems: High Head Safety Injection (HHSI) and Low Head Safety Injection (LHSI).

The ECCS flow paths consist of piping, valves and pumps such that water from the refueling water storage tank (RWST) can be injected into the Reactor Coolant System (RCS) following the accidents described in Bases 3.5.2.

APPLICABLE SAFETY ANALYSES

The Applicable Safety Analyses section of Bases 3.5.2 also applies to this Bases section.

Due to the stable conditions associated with operation in MODE 4 and the reduced probability of occurrence of a Design Basis Accident (DBA), the ECCS operational requirements are reduced. It is understood in these reductions that certain automatic safety injection (SI) actuation is not available. In this MODE, sufficient time exists for manual actuation of the required ECCS to mitigate the consequences of a DBA. The safety analysis assumes that flow from one HHSI pump is manually initiated 10 minutes after the DBA.

Only one train of ECCS is required for MODE 4. This requirement dictates that single failures are not considered during this MODE of operation.

The ECCS trains satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

In MODE 4, one of the two independent (and redundant) ECCS trains is required to be OPERABLE to ensure that sufficient ECCS flow is available to the core following a DBA.

In MODE 4, an ECCS train consists of an HHSI subsystem and an LHSI subsystem. Each train includes the piping, instruments, and controls to ensure an OPERABLE flow path capable of

(continued)

BASES

LCO (continued)

taking suction from the RWST and transferring suction to the containment sump.

During an event requiring ECCS actuation, a flow path is required to provide an abundant supply of water from the RWST to the RCS via the ECCS pumps and their respective supply headers to each of the three cold leg injection nozzles. In the long term, this flow path may be switched to take its supply from the containment sump and to deliver its flow to the RCS hot or cold legs.

APPLICABILITY

In MODES 1, 2, and 3, the OPERABILITY requirements for ECCS are covered by LCO 3.5.2.

In MODE 4 with RCS temperature below 350°F, one OPERABLE ECCS train is acceptable without single failure consideration, on the basis of the stable reactivity of the reactor and the limited core cooling requirements.

In MODES 5 and 6, unit conditions are such that the probability of an event requiring ECCS injection is extremely low. Core cooling requirements in MODE 5 are addressed by LCO 3.4.7, "RCS Loops—MODE 5, Loops Filled," and LCO 3.4.8, "RCS Loops—MODE 5, Loops Not Filled." MODE 6 core cooling requirements are addressed by LCO 3.9.5, "Residual Heat Removal (RHR) and Coolant Circulation—High Water Level," and LCO 3.9.6, "Residual Heat Removal (RHR) and Coolant Circulation—Low Water Level."

ACTIONS

A.1

With no ECCS train OPERABLE, due to the inoperability of the ECCS flow path, the unit is not prepared to respond to Design Basis Events requiring SI. The 1 hour Completion Time to restore at least one ECCS train to OPERABLE status ensures that prompt action is taken to provide the required cooling capacity or to initiate actions to place the unit in MODE 5, where an ECCS train is not required.

B.1

When the Required Actions of Condition A cannot be completed within the required Completion Time, the unit should be placed in MODE 5. Twenty-four hours is a reasonable time, based on operating experience, to reach MODE 5 in an orderly manner and without challenging unit systems or operators.

BASES

SURVEILLANCE REQUIREMENTS	<u>SR 3.5.3.1</u> The applicable Surveillance descriptions from Bases 3.5.2 apply.
REFERENCES	The applicable references from Bases 3.5.2 apply.

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B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.4 Refueling Water Storage Tank (RWST)

BASES

BACKGROUND

The RWST supplies borated water to the Chemical and Volume Control System (CVCS) during abnormal operating conditions, to the refueling pool during refueling, and to the ECCS and the Quench Spray System during accident conditions.

The RWST supplies water to the ECCS pumps through a common supply header. Water from the supply header enters the low head safety injection (LHSI) pumps through parallel, normally open, motor operated valves. Water to the High Head Safety Injection (HHSI) pumps is supplied via parallel motor operated valves to ensure that at least one opens on receipt of a safety injection actuation signal. The supply header then branches to the three HHSI pumps. The RWST supplies water to the Quench Spray pumps via separate, redundant lines. A motor operated isolation valve is provided in each header to isolate the RWST from the ECCS once the system has been transferred to the recirculation mode. The recirculation mode is entered when pump suction is transferred to the containment sump either manually or automatically following receipt of the RWST—Low Low level signal. Use of a single RWST to supply both trains of the ECCS and Quench Spray System is acceptable since the RWST is a passive component used for a short period of time following an accident, and passive failures are not required to be assumed to occur during the time the RWST is needed following Design Basis Events.

The switchover from normal operation to the injection phase of ECCS operation requires changing HHSI pump suction from the CVCS volume control tank (VCT) to the RWST through the use of isolation valves.

During normal operation, the LHSI pumps are aligned to take suction from the RWST.

The ECCS pumps are provided with recirculation lines that ensure each pump can maintain minimum flow requirements when operating at or near shutoff head conditions.

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BASES

BACKGROUND (continued)

When the suction for the ECCS pumps is transferred to the containment sump, the recirculation lines are isolated to prevent a release of the containment sump contents to the RWST, which could result in a release of contaminants to the atmosphere and the eventual loss of suction head for the ECCS pumps.

This LCO ensures that:

a. The RWST contains sufficient borated water to support the ECCS during the injection phase and Quench Spray System;

b. Sufficient water volume exists in the containment sump to support continued operation of the ECCS and Recirculation Spray System pumps following transfer to the recirculation mode of cooling; and

c. The reactor remains subcritical following a loss of coolant accident (LOCA).

Insufficient water volume in the RWST could result in insufficient cooling capacity when the transfer to the recirculation mode occurs. Improper boron concentrations could result in a reduction of SDM or excessive boric acid precipitation in the core following the LOCA, as well as excessive caustic stress corrosion of mechanical components and systems inside the containment.

APPLICABLE SAFETY ANALYSES

During accident conditions, the RWST provides a source of borated water to the ECCS and Quench Spray System pumps. As such, it provides containment cooling and depressurization, core cooling, and replacement inventory to the RCS and is a source of negative reactivity for reactor shutdown (Ref. 1). The design basis transients and applicable safety analyses concerning each of these systems are discussed in the Applicable Safety Analyses section of B 3.5.2, "ECCS—Operating"; B 3.5.3, "ECCS—Shutdown"; and B 3.6.6, "Quench Spray System." These analyses are used to assess changes to the RWST in order to evaluate their effects in relation to the acceptance limits in the analyses.

The RWST must also meet volume, boron concentration, and temperature requirements for certain non-LOCA events. The volume is not an explicit assumption in non-LOCA events since the required volume is a small fraction of the

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BASES

APPLICABLE SAFETY ANALYSES (continued)

available volume. The deliverable volume limit is assumed by the Large Break LOCA containment analyses. For the RWST, the deliverable volume is different from the total volume contained. Because of the design of the tank, more water can be contained than can be delivered. The upper RWST volume limit is assumed for pH control after a LBLOCA. The minimum boron concentration is an explicit assumption in the main steam line break (MSLB) analysis to ensure the required shutdown capability. The importance of its value is small because of the boron injection tank (BIT) with a high boron concentration. The maximum boron concentration is an explicit assumption in the inadvertent ECCS actuation analysis, although it is typically a nonlimiting event and the results are very insensitive to boron concentrations. The maximum RWST temperature ensures that the amount of containment cooling provided from the RWST during containment pressurization events is consistent with safety analysis assumptions. The minimum RWST temperature is an assumption in the inadvertent Quench Spray actuation analyses.

For a large break LOCA analysis, the minimum water volume limit of 466,200 gallons and the lower boron concentration limit of 2300 ppm are used to compute the post LOCA sump boron concentration necessary to assure subcriticality. The large break LOCA is the limiting case since the safety analysis assumes that all control rods are out of the core.

The upper limit on boron concentration of 2400 ppm is used to determine the maximum allowable time to switch to hot leg recirculation following a LOCA. The purpose of switching from cold leg to hot leg injection is to avoid boron precipitation in the core following the accident.

In the ECCS analysis, the quench spray temperature is bounded by the RWST lower temperature limit of 40°F. If the lower temperature limit is violated, the quench spray further reduces containment pressure, which decreases the rate at which steam can be vented out the break and increases peak clad temperature. The upper temperature limit of 50°F is bounded by the values used in the small break LOCA analysis and containment OPERABILITY analysis. Exceeding this temperature will result in a higher peak clad temperature, because there is less heat transfer from the core to the injected water for the small break LOCA and higher containment pressures due to reduced quench spray cooling capacity. For the containment response following an MSLB,

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BASES

APPLICABLE SAFETY ANALYSES (continued)

the lower limit on boron concentration and the upper limit on RWST water temperature are used to maximize the total energy release to containment.

The RWST satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The RWST ensures that an adequate supply of borated water is available to cool and depressurize the containment in the event of a Design Basis Accident (DBA), to cool and cover the core in the event of a LOCA, to maintain the reactor subcritical following a DBA, and to ensure adequate level in the containment sump to support ECCS and Recirculation Spray System pump operation in the recirculation mode.

To be considered OPERABLE, the RWST must meet the water volume, boron concentration, and temperature limits established in the SRs.

APPLICABILITY

In MODES 1, 2, 3, and 4, RWST OPERABILITY requirements are dictated by ECCS and Quench Spray System OPERABILITY requirements. Since both the ECCS and the Quench Spray System must be OPERABLE in MODES 1, 2, 3, and 4, the RWST must also be OPERABLE to support their operation. Core cooling requirements in MODE 5 are addressed by LCO 3.4.7, "RCS Loops—MODE 5, Loops Filled," and LCO 3.4.8, "RCS Loops—MODE 5, Loops Not Filled." MODE 6 core cooling requirements are addressed by LCO 3.9.5, "Residual Heat Removal (RHR) and Coolant Circulation—High Water Level," and LCO 3.9.6, "Residual Heat Removal (RHR) and Coolant Circulation—Low Water Level."

ACTIONS

A.1

With RWST boron concentration or borated water temperature not within limits, they must be returned to within limits within 8 hours. Under these conditions neither the ECCS nor the Quench Spray System can perform its design function. Therefore, prompt action must be taken to restore the tank to OPERABLE condition. The 8 hour limit to restore the RWST temperature or boron concentration to within limits was developed considering the time required to change either the boron concentration or temperature and the fact that the contents of the tank are still available for injection.

BASES

ACTIONS (continued)

B.1

With the RWST inoperable for reasons other than Condition A (e.g., water volume), it must be restored to OPERABLE status within 1 hour.

In this Condition, neither the ECCS nor the Quench Spray System can perform its design function. Therefore, prompt action must be taken to restore the tank to OPERABLE status or to place the unit in a MODE in which the RWST is not required. The short time limit of 1 hour to restore the RWST to OPERABLE status is based on this condition simultaneously affecting redundant trains.

C.1 and C.2

If the RWST cannot be returned to OPERABLE status within the associated Completion Time, 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 and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.5.4.1

The RWST borated water temperature should be verified every 24 hours to be within the limits assumed in the accident analyses band. This Frequency is sufficient to identify a temperature change that would approach either limit and has been shown to be acceptable through operating experience.

SR 3.5.4.2

The RWST water volume should be verified every 7 days to be above the required minimum level in order to ensure that a sufficient initial supply is available for injection and to support continued ECCS and Recirculation Spray System pump operation on recirculation. Since the RWST volume is normally stable and is protected by an alarm, a 7 day Frequency is appropriate and has been shown to be acceptable through operating experience.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.4.3

The boron concentration of the RWST should be verified every 7 days to be within the required limits. This SR ensures that the reactor will remain subcritical following a LOCA. Further, it assures that the resulting sump pH will be maintained in an acceptable range so that boron precipitation in the core will not occur and the effect of chloride and caustic stress corrosion on mechanical systems and components will be minimized. Since the RWST volume is normally stable, a 7 day sampling Frequency to verify boron concentration is appropriate and has been shown to be acceptable through operating experience.

REFERENCES

1. UFSAR, Chapter 6 and Chapter 15.

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.5 Seal Injection Flow

BASES

BACKGROUND

The function of the seal injection throttle valves during an accident is similar to the function of the ECCS throttle valves in that each restricts flow from the High Head Safety Injection (HHSI) pump header to the Reactor Coolant System (RCS).

The restriction on reactor coolant pump (RCP) seal injection flow limits the amount of ECCS flow that would be diverted from the injection path following an accident and precludes HHSI pump runout due to excessive seal injection flow. This limit is based on safety analysis assumptions that are required because RCP seal injection flow is not isolated during safety injection (SI).

APPLICABLE SAFETY ANALYSES

All ECCS subsystems are assumed to be OPERABLE in the large break loss of coolant accident (LOCA) at full power (Ref. 1). The LOCA analysis establishes the minimum flow for the HHSI pumps. The HHSI pumps are also credited in the small break LOCA analysis. This analysis establishes the flow and discharge head requirements at the design point for the HHSI pumps. The steam generator tube rupture and main steam line break event analyses also credit the HHSI pumps, but are not limiting in their design. Reference to these analyses is made in assessing changes to the Seal Injection System for evaluation of their effects in relation to the acceptance limits in these analyses.

This LCO ensures that seal injection flow of ≤ 30 gpm, with RCS pressure ≥ 2215 psig and ≤ 2255 psig and seal injection (air operated) hand control valve full open, will be limited in such a manner that the ECCS trains will be capable of delivering sufficient water to provide adequate core cooling following a large LOCA, and protect against HHSI pump runout. The analysis conservatively neglects the contribution from seal injection to the RCS. This conservatism bounds the minor effect of instrument uncertainty, so instrument uncertainties have not been included in the derivation of the flow (30 gpm) and RCS pressure (≥ 2215 psig and ≤ 2255 psig) setpoints. The flow limit also ensures that the HHSI pumps will deliver

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BASES

APPLICABLE SAFETY ANALYSES (continued)

sufficient water for a small LOCA and sufficient boron to maintain the core subcritical. For smaller LOCAs, the HHSI pumps alone deliver sufficient fluid to overcome the loss and maintain RCS inventory.

Seal injection flow satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

The intent of the LCO limit on seal injection flow is to make sure that flow through the RCP seal water injection line is low enough to ensure that sufficient HHSI pump injection flow is directed to the RCS via the injection points and to prevent pump runout.

The LCO is not strictly a flow limit, but rather a flow limit based on a flow line resistance. In order to establish the proper flow line resistance, a pressure and flow must be known. The flow line resistance is determined by assuming that the RCS pressure is at normal operating pressure as specified in this LCO. The HHSI pump discharge header pressure remains essentially constant through all the applicable MODES of this LCO. A reduction in RCS pressure would result in more flow being diverted to the RCP seal injection line than at normal operating pressure. The valve settings established at the prescribed RCS pressure result in a conservative valve position should RCS pressure decrease. The additional modifier of this LCO, the seal injection (air operated) hand control valve being full open, is required since the valve is designed to fail open for the accident condition. With the discharge pressure and control valve position as specified by the LCO, a flow path resistance limit is established. It is this resistance limit that is used in the accident analyses.

The limit on seal injection flow, combined with the RCS pressure limit and an open wide condition of the seal injection hand control valve, must be met to render the ECCS OPERABLE. If these conditions are not met, the ECCS flow to the core could be less than that assumed in the accident analyses.

APPLICABILITY

In MODES 1, 2, and 3, the seal injection flow limit is dictated by ECCS flow requirements, which are specified for MODES 1, 2, 3, and 4. The seal injection flow limit is not applicable for MODE 4 and lower, however, because high seal

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BASES

APPLICABILITY (continued)

injection flow is less critical as a result of the lower initial RCS pressure and decay heat removal requirements in these MODES. Therefore, RCP seal injection flow must be limited in MODES 1, 2, and 3 to ensure adequate ECCS performance.

ACTIONS

A.1

With the seal injection flow exceeding its limit, the amount of charging flow available to the RCS may be reduced or, following a LOCA, pump runout could occur. Under this Condition, action must be taken to restore the flow to below its limit. The operator has 4 hours from the time the flow is known to be above the limit to correctly position the manual valves and thus be in compliance with the accident analysis. The Completion Time minimizes the potential exposure of the unit to a LOCA with insufficient injection flow and provides a reasonable time to restore seal injection flow within limits. This time is conservative with respect to the Completion Times of other ECCS LCOs; it is based on operating experience and is sufficient for taking corrective actions by operations personnel.

B.1 and B.2

When the Required Actions cannot be completed within the required Completion Time, a controlled shutdown must be initiated. The Completion Time of 6 hours for reaching MODE 3 from MODE 1 is a reasonable time for a controlled shutdown, based on operating experience and normal cooldown rates, and does not challenge unit safety systems or operators. Continuing the unit shutdown begun in Required Action B.1, an additional 6 hours is a reasonable time, based on operating experience and normal cooldown rates, to reach MODE 4, where this LCO is no longer applicable.

SURVEILLANCE REQUIREMENTS

SR 3.5.5.1

Verification every 31 days that the manual seal injection throttle valves are adjusted to give a flow within the limit ensures that proper manual seal injection throttle valve position, and hence, proper seal injection flow, is maintained. The Frequency of 31 days is based on engineering

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.5.1 (continued)

judgment and is consistent with other ECCS valve Surveillance Frequencies. The Frequency has proven to be acceptable through operating experience.

As noted, the Surveillance is not required to be performed until 4 hours after the RCS pressure has stabilized within a ± 20 psi range of normal operating pressure. The RCS pressure requirement is specified since this configuration will produce the required pressure conditions necessary to assure that the manual valves are set correctly. The exception is limited to 4 hours to ensure that the Surveillance is timely.

REFERENCES

1. UFSAR, Chapter 6 and Chapter 15.

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.6 Boron Injection Tank (BIT)

BASES

BACKGROUND

The BIT is the primary means of quickly introducing negative reactivity into the Reactor Coolant System (RCS) on a safety injection (SI) signal.

The main flow path through the Boron Injection Tank is from the discharge of the High Head Safety Injection (HHSI) pumps through lines equipped with a flow element and two valves in parallel that open on an SI signal. The valves can be operated from the main control board. The valves and flow elements have main control board indications. Downstream of these valves, the flow enters the BIT (Ref. 1).

The BIT is a stainless steel clad tank containing concentrated boric acid. Two trains of strip heaters are mounted on the tank to keep the temperature of the boric acid solution above the precipitation point. The strip heaters are controlled by temperature elements located near the bottom of the BIT. The temperature elements also activate High and Low temperature alarms in the Control Room. In addition to the strip heaters on the BIT, there is a recirculation system with a heat tracing system, including the piping section between the motor operated isolation valves, which further ensures that the boric acid stays in solution. The entire contents of the BIT are injected when required; thus, the contained and deliverable volumes are the same.

During normal operation, a boric acid transfer pump provides recirculation between the boric acid tank and the BIT. On receipt of an SI signal, the recirculation line valves close. Flow to the BIT is then supplied from the HHSI pumps. The solution of the BIT is injected into the RCS through the RCS cold legs.

APPLICABLE SAFETY ANALYSES

During a main steam line break (MSLB) or loss of coolant accident (LOCA), the BIT provides an immediate source of concentrated boric acid that quickly introduces negative reactivity into the RCS.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The contents of the BIT are not credited for core cooling or immediate boration in the LOCA analysis, but are for post LOCA recovery. The BIT maximum boron concentration of 15,750 ppm is used to determine the minimum time for hot leg recirculation switchover. The minimum boron concentration of 12,950 ppm is used to determine the minimum mixed mean sump boron concentration for post LOCA shutdown requirements.

For the MSLB, the BIT is the primary mechanism for injecting boron into the core to counteract the positive increases in reactivity caused by an RCS cooldown. The MSLB core response analysis conservatively assumes a 0 ppm minimum boron concentration of the BIT, which also affects the departure from nucleate boiling design analysis. The MSLB containment response analysis conservatively assumes a 2000 ppm minimum boron concentration of the BIT. Reference to the LOCA and MSLB analyses is used to assess changes to the BIT to evaluate their effect on the acceptance limits contained in these analyses.

The minimum temperature limit of 115°F for the BIT ensures that the solution does not reach the boric acid precipitation point. The temperature of the solution is monitored and alarmed on the main control board.

The BIT boron concentration limits are established to ensure that the core remains subcritical during post LOCA recovery. The BIT will counteract any positive increases in reactivity caused by an RCS cooldown.

The BIT water volume of 900 gallons is used to ensure that the appropriate quantity of highly borated water with sufficient negative reactivity is injected into the RCS to shut down the core following an MSLB, to determine the hot leg recirculation switchover time, and to safeguard against boron precipitation.

The BIT satisfies Criteria 2 and 3 of 10 CFR 50.36(c)(2)(ii).

LCO

This LCO establishes the minimum requirements for contained volume, boron concentration, and temperature of the BIT inventory. This ensures that an adequate supply of borated water is available in the event of a LOCA or MSLB to maintain the reactor subcritical following these accidents.

(continued)

BASES

LCO (continued)	To be considered OPERABLE, the limits established in the SR for water volume, boron concentration, and temperature must be met.
APPLICABILITY	In MODES 1, 2, and 3, the BIT OPERABILITY requirements are consistent with those of LCO 3.5.2, "ECCS—Operating." In MODES 4, 5, and 6, the respective accidents are less severe, so the BIT is not required in these lower MODES.

ACTIONS

A.1

If the required volume is not present in the BIT, both the hot leg recirculation switchover time analysis and the boron precipitation analysis may not be correct. Under these conditions, prompt action must be taken to restore the volume to above its required limit to declare the tank OPERABLE, or the unit must be placed in a MODE in which the BIT is not required.

The BIT boron concentration is considered in the hot leg recirculation switchover time analysis, the boron precipitation analysis, and may effect the reactivity analysis for an MSLB. If the concentration were not within the required limits, these analyses could not be relied on. Under these conditions, prompt action must be taken to restore the concentration to within its required limits, or the unit must be placed in a MODE in which the BIT is not required.

The BIT temperature limit is established to ensure that the solution does not reach the boric acid crystallization point. If the temperature of the solution drops below the minimum, prompt action must be taken to raise the temperature and declare the tank OPERABLE, or the unit must be placed in a MODE in which the BIT is not required.

The 1 hour Completion Time to restore the BIT to OPERABLE status is consistent with other Completion Times established for loss of a safety function and ensures that the unit will not operate for long periods outside of the safety analyses.

BASES

ACTIONS (continued)

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

When Required Action A.1 cannot be completed within the required Completion Time, a controlled shutdown should be initiated. Six hours is a reasonable time, based on operating experience, to reach MODE 3 from full power conditions and to be borated to the required SDM without challenging unit systems or operators. Borating to the required SDM assures that the unit is in a safe condition, without need for any additional boration.

After determining that the BIT is inoperable and the Required Actions of B.1 and B.2 have been completed, the tank must be returned to OPERABLE status within 7 days. These actions ensure that the unit will not be operated with an inoperable BIT for a lengthy period of time. It should be noted, however, that changes to applicable MODES cannot be made until the BIT is restored to OPERABLE status pursuant to the provisions of LCO 3.0.4.

C.1

Even though the RCS has been borated to a safe and stable condition as a result of Required Action B.2, either the BIT must be restored to OPERABLE status (Required Action C.1) or the unit must be placed in a condition in which the BIT is not required (MODE 4). The 12 hour Completion Time to reach MODE 4 is reasonable, based on operating experience and normal cooldown rates, and does not challenge unit safety systems or operators.

SURVEILLANCE REQUIREMENTS

SR 3.5.6.1

Verification every 24 hours that the BIT water temperature is at or above the specified minimum temperature is frequent enough to identify a temperature change that would approach the acceptable limit. The solution temperature is also monitored by an alarm that provides further assurance of protection against low temperature. This Frequency has been shown to be acceptable through operating experience.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.6.2

Verification every 7 days that the BIT contained volume is above the required limit is frequent enough to assure that this volume will be available for quick injection into the RCS. The 900 gallon limit corresponds to the BIT being completely full. Methods of verifying that the BIT is completely full include venting from the high point vent, and recirculation flow with the Boric Acid Storage Tanks. If the volume is too low, the BIT would not provide enough borated water to ensure subcriticality during recirculation or to provide additional core shutdown margin following an MSLB. Since the BIT volume is normally stable, a 7 day Frequency is appropriate and has been shown to be acceptable through operating experience.

SR 3.5.6.3

Verification every 7 days that the boron concentration of the BIT is within the required band ensures that the reactor remains subcritical following a LOCA; it limits return to power following an MSLB, and maintains the resulting sump pH in an acceptable range so that boron precipitation will not occur in the core. In addition, the effect of chloride and caustic stress corrosion on mechanical systems and components will be minimized.

The BIT is in a recirculation loop that provides continuous circulation of the boric acid solution through the BIT and the boric acid tank (BAT). There are a number of points along the recirculation loop where local samples can be taken. The actual location used to take a sample of the solution is specified in the unit Surveillance procedures. Sampling from the BAT to verify the concentration of the BIT is not recommended, since this sample may not be homogenous and the boron concentration of the two tanks may differ.

The sample should be taken from the BIT or from a point in the flow path of the BIT recirculation loop.

REFERENCES

1. UFSAR, Chapter 6 and Chapter 15.

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SECTION 3.5 - EMERGENCY CORE COOLING SYSTEMS (ECCS)

IMPROVED STANDARD TECHNICAL SPECIFICATIONS

MARKUP AND JUSTIFICATION FOR DEVIATIONS

CTS

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.1 Accumulators

3.5.1 LCO 3.5.1 [Four] Three ECCS accumulators shall be OPERABLE. (1)

APPLICABILITY: MODES 1 and 2,
MODE 3 with ~~pressurizer~~ RCS pressure > [1000] psig. TSTF-117 (1)

ACTIONS

	CONDITION	REQUIRED ACTION		COMPLETION TIME
New	A. One accumulator inoperable due to boron concentration not within limits.	A.1	Restore boron concentration to within limits.	72 hours
Action a	B. One accumulator inoperable for reasons other than Condition A.	B.1	Restore accumulator to OPERABLE status.	1 hour
new	C. Required Action and associated Completion Time of Condition A or B not met.	C.1	Be in MODE 3.	6 hours
		AND		
		C.2	Reduce ~~pressurizer~~ RCS pressure to ≤ [1000] psig.	12 hours
new	D. Two or more accumulators inoperable.	D.1	Enter LCO 3.0.3.	Immediately

TSTF-117 (1)

Rev.0

CTS

SURVEILLANCE REQUIREMENTS

CTS		SURVEILLANCE	FREQUENCY	
4.5.1.a.2	SR 3.5.1.1	Verify each accumulator isolation valve is fully open.	12 hours	
4.5.1.a.1	SR 3.5.1.2	Verify borated water volume in each accumulator is ≥ [7853] gallons [( )%] and ≤ [8171] gallons [( )%]. 7580 7756	12 hours	1
4.5.1.a.1	SR 3.5.1.3	Verify nitrogen cover pressure in each accumulator is ≥ [385] psig and ≤ [481] psig. 599 667	12 hours	1
4.5.1.b	SR 3.5.1.4	Verify boron concentration in each accumulator is ≥ [1900] ppm and ≤ [2100] ppm. 2200 2400	31 days AND -----NOTE------ Only required to be performed for affected accumulators -------------- Once within 6 hours after each solution volume increase of ≥ [[ ] gallons, 50 ( )% of indicated level] that is not the result of addition from the refueling water storage tank	1

(continued)

Rev. 0

CTS

4.5.1.c

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.1.5	Verify power is removed from each accumulator isolation valve operator when ~~pressurizer~~ RCS pressure is ≥ [2000] psig.	31 days

TSTF-117
(1)

Rev. 0

1. The brackets are removed and the proper plant specific information/value is provided.

CTS

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.2 ECCS—Operating

3.5.2 LCO 3.5.2 Two ECCS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

-------------------------------NOTES-------------------------------

1. In MODE 3, both safety injection (SI) pump flow paths may be isolated by closing the isolation valves for up to 2 hours to perform pressure isolation valve testing per SR 3.4.14.1. ①

2. Operation in MODE 3 with ECCS pumps declared inoperable pursuant to LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System," is allowed for up to 4 hours or until the temperature of all RCS cold legs exceeds [375]°F, whichever comes first. ③

ACTIONS

	CONDITION	REQUIRED ACTION	COMPLETION TIME
Action a.	A. One or more trains inoperable. ~~AND~~ C. ~~At least~~ Less than 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available.	A.1 Restore train(s) to OPERABLE status.	72 hours
Action a.	B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	6 hours 12 hours
New		C.1 Enter LCO 3.0.3.	Immediately

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CTS

SURVEILLANCE REQUIREMENTS

CTS	SURVEILLANCE		FREQUENCY	
4.5.2.a	SR 3.5.2.1	Verify the following valves are in the listed position with power to the valve operator removed. (Insert) Number [ ] [ ] . . . [ ] / Position [ ] [ ] . . . [ ] / Function [ ] [ ] . . . [ ]	12 hours	(2)
4.5.2.b	SR 3.5.2.2	Verify each ECCS manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days	(6)
New	SR 3.5.2.3	Verify ECCS piping is sufficiently full of water.	~~31~~ 92 days	(5)
4.5.2.f	SR 3.5.2.4	Verify each ECCS pump's developed head at the test flow point is greater than or equal to the required developed head.	In accordance with the Inservice Testing Program	
4.5.2.e.1	SR 3.5.2.5	Verify each ECCS automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	[18] months	(2)

(continued)

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INSERT

Unit 1

Number	Position	Function
1-SI-MOV-1890A	Closed	LHSI to Hot Leg
1-SI-MOV-1890B	Closed	LHSI to Hot Leg
1-SI-MOV-1836	Closed	HHSI pump to Cold Leg
1-SI-MOV-1869A	Closed	HHSI pump to Hot Leg
1-SI-MOV-1869B	Closed	HHSI pump to Hot Leg

Unit 2

Number	Position	Function
2-SI-MOV-2890A	Closed	LHSI to Hot Leg
2-SI-MOV-2890B	Closed	LHSI to Hot Leg
2-SI-MOV-2836	Closed	HHSI pump to Cold Leg
2-SI-MOV-2869A	Closed	HHSI pump to Hot Leg
2-SI-MOV-2869B	Closed	HHSI pump to Hot Leg

CTS

SURVEILLANCE REQUIREMENTS (continued)

Capable of starting automatically

CTS	SURVEILLANCE		FREQUENCY	
4.5.2.e.2	SR 3.5.2.6	Verify each ECCS pump starts automatically on an actual or simulated actuation signal.	[18] months	4 2
4.5.2.g.2	SR 3.5.2.7	Verify, for each ECCS throttle valve listed below, each position stop is secured in the correct position. Unit 1 Valve Number: [ ] [ ] [ ] 1-51-188, 1-51-191, 1-51-193, 1-51-203, 1-51-204, 1-51-205 Unit 2 Valve Number: 2-51-89, 2-51-97, 2-51-103, 2-51-116, 2-51-111, 2-51-123	[18] months	2 4
4.5.2.d.1	SR 3.5.2.8	Verify, by visual inspection, each ECCS train containment sump suction inlet is not restricted by debris and the suction inlet trash racks and screens show no evidence of structural distress or abnormal corrosion.	[18] months	2

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JUSTIFICATION FOR DEVIATIONS
ITS 3.5.2 - ECCS - OPERATING

1. Pressure isolation valve testing on the safety injection flow paths is performed outside of MODES 1, 2, and 3. Note 1 provides an exception to LCO 3.5.2 for the performance of the testing in MODE 3. Therefore, Note 1 is not needed and has been removed.

2. The brackets are removed and the proper plant specific information/value is provided.

3. The North Anna LTOP system enable temperatures are 235 °F for Unit 1 and 270 °F for Unit 2. These temperatures are outside of the ECCS Applicability of MODES 1 - 3. Note 2 provides an exception for ECCS pumps inoperable pursuant to LTOP controls. Note 2 is not needed and had been removed.

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. Surveillance Requirement (SR) 3.5.2.3 is modified to add the word "sufficiently," so that the SR reads, "Verify ECCS piping is sufficiently full of water." Unit operating experience and engineering analysis has shown that after initial filling of the ECCS piping, some noncondensible gases remain. These gases will form voids and pockets in the ECCS piping. The ECCS piping contents are stable and the ECCS will perform its function when required. Performing the SR every 92 days does not verify the ECCS piping completely filled with water, but provides an added degree of assurance that the piping is sufficiently full of water to allow the ECCS to perform its function when required. There is no requirement for this Surveillance in the CTS.

6. A Frequency of 92 days is adopted for SR 3.5.2.3 to verify that ECCS piping is sufficiently full of water. The 92 day Frequency has been determined to be adequate based on plant operating experience and engineering analysis. Performing the SR every 92 days does not verify the ECCS piping completely filled with water, but provides an added degree of assurance that the piping is sufficiently full of water to allow the ECCS to perform its function when required. There is no requirement for this Surveillance in the CTS.

CTS

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.3 ECCS—Shutdown

3.5.3

LCO 3.5.3 One ECCS train shall be OPERABLE.

APPLICABILITY: MODE 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
[A. Required ECCS residual heat removal (RHR) subsystem inoperable.	A.1	Initiate action to restore required ECCS RHR subsystem to OPERABLE status.	Immediately]
Action a (A) → B. Required ECCS [high head subsystem] train inoperable.	(A) B.1	Restore required ECCS [high head subsystem] train to OPERABLE status.	1 hour
Action a (B) → C. Required Action and associated Completion Time [of Condition B] not met.	(B) C.1	Be in MODE 5.	24 hours

(1)

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CTS

4.5.3.1

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.3.1	-------------------------NOTE------------------------- An RHR train may be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned to the ECCS mode of operation. -- The following SRs are applicable for all equipment required to be OPERABLE: SR 3.5.2.1 SR 3.5.2.3 SR 3.5.2.4 SR 3.5.2.7 SR 3.5.2.8	In accordance with applicable SRs

(1)

(2)

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1. ISTS 3.5.3, Action A, provides ACTIONS to take when a required ECCS residual heat removal (RHR) subsystem is inoperable. ISTS 3.5.3, Action B, provides ACTIONS to take when the remaining portion of the required ECCS train, the high head subsystem, is inoperable. These ACTIONS are not appropriate for the North Anna ITS. The North Anna ECCS Low Head Safety Injection (LHSI) system does not share components with the RHR system. The Bases for ISTS Action A states that the Action is needed because it is unwise to require the plant to go to MODE 5 with both RHR and pumps and heat exchangers inoperable. This logic does not apply to North Anna since RHR is not an ECCS system, and cooldown to MODE 5 if the system cannot be restored to OPERABLE status is an appropriate action. As a result, ISTS Action A is eliminated in the North Anna ITS and Action B is revised to apply to the required ECCS train inoperable. The bracketed related option in Action C is also eliminated. SR 3.5.3.1 contains a Note that allows an RHR train to be considered OPERABLE during alignment and operation for decay heat removal. This Note does not appear in the North Anna ITS as the RHR trains are not used for ECCS.

2. The brackets are removed and the proper plant specific information/value is provided.

CTS

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.4 Refueling Water Storage Tank (RWST)

LCO 3.5.5

LCO 3.5.4 The RWST shall be OPERABLE.

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

ACTIONS

CTS	CONDITION	REQUIRED ACTION	COMPLETION TIME
New	A. RWST boron concentration not within limits. OR RWST borated water temperature not within limits.	A.1 Restore RWST to OPERABLE status.	8 hours
3.5.5 Action	B. RWST inoperable for reasons other than Condition A.	B.1 Restore RWST to OPERABLE status.	1 hour
3.5.5 Action	C. Required Action and associated Completion Time not met.	C.1 Be in MODE 3. AND C.2 Be in MODE 5.	6 hours 36 hours

CTS

SURVEILLANCE REQUIREMENTS

CTS	SURVEILLANCE		FREQUENCY	
4.5.5.b LCO 3.5.5.c	SR 3.5.4.1	-----NOTE----- Only required to be performed when ambient air temperature is < [35]°F or > [100]°F. ----- Verify RWST borated water temperature is ≥ [35] 40 °F and ≤ [100] 50 °F.	24 hours	2 / 1
4.5.5.a.1 LCO 3.5.5.a	SR 3.5.4.2	Verify RWST borated water volume is ≥ [466,200 gallons ( )%]. 466,200 gallons and ≤ 487,000 gallons	7 days	1
4.5.5.a.2 LCO 3.5.5.b	SR 3.5.4.3	Verify RWST boron concentration is ≥ [2000] 2300 ppm and ≤ [2200] 2400 ppm.	7 days	1

Rev. 0

1. The brackets are removed and the proper plant specific information/value is provided.

2. A bracketed Note for SR 3.5.4.1 associated with the effect of ambient air temperature on RWST temperature is not adopted. NAPS RWST borated water is cooled and not maintained at ambient temperature.

CTS

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.5 Seal Injection Flow

LCO 3.4.6.2.e

LCO 3.5.5 Reactor coolant pump seal injection flow shall be ≤ [40] (30) gpm with [centrifugal charging pump discharge header] (RCS) pressure ≥ [2480] (≥ 2215 psig and ≤ 2255) psig and the [charging flow] (seal injection hand) control valve full open. ① ① } ②

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
(Action b) A. Seal injection flow not within limit.	A.1 Adjust manual seal injection throttle valves to give a flow within limit with [centrifugal charging pump discharge header] (RCS) pressure ≥ [2480] (≥ 2215 psig and ≤ 2255) psig and the [charging flow] (seal injection hand) control valve full open.	4 hours ① ② ①
(Action b) B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	6 hours 12 hours

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CTS

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.5.5.1	-------------------NOTE------------------- Not required to be performed until 4 hours after the Reactor Coolant System pressure stabilizes at ≥ [2215 psig and ≤ 2255 psig]. -- Verify manual seal injection throttle valves are adjusted to give a flow within limit with [centrifugal charging pump discharge header] pressure ≥ [2480] psig and the [charging flow] control valve full open.	31 days

4.4.6.2.1.c

RCS

2215 psig and ≤ 2255

seal injection hand

① ② ② ① ①

Rev.0

1. The brackets are removed and the proper plant specific information/value is provided.

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.

CTS

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.6 Boron Injection Tank (BIT)

3.5.4.1 LCO 3.5.6 The BIT shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

	CONDITION	REQUIRED ACTION	COMPLETION TIME
Action	A. BIT inoperable.	A.1 Restore BIT to OPERABLE status.	1 hour
Action	B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 3. AND B.2 Borate to an SDM ~~equivalent to [1]% Δk/k at 200°F.~~ within the limit provided in the COLR AND B.3 Restore BIT to OPERABLE status.	6 hours 6 hours 7 days
Action	C. Required Action and associated Completion Time of Condition B not met.	C.1 Be in MODE 4.	12 hours

(1)

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CTS

SURVEILLANCE REQUIREMENTS

CTS	SURVEILLANCE		FREQUENCY	
4.5.4.1.c LCO 3.5.4.1.c	SR 3.5.6.1	Verify BIT borated water temperature is ≥ [145]°F. 115	24 hours	2
4.5.4.1.a LCO 3.5.4.1.a	SR 3.5.6.2	Verify BIT borated water volume is ≥ [1100] gallons. 900	7 days	2
4.5.4.1.b LCO 3.5.4.1.b	SR 3.5.6.3	Verify BIT boron concentration is ≥ [20,000] ppm and ≤ [22,500] ppm. 12,950 15,750	7 days	2

Rev. 0

1. TSTF-9, Rev. 1, relocated the specific values for Shutdown Margin (SDM) located throughout the Technical Specifications to the Core Operating Limits Report (COLR). SDM is a cycle-specific variable similar to Moderator Temperature Coefficient, Rod Insertion Limits, Axial Flux Difference, Heat Flux Hot Channel Factor, and Nuclear Enthalpy Rise Hot Channel Factor, which are currently contained in the COLR. In addition, there is an NRC-approved methodology for calculating SDM. Relocating SDM to the COLR will provide core design and operational flexibility that can be used for improved fuel management and to solve plant specific issues. If the SDM were contained in the COLR, the core design could be finalized after shutdown, when the actual end of cycle burnup is known. This would save redesign efforts if the actual burnup differs from the projected value. Current reload design efforts and the resolution of plant specific issues are restricted by the guidelines to not change the SDM, since it would result in a License Amendment request. TSTF-9, Rev. 1, was approved by the NRC on September 18, 1996. However, it inadvertently omitted relocating some of the SDM values in the ITS, such as LCO 3.5.6, Boron Injection Tank. A generic change will be submitted correcting this oversight.

2. The brackets are removed and the proper plant specific information/value is provided.

SECTION 3.5 - EMERGENCY CORE COOLING SYSTEMS (ECCS)

IMPROVED STANDARD TECHNICAL SPECIFICATIONS BASES

MARKUP AND JUSTIFICATION FOR DEVIATIONS

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.1 Accumulators

BASES

BACKGROUND

The functions of the ECCS accumulators are to supply water to the reactor vessel during the blowdown phase of a loss of coolant accident (LOCA), to provide inventory to help accomplish the refill phase that follows thereafter, and to provide Reactor Coolant System (RCS) makeup for a small break LOCA.

The blowdown phase of a large break LOCA is the initial period of the transient during which the RCS departs from equilibrium conditions, and heat from fission product decay, hot internals, and the vessel continues to be transferred to the reactor coolant. The blowdown phase of the transient ends when the RCS pressure falls to a value approaching that of the containment atmosphere.

In the refill phase of a large break LOCA, which immediately follows the blowdown phase, reactor coolant inventory has vacated the core through steam flashing and ejection out through the break. The core is essentially in adiabatic heatup. The balance of accumulator inventory is then available to help fill voids in the lower plenum and reactor vessel downcomer so as to establish a recovery level at the bottom of the core and ongoing reflood of the core with the addition of safety injection (SI) water. (5)

The accumulators are pressure vessels partially filled with borated water and pressurized with nitrogen gas. The accumulators are passive components, since no operator or control actions are required in order for them to perform their function. Internal accumulator tank pressure is sufficient to discharge the accumulator contents to the RCS, if RCS pressure decreases below the accumulator pressure.

Each accumulator is piped into an RCS cold leg via an accumulator line and is isolated from the RCS by a motor operated isolation valve and two check valves in series. The motor operated isolation valves are interlocked by P-11 with the pressurizer pressure measurement channels to ensure that the valves will automatically open as RCS pressure increases to above the permissive circuit P-11 setpoint. TSTF-316

(continued)

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BASES

BACKGROUND (continued)

This interlock also prevents inadvertent closure of the valves during normal operation prior to an accident. The valves will automatically open, however, as a result of an SI signal. These features ensure that the valves meet the requirements of the Institute of Electrical and Electronic Engineers (IEEE) Standard 279-1971 (Ref. 1) for "operating bypasses" and that the accumulators will be available for injection without reliance on operator action.

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The accumulator size, water volume, and nitrogen cover pressure are selected so that three of the four accumulators are sufficient to partially cover the core before significant clad melting or zirconium water reaction can occur following a LOCA. The need to ensure that three accumulators are adequate for this function is consistent with the LOCA assumption that the entire contents of one accumulator will be lost via the RCS pipe break during the blowdown phase of the LOCA.

APPLICABLE SAFETY ANALYSES

The accumulators are assumed OPERABLE in both the large and small break LOCA analyses at full power (Ref. 2). These are the Design Basis Accidents (DBAs) that establish the acceptance limits for the accumulators. Reference to the analyses for these DBAs is used to assess changes in the accumulators as they relate to the acceptance limits.

TSTF-3/6

In performing the LOCA calculations, conservative assumptions are made concerning the availability of ECCS flow. In the early stages of a LOCA, with or without a loss of offsite power, the accumulators provide the sole source of makeup water to the RCS. The assumption of loss of offsite power is required by regulations and conservatively imposes a delay wherein the ECCS pumps cannot deliver flow until the emergency diesel generators start, come to rated speed, and go through their timed loading sequence. In cold leg break scenarios, the entire contents of one accumulator are assumed to be lost through the break.

The limiting large break LOCA is a double ended guillotine break at the discharge of the reactor coolant pump. During this event, the accumulators discharge to the RCS as soon as RCS pressure decreases to below accumulator pressure.

(continued)

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BASES

APPLICABLE SAFETY ANALYSES (continued)

As a conservative estimate, no credit is taken for ECCS pump flow until an effective delay has elapsed. This delay accounts for the diesels starting and the pumps being loaded and delivering full flow. The delay time is conservatively set with an additional 2 seconds to account for SI signal generation. During this time, the accumulators are analyzed as providing the sole source of emergency core cooling. No operator action is assumed during the blowdown stage of a large break LOCA.

The worst case small break LOCA analyses also assume a time delay before pumped flow reaches the core. For the larger range of small breaks, the rate of blowdown is such that the increase in fuel clad temperature is terminated solely by the accumulators, with pumped flow then providing continued cooling. As break size decreases, the accumulators and ~~centrifugal charging~~ HHSI pumps both play a part in terminating the rise in clad temperature. As break size continues to decrease, the role of the accumulators continues to decrease until they are not required and the ~~centrifugal charging~~ HHSI pumps become solely responsible for terminating the temperature increase. (2)

This LCO helps to ensure that the following acceptance criteria established for the ECCS by 10 CFR 50.46 (Ref. ~~3~~ 2) will be met following a LOCA: TSTF-316

a. Maximum fuel element cladding temperature is ≤ 2200°F;

b. Maximum cladding oxidation is ≤ 0.17 times the total cladding thickness before oxidation;

c. Maximum hydrogen generation from a zirconium water reaction is ≤ 0.01 times the hypothetical amount that would be generated if all of the metal in the cladding cylinders surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react; and

d. Core is maintained in a coolable geometry.

Since the accumulators discharge during the blowdown phase of a (LB) LOCA, they do not contribute to the long term cooling requirements of 10 CFR 50.46. (5)

For both the large and small break LOCA analyses, a nominal contained accumulator water volume is used. ~~The contained~~ (13)

(continued)

Rev. 0

For small breaks, the accumulator water volume only affects the mass flow rate of water into the RCS since the tanks do not empty for most break sizes analyzed. The assumed water volume has an insignificant effect upon the peak clad temperature.

BASES

APPLICABLE SAFETY ANALYSES (continued)

water volume is the same as the deliverable volume for the accumulators, since the accumulators are emptied, once discharged. For small breaks, an increase in water volume is a peak clad temperature penalty. For large breaks, an increase in water volume can be either a peak clad temperature penalty or benefit, depending on downcomer filling and subsequent spill through the break during the core reflooding portion of the transient. The analysis makes a conservative assumption with respect to ignoring or taking credit for line water volume from the accumulator to the check valve. The safety analysis assumes values of [6468] gallons and [6879] gallons. To allow for instrument inaccuracy, values of [6520] gallons and [6820] gallons are specified. (13) (2) (6)

supports operation with a contained water volume of between 7580 gallons and 7756 gallons per accumulator.

The minimum boron concentration setpoint is used in the post LOCA boron concentration calculation. The calculation is performed to assure reactor subcriticality in a post LOCA environment. Of particular interest is the large break LOCA, since no credit is taken for control rod assembly insertion. A reduction in the accumulator minimum boron concentration would produce a subsequent reduction in the available containment sump concentration for post LOCA shutdown and an increase in the maximum sump pH. The maximum boron concentration is used in determining the cold leg to hot leg recirculation injection switchover time and minimum sump pH.

peak clad temperature (14)

The large and small break LOCA analyses are performed at the minimum nitrogen cover pressure, since sensitivity analyses have demonstrated that higher nitrogen cover pressure results in a computed peak clad temperature benefit. The maximum nitrogen cover pressure limit prevents accumulator relief valve actuation, and ultimately preserves accumulator integrity.

The effects on containment mass and energy releases from the accumulators are accounted for in the appropriate analyses (Refs. 2 and 4). (1) TSTF-316 (2)

The accumulators satisfy Criterion 3 of the NRC Policy Statement. (4)

10 CFR 50.36(c)(2)(ii)

(continued)

The large break LOCA containment analyses assume that the accumulator nitrogen is discharged into the containment, which affects transient subatmospheric pressure. (15)

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BASES (continued)

LCO

The LCO establishes the minimum conditions required to ensure that the accumulators are available to accomplish their core cooling safety function following a LOCA. Four Three accumulators are required to ensure that 100% of the contents of three two of the accumulators will reach the core during a large break LOCA. This is consistent with the assumption that the contents of one accumulator spill through the break. If less than three two accumulators are injected during the blowdown phase of a large break LOCA, the ECCS acceptance criteria of 10 CFR 50.46 (Ref. 3 2) could be violated. TS TF-316

For an accumulator to be considered OPERABLE, the isolation valve must be fully open, power removed above [2000] psig, and the limits established in the SRs for contained volume, boron concentration, and nitrogen cover pressure must be met.

APPLICABILITY

In MODES 1 and 2, and in MODE 3 with RCS pressure > 1000 psig, the accumulator OPERABILITY requirements are based on full power operation. Although cooling requirements decrease as power decreases, the accumulators are still required to provide core cooling as long as elevated RCS pressures and temperatures exist.

This LCO is only applicable at pressures > 1000 psig. At pressures ≤ 1000 psig, the rate of RCS blowdown is such that the ECCS pumps can provide adequate injection to ensure that peak clad temperature remains below the 10 CFR 50.46 (Ref. 3 2) limit of 2200°F. TSTF-316

In MODE 3, with RCS pressure ≤ 1000 psig, and in MODES 4, 5, and 6, the accumulator motor operated isolation valves are closed to isolate the accumulators from the RCS. This allows RCS cooldown and depressurization without discharging the accumulators into the RCS or requiring depressurization of the accumulators.

ACTIONS

A.1

If the boron concentration of one accumulator is not within limits, it must be returned to within the limits within 72 hours. In this Condition, ability to maintain subcriticality or minimum boron precipitation time may be

(continued)

Rev. 0

BASES

ACTIONS

A.1 (continued)

reduced. The boron in the accumulators contributes to the assumption that the combined ECCS water in the partially recovered core during the early reflooding phase of a large break LOCA is sufficient to keep that portion of the core subcritical. One accumulator below the minimum boron concentration limit, however, will have no effect on available ECCS water and an insignificant effect on core subcriticality during reflood. Boiling of ECCS water in the core during reflood concentrates boron in the saturated liquid that remains in the core. In addition, current analysis techniques demonstrate that the accumulators do not discharge following a large main steam line break for the majority of plants. Even if they do discharge, their impact is minor and not a design limiting event. Thus, 72 hours is allowed to return the boron concentration to within limits. (2)

B.1

If one accumulator is inoperable for a reason other than boron concentration, the accumulator must be returned to OPERABLE status within 1 hour. In this Condition, the required contents of three [two] accumulators cannot be assumed to reach the core during a [large break] LOCA. Due to the severity of the consequences should a [large break] LOCA occur in these conditions, the 1 hour Completion Time to open the valve, remove power to the valve, or restore the proper water volume or nitrogen cover pressure ensures that prompt action will be taken to return the inoperable accumulator to OPERABLE status. The Completion Time minimizes the potential for exposure of the plant [time the unit is exposed] to a LOCA under these conditions. (2) (5) (11)

C.1 and C.2

If the accumulator cannot be returned to OPERABLE status within the associated Completion Time, the plant [unit] must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to MODE 3 within 6 hours and pressurizer [RCS] pressure reduced to (2)

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(continued)

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BASES

ACTIONS

C.1 and C.2 (continued)

≤ 1000 psig within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. unit ②

D.1

If more than one accumulator is inoperable, the plant is in a condition outside the accident analyses; therefore, LCO 3.0.3 must be entered immediately. unit ②

SURVEILLANCE REQUIREMENTS

SR 3.5.1.1

Each accumulator isolation valve should be verified to be fully open every 12 hours. This verification ensures that the accumulators are available for injection and ensures timely discovery if a valve should be less than fully open. If an isolation valve is not fully open, the rate of injection to the RCS would be reduced. Although a motor operated valve position should not change with power removed, a closed valve could result in not meeting accident analyses assumptions. This Frequency is considered reasonable in view of other administrative controls that ensure a mispositioned isolation valve is unlikely. ③

SR 3.5.1.2 and SR 3.5.1.3

Every 12 hours, borated water volume and nitrogen cover pressure are verified for each accumulator. This Frequency is sufficient to ensure adequate injection during a LOCA. Because of the static design of the accumulator, a 12 hour Frequency usually allows the operator to identify changes before limits are reached. Operating experience has shown this Frequency to be appropriate for early detection and correction of off normal trends.

(continued)

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BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.1.4

The boron concentration should be verified to be within required limits for each accumulator every 31 days since the static design of the accumulators limits the ways in which the concentration can be changed. The 31 day Frequency is adequate to identify changes that could occur from mechanisms such as stratification or inleakage. Sampling the affected accumulator within 6 hours after a 1% volume increase will identify whether inleakage has caused a reduction in boron concentration to below the required limit. It is not necessary to verify boron concentration if the added water inventory is from the refueling water storage tank (RWST), because the water contained in the RWST is within the accumulator boron concentration requirements. This is consistent with the recommendation of NUREG-1366 (Ref. 8).

SR 3.5.1.5

Verification every 31 days that power is removed from each accumulator isolation valve operator when the pressurizer pressure is ≥ 2000 psig ensures that an active failure could not result in the undetected closure of an accumulator motor operated isolation valve. If this were to occur, only two accumulators would be available for injection given a single failure coincident with a LOCA. Since power is removed under administrative control, the 31 day Frequency will provide adequate assurance that power is removed.

This SR allows power to be supplied to the motor operated isolation valves when pressurizer pressure is < 2000 psig, thus allowing operational flexibility by avoiding unnecessary delays to manipulate the breakers during plant startups or shutdowns. Even with power supplied to the valves, inadvertent closure is prevented by the RCS pressure interlock associated with the valves.

Should closure of a valve occur in spite of the interlock, the SI signal provided to the valves would open a closed valve in the event of a LOCA.

(continued)

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INSERT

Although the run of piping between the two accumulator discharge check valves is credited in demonstrating compliance with Technical Specification 3.5.1 minimum accumulator volume requirement, the minimum boron concentration requirement does not apply to this run of piping. Applicable accident analyses have explicitly considered in-leakage from the RCS, and the resulting reduction in boron concentration in this run of piping, which is not sampled.

BASES (continued)

REFERENCES

1. IEEE Standard 279-1971.
2. FSAR, Chapter [6].
3. 10 CFR 50.46.
4. FSAR, Chapter [15].
5. NUREG-1366, February 1990.

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JUSTIFICATION FOR DEVIATIONS
ITS 3.5.1 BASES - ACCUMULATORS

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

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

3. Changes are made to reflect those changes made to the ISTS.

4. 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(c)(2)(ii).

5. The ISTS Bases do not always differentiate between Large Break and Small Break LOCA. The ITS includes the addition of the term "large break", as appropriate, to clarify which accident the Bases is discussing. This deviation is appropriate because it reflects the NAPS analysis.

6. The ISTS Applicable Safety Analyses discussion regarding the accumulator volume is not accurate with respect to the analysis for NAPS. The analysis employs the Westinghouse methodology for both small and large break LOCA events. For both events, the analysis assumes a total deliverable volume equal to 1000 ft3 per accumulator, which represents the midpoint of the allowable range of 975 ft3 to 1025 ft3. Therefore, the Bases have been revised to include a more accurate discussion of the safety analysis assumptions regarding accumulator volume. This is a plant specific change to reflect the NAPS analysis.

7. ISTS SR 3.5.1.5 states that verifying that removing the power from each accumulator isolation valve operator...ensures that an active failure could not result in the undetected failure of an accumulator motor operated isolation valve. The word "undetected" was not included in the ITS because the verification that power is removed only ensures that the valve does not have power. The requirements of ITS SR 3.5.1.1 and other administrative controls help to ensure that a valve closure does not remain undetected.

8. The NAPS EDGs do not have a timed loading sequence for the ECCS pumps. When the EDG comes up to speed and ties on to the bus, the ECCS pumps are already connected to the bus and become energized. This change is necessary to reflect the NAPS design.

9. The ISTS Bases in the Background Section states that "...the entire contents of one accumulator will be lost via the RCS pipe break during the blowdown phase of the LOCA." The ITS revises the last phrase to specify "large break" LOCA because the entire contents will not be lost for a small break LOCA. This change is made to reflect the NAPS analysis.

10. The ISTS Bases in the Applicable Safety Analysis Section states "In cold leg break scenarios, the entire contents of one accumulator are assumed to be lost through the break." This is revised in the ITS to state "In cold leg large break scenarios..." This clarification is necessary because for small break LOCA situations, the accumulators injects to all lines. This change is made to reflect the NAPS analysis.

11. The ISTS Action B.1 states that the Completion Time minimizes the potential for exposure of the plant to a LOCA under these conditions. In actuality, the Completion Time minimizes the time the plant is exposed to a LOCA under these conditions, not the potential for exposure. Therefore, the ISTS is revised to more accurately reflect the role of the Completion Time.

12. Changes are made to the Bases incorporating information relocated from the CTS Bases.

13. The ISTS Bases in the Applicable Safety Analysis Section discuss the contained and deliverable water volume and the impact of the volume on the peak clad temperature (PCT) during a small break LOCA. The ITS includes revised wording which more accurately reflects the NAPS analysis. For NAPS, most small break LOCAs do not result in the accumulator completely emptying. In addition, for NAPS the assumed water volume has an insignificant effect on the PCT and so the ISTS wording is revised to more accurately reflect the analysis.

14. The ISTS Bases in the Applicable Safety Analysis Section discuss the large and small break LOCA analyses and the fact that they are performed at the minimum nitrogen cover pressure. The ITS qualifies this discussion by stating that this is for the large and small break peak clad temperature analyses as opposed to analysis such as containment performance analysis which might maximize the nitrogen pressure for containment peak pressure concerns. This change is made to accurately represent the NAPS analysis.

15. A discussion is included in the ITS Applicable Safety Analysis Bases to more fully discuss the safety analysis assumptions with respect to accumulator nitrogen pressure. The ISTS only discusses the cover pressure with respect to peak clad temperature. The discussion added to the ITS addresses the safety analysis for nitrogen cover pressure with respect to containment analyses. This change is made to reflect the NAPS analysis.

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.2 ECCS—Operating

BASES

BACKGROUND

The function of the ECCS is to provide core cooling and negative reactivity to ensure that the reactor core is protected after any of the following accidents:

a. Loss of coolant accident (LOCA), coolant leakage greater than the capability of the normal charging system; Rupture of a control rod drive mechanism - control (2)

b. Rod ejection accident; assembly

c. Loss of secondary coolant accident, including uncontrolled steam release or loss of feedwater; and

d. Steam generator tube rupture (SGTR).

The addition of negative reactivity is designed primarily for the loss of secondary coolant accident where primary cooldown could add enough positive reactivity to achieve criticality and return to significant power. Main Steam Line Break (MSLB) (2)

There are three phases of ECCS operation: injection, cold leg recirculation, and hot leg recirculation. In the injection phase, water is taken from the refueling water storage tank (RWST) and injected into the Reactor Coolant System (RCS) through the cold legs. When sufficient water is removed from the RWST to ensure that enough boron has been added to maintain the reactor subcritical and the containment sumps have enough water to supply the required net positive suction head to the ECCS pumps, suction is switched to the containment sump for cold leg recirculation. (10) After approximately 24 hours, the ECCS flow is shifted to the hot leg recirculation phase to provide a backflush, which would reduce the boiling in the top of the core and any resulting boron precipitation. (2)

The ECCS consists of three (two) separate subsystems: centrifugal charging (high head), safety injection (SI) (intermediate head), and residual heat removal (RHR) (low head). Each subsystem consists of two redundant, 100% capacity trains. The ECCS accumulators and the RWST are also part of the (1)

High Head Safety Injection (HHSI)

Low Head Safety Injection (LHSI)

(continued)

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BASES

BACKGROUND (continued)

ECCS, but are not considered part of an ECCS flow path as described by this LCO.

The ECCS flow paths consist of piping, valves, heat exchangers, and pumps such that water from the RWST can be injected into the RCS following the accidents described in this LCO. The major components of each subsystem are the centrifugal charging pumps, the RHR pumps, heat exchangers, and the SI pumps. Each of the three subsystems consists of two 100% capacity trains that are interconnected and redundant such that either train is capable of supplying 100% of the flow required to mitigate the accident consequences. This interconnecting and redundant subsystem design provides the operators with the ability to utilize components from opposite trains to achieve the required 100% flow to the core.

During the injection phase of LOCA recovery, a suction header supplies water from the RWST to the ECCS pumps. Separate piping supplies each subsystem and each train within the subsystem. The discharge from the centrifugal charging pumps combines prior to entering the boron injection tank (BIT) (if the plant utilizes a BIT) and then divides again into four supply lines, each of which feeds the injection line to one RCS cold leg. The discharge from the SI and RHR pumps divides and feeds an injection line to each of the RCS cold legs. Control valves are set to balance the flow to the RCS. This balance ensures sufficient flow to the core to meet the analysis assumptions following a LOCA in one of the RCS cold legs.

For LOCAs that are too small to depressurize the RCS below the shutoff head of the SI pumps, the centrifugal charging pumps supply water until the RCS pressure decreases below the SI pump shutoff head. During this period, the steam generators are used to provide part of the core cooling function.

During the recirculation phase of LOCA recovery, RHR pump suction is transferred to the containment sump. The RHR pumps then supply the other ECCS pumps. Initially, recirculation is through the same paths as the injection phase. Subsequently, recirculation alternates injection between the hot and cold legs.

(continued)

Handwritten markup: HHSI; LHSI; two; Insert; HHSI; three; in the HHSI lines; and preclude pump runout; HHSI; LH; LHSI; HHSI; (1); (2); Rev. 0

Insert: LHSI pumps combine and then divide into three supply lines, each of which feeds the injection line to one RCS cold leg.

INSERT

Water from the supply header enters the LHSI pumps through parallel, normally open, motor operated valves. Water to the HHSI pumps is supplied via parallel motor operated valves to ensure that at least one valve opens on receipt of a safety injection actuation signal. The supply header then branches to the three HHSI pumps through normally open, motor operated valves.

BASES

HHSI

BACKGROUND (continued)

The centrifugal charging subsystem of the ECCS also functions to supply borated water to the reactor core following increased heat removal events, such as a main steam line break (MSLB). The limiting design conditions occur when the negative moderator temperature coefficient is highly negative, such as at the end of each cycle. 1 5 an

During low temperature conditions in the RCS, limitations are placed on the maximum number of ECCS pumps that may be OPERABLE. Refer to the Bases for LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System," for the basis of these requirements. 3

INSERT 16

The ECCS subsystems are actuated upon receipt of an SI signal. The actuation of safeguard loads is accomplished in a programmed time sequence. If offsite power is available, the safeguard loads start immediately in the programmed sequence. If offsite power is not available, the Engineered Safety Feature (ESF) buses shed normal operating loads and are connected to the emergency diesel generators (EDGs). Safeguard loads are then actuated in the programmed time sequence. The time delay associated with diesel starting, sequenced loading, and pump starting determines the time required before pumped flow is available to the core following a LOCA. 14

The active ECCS components, along with the passive accumulators and the RWST covered in LCO 3.5.1, "Accumulators," and LCO 3.5.4, "Refueling Water Storage Tank (RWST)," provide the cooling water necessary to meet GDC 35 (Ref. 1). Reference 1 18

APPLICABLE SAFETY ANALYSES

The LCO helps to ensure that the following acceptance criteria for the ECCS, established by 10 CFR 50.46 (Ref. 2), will be met following a LOCA:

a. Maximum fuel element cladding temperature is ≤ 2200°F;

b. Maximum cladding oxidation is ≤ 0.17 times the total cladding thickness before oxidation;

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HHSI pumps A and B are capable of being automatically started and are powered from separate emergency buses. HHSI pump C can only be manually started, but can be powered from either of the emergency buses that HHSI pumps A and B are powered from. An interlock prevents HHSI pump C from being powered from both emergency buses simultaneously. For HHSI pump C to be OPERABLE, it must be running since it does not start automatically. In the event of a Safety Injection signal coincident with a loss of offsite power, interlocks prevent automatic operation of two HHSI pumps on the same emergency bus to prevent overloading the emergency diesel generators. HHSI pump C is normally either running, or available but not running. HHSI pump C is normally running if either HHSI pump A or B is inoperable or both are otherwise preferred to not be in operation. HHSI pump C is normally available but not running when either HHSI pump A or B is running.

BASES

APPLICABLE SAFETY ANALYSES (continued)

c. Maximum hydrogen generation from a zirconium water reaction is ≤ 0.01 times the hypothetical amount generated if all of the metal in the cladding cylinders surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react;

d. Core is maintained in a coolable geometry; and

e. Adequate long term core cooling capability is maintained.

The LCO also limits the potential for a post trip return to power following an MSLB event and ensures that containment temperature limits are met.

Each ECCS subsystem is taken credit for in a large break LOCA event at full power (Refs. 3 and 4). This event establishes the requirement for runout flow for the ECCS pumps, as well as the maximum response time for their actuation. The centrifugal charging pumps and SI pumps are credited in a small break LOCA event. This event establishes the flow and discharge head at the design point for the centrifugal charging pumps. The SGTR and MSLB events also credit the centrifugal charging pumps. The OPERABILITY requirements for the ECCS are based on the following LOCA analysis assumptions:

a. A large break LOCA event, with loss of offsite power and a single failure disabling one RHR pump (both EDG trains are assumed to operate due to requirements for modeling full active containment heat removal system operation); and

b. A small break LOCA event, with a loss of offsite power and a single failure disabling one ECCS train.

During the blowdown stage of a LOCA, the RCS depressurizes as primary coolant is ejected through the break into the containment. The nuclear reaction is terminated either by moderator voiding during large breaks or control rod insertion for small breaks. Following depressurization, emergency cooling water is injected into the cold legs, flows into the downcomer, fills the lower plenum, and refloods the core.

(continued)

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BASES

APPLICABLE SAFETY ANALYSES (continued)

The effects on containment mass and energy releases are accounted for in appropriate analyses (Refs. 3 and 4). The LCO ensures that an ECCS train will deliver sufficient water to match boiloff rates soon enough to minimize the consequences of the core being uncovered following a large LOCA. It also ensures that the centrifugal charging and SI pumps will deliver sufficient water and boron during a small LOCA to maintain core subcriticality. For smaller LOCAs, the centrifugal charging pump delivers sufficient fluid to maintain RCS inventory. For a small break LOCA, the steam generators continue to serve as the heat sink, providing part of the required core cooling.

The ECCS trains satisfy Criterion 3 of the NRC Policy Statement.

LCO

In MODES 1, 2, and 3, two independent (and redundant) ECCS trains are required to ensure that sufficient ECCS flow is available, assuming a single failure affecting either train. Additionally, individual components within the ECCS trains may be called upon to mitigate the consequences of other transients and accidents.

In MODES 1, 2, and 3, an ECCS train consists of a centrifugal charging subsystem, an SI subsystem, and an RHR subsystem. Each train includes the piping, instruments, and controls to ensure an OPERABLE flow path capable of taking suction from the RWST upon an SI signal and automatically transferring suction to the containment sump.

During an event requiring ECCS actuation, a flow path is required to provide an abundant supply of water from the RWST to the RCS via the ECCS pumps and their respective supply headers to each of the four cold leg injection nozzles. In the long term, this flow path may be switched to take its supply from the containment sump and to supply its flow to the RCS hot and cold legs.

The flow path for each train must maintain its designed independence to ensure that no single failure can disable both ECCS trains.

(continued)

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BASES (continued)

APPLICABILITY

In MODES 1, 2, and 3, the ECCS OPERABILITY requirements for the limiting Design Basis Accident, a large break LOCA, are based on full power operation. Although reduced power would not require the same level of performance, the accident analysis does not provide for reduced cooling requirements in the lower MODES. The centrifugal charging pump performance is based on a small break LOCA, which establishes the pump performance curve and has less dependence on power. The SI pump performance requirements are based on a small break LOCA. MODE 2 and MODE 3 requirements are bounded by the MODE 1 analysis. (7) (9)

This LCO is only applicable in MODE 3 and above. Below MODE 3, the SI signal setpoint is manually bypassed by operator control, and system functional requirements are relaxed as described in LCO 3.5.3, "ECCS—Shutdown." (15)

As indicated in Note 1, the flow path may be isolated for 2 hours in MODE 3, under controlled conditions, to perform pressure isolation valve testing per SR 3.4.14.1. The flow path is readily restorable from the control room.

As indicated in Note 2, operation in MODE 3 with ECCS trains declared inoperable pursuant to LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System," is necessary for plants with an LTOP arming temperature at or near the MODE 3 boundary temperature of 350°F. LCO 3.4.12 requires that certain pumps be rendered inoperable at and below the LTOP arming temperature. When this temperature is at or near the MODE 3 boundary temperature, time is needed to restore the inoperable pumps to OPERABLE status. (3)

In MODES 5 and 6, plant conditions are such that the probability of an event requiring ECCS injection is extremely low. Core cooling requirements in MODE 5 are addressed by LCO 3.4.7, "RCS Loops—MODE 5, Loops Filled," and LCO 3.4.8, "RCS Loops—MODE 5, Loops Not Filled." MODE 6 core cooling requirements are addressed by LCO 3.9.5, "Residual Heat Removal (RHR) and Coolant Circulation—High Water Level," and LCO 3.9.6, "Residual Heat Removal (RHR) and Coolant Circulation—Low Water Level." (2)

(continued)

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BASES (continued)

ACTIONS

A.1

With one or more trains inoperable and at least 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available, the inoperable components must be returned to OPERABLE status within 72 hours. The 72 hour Completion Time is based on an NRC reliability evaluation (Ref. 5) and is a reasonable time for repair of many ECCS components.

An ECCS train is inoperable if it is not capable of delivering design flow to the RCS. Individual components are inoperable if they are not capable of performing their design function or supporting systems are not available.

The LCO requires the OPERABILITY of a number of independent subsystems. Due to the redundancy of trains and the diversity of subsystems, the inoperability of one (active) component in a train does not render the ECCS incapable of performing its function. Neither does the inoperability of two different components, each in a different train, necessarily result in a loss of function for the ECCS (e.g., an inoperable HHSI pump in one train, and an inoperable LHSI pump in the other). The intent of this Condition is to maintain a combination of equipment such that 100% of the ECCS flow equivalent to a single OPERABLE ECCS train remains available. This allows increased flexibility in plant (unit) operations under circumstances when components in opposite trains are inoperable. (6) (12) TSTF-325 (2)

An event accompanied by a loss of offsite power and the failure of an EDG can disable one ECCS train until power is restored. A reliability analysis (Ref. 5) has shown that the impact of having one full ECCS train inoperable is sufficiently small to justify continued operation for 72 hours.

Reference 6 describes situations in which one component, such as an RHR crossover valve, can disable both ECCS trains. With one or more component(s) inoperable such that 100% of the flow equivalent to a single OPERABLE ECCS train is not available, the facility is in a condition outside the accident analysis. Therefore, LCO 3.0.3 must be immediately entered. (2)

(continued)

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BASES

ACTIONS (continued)

B.1 and B.2

If the inoperable trains cannot be returned to OPERABLE status within the associated Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to MODE 3 within 6 hours and MODE 4 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

Insert

unit (2)

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SURVEILLANCE REQUIREMENTS

SR 3.5.2.1

Verification of proper valve position ensures that the flow path from the ECCS pumps to the RCS is maintained. Misalignment of these valves could render both ECCS trains inoperable. Securing these valves in position by removal of power or by key locking the control in the correct position ensures that they cannot change position as a result of an active failure or be inadvertently misaligned. These valves are of the type described in Reference 6, that can disable the function of both ECCS trains and invalidate the accident analyses. A 12 hour Frequency is considered reasonable in view of other administrative controls that will ensure a mispositioned valve is unlikely.

(2)

SR 3.5.2.2

Verifying the correct alignment for manual, power operated, and automatic valves in the ECCS flow paths provides assurance that the proper flow paths will exist for ECCS operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since these were verified to be in the correct position prior to locking, sealing, or securing. A valve that receives an actuation signal is allowed to be in a nonaccident position provided the valve will automatically reposition within the proper stroke time. This Surveillance does not require any testing or valve manipulation. Rather, it involves verification that those valves capable of being mispositioned are in the correct position. The 31 day Frequency is appropriate because the valves are operated

(continued)

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INSERT

C.1

Condition A is applicable with one or more trains inoperable. The allowed Completion Time is based on the assumption that at least 100% of the ECCS flow equivalent to a single OPERABLE ECCS train is available. With less than 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available, the facility is in a condition outside of the accident analyses. Therefore, LCO 3.0.3 must be entered immediately.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.2.2 (continued)

under administrative control, and an improper valve position would only affect a single train. This Frequency has been shown to be acceptable through operating experience.

SR 3.5.2.3

(some) (sufficiently)

With the exception of the operating centrifugal charging pump, the ECCS pumps are normally in a standby, nonoperating mode. As such, flow path piping has the potential to develop voids and pockets of entrained gases. Maintaining the piping from the ECCS pumps to the RCS full of water ensures that the system will perform properly, injecting its full capacity into the RCS upon demand. This will also prevent water hammer, pump cavitation, and pumping of (excess) noncondensible gas (e.g., air, nitrogen, or hydrogen) into the reactor vessel following an SI signal or during shutdown cooling. The 31 day Frequency takes into consideration the gradual nature of gas accumulation in the ECCS piping and the procedural controls governing system operation. INSERT (17) (92) (19) (17)

(of the postulated void generation mechanism)

SR 3.5.2.4

Periodic surveillance testing of ECCS pumps to detect gross degradation caused by impeller structural damage or other hydraulic component problems is required by Section XI of the ASME Code. This type of testing may be accomplished by measuring the pump developed head at only one point of the pump characteristic curve. This verifies both that the measured performance is within an acceptable tolerance of the original pump baseline performance and that the performance at the test flow is greater than or equal to the performance assumed in the plant safety analysis. SRs are specified in the Inservice Testing Program, which encompasses Section XI of the ASME Code. Section XI of the ASME Code provides the activities and Frequencies necessary to satisfy the requirements. (2)

SR 3.5.2.5 and SR 3.5.2.6

These Surveillances demonstrate that each automatic ECCS valve actuates to the required position on an actual or

(continued)

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INSERT

Plant operating experience and analysis has shown that after proper system filling (following maintenance or refueling outages), some entrained noncondensable gases remain. These gases will form small voids, which remain stable in the system in both normal and transient operation. Mechanisms postulated to increase the void size are gradual in nature, and the system is operated in accordance with procedures to preclude growth in these voids.

To provide additional assurance that the system will function, a verification is performed every 92 days that the system is sufficiently full of water. The system is sufficiently full of water when the voids and pockets of entrained gases in the ECCS piping are small enough in size and number so as to not interfere with the proper operation of the ECCS. Verification that the ECCS piping is sufficiently full of water can be performed by venting the necessary high point ECCS vents outside containment, using NDE, or using other Engineering-justified means.

capable of starting automatically

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.2.5 and SR 3.5.2.6 (continued) (3)

simulated SI signal and that each ECCS pump starts on receipt of an actual or simulated SI signal. This Surveillance is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative controls. The 18 month Frequency is based on the need to perform these Surveillances under the conditions that apply during a plant outage and the potential for unplanned plant transients if the Surveillances were performed with the reactor at power. The 18 month Frequency is also acceptable based on consideration of the design reliability (and confirming operating experience) of the equipment. The actuation logic is tested as part of ESF Actuation System testing, and equipment performance is monitored as part of the Inservice Testing Program. unit (2)

SR 3.5.2.7 Proper throttle valve position (13)

Realignment of valves in the flow path on an SI signal is necessary for proper ECCS performance. These valves have stops to allow proper positioning for restricted flow to a ruptured cold leg, ensuring that the other cold legs receive at least the required minimum flow. This Surveillance is not required for plants with flow limiting orifices. The 18 month Frequency is based on the same reasons as those stated in SR 3.5.2.5 and SR 3.5.2.6. (2) (2) (11)

and to prevent pump runout and subsequent component damage

The Surveillance verifies each listed ECCS throttle valve is secured in the correct position.

SR 3.5.2.8

Periodic inspections of the containment sump suction inlet ensure that it is unrestricted and stays in proper operating condition. The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage, on the need to have access to the location, and because of the potential for an unplanned transient if the Surveillance were performed with the reactor at power. This Frequency has been found to be sufficient to detect abnormal degradation and is confirmed by operating experience. and unit (2) (10)

(continued)

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BASES (continued)

UFSAR, Section 3.1.3.1.

18

REFERENCES

1. 10 CFR 50, Appendix A, GDC 35.
2. 10 CFR 50.46.
3. UFSAR, Section 15.4.1 Section 6.2 and 2
4. UFSAR, Chapter 15, "Accident Analysis." 2
5. NRC Memorandum to V. Stello, Jr., from R.L. Baer, "Recommended Interim Revisions to LCOs for ECCS Components," December 1, 1975.
6. IE Information Notice No. 87-01. 2

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JUSTIFICATION FOR DEVIATIONS
ITS 3.5.2 - ECCS - OPERATING

1. The North Anna ECCS system consists of two trains of High Head Safety Injection (HHSI) and two trains of Low Head Safety Injection (LHSI). A Boron Injection Tank (BIT) is used. The HHSI trains are also used for normal charging. In their ECCS capacity, the HHSI pumps are also referred to as High Head Safety Injection (HHSI) pumps. Unlike the model plant used in NUREG-1431, the LHSI system is not shared with the Residual Heat Removal (RHR) system. The LHSI system provides water to the HHSI pumps to assure sufficient NPSH. Also unlike NUREG-1431, there are no intermediate pressure pumps (referred to as Safety Injection pumps) and there are no heat exchangers in the ECCS system. The recirculation mode heat exchangers are in the Recirculation Spray system. North Anna has three RCS loops, so there are three injection points per loop for the ECCS. Changes have been made to the Bases to reflect these differences.

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

3. Changes are made to reflect those changes made to the ISTS. The following requirements are renumbered or revised, where applicable, to reflect the changes.

4. 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(c)(2)(ii).

5. Editorial change made for consistency with similar phrases in other parts of the ITS Bases.

6. The term "active" is inserted in the Action A.1 Bases discussion to reflect that the NAPS design only accommodates failure of an active component.

7. Statements regarding specific accidents representing the design basis of ECCS pumps have been corrected. The ECCS pumps design characteristics are inputs to the accident analysis, not outputs.

8. The North Anna Main Steam Line Break (MSLB) analysis (UFSAR 15.4.2) shows that there is a brief post trip return to power until the ECCS borated water enters the core. Statements in the Bases to the contrary are revised.

9. The Applicability Section of ISTS B 3.5.2 states: "The SI pump performance requirements are based on a small break LOCA." The Applicable Safety Analysis Section states: "The centrifugal charging pumps and SI pumps are credited in a small break LOCA event." The NAPS design does not include a separate set of pumps, called SI pumps for intermediate head injection, as is assumed by the ISTS. Therefore, the ISTS information has been revised to reference the LHSI pumps and

state that their pump performance requirements are based on the large break LOCA, and deleting reference to the SI pumps for a small break LOCA. This is a plant specific change to reflect the NAPS design.

10. SR 3.5.2.8 requires a visual inspection of the containment sump suction inlet every 18 months. The Bases for this Surveillance Frequency states that the SR should be performed under conditions that apply during a plant outage, the need to have access to the location and because of the potential for an unplanned transient if the Surveillance were performed with the reactor at power. The last justification is incorrect and is removed. A visual inspection of the containment sump inlet could not result in an unplanned transient. However, the containment conditions (temperature, pressure, and radiation) are such that performance of the inspection should be conducted during a plant outage.

11. Editorial change made for enhanced clarity or to be consistent with the ISTS Writers Guide.

12. An example is added to the ISTS Bases for Action A.1 to provide clarification of the intent of the Action.

13. Information is moved from the current Technical Specifications to the Bases.

14. The NAPS EDGs do not sequence on the ECCS loads. The ECCS loads are already on the emergency bus such that when the EDG comes up to speed and ties on to the bus, the loads are energized. This change is necessary to reflect the NAPS design.

15. The ISTS Bases in the Applicability Section discusses that below MODE 3 the SI signal is manually bypassed. This bypass actually occurs at 2000 psig, which would still be in MODE 3. The ITS revises this wording to remove the implication that SI is bypassed once conditions are below MODE 3.

16. The NAPS HHSI pumps include one pump that can only be manually started. A paragraph is added to describe the operation of the manual start HHSI pump and the HHSI pumps capable of being automatically started.

17. Surveillance Requirement (SR) 3.5.2.3 is modified to add the word "sufficiently," so that the SR reads, "Verify ECCS piping is sufficiently full of water." Plant operating experience and engineering analysis has shown that after initial filling of the ECCS piping, some noncondensible gases remain. The gases will form small voids in the ECCS piping. The ECCS piping contents are stable and the ECCS will perform its function when required. Performing the SR every 92 days does not verify the ECCS piping completely filled with water, but provides an added degree of assurance that the piping is sufficiently full of water to allow the ECCS to perform its function when required. There is no requirement for this Surveillance in the CTS.

18. 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.

19. A Frequency of 92 days is adopted for SR 3.5.2.3 to verify that ECCS piping is sufficiently full of water. The 92 day Frequency has been determined to be adequate based on plant operating experience and engineering analysis. Performing the SR every 92 days does not verify the ECCS piping completely filled with water, but provides an added degree of assurance that the piping is sufficiently full of water to allow the ECCS to perform its function when required. There is no requirement for this Surveillance in the CTS.

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.3 ECCS—Shutdown

BASES

BACKGROUND

The Background section for Bases 3.5.2, "ECCS—Operating," is applicable to these Bases, with the following modifications. (High Head Safety Injection (HHSI))

In MODE 4, the required ECCS train consists of two separate subsystems: centrifugal charging (high head) and residual heat removal (RHR) (low head). (Low Head Safety Injection (LHSI)) ② ①

The ECCS flow paths consist of piping, valves, heat exchangers, and pumps such that water from the refueling water storage tank (RWST) can be injected into the Reactor Coolant System (RCS) following the accidents described in Bases 3.5.2. ⑤

APPLICABLE SAFETY ANALYSES

The Applicable Safety Analyses section of Bases 3.5.2 also applies to this Bases section.

Due to the stable conditions associated with operation in MODE 4 and the reduced probability of occurrence of a Design Basis Accident (DBA), the ECCS operational requirements are reduced. It is understood in these reductions that certain automatic safety injection (SI) actuation is not available. In this MODE, sufficient time exists for manual actuation of the required ECCS to mitigate the consequences of a DBA. (The safety analysis assumes that flow from one HHSI pump is manually initiated 10 minutes after the DBA) ⑥

Only one train of ECCS is required for MODE 4. This requirement dictates that single failures are not considered during this MODE of operation. The ECCS trains satisfy Criterion 3 of the NRC Policy Statement. (10 CFR 50.36(c)(2)(ii)) ④

LCO

In MODE 4, one of the two independent (and redundant) ECCS trains is required to be OPERABLE to ensure that sufficient ECCS flow is available to the core following a DBA.

In MODE 4, an ECCS train consists of a centrifugal charging (HHSI) subsystem and an RHR (LHSI) subsystem. Each train includes the piping, instruments, and controls to ensure an OPERABLE flow ② ①

(continued)

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BASES

LCO (continued)

path capable of taking suction from the RWST and transferring suction to the containment sump.

During an event requiring ECCS actuation, a flow path is required to provide an abundant supply of water from the RWST to the RCS via the ECCS pumps and their respective supply headers to each of the four cold leg injection nozzles. In the long term, this flow path may be switched to take its supply from the containment sump and to deliver its flow to the RCS hot and cold legs. three (2) or (2)

APPLICABILITY

In MODES 1, 2, and 3, the OPERABILITY requirements for ECCS are covered by LCO 3.5.2.

In MODE 4 with RCS temperature below 350°F, one OPERABLE ECCS train is acceptable without single failure consideration, on the basis of the stable reactivity of the reactor and the limited core cooling requirements.

In MODES 5 and 6, plant conditions are such that the probability of an event requiring ECCS injection is extremely low. Core cooling requirements in MODE 5 are addressed by LCO 3.4.7, "RCS Loops—MODE 5, Loops Filled," and LCO 3.4.8, "RCS Loops—MODE 5, Loops Not Filled." MODE 6 core cooling requirements are addressed by LCO 3.9.5, "Residual Heat Removal (RHR) and Coolant Circulation—High Water Level," and LCO 3.9.6, "Residual Heat Removal (RHR) and Coolant Circulation—Low Water Level." unit (2)

ACTIONS

A.1

With no ECCS RHR subsystem OPERABLE, the plant is not prepared to respond to a loss of coolant accident or to continue a cooldown using the RHR pumps and heat exchangers. The Completion Time of immediately to initiate actions that would restore at least one ECCS RHR subsystem to OPERABLE status ensures that prompt action is taken to restore the required cooling capacity. Normally, in MODE 4, reactor decay heat is removed from the RCS by an RHR loop. If no RHR loop is OPERABLE for this function, reactor decay heat must be removed by some alternate method, such as use of the steam generators. The alternate means of heat removal must (1)

(continued)

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BASES

ACTIONS

A.1 (continued)

continue until the inoperable RHR loop components can be restored to operation so that decay heat removal is continuous.

With both RHR pumps and heat exchangers inoperable, it would be unwise to require the plant to go to MODE 5, where the only available heat removal system is the RHR. Therefore, the appropriate action is to initiate measures to restore one ECCS RHR subsystem and to continue the actions until the subsystem is restored to OPERABLE status. (1)

A B.1

With no ECCS high head subsystem OPERABLE, due to the inoperability of the centrifugal charging pump or flow path from the RWST, the plant is not prepared to provide high pressure response to Design Basis Events requiring SI. The 1 hour Completion Time to restore at least one ECCS high head subsystem to OPERABLE status ensures that prompt action is taken to provide the required cooling capacity or to initiate actions to place the plant in MODE 5, where an ECCS train is not required. (2) (3) (2) (3) (2)

B C.1

When the Required Actions of Condition B cannot be completed within the required Completion Time, a controlled shutdown should be initiated. Twenty-four hours is a reasonable time, based on operating experience, to reach MODE 5 in an orderly manner and without challenging plant systems or operators. (3) (7) (2)

SURVEILLANCE REQUIREMENTS

SR 3.5.3.1

The applicable Surveillance descriptions from Bases 3.5.2 apply. This SR is modified by a Note that allows an RHR train to be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned (remote or local) to the ECCS mode of (1)

(continued)

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BASES

SURVEILLANCE REQUIREMENTS	SR 3.5.3.1 (continued) operation and not otherwise inoperable. This allows operation in the RHR mode during MODE 4, if necessary. (1)
REFERENCES	The applicable references from Bases 3.5.2 apply.

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1. The Bases for ISTS Specification 3.5.3 are written for a plant that uses a LHSI system that also serves as the Residual Heat Removal (RHR) system. For NAPS, the LHSI and RHR are independent systems. Therefore, the discussion regarding the RHR function of decay heat removal is not appropriate for ITS 3.5.3. The Bases for ITS 3.5.3 have been revised to reflect the NAPS specific ECCS design.

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

3. Changes are made to reflect those changes made to the ISTS. The following requirements are renumbered or revised, where applicable, to reflect the changes.

4. 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(c)(2)(ii).

5. The ISTS Bases Background discusses heat exchangers in the ECCS flow paths. The North Anna design does not utilize heat exchangers in the ECCS system. Therefore, the discussion has been eliminated.

6. A discussion is added to the ISTS Applicable Safety Analysis Section to define the ISTS wording of "sufficient time". This is a plant specific discussion to inform the operators of the duration assumed in the safety analyses to take manual operator action to mitigate the consequences of an accident.

7. The Bases of the Action to take when Required Actions cannot be completed is changed to state that the unit must be brought to MODE 5. This is a more accurate description than the ISTS statement that a controlled shutdown should be initiated since the LCO only applies during shutdown.

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.4 Refueling Water Storage Tank (RWST)

BASES

BACKGROUND

The RWST supplies borated water to the Chemical and Volume Control System (CVCS) during abnormal operating conditions, to the refueling pool during refueling, and to the ECCS and the Containment Spray System during accident conditions. (Quench) ①

(Insert) The RWST supplies both trains of the ECCS and the Containment Spray System through separate, redundant supply headers during the injection phase of a loss of coolant accident (LOCA) recovery. A motor operated isolation valve is provided in each header to isolate the RWST from the ECCS once the system has been transferred to the recirculation mode. The recirculation mode is entered when pump suction is transferred to the containment sump (either manually or automatically) following receipt of the RWST—Low Low (Level 1) (level) signal. Use of a single RWST to supply both trains of the ECCS and Containment (Quench) Spray System is acceptable since the RWST is a passive component, and passive failures are not required to be assumed to occur coincidentally with (during the time the RWST is needed following) Design Basis Events. (used for a short period of time following an accident) ② ② ①

The switchover from normal operation to the injection phase of ECCS operation requires changing centrifugal charging (HHSI) pump suction from the CVCS volume control tank (VCT) to the RWST through the use of isolation valves. Each set of isolation valves is interlocked so that the VCT isolation valves will begin to close once the RWST isolation valves are fully open. Since the VCT is under pressure, the preferred pump suction will be from the VCT until the tank is isolated. This will result in a delay in obtaining the RWST borated water. The effects of this delay are discussed in the Applicable Safety Analyses section of these Bases. ② ⑦

During normal operation in MODES 1, 2, and 3, the safety (LHSI) injection (SI) and residual heat removal (RHR) pumps are aligned to take suction from the RWST. ①

The ECCS and Containment Spray System pumps are provided with recirculation lines that ensure each pump can maintain minimum flow requirements when operating at or near shutoff head conditions. ①

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INSERT

The RWST supplies water to the ECCS pumps through a common supply header. Water from the supply header enters the low head safety injection (LHSI) pumps through parallel, normally open, motor operated valves. Water to the high head safety injection (HHSI) pumps is supplied via parallel motor operated valves to ensure that at least one opens on receipt of a safety injection actuation signal. The supply header then branches to the three HHSI pumps. The RWST supplies water to the Quench Spray pumps via separate, redundant lines.

BASES

BACKGROUND (continued)

When the suction for the ECCS and Containment Spray System pumps is transferred to the containment sump, the RWST flow paths must be isolated to prevent a release of the containment sump contents to the RWST, which could result in a release of contaminants to the atmosphere and the eventual loss of suction head for the ECCS pumps.

This LCO ensures that:

a. The RWST contains sufficient borated water to support the ECCS during the injection phase;

b. Sufficient water volume exists in the containment sump to support continued operation of the ECCS and Containment Spray System pumps at the time of transfer to the recirculation mode of cooling; and

c. The reactor remains subcritical following a LOCA.

Insufficient water in the RWST could result in insufficient cooling capacity when the transfer to the recirculation mode occurs. Improper boron concentrations could result in a reduction of SDM or excessive boric acid precipitation in the core following the LOCA, as well as excessive caustic stress corrosion of mechanical components and systems inside the containment.

APPLICABLE SAFETY ANALYSES

During accident conditions, the RWST provides a source of borated water to the ECCS and Containment Spray System pumps. As such, it provides containment cooling and depressurization, core cooling, and replacement inventory and is a source of negative reactivity for reactor shutdown (Ref. 1). The design basis transients and applicable safety analyses concerning each of these systems are discussed in the Applicable Safety Analyses section of B 3.5.2, "ECCS—Operating"; B 3.5.3, "ECCS—Shutdown"; and B 3.6.6, "Containment Spray and Cooling Systems." These analyses are used to assess changes to the RWST in order to evaluate their effects in relation to the acceptance limits in the analyses.

The RWST must also meet volume, boron concentration, and temperature requirements for non-LOCA events. The volume is not an explicit assumption in non-LOCA events since the

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

required volume is a small fraction of the available volume. The deliverable volume limit is set by the LOCA and containment analyses. For the RWST, the deliverable volume is different from the total volume contained since, due to the design of the tank, more water can be contained than can be delivered. The minimum boron concentration is an explicit assumption in the main steam line break (MSLB) analysis to ensure the required shutdown capability. The importance of its value is small for units with a boron injection tank (BIT) with a high boron concentration. For units with no BIT or reduced BIT boron requirements, the minimum boron concentration limit is an important assumption in ensuring the required shutdown capability. The maximum boron concentration is an explicit assumption in the inadvertent ECCS actuation analysis, although it is typically a nonlimiting event and the results are very insensitive to boron concentrations. The maximum temperature ensures that the amount of cooling provided from the RWST during the heatup phase of a feedline break is consistent with safety analysis assumptions; the minimum is an assumption in both the MSLB and inadvertent ECCS actuation analyses, although the inadvertent ECCS actuation event is typically nonlimiting.

The MSLB analysis has considered a delay associated with the interlock between the VCT and RWST isolation valves, and the results show that the departure from nucleate boiling design basis is met. The delay has been established as [27] seconds, with offsite power available, or [37] seconds without offsite power. This response time includes [2] seconds for electronics delay, a [15] second stroke time for the RWST valves, and a [10] second stroke time for the VCT valves. Plants with a BIT need not be concerned with the delay since the BIT will supply highly borated water prior to RWST switchover, provided the BIT is between the pumps and the core.

For a large break LOCA analysis, the minimum water volume limit of [466,200] gallons and the lower boron concentration limit of [2000] ppm are used to compute the post LOCA sump boron concentration necessary to assure subcriticality. The large break LOCA is the limiting case since the safety analysis assumes that all control rods are out of the core.

The upper limit on boron concentration of [2200] ppm is used to determine the maximum allowable time to switch to hot leg

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BASES

APPLICABLE SAFETY ANALYSES (continued)

recirculation following a LOCA. The purpose of switching from cold leg to hot leg injection is to avoid boron precipitation in the core following the accident.

In the ECCS analysis, the containment (quench) spray temperature is assumed to be equal to (bounded by) the RWST lower temperature limit of [35] (40)°F. If the lower temperature limit is violated, the containment (quench) spray further reduces containment pressure, which decreases the rate at which steam can be vented out the break and increases peak clad temperature. The upper temperature limit of [100] (50)°F is used (bounded by the values used) in the small break LOCA analysis and containment OPERABILITY analysis. Exceeding this temperature will result in a higher peak clad temperature, because there is less heat transfer from the core to the injected water for the small break LOCA and higher containment pressures due to reduced containment (quench) spray cooling capacity. For the containment response following an MSLB, the lower limit on boron concentration and the upper limit on RWST water temperature are used to maximize the total energy release to containment. (1) (6) (4)

The RWST satisfies Criterion 3 of the NRC Policy Statement (10 CFR 50.36 (c)(2)(ii)). (5)

LCO

The RWST ensures that an adequate supply of borated water is available to cool and depressurize the containment in the event of a Design Basis Accident (DBA), to cool and cover the core in the event of a LOCA, to maintain the reactor subcritical following a DBA, and to ensure adequate level in the containment sump to support ECCS and Containment (Recirculation) Spray System pump operation in the recirculation mode. (1) (4)

To be considered OPERABLE, the RWST must meet the water volume, boron concentration, and temperature limits established in the SRs.

APPLICABILITY

In MODES 1, 2, 3, and 4, (Quench) RWST OPERABILITY requirements are dictated by ECCS and Containment (Quench) Spray System OPERABILITY requirements. Since both the ECCS and the Containment (Quench) Spray System must be OPERABLE in MODES 1, 2, 3, and 4, the RWST must also be OPERABLE to support their operation. Core cooling requirements in MODE 5 are addressed by LCO 3.4.7, "RCS Loops—MODE 5, Loops Filled," and LCO 3.4.8, "RCS (1)

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BASES

APPLICABILITY (continued)

Loops—MODE 5, Loops Not Filled." MODE 6 core cooling requirements are addressed by LCO 3.9.5, "Residual Heat Removal (RHR) and Coolant Circulation—High Water Level," and LCO 3.9.6, "Residual Heat Removal (RHR) and Coolant Circulation—Low Water Level."

ACTIONS

A.1

With RWST boron concentration or borated water temperature not within limits, they must be returned to within limits within 8 hours. Under these conditions neither the ECCS nor the Containment Spray System can perform its design function. Therefore, prompt action must be taken to restore the tank to OPERABLE condition. The 8 hour limit to restore the RWST temperature or boron concentration to within limits was developed considering the time required to change either the boron concentration or temperature and the fact that the contents of the tank are still available for injection. Quench (1)

B.1

With the RWST inoperable for reasons other than Condition A (e.g., water volume), it must be restored to OPERABLE status within 1 hour.

In this Condition, neither the ECCS nor the Containment Spray System can perform its design function. Therefore, prompt action must be taken to restore the tank to OPERABLE status or to place the plant in a MODE in which the RWST is not required. The short time limit of 1 hour to restore the RWST to OPERABLE status is based on this condition simultaneously affecting redundant trains. Quench (1) unit (2)

C.1 and C.2

If the RWST cannot be returned to OPERABLE status within the associated Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full unit (2)

(continued)

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BASES

ACTIONS

C.1 and C.2 (continued)

power conditions in an orderly manner and without challenging plant systems. unit ②

SURVEILLANCE REQUIREMENTS

SR 3.5.4.1

The RWST borated water temperature should be verified every 24 hours to be within the limits assumed in the accident analyses band. This Frequency is sufficient to identify a temperature change that would approach either limit and has been shown to be acceptable through operating experience.

~~The SR is modified by a Note that eliminates the requirement to perform this Surveillance when ambient air temperatures are within the operating limits of the RWST. With ambient air temperatures within the band, the RWST temperature should not exceed the limits.~~ ③

SR 3.5.4.2

The RWST water volume should be verified every 7 days to be above the required minimum level in order to ensure that a sufficient initial supply is available for injection and to support continued ECCS and Containment Spray System pump operation on recirculation. Since the RWST volume is normally stable and is protected by an alarm, a 7 day Frequency is appropriate and has been shown to be acceptable through operating experience. Recirculation ①

SR 3.5.4.3

The boron concentration of the RWST should be verified every 7 days to be within the required limits. This SR ensures that the reactor will remain subcritical following a LOCA. Further, it assures that the resulting sump pH will be maintained in an acceptable range so that boron precipitation in the core will not occur and the effect of chloride and caustic stress corrosion on mechanical systems and components will be minimized. Since the RWST volume is normally stable, a 7 day sampling Frequency to verify boron

(continued)

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BASES

SURVEILLANCE REQUIREMENTS	SR 3.5.4.3 (continued) concentration is appropriate and has been shown to be acceptable through operating experience.
REFERENCES	1. (U)FSAR, Chapter [6] and Chapter [15].

(2) (6)

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JUSTIFICATION FOR BASES DEVIATIONS
ITS 3.5.4 - REFUELING WATER STORAGE TANK

1. The North Anna Refueling Water Storage Tank (RWST) supplies borated water to the Low Head Safety Injection (LHSI) pumps and the Quench Spray (QS) system. The North Anna containment depressurization system consists of a Quench Spray System, which draws water from the RWST during the injection phase of a Loss of Coolant Accident (LOCA), and Inside Recirculation Spray and Outside Recirculation Spray subsystems which draw water from the containment sump and spray it into containment during the recirculation phase of a LOCA. The LHSI system is separate from the Residual Heat Removal system. North Anna utilizes a Boron Injection Tank (BIT) filled with highly concentrated boric acid which is flushed into the Reactor Coolant System by the charging pumps.

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. Changes are made to reflect those changes made to the ISTS. The following requirements are renumbered or revised, where applicable, to reflect the changes.

4. Editorial change made for enhanced clarity or to be consistent with the ISTS Writers Guide.

5. 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.

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

7. A discussion of interlocked Volume Control Tank and RWST isolation valves and the resulting delay in Safety Injection has been deleted. As stated in the Applicable Safety Analysis section, this delay is of no concern for plants, such as North Anna, with a Boron Injection Tank. The discussion of the delay in the Applicable Safety Analysis section is also deleted. A discussion of the assumptions regarding boron concentration in the Boron Injection Tank is included in the Applicable Safety Analyses Bases for ITS 3.5.6, Boron Injection Tank.

8. An explanation for retaining the CTS requirement for an RWST upper volume limit is added. The upper limit is assumed for pH control after a large break LOCA.

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.5 Seal Injection Flow

BASES

BACKGROUND

This LCO is applicable only to those units that utilize the centrifugal charging pumps for safety injection (SI). The function of the seal injection throttle valves during an accident is similar to the function of the ECCS throttle valves in that each restricts flow from the centrifugal charging pump header to the Reactor Coolant System (RCS).

The restriction on reactor coolant pump (RCP) seal injection flow limits the amount of ECCS flow that would be diverted from the injection path following an accident. This limit is based on safety analysis assumptions that are required because RCP seal injection flow is not isolated during SI.

APPLICABLE SAFETY ANALYSES

All ECCS subsystems are taken credit for in the large break loss of coolant accident (LOCA) at full power (Ref. 1). The LOCA analysis establishes the minimum flow for the ECCS pumps. The centrifugal charging pumps are also credited in the small break LOCA analysis. This analysis establishes the flow and discharge head at the design point for the centrifugal charging pumps. The steam generator tube rupture and main steam line break event analyses also credit the centrifugal charging pumps, but are not limiting in their design. Reference to these analyses is made in assessing changes to the Seal Injection System for evaluation of their effects in relation to the acceptance limits in these analyses.

This LCO ensures that seal injection flow of ≤ [40] gpm, with centrifugal charging pump discharge header pressure ≥ [2480] psig and charging flow control valve full open, will be sufficient for RCP seal integrity but limited so that the ECCS trains will be capable of delivering sufficient water to match boiloff rates soon enough to minimize uncovering of the core following a large LOCA. It also ensures that the centrifugal charging pumps will deliver sufficient water for a small LOCA and sufficient boron to maintain the core subcritical. For smaller LOCAs, the charging pumps alone deliver sufficient fluid to overcome the loss and maintain RCS inventory. Seal

(continued)

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INSERT

, and protect against HHSI pump runout. The analysis neglects the contribution from seal injection to the RCS. This conservatism bounds the minor effect of instrument uncertainty, so instrument uncertainties have not been included in the derivation of the flow (30 gpm) and RCS pressure (≥2215 psig and ≤2255 psig) setpoints.

BASES

APPLICABLE SAFETY ANALYSES (continued)

injection flow satisfies Criterion 2 of the NRC Policy Statement. (10 CFR 50.36(c)(2)(ii)) (B)

LCO

The intent of the LCO limit on seal injection flow is to make sure that flow through the RCP seal water injection line is low enough to ensure that sufficient centrifugal charging (HHSI) pump injection flow is directed to the RCS via the injection points (Ref. 2) (and to prevent pump runout). (4) (1) (2)

The LCO is not strictly a flow limit, but rather a flow limit based on a flow line resistance. In order to establish the proper flow line resistance, a pressure and flow must be known. The flow line resistance is determined by assuming that the RCS pressure is at normal operating pressure and that the centrifugal charging pump discharge pressure is greater than or equal to (as) the value specified in this LCO. The centrifugal charging (HHSI) pump discharge header pressure remains essentially constant through all the applicable MODES of this LCO. A reduction in RCS pressure would result in more flow being diverted to the RCP seal injection line than at normal operating pressure. The valve settings established at the prescribed centrifugal charging pump discharge header (RCS) pressure result in a conservative valve position should RCS pressure decrease. The additional modifier of this LCO, the control valve (charging flow for four loop units and air operated seal injection for three loop units) (seal injection (air operated) hand) being full open, is required since the valve is designed to fail open for the accident condition. With the discharge pressure and control valve position as specified by the LCO, a flow (path resistance) limit is established. It is this flow (resistance) limit that is used in the accident analyses. (4)

The limit on seal injection flow, combined with the centrifugal charging pump discharge header (RCS) pressure limit and an open wide condition of the charging flow (seal injection hand) control valve, must be met to render the ECCS OPERABLE. If these conditions are not met, the ECCS flow will not be as assumed (to the core could be less than that assumed) in the accident analyses. (4)

APPLICABILITY

In MODES 1, 2, and 3, the seal injection flow limit is dictated by ECCS flow requirements, which are specified for

(continued)

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BASES

APPLICABILITY (continued)

MODES 1, 2, 3, and 4. The seal injection flow limit is not applicable for MODE 4 and lower, however, because high seal injection flow is less critical as a result of the lower initial RCS pressure and decay heat removal requirements in these MODES. Therefore, RCP seal injection flow must be limited in MODES 1, 2, and 3 to ensure adequate ECCS performance.

ACTIONS

A.1

or, following a LOCA, pump runout could occur. (2)

With the seal injection flow exceeding its limit, the amount of charging flow available to the RCS may be reduced. Under this Condition, action must be taken to restore the flow to below its limit. The operator has 4 hours from the time the flow is known to be above the limit to correctly position the manual valves and thus be in compliance with the accident analysis. The Completion Time minimizes the potential exposure of the plant to a LOCA with insufficient injection flow and provides a reasonable time to restore seal injection flow within limits. This time is conservative with respect to the Completion Times of other ECCS LCOs; it is based on operating experience and is sufficient for taking corrective actions by operations personnel. unit (4)

B.1 and B.2

When the Required Actions cannot be completed within the required Completion Time, a controlled shutdown must be initiated. The Completion Time of 6 hours for reaching MODE 3 from MODE 1 is a reasonable time for a controlled shutdown, based on operating experience and normal cooldown rates, and does not challenge plant safety systems or operators. Continuing the plant shutdown begun in Required Action B.1, an additional 6 hours is a reasonable time, based on operating experience and normal cooldown rates, to reach MODE 4, where this LCO is no longer applicable. 3(4)

Unit

(continued)

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BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.5.5.1

Verification every 31 days that the manual seal injection throttle valves are adjusted to give a flow within the limit ensures that proper manual seal injection throttle valve position, and hence, proper seal injection flow, is maintained. The Frequency of 31 days is based on engineering judgment and is consistent with other ECCS valve Surveillance Frequencies. The Frequency has proven to be acceptable through operating experience.

As noted, the Surveillance is not required to be performed until 4 hours after the RCS pressure has stabilized within a ± 20 psig range of normal operating pressure. The RCS pressure requirement is specified since this configuration will produce the required pressure conditions necessary to assure that the manual valves are set correctly. The exception is limited to 4 hours to ensure that the Surveillance is timely. (1)

REFERENCES

1. (U)FSAR, Chapter [6] and Chapter [15]. (4)
2. 10 CFR 50.46. (4)

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JUSTIFICATION FOR DEVIATIONS
ITS 3.5.5 BASES – SEAL INJECTION FLOW

1. Editorial change made for enhanced clarity or to be consistent with the ISTS Writers Guide.

2. The Seal Injection Bases have been modified to state that the LCO is also used for the prevention of pump runout at low RCS pressures following a LOCA.

3. The Applicable Safety Analysis section of the Bases state that all ECCS subsystems are taken credit for in the large break LOCA analysis. This is incorrect. The analysis assumes that both ECCS subsystems are OPERABLE prior to a large break LOCA but that one ECCS subsystem is disabled due to a single failure. The analysis only credits one ECCS subsystem. This has been corrected.

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 Applicable Safety Analysis section of the Bases state that the LCO ensures that the seal injection flow is sufficient to ensure RCP seal integrity. This is incorrect for North Anna and has been corrected. The same paragraph states that the resulting flow from the ECCS trains is sufficient to match boiloff rates soon enough to minimize uncovering of the core. This is changed to state that the ECCS trains provide adequate core cooling. A large break LOCA produces core uncovery for a limited amount of time which is mostly countered by the injection of the accumulators. The safety injection flow provides longer term core cooling. The matching, and exceeding, of core boiloff rates is a longer term core cooling function. The main objective of safety injection following an accident is to provide adequate core cooling. The Bases have been changed to reflect this analysis.

7. A discussion was added to the Applicable Safety Analysis section of the Bases describing that uncertainties are not explicitly included in the derivation of the seal injection flow and HHSI pump discharge pressure limits. The analysis conservatively neglect the contribution from seal injection to the RCS. This conservatism bounds the minor effect of instrument uncertainty.

8. 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.

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.6 Boron Injection Tank (BIT)

BASES

BACKGROUND

The BIT is part of the Boron Injection System, which is the primary means of quickly introducing negative reactivity into the Reactor Coolant System (RCS) on a safety injection (SI) signal.

The main flow path through the Boron Injection System is from the discharge of the centrifugal charging pumps through lines equipped with a flow element and two valves in parallel that open on an SI signal. The valves can be operated from the main control board. The valves and flow elements have main control board indications. Downstream of these valves, the flow enters the BIT (Ref. 1).

The BIT is a stainless steel tank containing concentrated boric acid. Two trains of strip heaters are mounted on the tank to keep the temperature of the boric acid solution above the precipitation point. The strip heaters are controlled by temperature elements located near the bottom of the BIT. The temperature elements also activate High and Low alarms on the main control board. In addition to the strip heaters on the BIT, there is a recirculation system with a heat tracing system, including the piping section between the motor operated isolation valves, which further ensures that the boric acid stays in solution. The BIT is also equipped with a High Pressure alarm on the main control board. The entire contents of the BIT are injected when required; thus, the contained and deliverable volumes are the same.

During normal operation, one of the two BIT recirculation pumps takes suction from the boron injection surge tank (BIST) and discharges to the BIT. The solution then returns to the BIST. Normally, one pump is running and one is shut off. On receipt of an SI signal, the running pump shuts off and the air operated valves close. Flow to the BIT is then supplied from the centrifugal charging pumps. The solution of the BIT is injected into the RCS through the RCS cold legs.

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES

During a main steam line break (MSLB) or loss of coolant accident (LOCA), the BIT provides an immediate source of concentrated boric acid that quickly introduces negative reactivity into the RCS. (3)

The contents of the BIT are not credited for core cooling or immediate boration in the LOCA analysis, but are for post LOCA recovery. The BIT maximum boron concentration of [22,500] 15,750 ppm is used to determine the minimum time for hot leg recirculation switchover. The minimum boron concentration of [20,000] 12,950 ppm is used to determine the minimum mixed mean sump boron concentration for post LOCA shutdown requirements. (4) (4)

For the MSLB analysis, the BIT is the primary mechanism for injecting boron into the core to counteract any the positive increases in reactivity caused by an RCS cooldown. The MSLB core response analysis uses the conservatively assumes a 0 ppm minimum boron concentration of the BIT, which also affects both the departure from nucleate boiling and containment design analyses. analysis. The MSLB containment response analysis conservatively assumes a 2000 ppm minimum boron concentration of the BIT. Reference to the LOCA and MSLB analyses is used to assess changes to the BIT to evaluate their effect on the acceptance limits contained in these analyses. (7)

The minimum temperature limit of [145] 115 °F for the BIT ensures that the solution does not reach the boric acid precipitation point. The temperature of the solution is monitored and alarmed on the main control board. (4)

The BIT boron concentration limits are established to ensure that the core remains subcritical during post LOCA recovery. The BIT will counteract any positive increases in reactivity caused by an RCS cooldown.

The BIT minimum water volume limit of [1100] 900 gallons is used to ensure that the appropriate quantity of highly borated water with sufficient negative reactivity is injected into the RCS to shut down the core following an MSLB, to determine the hot leg recirculation switchover time, and to safeguard against boron precipitation. (4) (5)

The BIT satisfies Criteria 2 and 3 of the NRC Policy Statement 10 CFR 50.36(c)(2)(ii). (6)

(continued)

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BASES (continued)

LCO

This LCO establishes the minimum requirements for contained volume, boron concentration, and temperature of the BIT inventory (Ref. 2). This ensures that an adequate supply of borated water is available in the event of a LOCA or MSLB to maintain the reactor subcritical following these accidents. ②

To be considered OPERABLE, the limits established in the SR for water volume, boron concentration, and temperature must be met.

If the equipment used to verify BIT parameters (temperature, volume, and boron concentration) is determined to be inoperable, then the BIT is also inoperable. ⑧

APPLICABILITY

In MODES 1, 2, and 3, the BIT OPERABILITY requirements are consistent with those of LCO 3.5.2, "ECCS—Operating."

In MODES 4, 5, and 6, the respective accidents are less severe, so the BIT is not required in these lower MODES.

ACTIONS

A.1

If the required volume is not present in the BIT, both the hot leg recirculation switchover time analysis and the boron precipitation analysis would not be met. Under these conditions, prompt action must be taken to restore the volume to above its required limit to declare the tank OPERABLE, or the plant must be placed in a MODE in which the BIT is not required. unit may not be correct ③ ②

The BIT boron concentration is considered in the hot leg recirculation switchover time analysis, the boron precipitation analysis, and the reactivity analysis for an MSLB. If the concentration were not within the required limits, these analyses could not be relied on. Under these conditions, prompt action must be taken to restore the concentration to within its required limits, or the plant must be placed in a MODE in which the BIT is not required. may effect ② unit ②

The BIT temperature limit is established to ensure that the solution does not reach the boric acid crystallization point. If the temperature of the solution drops below the

(continued)

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BASES

ACTIONS

A.1 (continued)

minimum, prompt action must be taken to raise the temperature and declare the tank OPERABLE, or the plant must be placed in a MODE in which the BIT is not required. unit 2

The 1 hour Completion Time to restore the BIT to OPERABLE status is consistent with other Completion Times established for loss of a safety function and ensures that the plant will not operate for long periods outside of the safety analyses. unit 2

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

When Required Action A.1 cannot be completed within the required Completion Time, a controlled shutdown should be initiated. Six hours is a reasonable time, based on operating experience, to reach MODE 3 from full power conditions and to be borated to the required SDM without challenging plant systems or operators. Borating to the required SDM assures that the plant is in a safe condition, without need for any additional boration. unit 2

After determining that the BIT is inoperable and the Required Actions of B.1 and B.2 have been completed, the tank must be returned to OPERABLE status within 7 days. These actions ensure that the plant will not be operated with an inoperable BIT for a lengthy period of time. It should be noted, however, that changes to applicable MODES cannot be made until the BIT is restored to OPERABLE status pursuant to the provisions of LCO 3.0.4. unit 2

C.1

Even though the RCS has been borated to a safe and stable condition as a result of Required Action B.2, either the BIT must be restored to OPERABLE status (Required Action C.1) or the plant must be placed in a condition in which the BIT is not required (MODE 4). The 12 hour Completion Time to reach MODE 4 is reasonable, based on operating experience and normal cooldown rates, and does not challenge plant safety systems or operators. Unit 2

(continued)

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BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.5.6.1

Verification every 24 hours that the BIT water temperature is at or above the specified minimum temperature is frequent enough to identify a temperature change that would approach the acceptable limit. The solution temperature is also monitored by an alarm that provides further assurance of protection against low temperature. This Frequency has been shown to be acceptable through operating experience.

SR 3.5.6.2

Verification every 7 days that the BIT contained volume is above the required limit is frequent enough to assure that this volume will be available for quick injection into the RCS. [The 900 gallon limit corresponds to the BIT being completely full. Methods of verifying that the BIT is completely full include venting from the high point vent, and recirculation flow with the Boric Acid Storage Tanks.] If the volume is too low, the BIT would not provide enough borated water to ensure subcriticality during recirculation or to ~~shut down the core~~ [provide additional core shutdown margin] following an MSLB. Since the BIT volume is normally stable, a 7 day Frequency is appropriate and has been shown to be acceptable through operating experience. (2)

(2)

SR 3.5.6.3

Verification every 7 days that the boron concentration of the BIT is within the required band ensures that the reactor remains subcritical following a LOCA; it limits return to power following an MSLB, and maintains the resulting sump pH in an acceptable range so that boron precipitation will not occur in the core. In addition, the effect of chloride and caustic stress corrosion on mechanical systems and components will be minimized.

The BIT is in a recirculation loop that provides continuous circulation of the boric acid solution through the BIT and the boric acid tank (BAT). There are a number of points along the recirculation loop where local samples can be taken. The actual location used to take a sample of the solution is specified in the ~~plant~~ [unit] Surveillance procedures. (2) Sampling from the BAT to verify the concentration of the BIT is not recommended, since this sample may not be homogenous and the boron concentration of the two tanks may differ.

(continued)

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.6.3 (continued)

The sample should be taken from the BIT or from a point in the flow path of the BIT recirculation loop.

REFERENCES

1. FSAR, Chapter 6 and Chapter 15. (4) (2)
2. 10 CFR 50.46. (2)

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JUSTIFICATION FOR DEVIATIONS
ITS 3.5.6 BASES – BORON INJECTION TANK

1. North Anna does not use the system name, "Boron Injection System" and it has been removed from the Bases.

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. Editorial change made for enhanced clarity or to be consistent with the ISTS Writers Guide.

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

5. The Boron Injection Tank volume and usable volume are the same. Changes are made to the Bases to reflect the design.

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. Changes are made to describe specific assumptions made regarding Boron Injection Tank boron concentration for specific analyses.

8. The LCO paragraph, "If the equipment used to verify BIT parameters (temperature, volume, and boron concentration) is determined to be inoperable, then the BIT is also inoperable," is not adopted. Surveillances use this equipment to verify these parameters are within limits at appropriate frequencies. They are required to verify that the BIT is OPERABLE, but their inoperability does not render the BIT inoperable. The BIT is considered capable of performing it's safety function as long as the Surveillance Requirements for these parameters have been met within the required Frequencies. This is consistent with the use of equipment used to perform surveillances in other sections of NUREG-1431.

SECTION 3.5 - EMERGENCY CORE COOLING SYSTEMS (ECCS)

CURRENT TECHNICAL SPECIFICATIONS

MARKUP AND DISCUSSION OF CHANGES

UNIT 1

A.1

ITS

3/4.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

ACCUMULATORS

LIMITING CONDITION FOR OPERATION

LCO 3.5.1 3.5.1 Each [Three] reactor coolant system accumulator shall be OPERABLE with: A.1

SR 3.5.1.1 a. The isolation valve open,

SR 3.5.1.2 b. A contained borated water volume of between 7580 and 7756 gallons A.2

SR 3.5.1.4 c. Between 2200 and 2400 ppm of boron, and

SR 3.5.1.3 d. A nitrogen cover-pressure of between 599 and 667 psig.

APPLICABILITY: MODES 1, 2 and 3*. [reduce RCS pressure to ≤ 1000 psig] L.2

Action A ACTION: [Add proposed Action A] [Condition A] A.1

Action B a. With one accumulator inoperable, except as a result of a closed isolation valve, restore the inoperable accumulator to OPERABLE status within one hour or be in HOT SHUTDOWN within the next 12 hours. L.3 A.6 M.1

Action C.2 [Add proposed Action C.1]

Action C.1 b. With one accumulator inoperable due to the isolation valve being closed, either immediately open the isolation valve or be in HOT STANDBY within one hour and be in HOT SHUTDOWN within the next 12 hours. L.3 A.6

Action D [Add proposed Action D] A.3

SURVEILLANCE REQUIREMENTS

4.5.1 Each accumulator shall be demonstrated OPERABLE:

a. At least once per 12 hours by: [is ≥ 7580 gallons and ≤ 7756 gallons] A.2

SR 3.5.1.2 / SR 3.5.1.3 1. Verifying the contained borated water volume and nitrogen cover-pressure in the tanks, and [is ≥ 599 psig and ≤ 667 psig]

SR 3.5.1.1 2. Verifying that each accumulator isolation valve is [fully] open. A.1

*Pressurizer [RCS] Pressure above 1000 psig. Power lock out of valves is not permitted in MODE 3 when below 1000 psig. L.1 A.5

(A.1)

ITS

EMERGENCY CORE COOLING SYSTEMS

that is not the result of addition from the refueling water storage tank (L.4)

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.5.1.4 b. At least once per 31 [50] days and within 6 hours after each solution volume increase of ≥ 8% of ~~tank volume~~ [indicated level] by verifying the boron concentration of the [affected] accumulator solution. [is ≥ 2200 ppm and ≤ 2400 ppm] (A.1) (A.2)

SR 3.5.1.5 c. At least once per 31 days when the RCS pressure is above 2000 psig by verifying that the ~~breaker supplying~~ power to the isolation valve operator is ~~locked in the off position~~ [removed]. (L.6)

~~d. At least once per 18 months by verifying that each accumulator isolation valve opens automatically under each of the following conditions:~~

~~1. When the RCS pressure exceeds 2010 psig,~~

~~2. Upon receipt of a safety injection test signal.~~ (L.5)

(A.4)

UNIT 2

ITS 3.5.1

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(A.1)

ITS

3/4.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

ACCUMULATORS

LIMITING CONDITION FOR OPERATION

LCO 3.5.1

3.5.1 Each [Three] reactor coolant system accumulator shall be OPERABLE with: (A.1)

SR 3.5.1.1 a. The isolation valve open,

SR 3.5.1.2 b. A contained borated water volume of between 7580 and 7756 gallons, (A.2)

SR 3.5.1.4 c. Between 2200 and 2400 ppm of boron, and

SR 3.5.1.3 d. A nitrogen cover-pressure of between 599 and 667 psig. (L.2)

APPLICABILITY: MODES 1, 2 and 3*. [reduce RCS pressure to ≤ 1000 psig]

Action A

ACTION: [Add proposed Action A] (A.1)

Action B

a. With one accumulator inoperable, except as a result of a closed isolation valve, [Condition A] restore the inoperable accumulator to OPERABLE status within one hour or be in HOT SHUTDOWN within the next 12 hours. (L.3) (A.6) (M.1)

Action C.2

[Add proposed Action C.1]

b. With one accumulator inoperable due to the isolation valve being closed, either immediately open the isolation valve or be in HOT STANDBY within one hour and be in HOT SHUTDOWN within the next 12 hours. (L.3) (A.6)

Action C.1

Action D

[Add proposed Action D] (A.3)

SURVEILLANCE REQUIREMENTS

4.5.1.1 Each accumulator shall be demonstrated OPERABLE:

a. At least once per 12 hours by: [is ≥ 7580 gallons and ≤ 7756 gallons] (A.2)

SR 3.5.1.2 1. Verifying the contained borated water volume and nitrogen

SR 3.5.1.3 cover-pressure in the tanks, and [is ≥ 599 psig and ≤ 667 psig]

SR 3.5.1.1 2. Verifying that each accumulator isolation valve is [fully] open. (A.1)

*Pressurizer [RCS] Pressure above 1000 psig. Power lock out of valves is not permitted in MODE 3 when below 1000 psig. (L.1) (A.5)

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A.1

ITS EMERGENCY CORE COOLING SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

that is not the result of addition from the refueling water storage tank — L.4

50 — indicated level — A.1

SR 3.5.1.4 b. At least once per 31 days and within 6 hours after each solution volume increase of greater than or equal to ~~5%~~ of ~~tank volume~~ by verifying the boron concentration of the ~~accumulator solution.~~ affected — is ≥ 2200 ppm and ≤ 2400 ppm — A.2

SR 3.5.1.5 c. At least once per 31 days when the RCS pressure is above 2000 psig by verifying that the ~~breaker supplying~~ power to the isolation valve operator is ~~locked in the off position~~. removed — L.6

~~d. At least once per 18 months by verifying that each accumulator isolation valve opens automatically under each of the following conditions:~~

~~1. When a simulated RCS pressure signal exceeds 2010 psig,~~

~~2. Upon receipt of a safety injection test signal.~~

L.5

A.4

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 LCO 3.5.1 states each reactor coolant system accumulator shall be OPERABLE and states accumulator requirements that must be met for each accumulator to be OPERABLE. ITS LCO 3.5.1 states three accumulators shall be OPERABLE. This changes CTS by moving the specific accumulator requirements to Surveillances.

This change is acceptable because ITS SR 3.0.1 states that failure to meet a Surveillance is failure to meet the LCO. The movement of this information from the LCO to the Surveillances results in no change to the OPERABILITY requirements. This change is designated as administrative because it does not result in technical changes to the CTS.

A.3 CTS 3.5.1 does not contain a specific ACTION for two or more accumulators inoperable. With two or more accumulators inoperable, CTS 3.0.3 would be entered. ITS 3.5.1 ACTION D directs entry into LCO 3.0.3 when two or more accumulators are inoperable.

This change is acceptable because the actions taken when two or more accumulators are inoperable are unchanged. Adding this ACTION is consistent with the ITS convention of directing entry into LCO 3.0.3 when a condition represents a loss of safety function. This change is designated as administrative because it does not result in technical changes to the CTS.

A.4 CTS Surveillance 4.5.1.b requires the accumulator boron concentration to be verified after each solution volume increase of ≥ 5% of accumulator tank volume. ITS SR 3.5.1.4 Frequency includes a Note clarifying that this boron concentration verification need only be performed on the affected accumulator.

This change is acceptable because it is consistent with the current use and understanding of the Surveillance. Testing is unnecessary on accumulators not affected by a solution volume increase. This change is designated as administrative because it does not result in technical changes to the CTS.

A.5 CTS 3.5.1 Applicability is modified by a Note restricting the MODE 3 applicability to when pressurizer pressure above 1000 psig. ITS 3.5.1 Applicability restricts MODE 3 applicability to when RCS pressure is above 1000 psig.

This change is acceptable because the difference between pressurizer pressure and RCS pressure is not significant, though pressurizer pressure and RCS pressure do differ somewhat due to the elevation head of the pressurizer. Specifying RCS pressure instead of pressurizer pressure provides consistency with the instrumentation actually used to meet the LCO. This change is designated as administrative because it does not result in technical changes to the CTS.

A.6 CTS 3.5.1, Action a states that if an inoperable accumulator is not restored to OPERABLE status within one hour, the unit must be placed in HOT SHUTDOWN within the next 12 hours. CTS 3.5.1, Action b states that with one accumulator inoperable due to the isolation valve being closed, if the valve is not immediately opened, the unit be in HOT STANDBY within one hour, and HOT SHUTDOWN within the next 12 hours. CTS 3.0.1 states that the LCO and Action requirements are applicable during the Operational MODEs or other conditions specified for each Specification. The Applicability of CTS 3.5.1 is MODES 1, 2, and MODE 3 with pressurizer pressure > 1000 psig, so the LCO and Actions become not applicable in MODE 3 with pressurizer pressure ≤ 1000 psig, and entry into HOT SHUTDOWN (MODE 4) is not required. ITS 3.5.1, ACTION B.1 requires that with one accumulator inoperable for reasons other than boron concentration not within limits, that the accumulator be restored to OPERABLE status within one hour. If the accumulator is not restored to OPERABLE status within one hour, ITS 3.5.1 Action C.1 requires entry into MODE 3 within 6 hours, and Action C.2 requires RCS pressure be ≤ 1000 psig within 12 hours. This changes the CTS by replacing the requirement to be in MODE 4 within 13 hours of the inoperability with a requirement to reduce RCS pressure to ≤ 1000 psig while in MODE 3. The addition of the 6 hour time limit to be in MODE 3 is described in Discussion of Change M.1.

This change is acceptable because the time to reduce RCS pressure to ≤ 1000 psig while in MODE 3 is still 13 hours from the time of the inoperability. This change clarifies an existing requirement. This change is designated as administrative because it does not result in technical changes to the CTS.

MORE RESTRICTIVE CHANGES

M.1 CTS 3.5.1, Action a states that if an inoperable accumulator is not restored to OPERABLE status within one hour, the unit must be placed in HOT SHUTDOWN within the next 12 hours, but does not include a time by which the unit must be placed in MODE 3. ITS 3.5.1, Action C.1 requires entry into MODE 3 within 6 hours. This changes the CTS by adding a 6 hour time limit to be in MODE 3.

This change is acceptable because the requirement to place the unit in MODE 3 in six hours is based on operating experience and the need to reach the required conditions from full power in an orderly manner and without challenging unit systems. This change is designated as more restrictive because it imposes a new Completion Time requirement.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

None

LESS RESTRICTIVE CHANGES

L.1 *(Category 2 – Relaxation of Applicability)* The CTS 3.5.1 Applicability is MODES 1, 2, and 3. The MODE 3 applicability is modified by a footnote that states, "Pressurizer Pressure above 1000 psig. Power lock out of valves is not permitted in MODE 3 when below 1000 psig." The ITS 3.5.1 Applicability is MODES 1 and 2, and MODE 3 with RCS pressure > 1000 psig. This changes the CTS by eliminating the CTS Applicability statement, "Power lock out of valves is not permitted in MODE 3 when below 1000 psig."

The purpose of the CTS 3.5.1 additional Applicability requirement is to ensure that the accumulator isolation Motor Operated Valves (MOVs) have electrical power and can be opened in lower MODES from the Control Room if needed. This change is acceptable because the requirements continue to ensure that the components are maintained in the MODES and other specified conditions assumed in the safety analyses and licensing basis. This requirement is not part of the Applicability, but a separate requirement on the accumulator isolation MOVs that applies outside of the Applicability of CTS LCO 3.5.1. Below 1000 psig, the accumulator isolation MOVs are closed to prevent injection of the accumulator contents during normal shutdown and depressurization of the RCS. This change is acceptable because no accident analyses performed in MODE 3 with RCS pressure below 1000 psig or in lower modes or other specified conditions assume the use of the accumulators for accident mitigation. This requirement does not contribute to the accumulator's performance of their safety function and is not required for accumulator OPERABILITY. This change is designated as less restrictive because the LCO requirements are applicable in fewer operating conditions than in the CTS.

L.2 *(Category 3 – Relaxation of Completion Time)* CTS 3.5.1 Action a states that an inoperable accumulator must be restored to OPERABLE status within one hour, except as a result of a closed isolation valve. ITS 3.5.1 ACTION A.1 states that if one accumulator is inoperable due to boron concentration not within limits, it must be restored to OPERABLE status within 72 hours. This changes CTS by increasing the time one accumulator may be inoperable due to boron concentration not within limits from 1 hour to 72 hours.

The purpose of CTS 3.5.1 is to ensure that the accumulator is available to mitigate design basis events. The boron in the accumulator, when mixed following a Loss of Coolant Accident (LOCA) with the borated water of the other accumulators, the RCS, the Boron Injection Tank, and the Refueling Water Storage Tank, is used to keep the core subcritical. 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 maximum accumulator boron concentration, when mixed with the other borated water sources, affects the actions taken to prevent boron stratification after a LOCA. This change is acceptable because an out of limit boron concentration is likely to be a small departure from the assumed values and, when mixed with the other borated water sources, will not have a significant effect on post-LOCA shutdown margin or boron stratification. The Completion Time of 72 hours is acceptable given the low probability of a LOCA occurring during the period and is the same time allowed for an inoperable ECCS train. 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.3 *(Category 3 – Relaxation of Completion Time)* CTS 3.5.1, Action b, requires that a unit be in HOT STANDBY within 1 hour and HOT SHUTDOWN within the next 12 hours when an accumulator is inoperable due to a closed accumulator isolation valve. ITS LCO 3.5.1 states that if an accumulator is inoperable for any reason other than an out of limit boron concentration, the accumulator must be restored to OPERABLE status within one hour. If the accumulator is not restored to OPERABLE status within one hour, the unit must be in MODE 3 in 6 hours and MODE 3 with RCS pressure ≤ 1000 psig in 12 hours. This changes the CTS by extending the time to enter MODE 3 with a closed accumulator isolation MOV from 1 hour to 7 hours. The time to exit the Applicability remains 13 hours from the time of the inoperability, and is addressed by Discussion of Change A.6.

The purpose of CTS 3.5.1 Action b is to minimize the time that one accumulator is inoperable due to isolation. 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. Two accumulator are still OPERABLE. The unit is still required to enter MODE 3, but in a more controlled manner and allows one hour to correct the inoperability. Allowing only one hour to reach MODE 3 allows no time to correct the condition and requires a very rapid shutdown or a manual reactor trip, both of which are undesirable transients. Allowing one hour to open a closed accumulator isolation MOV could avoid those transients, and allowing 6 hours to enter MODE 3 decreases the risk associated with a rapid shutdown or plant trip. Actions allowing 1 hour to repair and 6 hours to enter MODE 3 are consistent with Technical Specifications ACTIONS for comparable conditions. 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 7 – Relaxation Of Surveillance Frequency)* CTS Surveillance 4.5.1.c requires that the accumulator boron concentration be verified at least once per 31 days and within 6 hours after each solution volume increase of ≥ 5% of tank volume. ITS SR 3.5.1.4 contains the same requirements, but it will not require the boron concentration to be measured if the solution volume increase was made from the Refueling Water Storage Tank (RWST).

The purpose of CTS 4.5.1.b is to provide assurance that solution added to the accumulators does not make boron concentration in the accumulator go out of specification. This change is acceptable because the new Surveillance Frequency has been evaluated to ensure that it provides an acceptable level of equipment reliability. This change is acceptable because the accumulator boron concentration is required to be between 2200 and 2400 ppm and ITS LCO 3.5.4 requires the RWST boron concentration to be between 2300 and 2400 ppm. Therefore, the borated water moved from the RWST to the accumulators cannot cause the accumulator boron concentration to be changed to outside of its limit. This change is designated as less restrictive because Surveillances will be performed less frequently under the ITS than under the CTS.

L.5 *(Category 5 – Deletion of Surveillance Requirement)* CTS Surveillance 4.5.1.d requires verification every 18 months that each accumulator isolation MOV opens automatically when RCS pressure exceeds 2010 psig and on receipt of a safety injection test signal. The ITS does not contain that requirement.

The purpose of CTS 4.5.1.d is to verify that the accumulator isolation valves open automatically when the specific conditions are met. 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. ITS SR 3.5.1.1 requires that each accumulator isolation valve is fully open every 12 hours. ITS SR 3.5.1.5 requires that every 31 days that power is verified removed from each accumulator isolation valve. There are indications in the Control Room which would alert an operator if an accumulator isolation MOV were to be inadvertently closed and within one hour the valve must be opened or a unit shutdown must be initiated. The ability of the valves to open automatically is not credited in the safety analysis, which assumes that the valves are open at the time the accident occurs. This change is designated as less restrictive because Surveillances which are required in the CTS will not be required in the ITS.

L.6 *(Category 6 – Relaxation Of Surveillance Requirement Acceptance Criteria)* CTS Surveillance 4.5.1.c requires verification that the breaker supplying power to the accumulator isolation MOV is locked in the off position at least every 31 days when the RCS pressure is above 2000 psig. ITS SR 3.5.1.5 requires verification that power is removed from each accumulator isolation MOV at least every 31 days when the RCS pressure is above 2000 psig. This changes the CTS by not specifying in what manner electrical power is removed from the valve.

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. Replacing the requirement to specifically verify that the breaker supplying power to the isolation valve operator is locked in the off position with the requirement to verify power is removed eliminates unnecessary details in the Surveillance Requirement. The ITS still retains the requirement to verify power is removed from each accumulator isolation valve operator. 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

EMERGENCY CORE COOLING SYSTEMS

ECCS SUBSYSTEMS – Tavg GREATER THAN OR EQUAL TO 350°F

LIMITING CONDITION FOR OPERATION

LCO 3.5.2

3.5.2 Two independent ECCS subsystems shall be OPERABLE with each subsystem comprised of:

a. One OPERABLE charging pump,

b. One OPERABLE low head safety injection pump,

c. An OPERABLE flow path capable of transferring fluid to the Reactor Coolant System when taking suction from the refueling water storage tank on a safety injection signal or from the containment sump when suction is transferred during the recirculation phase of operation or from the discharge of the outside recirculation spray pump.

LA.1

M.4

APPLICABILITY: MODES 1, 2 and 3.

ACTION: or more

L2

Action A

Action B

a. With one ECCS subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 72 hours or be in HOT SHUTDOWN within the next 12 hours. MODE 3 in 6 hours and

M.1

b. In the event the ECCS is actuated and injects water into the Reactor Coolant System, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date.

L.3

c. The provisions of Specification 3.0.4 are not applicable to 3.5.2.a and 3.5.2.b for one hour following heatup above 235°F or prior to cooldown below 235°F.

M.2

Action C

Insert Proposed Action C

L.2

(A.1)

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EMERGENCY CORE COOLING SYSTEMS

ITS

SURVEILLANCE REQUIREMENTS

4.5.2 Each ECCS subsystem shall be demonstrated OPERABLE:

SR 3.5.2.1 a. At least once per 12 hours by verifying that the following valves are in the indicated positions with power to the valve operators removed: (A.1)

(Unit 1) Valve Number	Valve Function	Valve Position
a. MOV-1890A	a. LHSI to hot leg	a. closed
b. MOV-1890B	b. LHSI to hot leg	b. closed
c. MOV-1836	c. Ch pump to cold leg	c. closed
d. MOV-1869A	d. Ch pump to hot leg	d. closed
e. MOV-1869B	e. Ch pump to hot leg	e. closed

SR 3.5.2.2
SR 3.5.2.3 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. (Add SR 3.5.2.3) (M.3)

c. By a visual inspection which verifies that no loose debris (rags, trash, clothing, etc.) is present in the containment which could be transported to the containment sump and cause restriction of the pump suctions during LOCA conditions. This visual inspection shall be performed: (LA.4)

1. For all accessible areas of the containment prior to establishing CONTAINMENT INTEGRITY, and

2. Of the areas affected within containment at the completion of each containment entry when CONTAINMENT INTEGRITY is established.

d. At least once per 18 months by:

SR 3.5.2.8 1. A visual inspection of the containment sump and verifying that the subsystem suction inlets are not restricted by debris and that the sump components (trash racks, screens, etc.) show no evidence of structural distress or (abnormal) corrosion. (L.5)

SR 3.5.2.5 e. At least once per 18 months (during shutdown) by: (LA.5)

1. Verifying that each automatic valve in the flow path (that is not locked, sealed, or otherwise secured in position) actuates to its correct position on a safety injection (test) signal. (L.6)

(actuation) (LA.6)

(an actual or simulated) (L.1)

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SR 3.5.2.6 2. Verifying that each of the following pumps start automatically upon receipt of a safety injection test signal: (A.1) (L.1) (LA.1)

a. Charging pump, and

b. Low head safety injection pump.

SR 3.5.2.4 f. By verifying that each of the following pumps develop the indicated discharge pressure (after subtracting suction pressure) on recirculation flow when tested pursuant to Specification 4.0.5. (LA.3)

1. Charging pump greater than or equal to 2410 psig.
2. Low head safety injection pump greater than or equal to 156 psig.

SR 3.5.2.7 g. By verifying that the following manual valves requiring adjustment to prevent pump "runout" and subsequent component damage are locked and tagged in the proper position for injection: (LA.2) (L.7)

1. Within 4 hours following completion of any repositioning or maintenance on the valve when the ECCS subsystems are required to be OPERABLE. (L.4)
2. At least once per 18 months.
   1. 1-SI-188 Loop A Cold Leg
   2. 1-SI-191 Loop B Cold Leg
   3. 1-SI-193 Loop C Cold Leg
   4. 1-SI-203 Loop A Hot Leg
   5. 1-SI-204 Loop B Hot Leg
   6. 1-SI-205 Loop C Hot Leg

h. By performing a flow balance test, during shutdown, following completion of modifications to the ECCS subsystems that alter the subsystem flow characteristics and verifying that: (L.4)

1. For high head safety injection lines, with a single pump running:
   a. The sum of the injection line flow rates, excluding the highest flow rate, is greater than or equal to the minimum flow rate required to demonstrate compliance with 10 CFR 50.46, and
   b. The total pump flow rate is less than or equal to the evaluated pump runout limit.

UNIT 2

(A.1)

EMERGENCY CORE COOLING SYSTEMS

ITS

ECCS SUBSYSTEMS – Tavg GREATER THAN OR EQUAL TO 350°F

LIMITING CONDITION FOR OPERATION

LCO 3.5.2 3.5.2 Two independent ECCS subsystems shall be OPERABLE with each subsystem comprised of:

a. One OPERABLE charging pump,

b. One OPERABLE low head safety injection pump,

c. An OPERABLE flow path capable of transferring fluid to the Reactor Coolant System when taking suction from the refueling water storage tank on a safety injection signal or from the containment sump when suction is transferred during the recirculation phase of operation.

(LA.1)

APPLICABILITY: MODES 1, 2 and 3.

ACTION: (or more) (L.2)

Action A Action B a. With one ECCS subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 72 hours or be in HOT SHUTDOWN within the next 12 hours. (MODE 3 in 6 hours and) (M.1)

b. In the event the ECCS is actuated and injects water into the Reactor Coolant System, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date. The current value of the usage factor for each affected safety injection nozzle shall be provided in this Special Report whenever its value exceeds 0.70.

Action C

c. The provisions of Specification 3.0.4 are not applicable to 3.5.2.a and 3.5.2.b for one hour following heatup above 270°F or prior to cooldown below 270°F. (L.3) (M.2)

Insert Proposed Action C

SURVEILLANCE REQUIREMENTS (L.2)

4.5.2 Each ECCS subsystem shall be demonstrated OPERABLE:

SR 3.5.2.1 a. At least once per 12 hours by verifying that the following valves are in the indicated positions with power to the valve operators removed:

ITS

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.5.2.1 (Unit 2)

Valve Number	Valve Function	Valve Position
a. MOV-2890A	a. LHSI to hot leg	a. closed
b. MOV-2890B	b. LHSI to hot leg	b. closed
c. MOV-2836	c. Ch pump to cold leg	c. closed
d. MOV-2869A	d. Ch pump to hot leg	d. closed
e. MOV-2869B	e. Ch pump to hot leg	e. closed

(A.1)

SR 3.5.2.2 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. Add SR 3.5.2.3 (M.3)

SR 3.5.2.3

c. By a visual inspection which verifies that no loose debris (rags, trash, clothing, etc.) is present in the containment which could be transported to the containment sump and cause restriction of the pump suctions during LOCA conditions. This visual inspection shall be performed: (LA.4)

1. For all accessible areas of the containment prior to establishing CONTAINMENT INTEGRITY, and
2. Of the areas affected within containment at the completion of each containment entry when CONTAINMENT INTEGRITY is established.

d. At least once per 18 months by: (L.5)

SR 3.5.2.8 1. A visual inspection of the containment sump and verifying that the subsystem suction inlets are not restricted by debris and that the sump components (trash racks, screens, etc.) show no evidence of structural distress or corrosion. abnormal (LA.5)

e. At least once per 18 months, during shutdown, by: (L.6)

SR 3.5.2.5 1. Verifying that each automatic valve in the flow path actuates to its correct position on a safety injection test signal. that is not locked, Sealed, or otherwise Secured in position; actuation (LA.6); an actual or simulated

SR 3.5.2.6 2. Verifying that each of the following pumps start automatically upon receipt of a safety injection test signal: ECCS; actuation (A.1) (LA.6)

a) Charging pump, and
b) Low head safety injection pump. (LA.1)

an actual or simulated (L.1)

ITS

EMERGENCY CORE COOLING SYSTEM

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.5.2.4 f. By verifying that each of the following ECCS (1) pumps develop the indicated discharge pressure (after subtracting suction pressure) on recirculation flow when tested pursuant to Specification 4.0.5. (A.1) (LA.3)

(LA.3) the Inservice Testing Program

developed head at the test flow point is greater than or equal to the required developed head

1. Charging pump greater than or equal to 2410 psig.
2. Low head safety injection pump greater than or equal to 156 psig.

SR 3.5.2.7 g. By verifying that the following manual valves requiring adjustment to prevent pump "runout" and subsequent component damage are locked and tagged secured in the proper position for injection: (LA.2) (L.7)

1. Within 4 hours following completion of any repositioning or maintenance on the valve when the ECCS subsystems are required to be OPERABLE. (L.4)
2. At least once per 18 months.
   1. 2-SI-89 Loop A Cold Leg
   2. 2-SI-97 Loop B Cold Leg
   3. 2-SI-103 Loop C Cold Leg
   4. 2-SI-116 Loop A Hot Leg
   5. 2-SI-111 Loop B Hot Leg
   6. 2-SI-123 Loop C Hot Leg

h. By performing a flow balance test, during shutdown, following completion of modifications to the ECCS subsystems that alter the subsystem flow characteristics and verifying that: (L.4)

1. For high head safety injection lines, with a single pump running:
   a) The sum of the injection line flow rates, excluding the highest flow rate, is greater than or equal to the minimum flow rate required to demonstrate compliance with 10 CFR 50.46, and
   b) The total pump flow rate is less than or equal to the evaluated pump runout limit.

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.

MORE RESTRICTIVE CHANGES

M.1 CTS 3.5.2 Action a requires, when one ECCS subsystem is inoperable, the subsystem be restored to OPERABLE status within 72 hours or the unit be in HOT SHUTDOWN within the next 12 hours. ITS 3.5.2 Action A requires an inoperable ECCS train be returned to OPERABLE status in 72 hours. ITS 3.5.2 Action B requires the unit to be placed in MODE 3 within 6 hours and MODE 4 within 12 hours if the Required Action and Completion Time for ITS Action A are not met. This changes the CTS by requiring entry into MODE 3 within 6 hours.

This change is acceptable because the requirement to place the unit in MODE 3 in six hours is based on operating experience and the need to reach the required conditions from full power in an orderly manner and without challenging unit systems. This change is designated as more restrictive because it imposes a time requirement on when the unit must be in MODE 3.

M.2 CTS 3.5.2, Action c states that the provisions of Specification 3.0.4 are not applicable for one hour following heatup over 235 °F (270 °F Unit 2) or prior to cooldown below 235 °F (270 °F Unit 2). ITS 3.5.2 does not include this allowance.

The purpose of CTS 3.5.2 Action c is to provide 1 hour to disable or enable ECCS equipment in order to comply with the Low Temperature Over Pressure System (LTOPS) requirements. This change is acceptable because the allowance is no longer needed. The current LTOPS enable temperature is 235 °F for Unit 1 and 270 °F for Unit 2. This is well below the Applicability of LCO 3.5.2 (i.e., MODE 3 entry at 350 °F.) Therefore, there is sufficient time without this allowance to disable or enable ECCS equipment. This change is more restrictive because it eliminates an allowance.

M.3 ITS SR 3.5.2.3 requires verification that ECCS piping is sufficiently full of water every 92 days. CTS does not contain such a requirement. This changes the CTS by adding a Surveillance Requirement.

The purpose of ITS SR 3.5.2.3 is to provide an added degree of assurance that that the ECCS piping is sufficiently full of water, permitting the ECCS to function properly when required. Operating experience and engineering analysis has shown that after initial filling of the ECCS, some noncondensible gas will remain and form voids and pockets in the ECCS piping, and the ECCS can still perform its function. This change is acceptable because it requires a new surveillance requirement providing additional assurance that the ECCS can perform its function. This change is designated as more restrictive because it adds a Surveillance Requirement.

M.4 Unit 1 CTS LCO 3.5.2 states that two independent ECCS subsystems shall be OPERABLE and an OPERABLE flow path must be capable of taking suction from the refueling water storage tank, the containment sump, or from the discharge of the outside recirculation spray pump. The ITS moves the details of what constitutes an OPERABLE subsystem to the Bases, but these details do not include the option to take suction from the discharge of the outside recirculation spray pump. This changes the CTS by eliminating the option of an OPERABLE ECCS subsystem taking suction from the discharge of an outside recirculation spray pump.

This change is acceptable because it is consistent with the accident analyses. The accident analyses do not assume that an ECCS subsystem takes suction from the discharge of an outside recirculation spray pump. This change is designated as more restrictive because an option present in the CTS does not appear in the ITS.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

LA.1 *(Type 1 – Removing Details of System Design and System Description, Including Design Limits)* CTS LCO 3.5.2 states that two ECCS subsystems shall be OPERABLE and contains a description of what constitutes an OPERABLE subsystem. The Unit 1 LCO also describes the capability of the outside recirculation spray pump to discharge to the ECCS subsystems (acting as a backup to the Low Head Safety Injection pump) during the recirculation phase of a LOCA. CTS Surveillance 4.5.2.e.2 lists the pumps that are included in an OPERABLE subsystem. ITS 3.5.2 requires two ECCS trains to be OPERABLE, but the details of what constitutes an OPERABLE train are moved to the Bases. ITS SR 3.5.2.6 does not list the pumps which comprise an ECCS train. This changes the CTS by moving the details of what constitutes an OPERABLE system to the Bases.

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 for two ECCS trains to be OPERABLE and to verify each ECCS pump starts or breaker closes in test automatically on an actual or simulated actuation signal. 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, described in Chapter 5 of the ITS, which provides for control of changes to the Bases and ensures that any changes to the Bases are properly evaluated. 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.

LA.2 *(Type 2 – Removing Descriptions of System Operation)* CTS Surveillance 4.5.2.g requires verification that a specified group of manual valves requiring adjustment to prevent pump "runout" and subsequent component damage are secured in the proper position for injection. ITS SR 3.5.2.7 requires verification that the same group of valves are secured in the correct position. This changes the CTS by moving the description of the purpose of the valves and what constitutes the proper position to the Bases.

The removal of these details, which are related to system operation, 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 to verify the valves are secured in the listed position. Also, this change is acceptable because the removed information will be adequately controlled in the ITS Bases, as appropriate. Changes to the Bases are controlled by the Technical Specification Bases Control Program, described in Chapter 5 of the ITS, which provides for control of changes to the Bases and ensures that any changes to the Bases are properly evaluated. This change is designated as a less restrictive removal of detail change because information relating to system operation is being removed from the Technical Specifications.

LA.3 *(Type 3 – Removing Procedural Details for Meeting TS Requirements and Related Reporting Problems)* CTS Surveillance 4.5.2.f specifies that the HHSI pumps and LHSI pumps be tested in accordance with 4.0.5 (the Inservice Test Program) and that a specific developed head (i.e., developed head equals the discharge pressure minus the suction pressure) be met. ITS SR 3.5.2.4 requires the same testing, but the specific limits on developed head for each type of pump are maintained by the Inservice Test Program. This changes the CTS by moving the procedural details for meeting the Surveillance to the ISI/IST Program.

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 to verify each ECCS pump's developed head when tested in accordance with the Inservice Testing Program. Also, this change is acceptable because these types of procedural details will be adequately controlled in the ISI/IST Program. 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.

LA.4 *(Type 3 – Removing Procedural Details for Meeting TS Requirements and Related Reporting Problems)* CTS Surveillance 4.5.2.c requires a visual inspection for loose debris in containment prior to establishing containment integrity and within affected areas of the containment at the completion of each containment entry when containment integrity is established. ITS does not include this requirement. This changes the CTS by moving this requirement to the Technical Requirements Manual.

The removal of these details, which are related to system operation, 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. ITS SR 3.5.2.8 still retains the requirement for an inspection of the containment sump for debris every 18 months. The purpose of CTS 4.5.2.c is to ensure that following a containment entry for maintenance or inspection that debris is removed which could clog the containment sump following a LOCA. This is a good housekeeping practice which should be part of any containment entry and is a detail not necessary to be included in the ITS to provide adequate protection of the public health and safety. Also, this change is acceptable because the removed information will be adequately controlled in the Technical Requirements Manual. Any changes to the TRM are made under 10 CFR 50.59, which ensures changes are properly evaluated. This change is designated as a less restrictive removal of detail change because information relating to system operation is being removed from the Technical Specifications.

LA.5 *(Type 3 – Removing Procedural Details for Meeting TS Requirements and Related Reporting Problems)* CTS Surveillance 4.5.2.e.1 and 4.5.2.e.2 require verification of the automatic actuation of the ECCS components every 18 months during shutdown. ITS SR 3.5.2.5 and SR 3.5.2.6 require this testing every 18 months. This changes CTS by moving the requirement that this testing be performed during shutdown to the Bases.

The removal of these details for performing surveillance 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 to perform the Surveillance Requirement every 18 months. The method of testing requires the conditions that exist during a unit shutdown or else a plant transient could occur as described in

UFSAR Section 15.2.14, Spurious Operation of Safety Injection System at Power. Since performance during shutdown is a prerequisite of the test, specifying this condition as a Technical Specifications requirement is unnecessary. 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, described in Chapter 5 of the ITS, which provides for control of changes to the Bases and ensures that any changes to the Bases are properly evaluated. 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.

LA.6 *(Type 1 – Removing Details of System Design and System Description, Including Design Limits)* CTS 4.5.2.e.1 and 4.5.2.e.2 require verification of the automatic actuation of ECCS components on a safety injection test signal. ITS SR SR 3.5.2.5 and SR 3.5.2.6 do not specify the signal, but only specify an actuation signal. This changes CTS by moving the designated actuation signal to the Bases.

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 to verify that appropriate equipment actuates upon receipt of an actuation signal. Also, this change is acceptable because the removed information will be adequately controlled in the ITS Bases. 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 6 – Relaxation Of Surveillance Requirement Acceptance Criteria)* CTS 4.5.2.e.1 and 4.5.2.e.2 require verification of the automatic actuation of ECCS components on a safety injection test signal. ITS SR 3.5.2.5 and SR 3.5.2.6 state that automatic actuation of ECCS components may be performed with an actual or simulated actuation signal. This changes the CTS by explicitly allowing the use of either an actual or simulated signal for the test. The change from "safety injection" to "actuation" is discussed in LA.6.

The purpose of CTS 4.5.2.e.1 and 4.5.2.e.2 is to verify that the specified ECCS components automatically actuate properly in response to an actuation signal. 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 equipment does not perform differently when actuated by an "actual" or "simulated" signal and, therefore, the results of the testing are unaffected by the type of signal used to initiate the test.

This change allows taking credit for unplanned actuations if sufficient information is collected to satisfy the surveillance test requirements. This change is designated as less restrictive because less stringent Surveillance Requirements are being applied in the ITS than were applied in the CTS.

L.2 *(Category 4 – Relaxation of Required Action)* CTS 3.5.2 Action a states that when one ECCS train is inoperable, it must be returned to OPERABLE status within 72 hours. ITS 3.5.2 Action A states that when one or more trains are inoperable, restore the trains to OPERABLE status within 72 hours. ITS 3.5.2, Action C states that with less than 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available, enter LCO 3.0.3 immediately. This changes the CTS by allowing combinations of equipment from each train to be credited as meeting the ECCS safety function provided 100% of the ECCS flow equivalent to a single OPERABLE ECCS train is available. For example, under the CTS an inoperable HHSI pump in one train and an inoperable low head safety injection (LHSI) pump in the other train would require a 3.0.3 entry. Under the ITS, the same condition would allow 72 hours before requiring a shutdown because the remaining OPERABLE HHSI pump and LHSI pump are capable of producing the flow equivalent to a single OPERABLE train.

The purpose of CTS 3.5.2 Action a is to limit the period of time the plant can operate without redundant ECCS trains. 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. ITS 3.5.2 Actions A and C continue to provide an ECCS train and limits the time only one is available to 72 hours. The ECCS system can still perform its safety function, assuming no single failure occurs. 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 8 – Deletion of Reporting Requirements)* CTS 3.5.2 Action b requires that a Special Report be prepared and submitted to the NRC within 90 days following an ECCS actuation that results in water being injected into the Reactor Coolant System. The report is to include the total accumulated actuation cycles to date. ITS 3.5.2 does not include this requirement.

The purpose of CTS 3.5.2 Action b 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)(iv) describing any event or condition that resulted in manual or automatic actuation of any Engineered

Safety Feature (ESF). Therefore, a report to the NRC is still required. However, 10 CFR 50.73 does not require that the report include the total accumulated actuation cycles to date. ITS Section 5.0, Component Cyclic or Transient Limit Program, requires that controls are in place to track the cyclic and transient occurrences to ensure that components are maintained within the design limits. This change is designated as less restrictive because reports that would be submitted under the CTS will not be required under the ITS.

L.4 *(Category 5 – Deletion of Surveillance Requirement)* CTS 4.5.2.g.1 and 4.5.2.h describe tests that must be performed following repositioning of valves, maintenance, or modification to the ECCS. The ITS does not include these testing requirements.

The purpose of 4.5.2.g.1 and 4.5.2.h is verify OPERABILITY of ECCS subsystems following repositioning or maintenance on a valve and following completion of modifications to the ECCS subsystems that alter subsystem flow characteristics. 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 ECCS trains are described in the Bases for Specification 3.5.2. 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.5 *(Category 6 – Relaxation Of Surveillance Requirement Acceptance Criteria)* CTS Surveillance 4.5.2.d.1 requires a visual inspection of the containment sump and verification that the subsystems suction inlets are not restricted by debris and that the sump components (trash racks, screens, etc.) show no evidence of structural distress or corrosion. ITS SR 3.5.2.8 contains the same requirements, but it is only necessary to verify that the sump components show no evidence of abnormal corrosion. This changes CTS by only requiring verification of no abnormal corrosion versus corrosion.

The purpose of CTS Surveillance 4.5.2.d.1 is to verify that the containment sump will be capable of performing its safety function should a design basis accident occur. 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. Normal corrosion will not interfere with the operation of the containment sump. Depending on the materials of construction and the operating environment, some corrosion may occur on the containment sump components. This normal corrosion is acceptable. Only if abnormal corrosion that could compromise the structural integrity of the sump were to occur, would the OPERABILITY of the containment sump be affected. This change is designated as less restrictive because less stringent Surveillance Requirements are being applied in the ITS than were applied in the CTS.

L.6 *(Category 6 – Relaxation Of Surveillance Requirement Acceptance Criteria)* CTS 4.5.2.e.1 requires verification that ECCS automatic valves actuate to their correct position. ITS SR 3.5.2.5 requires verification that ECCS automatic valves in the flow path that are not locked, sealed or otherwise secured in position, actuate to the correct position on an actual or simulated actuation signal. This changes the CTS by excluding those valves that are locked, sealed, or otherwise secured in position from the verification.

The purpose of CTS 4.5.2.e.1 is to provide assurance that if an event occurred requiring the ECCS valves to be in their correct position, that those requiring automatic actuation would actuate to their correct position. 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. Those automatic valves that are locked, sealed, or otherwise secured in position are not required to actuate on an ECCS actuation signal in order to perform their safety function because they are already in the required position. Testing such valves would not provide any additional assurance of OPERABILITY. Valves that are required to actuate will continue to be tested. This change is designated as less restrictive because less stringent Surveillance Requirements are being applied in the ITS than were applied in the CTS.

L.7 *(Category 6 – Relaxation Of Surveillance Requirement Acceptance Criteria)* CTS Surveillance 4.5.2.g requires verification that specified manual valves are locked and tagged in the proper position for injection. ITS SR 3.5.2.7 requires verification that the specified ECCS throttle valves are secured in the correct position. This changes the CTS by not specifying that the valves be verified locked and tagged.

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. Replacing the requirement to specifically verify that the specified valves are locked and tagged with the requirement to verify they are secured in the correct position eliminates unnecessary details in the Surveillance Requirement. The ITS still retains the requirement to verify that the specified valves are in the correct position. 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)

07-24-96

ITS

EMERGENCY CORE COOLING SYSTEMS

ECCS SUBSYSTEMS – Tavg LESS THAN 350°F

LIMITING CONDITION FOR OPERATION

3.5.3 3.5.3 As a minimum, one ECCS subsystem comprised of the following shall be OPERABLE: (LA.1)

a. One OPERABLE charging pump#,

b. One OPERABLE low head safety injection pump#, and

c. An OPERABLE flow path capable of automatically transferring fluid to the reactor coolant system when taking suction from the refueling water storage tank or from the containment sump when the suction is transferred during the recirculation phase of operation or from the discharge of the outside recirculation spray pump. (LA.1)

APPLICABILITY: MODE 4.

ACTION:

Action A / Action B

a. With no ECCS subsystem OPERABLE because of the inoperability of either the charging pump or the flow path from the refueling water storage tank, restore at least one ECCS subsystem to OPERABLE status within 1 hour or be in COLD SHUTDOWN within the next 20 hours. 24 (M.1) (L.2)

b. With no ECCS subsystem OPERABLE because of the inoperability of the low head safety injection pump, restore at least one ECCS subsystem to OPERABLE status or maintain the Reactor Coolant System T_{avg} less than 350°F by use of alternate heat removal methods. (M.1)

c. In the event the ECCS is actuated and injects water into the Reactor Coolant System, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date. (L.1)

A maximum of one charging pump and one low head safety injection 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 except two charging pumps may be OPERABLE and capable of injecting into the RCS during pump switching operations. (See ITS 3.4.12)

Rev. 0

(A.1)

07-24-96

ITS

EMERGENCY CORE COOLING SYSTEMS

SURVEILLANCE REQUIREMENTS

SR 3.5.3.1 4.5.3.1 The ECCS subsystem shall be demonstrated OPERABLE per ~~the applicable~~ Surveillance Requirements of 4.5.2. (A.2)

4.5.3.2 At least once per 12 hours, verify that a maximum of one charging pump and one low head safety injection 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.* (See ITS 3.4.12)

SR 3.5.2.1
SR 3.5.2.3
SR 3.5.2.4
SR 3.5.2.7
SR 3.5.2.8

* Two charging pumps may be OPERABLE and capable of injecting into the RCS during pump switching operations. (See ITS 3.4.12)

UNIT 2

ITS 3.5.3

(A.1)

EMERGENCY CORE COOLING SYSTEMS

ITS ECCS SUBSYSTEMS – Tavg LESS THAN 350°F

LIMITING CONDITION FOR OPERATION

3.5.3 3.5.3 As a minimum, one ECCS subsystem comprised of the following shall be OPERABLE: (LA.1)

a. One OPERABLE charging pump#,

b. One OPERABLE low head safety injection pump#, and

c. An OPERABLE flow path capable of automatically transferring fluid to the reactor coolant system when taking suction from the refueling water storage tank or from the containment sump when the suction is transferred during the recirculation phase of operation. (LA.1)

APPLICABILITY: MODE 4.

ACTION:

Action A a. With no ECCS subsystem OPERABLE because of the inoperability of either the charging pump or the flow path from the refueling water storage tank, restore at least one ECCS subsystem to OPERABLE status within 1 hour or be in COLD
Action B SHUTDOWN within the next 20 hours. (24) (M.1) (L.2)

b. With no ECCS subsystem OPERABLE because of the inoperability of the low head safety injection pump, restore at least one ECCS subsystem to OPERABLE status or maintain the Reactor Coolant System T_{avg} less than 350°F by use of alternate heat removal methods. (M.1)

c. In the event the ECCS is actuated and injects water into the Reactor Coolant System, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date. The current value of the usage factor for each affected safety injection nozzle shall be provided in this Special Report whenever its value exceeds 0.70. (L.1)

\# A maximum of one charging pump and one low head safety injection 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 except two charging pumps may be OPERABLE and capable of injecting into the RCS during pump switching operations. (See ITS 3.4.12)

A.1

07-24-96

ITS

EMERGENCY CORE COOLING SYSTEMS

SURVEILLANCE REQUIREMENTS

SR 3.5.3.1 4.5.3.1 The ECCS subsystem shall be demonstrated OPERABLE per ~~the~~ applicable ~~Surveillance Requirements of 4.5.2~~ A.2

SR 3.5.2.1
SR 3.5.2.3
SR 3.5.2.4
SR 3.5.2.7
SR 3.5.2.8

4.5.3.2 At least once per 12 hours, verify that a maximum of one charging pump and one low head safety injection 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.* ⟨See ITS 3.4.12⟩

* Two charging pumps may be OPERABLE and capable of injecting into the RCS during pump switching operations. ⟨See ITS 3.4.12⟩

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 4.5.3.1 states that the ECCS subsystem shall be demonstrated OPERABLE per the applicable Surveillance Requirements of 4.5.2. ITS SR 3.5.3.1 states the specific Surveillances in Specification 3.5.2 which must be performed.

This change is acceptable because the change is editorial. The Surveillances listed in ITS SR 3.5.3.1 are those that are considered "applicable" under the CTS. All Specification 3.5.2 Surveillances are included in SR 3.5.3.1 except those that are not applicable in MODE 4. SR 3.5.2.2 verifies that ECCS valves are in their proper position to respond to an accident. It is excluded because valves are allowed to be positioned manually to align the flow paths due to reduced RCS pressure. This reduced pressure allows more time for the ECCS to deliver water to the core in the event of an accident in MODE 4. SR 3.5.3.5 and 3.5.3.6 verify actuation of components on an actuation signal. They are excluded because the ECCS actuation system is not required to be OPERABLE in MODE 4. This change is designated as administrative because it does not result in technical changes to the CTS.

MORE RESTRICTIVE CHANGES

M.1 CTS 3.5.3, Action b applies when the required Low Head Safety Injection (LHSI) pump is inoperable. It directs that at least one ECCS subsystem be restored to OPERABLE status or RCS T_{avg} be maintained less than 350 °F by use of alternate heat removal methods. Action a applies to an ECCS train inoperable due to either the HHSI pump or the flow path from the refueling water storage tank. The ITS will not contain CTS 3.5.3 Action B and ITS 3.5.3 Action A will not include the exclusion regarding an ECCS inoperability due to the inoperability of either the HHSI pump or the flow path from the RWST, and will apply to all inoperabilities of the required ECCS train. This changes CTS by changing the Completion Time for a LHSI subsystem inoperable in MODE 4 from no specified time to restore OPERABILITY to one hour. In addition, the ITS requires that the plant be in MODE 5 within 24 hours when a LHSI subsystem is inoperable and not restored within 1 hour instead of remaining in MODE 4 as allowed by the CTS.

The purpose of CTS 3.5.3 Action b is to provide an allowance to remain in MODE 4 with no ECCS train OPERABLE because it is assumed that RHR is also inoperable and there is no means to cool down to MODE 5. Action b is based on the assumption that the North Anna LHSI subsystem shares components with the Residual Heat Removal (RHR) system. While such sharing is common in Westinghouse NSSS plants, it is not shared at North Anna. The LHSI system and the RHR system are separate. This assumption is evidenced in two ways. First, the Action requires the use of alternate heat removal methods even though the primary heat removal method, RHR, is unaffected. Second, the Action does not require exiting the MODE of Applicability (MODE 4) because it is assumed that RHR is inoperable and cool down to MODE 5 is not possible. To reflect the plant design, CTS Action b does not appear in ITS 3.5.3. Also, ITS 3.5.3 Action A applies to all inoperabilities of the required ECCS subsystem. This change is acceptable because it reflects appropriate actions for an inoperable ECCS train consistent with the plant design. The 1 hour Completion Time to restore at least one ECCS subsystem to OPERABLE status ensures that prompt action is taken to provide the required emergency equipment or to initiate actions to place the plant in MODE 5, where an ECCS train is not required. Twenty-four hours is a reasonable time, based on operating experience, to reach MODE 5 in an orderly manner and without challenging operator or plant systems. This change is designated as more restrictive because it requires a low head subsystem to be returned to OPERABLE status within one hour and the unit be in MODE 5, while CTS 3.5.3 contains no time limit or MODE change requirement.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

LA.1 *(Type 1 – Removing Details of System Design and System Description, Including Design Limits)* CTS LCO 3.5.3 states that an ECCS subsystem shall be OPERABLE and contains a description of what constitutes an OPERABLE subsystem. ITS 3.5.3 requires an ECCS train be OPERABLE, but the details of what constitutes an OPERABLE train are moved to the Bases.

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 for one ECCS train to be OPERABLE. 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, described in Chapter 5 of the ITS, which provides for control of changes to the Bases and ensures that any changes to the Bases are properly evaluated. 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 8 – Deletion of Reporting Requirements)* CTS 3.5.3, Action c requires that a Special Report be prepared and submitted to the NRC within 90 days following an ECCS actuation that results in water being injected into the Reactor Coolant System. The report is to include the total accumulated actuation cycles to date. ITS 3.5.3 does not include this requirement.

The purpose of CTS 3.5.3 Action c 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)(iv) describing any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature (ESF). Therefore, a report to the NRC is still required. However, 10 CFR 50.73 does not require that the report include the total accumulated actuation cycles to date. ITS Section 5.0, Component Cyclic or Transient Limit Program, requires that controls are in place to track the cyclic and transient occurrences to ensure that components are maintained within the design limits. 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 3 – Relaxation of Completion Time)* CTS 3.5.3 Action a allows 20 hours to reach MODE 5 when a HHSI pump or its flow path from the refueling water storage tank is inoperable. ITS 3.5.3 Action B allows 24 hours to reach MODE 5. This change the CTS by extending the Completion Time from 20 to 24 hours.

The purpose of CTS 3.5.3 is to ensure the unit is being cooled down by whatever means available when no ECCS subsystem is OPERABLE. 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 24 hour Completion Time is reasonable based on operating experience to reach MODE 5 in an orderly manner and without challenging plant systems or operators. This is consistent with LCO 3.0.3, which allows 24 hours to transition from MODE 4 to MODE 5. 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.

UNIT 1

(A.1)

ITS

EMERGENCY CORE COOLING SYSTEMS

REFUELING WATER STORAGE TANK

LIMITING CONDITION FOR OPERATION

LCO 3.5.4 — 3.5.5 The refueling water storage tank (RWST) shall be OPERABLE ~~with:~~

SR 3.5.4.2 — a. ~~A contained borated water volume of between 466,200 and 487,000 gallons.~~

SR 3.5.4.3 — b. ~~Between 2300 and 2400 ppm of boron, and~~

SR 3.5.4.1 — c. ~~A solution temperature between 40°F and 50°F.~~

(A.2)

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION: ← Add proposed Action A (L.1)

Action A / Action B / Action C — With the refueling water storage tank inoperable [for reasons other than Condition A], restore the tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours. (A.1)

SURVEILLANCE REQUIREMENTS

4.5.5 The RWST shall be demonstrated OPERABLE:

a. At least once per 7 days by:

SR 3.5.4.2 — 1. Verifying the contained borated water volume in the tank [is ≥ 466,200 gallons and ≤ 487,000 gallons], and

SR 3.5.4.3 — 2. Verifying the boron concentration of the water [is ≥ 2300 ppm and ≤ 2400 ppm].

SR 3.5.4.1 — b. At least once per 24 hours by verifying the RWST temperature [is ≥ 40°F and ≤ 50°F].

(A.2)

UNIT 2

A.1

12-14-88

EMERGENCY CORE COOLING SYSTEMS

REFUELING WATER STORAGE TANK

ITS

LIMITING CONDITION FOR OPERATION

LCO 3.5.4 3.5.5 The refueling water storage tank (RWST) shall be OPERABLE ~~with:~~

SR 3.5.4.2 ~~a. A contained borated water volume of between 466,200 and 487,000 gallons,~~

SR 3.5.4.3 ~~b. Between 2300 and 2400 ppm of boron, and~~

SR 3.5.4.1 ~~c. A solution temperature between 40°F and 50°F.~~

A.2

APPLICABILITY: MODES 1, 2, 3 and 4.

Action A ACTION: Add proposed Action A

L.1

Action B
Action C

With the refueling water storage tank inoperable [for reasons other than Condition A], restore the tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

A.1

SURVEILLANCE REQUIREMENTS

4.5.5 The RWST shall be demonstrated OPERABLE:

a. At least once per 7 days by:

SR 3.5.4.2 1. Verifying the contained borated water volume in the tank [is ≥ 466,200 gallons and ≤ 487,000 gallons], and

SR 3.5.4.3 2. Verifying the boron concentration of the water [is ≥ 2300 ppm and ≤ 2400 ppm].

SR 3.5.4.1 b. At least once per 24 hours by verifying the RWST temperature [is ≥ 40°F and ≤ 50°F].

A.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 LCO 3.5.5 contains a list of requirements that must be met for the Refueling Water Storage Tank (RWST) to be OPERABLE. ITS LCO 3.5.4 still requires the RWST to be OPERABLE, but the requirements for OPERABILITY are moved to the Surveillances.

This change is acceptable because, in accordance with SR 3.0.1, failure to meet a Surveillance is failure to meet the LCO. Therefore, the movement of the requirements from the LCO to the Surveillances results in no changes to the OPERABILITY requirements. This change is designated as administrative because it does not result in technical changes to the CTS.

MORE RESTRICTIVE CHANGES

None

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

None

LESS RESTRICTIVE CHANGES

L.1 *(Category 3 – Relaxation of Completion Time)* The CTS 3.5.5 Action allows 1 hour to restore an inoperable RWST. ITS LCO 3.5.4, Action A allows 8 hours to restore the RWST to OPERABLE status if the inoperability is due to the RWST boron concentration or temperature not within limits. This changes CTS by increasing the Completion Time for the specified Conditions from 1 hour to 8 hours.

The purpose of CTS 3.5.5 Action is to require rapid correction of conditions that affect both trains of ECCS. 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 primary function of the RWST is to provide large volumes of water to the RCS following a Loss of Coolant Accident. This large volume of water continues to be available while in this Condition. As a result, the most important safety function of the RWST can still be provided. Because of the volume of the RWST, changes to the boron concentration or temperature occur slowly, and consequently would not go far out of limit. If one of these parameters were out of limit, more than one hour would likely be required to restore the parameter. Given the remaining abilities of the RWST, requiring a plant shutdown after one hour is not warranted. 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.

ITS 3.5.5 - SEAL INJECTION FLOW

UNIT 1

LCO 3.5.5 Seal Injection Flow (A.1)

(A.1)

12-12-88

ITS

REACTOR COOLANT SYSTEM

OPERATIONAL LEAKAGE

LIMITING CONDITION FOR OPERATION

3.4.6.2 Reactor Coolant System leakage shall be limited to:

a. No PRESSURE BOUNDARY LEAKAGE,

b. 1 GPM UNIDENTIFIED LEAKAGE,

c. 1 GPM total primary-to-secondary leakage through all steam generators not isolated from the Reactor Coolant System and 500 gallons per day through any one steam generator not isolated from the Reactor Coolant System,*

d. 10 GPM IDENTIFIED LEAKAGE from the Reactor Coolant System,

(See ITS 3.4.13)

LCO 3.5.5 — e. 30 GPM CONTROLLED LEAKAGE at a Reactor Coolant System pressure of 2235 ± 20 psig, and

f. Leakage for the Reactor Coolant System Pressure Isolation Valves specified in Table 3.4-1. (See 3.4.14)

APPLICABILITY: MODES 1, 2, 3 and 4 (L.1)

ACTION:

a. With any PRESSURE BOUNDARY LEAKAGE, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours. (See 3.4.13)

Action A — b. With any Reactor Coolant System leakage greater than any one of the above limits, excluding PRESSURE BOUNDARY LEAKAGE and leakage from the Reactor Coolant System Pressure Isolation Valves, reduce the leakage rate to within limits within 4 hours INSERT (A.2)

Action B — or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. MODE 4 in 12 hours (L.1)

c. With any Reactor Coolant System Pressure Isolation Valve leakage greater than the above limit, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. (See ITS 3.4.14)

*When in Mode 1 above 50% power, provisions of Specification 3.4.6.3 apply. (see ITS 3.4.13)

INSERT

seal injection flow not within limit, adjust manual seal injection throttle valves to give a flow within limit with RCS pressure ≥ 2215 psig and ≤ 2255 psig and the seal injection hand control valve full open

ITS 3.5.5

(A.1)

ITS

4.4.6.2.1 Reactor Coolant System leakages shall be demonstrated to be within each of the above limits by: 22

See ITS 3.4.13

a. Monitoring the containment atmosphere particulate radioactivity monitoring at least once per 12 hours.

b. Monitoring the containment sump inventory and discharge at least once per 12 hours.

SR 3.5.5.1

c. Measurement of the CONTROLLED LEAKAGE to the reactor coolant pump seals when the Reactor Coolant System pressure is 2235 ± 20 psig at least once per 31 days with the modulating valve fully open, (Insert ITS SR 3.5.5.1 NOTE) (L.2)

LCO 3.5.5

See ITS 3.4.13

d. Performance of a Reactor Coolant System water inventory balance at least once per 72 hours during steady state operation, and

e. Monitoring the reactor head flange leakoff temperature at least once per 24 hours.

4.4.6.2.2 Each Reactor Coolant System Pressure Isolation Valve specified in Table 3.4.1 shall be individually demonstrated OPERABLE by verifying leakage* to be within its limit:

a. Prior to entering MODE 2 after each refueling,

b. Prior to entering MODE 2 whenever the plant has been in COLD SHUTDOWN for 72 hours or more and if leakage testing has not been performed in the previous 9 months, and 22

c. Prior to returning the valve to service following maintenance, repair or replacement work on the valve.

See ITS 3.4.14

*To satisfy ALARA requirements, leakage may be measured indirectly (as from the performance of pressure indicators) if accomplished in accordance with approved procedures and supported by computations showing that the method is capable of demonstrating valve compliance with the leakage criteria. 22

ITS 3.5.5 - SEAL INJECTION FLOW

UNIT 2

(LCO 3.5.5 Seal Injection Flow)

12-12-88

(A.1)

(A.1)

ITS

REACTOR COOLANT SYSTEM

OPERATIONAL LEAKAGE

LIMITING CONDITION FOR OPERATION

3.4.6.2 Reactor Coolant System leakage shall be limited to:

a. No PRESSURE BOUNDARY LEAKAGE,

b. 1 GPM UNIDENTIFIED LEAKAGE,

c. 1 GPM total primary-to-secondary leakage through all steam generators not isolated from the Reactor Coolant System and 500 gallons per day through any one steam generator not isolated from the Reactor Coolant System,**

d. 10 GPM IDENTIFIED LEAKAGE from the Reactor Coolant System,

⟨See ITS 3.4.13⟩

LCO 3.5.5 e. 30 GPM CONTROLLED LEAKAGE at a Reactor Coolant System pressure of 2235 ± 20 psig, and

f. Leakage for the Reactor Coolant System Pressure Isolation Valves specified in Table 3.4-1.*

⟨See ITS 3.4.14⟩

APPLICABILITY: MODES 1, 2, 3 and 4.

(L.1)

ACTION:

a. With any PRESSURE BOUNDARY LEAKAGE, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

⟨See ITS 3.4.13⟩

Action A

Action B

b. With any Reactor Coolant System leakage greater than any one of the above limits, excluding PRESSURE BOUNDARY LEAKAGE and leakage from the Reactor Coolant System Pressure Isolation Valves, reduce the leakage rate to within limits within 4 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

INSERT (A.2)

(L.1) MODE 4 in 12 hours

c. With any Reactor Coolant System Pressure Isolation Valve leakage greater than the above limit, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

⟨See ITS 3.4.14⟩

*The leakage limit for any RHR system isolation valve shown in Table 3.4-1 shall be 5 GPM.

**When in Mode 1 above 50% power, provisions of Specification 3.4.6.3 apply.

⟨See ITS 3.4.13⟩

INSERT

seal injection flow not within limit, adjust manual seal injection throttle valves to give a flow within limit with RCS pressure ≥ 2215 psig and ≤ 2255 psig and the seal injection hand control valve full open

(A1)

11-17-80

ITS

REACTOR COOLANT SYSTEM

SURVEILLANCE REQUIREMENTS

4.4.6.2.1 Reactor Coolant System leakages shall be demonstrated to be within each of the above limits by:

a. Monitoring the containment atmosphere particulate radioactivity monitor at least once per 12 hours.

b. Monitoring the containment sump inventory and discharge at least once per 12 hours.

<See ITS 3.4.13>

SR 3.5.5.1
LCO 3.5.5

c. Measurement of the CONTROLLED LEAKAGE to the reactor coolant pump seals when the Reactor Coolant System pressure is 2235 ± 20 psig at least once per 31 days with the modulating valve fully open. The provisions of Specification 4.0.4 are not applicable for entry into MODE 4.

Insert ITS SR 3.5.5.1 NOTE (L.2)

d. Performance of a Reactor Coolant System water inventory balance at least once per 72 hours.

e. Monitoring the reactor head flange leakoff temperature at least once per 24 hours.

<See ITS 3.4.13>

4.4.6.2.2 Each Reactor Coolant System Pressure Isolation Valve specified in Table 3.4-1 shall be demonstrated OPERABLE pursuant to Specification 4.0.5, except that in lieu of any leakage testing required by Specification 4.0.5, each valve shall be demonstrated OPERABLE by verifying leakage to be within its limit:

a. At least once per 18 months.

b. Prior to entering MODE 2 whenever the plant has been in COLD SHUTDOWN for 72 hours or more and if leakage testing has not been performed in the previous 9 months.

c. Prior to returning the valve to service following maintenance, repair or replacement work on the valve.

d. Within 24 hours following valve actuation due to automatic or manual action or flow through the valve.

<See ITS 3.4.14>

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 3.4.6.2 Action b states that with any RCS leakage greater than the controlled leakage rate, reduce the leakage rate to within limits within 4 hours. ITS 3.5.5 Action A states with seal injection flow not within limit, adjust manual seal injection throttle valves to give a flow within limit with RCS pressure ≥ 2215 psig and ≤ 2255 psig and the seal injection modulating valve full open within 4 hours. This changes CTS by providing more detail for the Action.

ITS 3.5.5 Action A provides detail of how CTS 3.4.6.2 Action B is carried out. This change is designated as administrative because it does not result in technical changes to the CTS.

MORE RESTRICTIVE CHANGES

None

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

None

LESS RESTRICTIVE CHANGES

L.1 *(Category 2 – Relaxation of Applicability)* CTS 3.4.6.2.e is applicable in MODES 1, 2, 3 and 4. If the requirements of the LCO are not met, Action b requires entering MODE 5 (Cold Shutdown) within 30 hours. ITS 3.5.5 is applicable in MODES 1, 2, and 3. If the requirements of LCO are not met, Action B requires entering MODE 4 in 12 hours. This changes the CTS by deleting MODE 4 from the MODES of

Applicability and making corresponding changes to the ACTIONS and Completion Times.

The purpose of CTS 3.4.6.2.e is to maintain proper seal injection flow in the event of an accident. 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. Limiting HHSI pump flow to seal injection is less critical in MODE 4 than in MODES 1, 2, and 3. Should an accident occur in MODE 4, it would be less severe due to the lower RCS pressure and decreased decay heat generation. Therefore, it is not necessary to limit seal injection flow in MODE 4 due to the lesser requirements of safety injection flow needed for long term cooling. Requiring the unit be in MODE 4, outside the MODE of Applicability, within 12 hours corresponds with similar Completion Times in ITS. This change is designated as less restrictive because the LCO requirements are applicable in fewer operating conditions than in the CTS.

L.2 *(Category 7 – Relaxation Of Surveillance Frequency)* CTS Surveillance 4.4.6.2.1.c requires measurement of the RCP seal injection flow when RCS pressure is 2235 ± 20 psig. ITS SR 3.5.5.1 will allow 4 hours to perform the Surveillance after RCS pressure stabilizes ≥ 2215 psig and ≤ 2255 psig. This changes the CTS by allowing 4 hours after RCS pressure is stabilized at normal operating pressure to perform the Surveillance.

The purpose of CTS 4.4.6.2.1.c is to verify Reactor Coolant Pump seal injection flow is within limits during steady state operation. This change is acceptable because the new Surveillance Frequency has been evaluated to ensure that it provides an acceptable level of equipment reliability. This change is acceptable because it is necessary in order to obtain an accurate measurement of RCP seal injection flow. The Surveillance is required to be met within 4 hours after the RCS pressure has stabilized within a ± 20 psi range of normal operating pressure. This configuration will produce the required pressure conditions necessary to assure that the manual valves controlling seal injection flow are set correctly. The exception is limited to 4 hours to ensure that the Surveillance is timely. This change is designated as less restrictive because Surveillances will be performed less frequently under the ITS than under the CTS.

UNIT 1

ITS

EMERGENCY CORE COOLING SYSTEMS (A.1)

3/4.5.4 BORON INJECTION SYSTEM

BORON INJECTION TANK

LIMITING CONDITION FOR OPERATION

LCO 3.5.6 3.5.4.1 The boron injection tank shall be OPERABLE ~~with:~~ (A.1)

SR 3.5.6.2 ~~a. A contained borated water volume of at least 900 gallons,~~ (A.2)

SR 3.5.6.3 ~~b. Between 12,950 and 15,750 ppm of boron, and~~

SR 3.5.6.1 ~~c. A minimum solution temperature of 115°F.~~

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

Action A, Action B, Action C: With the boron injection tank inoperable, restore the tank to OPERABLE status within 1 hour or be in HOT STANDBY and borated to a SHUTDOWN MARGIN ~~equivalent to 1.77% Δk/k at 200°F~~ [within the limit provided in the COLR] within the next 6 hours; restore the tank to OPERABLE status within the next 7 days or be in HOT SHUTDOWN within the next 12 hours. (LA.1)

SURVEILLANCE REQUIREMENTS

4.5.4.1 The boron injection tank shall be demonstrated OPERABLE by: (A.2)

SR 3.5.6.2 a. Verifying the contained borated water volume [is ≥ 900 gallons] at least once per 7 days,

SR 3.5.6.3 b. Verifying the boron concentration of the water in the tank [is ≥ 12,950 ppm and ≤ 15,750 ppm] at least once per 7 days, and

SR 3.5.6.1 c. Verifying the water temperature [is ≥ 115°F] at least once per 24 hours.

UNIT 2

A.1

09-09-85

EMERGENCY CORE COOLING SYSTEMS

ITS

3/4.5.4 BORON INJECTION SYSTEM

BORON INJECTION TANK

LIMITING CONDITION FOR OPERATION

LCO 3.5.6 3.5.4.1 The boron injection tank shall be OPERABLE with: A.1

SR 3.5.6.2 a. A contained borated water volume of at least 900 gallons,

SR 3.5.6.3 b. Between 12,950 and 15,750 ppm of boron, and A.2

SR 3.5.6.1 c. A minimum solution temperature of 115°F.

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

Action A With the boron injection tank inoperable, restore the tank to OPERABLE status within 1 hour or be in HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to 1.77% Δk/k at 200°F within the next 6 hours; restore the tank to OPERABLE status within the next 7 days or be in HOT SHUTDOWN within the next 12 hours. LA.1

Action B

Action C

within the limit provided in the COLR

SURVEILLANCE REQUIREMENTS

4.5.4.1 The boron injection tank shall be demonstrated OPERABLE by: is ≥ 900 gallons

SR 3.5.6.2 a. Verifying the contained borated water volume at least once per 7 days,

SR 3.5.6.3 b. Verifying the boron concentration of the water in the tank at least once per 7 days, and A.2

is ≥ 12,950 ppm and ≤ 15,750 ppm

SR 3.5.6.1 c. Verifying the water temperature at least once per 24 hours.

is ≥ 115°F

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 LCO 3.5.4.1 contains a list of requirements that must be met for the Boron Injection Tank (BIT) to be OPERABLE. ITS LCO 3.5.6 requires the BIT to be OPERABLE, but the requirements for OPERABILITY are moved to Surveillances.

This change is acceptable because, in accordance with SR 3.0.1, failure to meet a Surveillance is failure to meet the LCO. Therefore, the movement of these requirements from the LCO to the Surveillances results in no changes to the OPERABILITY requirements. This change is designated as administrative because it does not result in technical changes to the CTS.

MORE RESTRICTIVE CHANGES

None

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

LA.1 *(Type 3 – Removing Procedural Details for Meeting TS Requirements and Related Reporting Problems)* CTS 3.5.4.1 states that when the boron injection tank is inoperable, the tank must be restored to OPERABLE status within one hour or the reactor must be in HOT STANDBY and borated to a Shutdown Margin (SDM) equivalent to 1.77% $\Delta k/k$ at 200 °F within the next 6 hours. ITS 3.5.6, Actions A and B, contain similar requirements, but the specific value of SDM is relocated to the COLR.

The removal of these details for performing actions 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 to borate to a specific shutdown margin. The specific shutdown margin value is a cycle-specific variable similar to Moderator Temperature Coefficient, Rod Insertion Limits, Axial Flux Difference, Heat Flux Hot Channel Factor, and Nuclear Enthalpy Rise Hot Channel Factor, which are currently contained in the COLR. In addition, there is an NRC-approved methodology for calculating SDM. Also, this change is acceptable because these types of procedural details will be adequately controlled in the COLR. 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

None

UNIT 1

EMERGENCY CORE COOLING SYSTEMS

HEAT TRACING

LIMITING CONDITION FOR OPERATION

3.5.4.2 At least two independent channels of heat tracing shall be OPERABLE for the boron injection tank and for the heat traced portions of the associated flow paths.

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

With only one channel of heat tracing on either the boron injection tank or on the heat traced portion of an associated flow path OPERABLE, operation may continue for up to 30 days provided the tank and flow path temperatures are verified to be $\geq$ 115°F at least once per 8 hours; otherwise, be in HOT SHUTDOWN within 12 hours.

(R.1)

SURVEILLANCE REQUIREMENTS

4.5.4.2 Each heat tracing channel for the boron injection tank and associated flow path shall be demonstrated OPERABLE:

a. At least once per 31 days by energizing each heat tracing channel, and

b. At least once per 24 hours by verifying the tank and flow path temperatures to be $\geq$ 115°F. The tank temperature shall be determined by measurement. The flow path temperature shall be determined by either measurement or recirculation flow until establishment of equilibrium temperatures within the tank.

UNIT 2

EMERGENCY CORE COOLING SYSTEMS

HEAT TRACING

LIMITING CONDITION FOR OPERATION

3.5.4.2 At least two independent channels of heat tracing shall be OPERABLE for the boron injection tank and for the heat traced portions of the associated flow paths.

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

With only one channel of heat tracing on either the boron injection tank or on the heat traced portion of an associated flow path OPERABLE, operation may continue for up to 30 days provided the tank and flow path temperatures are verified to be greater than or equal to 115°F at least once per 8 hours; otherwise, be in HOT SHUTDOWN within 12 hours.

R.1

SURVEILLANCE REQUIREMENTS

4.5.4.2 Each heat tracing channel for the boron injection tank and associated flow path shall be demonstrated OPERABLE:

a. At least once per 31 days by energizing each heat tracing channel and

b. At least once per 24 hours by verifying the tank and flow path temperatures to be greater than or equal to 115°F. The tank temperature shall be determined by measurement. The flow path temperature shall be determined by either measurement or recirculation flow until establishment of equilibrium temperatures within the tank.

RELOCATED SPECIFICATIONS

R.1 CTS 3.5.4.2 states, "At least two independent channels of heat tracing shall be OPERABLE for the boron injection tank and for the heat traced portions of the associated flow paths." The ITS will not contain this requirement and it will be relocated to the Technical Requirements Manual.

This change is acceptable because CTS 3.5.4.2 does not meet the 10 CFR 50.92(c)(2)(ii) criteria for inclusion into the ITS. The Boron Injection Tank (BIT) heat tracing is used to automatically maintain the solution in the BIT and associated piping at a temperature which allows the solution to remain in a fluid state during normal operation. This is an initial assumption of the accident analysis. The BIT heat tracing is not required to function during the course of an accident.

10 CFR 50.36(c)(2)(ii) Criteria Evaluation:

1. The BIT heat tracing 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. BIT heat tracing does not meet criterion 1.

2. The BIT heat tracing maintains an initial condition of the accident analysis, but is not itself 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. BIT heat tracing does not meet criterion 2.

3. The BIT heat tracing 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. BIT heat tracing does not meet criterion 3.

4. As discussed in Section 4.0, (Appendix A, page A-45) of WCAP-11618, the BIT heat tracing was 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. BIT heat tracing is not important for any scenarios modeled in the North Anna Power Station site-specific PRAs. BIT heat tracing does not meet criterion 4.

Since the 10 CFR 50.36(c)(2)(ii) criteria have not been met, the BIT heat tracing LCO and associated Applicability, Actions, and Surveillances may be relocated out of the Technical Specifications. The BIT heat tracing specification will be relocated to the Technical Requirements Manual (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 Technical Requirements Manual.

SECTION 3.5 - EMERGENCY CORE COOLING SYSTEMS (ECCS)

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.

ENVIRONMENTAL ASSESSMENT
SECTION 3.5 - EMERGENCY CORE COOLING SYSTEMS (ECCS)

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 3.5 - EMERGENCY CORE COOLING SYSTEMS (ECCS)

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS

SPECIFIC NSHCs

There are no specific NSHC discussions for this Section.