Table 3.3.5.1-1 (page 1 of 6)
Emergency Core Cooling System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	
1. Core Spray System						
a. Reactor Vessel Water Level – Low Low Low (Level 1)	1,2,3, $4^{(a)}$, $5^{(a)}$	$4^{(b)}$	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.5	$\geq$ -113 inches	
b. Drywell Pressure – High	1,2,3	$4^{(b)}$	B	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.5	$\leq$ 1.84 psig	
c. Reactor Pressure – Low (Injection Permissive)	1,2,3	4	C	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.5	$\geq$ 291 psig and $\leq$ 436 psig	A
	$4^{(a)}$, $5^{(a)}$	4	B	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.5	$\geq$ 291 psig and $\leq$ 436 psig	A
d. Core Spray Pump Discharge Flow – Low (Bypass)	1,2,3, $4^{(a)}$, $5^{(a)}$	1 per pump	E	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.5	$\geq$ 1370 gpm	B
e. Core Spray Pump Start-Time Delay Relay	1,2,3, $4^{(a)}$, $5^{(a)}$	1 per pump	C	SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.5	$\geq$ 9 seconds and $\leq$ 11 seconds	A
2. Low Pressure Coolant Injection (LPCI) System						
a. Reactor Vessel Water Level – Low Low Low (Level 1)	1,2,3, $4^{(a)}$, $5^{(a)}$	4	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.4 SR 3.3.5.1.5	$\geq$ -113 inches	

(continued)

(a) When associated subsystem(s) are required to be OPERABLE.

(b) Also required to initiate the associated diesel generator (DG).

Table 3.3.6.1-1 (page 2 of 3)
Primary Containment Isolation Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION C.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
3. High Pressure Coolant Injection (HPCI) System Isolation					
a. HPCI Steam Line Flow – High	1,2,3	1	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 250% rated steam flow
b. HPCI Steam Line Flow-Time Delay Relays	1,2,3	1	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 6 seonds
c. HPCI Steam Supply Line Pressure – Low	1,2,3	2	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≥ 107 psig
d. HPCI Steam Line Space Temperature – High	1,2,3	2 per location	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 195°F
4. Reactor Core Isolation Cooling (RCIC) System Isolation					
a. RCIC Steam Line Flow – High	1,2,3	1	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 288% rated steam flow
b. RCIC Steam Line Flow-Time Delay Relays	1,2,3	1	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 6 seconds
c. RCIC Steam Supply Line Pressure – Low	1,2,3	2	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≥ 61 psig (B)
d. RCIC Steam Line Space Temperature – High	1,2,3	2 per location	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 195°F
5. Reactor Water Cleanup (RWCU) System Isolation					
a. RWCU Flow – High	1,2,3	1	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 191% of Rated
b. RWCU System Space Temperature – High	1,2,3	2 per location	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ 195°F
c. SLC System Initiation	1,2	1	H	SR 3.3.6.1.6	NA
d. Reactor Vessel Water Level – Low (Level 3)	1,2,3	4	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≥ 3 inches

(continued)

A.1

L.3 Add proposed Note to ACTIONS → Specification 3.3.5.2

NOTES FOR TABLE 3.2.B ← Add proposed ACTION A

See ITS: 3.3.5.1

1. When any ECCS system is required to be operable, there shall be two operable trip systems except as noted. If a requirement of the fourth column is reduced by one, the indicated action shall be taken. If the same function is inoperable in more than one trip system or the fourth column reduced by more than one, action B shall be taken.

A.4

M.2

Action: ← For Required Actions B.2 and D.2.1 Add proposed Required Actions B.1 and D.1

L.2

A. Repair in 24 hours. If the function is not operable in 24 hours, take action B.

Required Action B.1 → ACTION E

L.3 Add proposed Required Action D.2.2

B. Declare the system or component inoperable.

Required Actions B.2, C.1, D.2.1

C. Immediately take action B until power is verified on the trip system.

See ITS: 3.3.5.1

D. The high point vent shall be vented weekly upon failure of PS 73A or B, PS 266, PS 268, PS 269, PS 270.

E. Repair as soon as possible. It does not directly effect system operations.

M.1

2. In only one trip system.

3. Not considered in a trip system.

4. Requires one channel from each physical location in the steam line space.

5. One relay senses each phase of MCC-S and the LC relay is a transfer permissive relay.

See ITS: 3.3.5.1

B

*JFD numbers at head of column apply to all changes in column, unless otherwise noted.

Table 3.3.5.1-1 (page 1 of 6)
Emergency Core Cooling System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Core Spray System		2		SR 3.3.5.1.3, SR 3.3.5.1.4	≥ 3
a. Reactor Vessel Water Level – Low Low Low Level 1	1,2,3, 4(a), 5(a)	4(b)	B	SR 3.3.5.1.1, SR 3.3.5.1.2, SR 3.3.5.1.3, SR 3.3.5.1.5, SR 3.3.5.1.6, SR 3.3.5.1.7	≥ -113 inches
b. Drywell Pressure – High	1,2,3	4(b)	B	SR 3.3.5.1.1, SR 3.3.5.1.2, SR 3.3.5.1.3, SR 3.3.5.1.5, SR 3.3.5.1.6, SR 3.3.5.1.7	≤ 1.92 psig
c. Reactor Steam Dome Pressure – Low (Injection Permissive)	1,2,3	4	C	SR 3.3.5.1.1, SR 3.3.5.1.2, SR 3.3.5.1.3, SR 3.3.5.1.5, SR 3.3.5.1.6, SR 3.3.5.1.7	≥ 291 psig and ≤ 300 psig
	4(a), 5(a)	4	B	SR 3.3.5.1.1, SR 3.3.5.1.2, SR 3.3.5.1.3, SR 3.3.5.1.5, SR 3.3.5.1.6, SR 3.3.5.1.7	≥ 291 psig and ≤ 300 psig
d. Core Spray Pump Discharge Flow – Low (Bypass)	1,2,3, 4(a), 5(a)	2 (1 per pump)	E	SR 3.3.5.1.1, SR 3.3.5.1.2, SR 3.3.5.1.3, SR 3.3.5.1.6	≥ 1570 gpm and ≤ [ ] gpm
e. Manual Initiation	1,2,3, 4(a), 5(a)	[2 (1 per subsystem)]	C	SR 3.3.5.1.6	NA
2. Low Pressure Coolant Injection (LPCI) System					
a. Reactor Vessel Water Level – Low Low Low Level 1	1,2,3, 4(a), 5(a)	4 (8)	B	SR 3.3.5.1.1, SR 3.3.5.1.2, SR 3.3.5.1.3, SR 3.3.5.1.5, SR 3.3.5.1.6, SR 3.3.5.1.7	≥ -113 inches

(continued)

(a) When associated subsystem(s) are required to be OPERABLE.

(b) Also required to initiate the associated diesel generator (DG) and isolate the associated plant service water (PSW) turbine building (T/B) isolation valves.

e. Core Spray Pump Start-Time Delay Relay | 1,2,3, 4(a), 5(a) | 1 per pump | C | SR 3.3.5.1.2, SR 3.3.5.1.4, SR 3.3.5.1.5 | ≥ 9 seconds and ≤ 11 seconds

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS) AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.1 ECCS – Operating

LCO 3.5.1 Each ECCS injection/spray subsystem and the Automatic Depressurization System (ADS) function of six safety/relief valves shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3, except high pressure coolant injection (HPCI) and ADS valves are not required to be OPERABLE with reactor steam dome pressure $\leq$ 150 psig.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME	
A. One low pressure ECCS injection/spray subsystem inoperable.	A.1	Restore low pressure ECCS injection/spray subsystem to OPERABLE status.	7 days	
B. Required Action and associated Completion Time of Condition A not met.	B.1	Be in MODE 3.	12 hours	B
	AND			
	B.2	Be in MODE 4.	36 hours	B
C. HPCI System inoperable.	C.1	Verify by administrative means RCIC System is OPERABLE.	1 hour	B
	AND			
	C.2	Restore HPCI System to OPERABLE status.	14 days	B

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. HPCI System inoperable. AND One low pressure ECCS injection/spray subsystem is inoperable.	D.1 Restore HPCI System to OPERABLE status. OR D.2 Restore low pressure ECCS injection/spray subsystem to OPERABLE status.	72 hours 72 hours
E. One ADS valve inoperable.	E.1 Restore ADS valve to OPERABLE status.	14 days
F. One ADS valve inoperable. AND One low pressure ECCS injection/spray subsystem inoperable.	F.1 Restore ADS valve to OPERABLE status. OR F.2 Restore low pressure ECCS injection/spray subsystem to OPERABLE status.	72 hours 72 hours
G. Required Action and associated Completion Time of Condition C, D, E, or F not met. OR Two or more ADS valves inoperable.	G.1 Be in MODE 3. AND G.2 Reduce reactor steam dome pressure to ≤ 150 psig.	12 hours 36 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
H. Two or more low pressure ECCS injection/spray subsystems inoperable. OR HPCI System and one or more ADS valves inoperable.	H.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.1.1	Verify, for each ECCS injection/spray subsystem, the piping is filled with water from the pump discharge valve to the injection valve.	31 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.5.1.2	----------NOTE---------- Low pressure coolant injection (LPCI) subsystems may be considered OPERABLE during alignment and operation for decay heat removal with reactor steam dome pressure less than the shutdown cooling permissive pressure in MODE 3, if capable of being manually realigned and not otherwise inoperable. ---------- Verify each ECCS injection/spray subsystem 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 3.5.1.3	Verify ADS pneumatic supply header pressure is $\geq$ 88 psig.	31 days
SR 3.5.1.4	Verify the RHR System cross tie shutoff valve is closed.	31 days
SR 3.5.1.5	----------NOTE---------- Not required to be performed if performed within the previous 31 days. ---------- Verify each recirculation pump discharge valve cycles through one complete cycle of full travel or is de-energized in the closed position.	Once each startup prior to exceeding 25% RTP

(continued)

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.5.1.6	Verify the following ECCS pumps develop the specified flow rate against a system head corresponding to the specified reactor pressure. SYSTEM: Core Spray — FLOW RATE: ≥ 4720 gpm — NO. OF PUMPS: 1 — SYSTEM HEAD CORRESPONDING TO A REACTOR PRESSURE OF: ≥ 113 psig SYSTEM: LPCI — FLOW RATE: ≥ 15,000 gpm — NO. OF PUMPS: 2 — SYSTEM HEAD CORRESPONDING TO A REACTOR PRESSURE OF: ≥ 20 psig	In accordance with the Inservice Testing Program
SR 3.5.1.7	----------NOTE---------- Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. ---------- Verify, with reactor pressure ≤ 1020 and ≥ 920 psig, the HPCI pump can develop a flow rate ≥ 4250 gpm against a system head corresponding to reactor pressure.	92 days
SR 3.5.1.8	----------NOTE---------- Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. ---------- Verify, with reactor pressure ≤ 165 psig, the HPCI pump can develop a flow rate ≥ 4250 gpm against a system head corresponding to reactor pressure.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.1.9	----------NOTES---------- 1. For HPCI only, not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. 2. Vessel injection/spray may be excluded. ---------- Verify each ECCS injection/spray subsystem actuates on an actual or simulated automatic initiation signal.	18 months
SR 3.5.1.10	----------NOTE---------- Valve actuation may be excluded. ---------- Verify the ADS actuates on an actual or simulated automatic initiation signal.	18 months
SR 3.5.1.11	----------NOTE---------- Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. ---------- Verify each ADS valve opens when manually actuated.	18 months

A

BASES (continued)

APPLICABILITY

All ECCS subsystems are required to be OPERABLE during MODES 1, 2, and 3, when there is considerable energy in the reactor core and core cooling would be required to prevent fuel damage in the event of a break in the primary system piping. In MODES 2 and 3, when reactor steam dome pressure is $\leq$ 150 psig, ADS and HPCI are not required to be OPERABLE because the low pressure ECCS subsystems can provide sufficient flow below this pressure. ECCS requirements for MODES 4 and 5 are specified in LCO 3.5.2, "ECCS – Shutdown."

ACTIONS

A.1

If any one low pressure ECCS injection/spray subsystem is inoperable, the inoperable subsystem must be restored to OPERABLE status within 7 days. In this condition, the remaining OPERABLE subsystems provide adequate core cooling during a LOCA. However, overall ECCS reliability is reduced, because a single failure in one of the remaining OPERABLE subsystems, concurrent with a LOCA, may result in the ECCS not being able to perform its intended safety function. The 7 day Completion Time is consistent with the recommendations provided in a reliability study (Ref. 11) that evaluated the impact on ECCS availability, assuming various components and subsystems were taken out of service. The results were used to calculate the average availability of ECCS equipment needed to mitigate the consequences of a LOCA as a function of allowed Completion Times.

B.1 and B.2

If the inoperable low pressure ECCS subsystem cannot be restored 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 12 hours and to MODE 4 within 36 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.

(B)

(continued)

BASES

ACTIONS (continued)

C.1 and C.2

If the HPCI System is inoperable and the RCIC System is verified to be OPERABLE, the HPCI System must be restored to OPERABLE status within 14 days. In this condition, adequate core cooling is ensured by the OPERABILITY of the redundant and diverse low pressure ECCS injection/spray subsystems in conjunction with ADS. Also, the RCIC System will automatically provide makeup water at most reactor operating pressures. Verification of RCIC OPERABILITY within 1 hour is therefore required when HPCI is inoperable. This may be performed as an administrative check by examining logs or other information, to determine if RCIC is out of service for maintenance or other reasons. It does not mean to perform the Surveillances needed to demonstrate the OPERABILITY of the RCIC System. If the OPERABILITY of the RCIC System cannot be verified, however, Condition G must be immediately entered. If a single active component fails concurrent with a design basis LOCA, there is a potential, depending on the specific failure, that the minimum required ECCS equipment will not be available. A 14 day Completion Time is consistent with the recommendations provided in a reliability study cited in Reference 11 and has been found to be acceptable through operating experience.

D.1 and D.2

If any one low pressure ECCS injection/spray subsystem is inoperable in addition to an inoperable HPCI System, the inoperable low pressure ECCS injection/spray subsystem or the HPCI System must be restored to OPERABLE status within 72 hours. In this condition, adequate core cooling is ensured by the OPERABILITY of the ADS and the remaining low pressure ECCS subsystems. However, the overall ECCS reliability is significantly reduced because a single failure in one of the remaining OPERABLE subsystems concurrent with a design basis LOCA may result in the ECCS not being able to perform its intended safety function. Since both a high pressure system (HPCI) and a low pressure subsystem are inoperable, a more restrictive Completion Time

(continued)

BASES

ACTIONS

D.1 and D.2 (continued)

of 72 hours is required to restore either the HPCI System or the low pressure ECCS injection/spray subsystem to OPERABLE status. This Completion Time is consistent with the recommendations provided in a reliability study cited in Reference 11 and has been found to be acceptable through operating experience.

E.1

The LCO requires six ADS valves to be OPERABLE in order to provide the ADS function. Reference 9 contains the results of an analysis that evaluated the effect of one ADS valve being out of service. This analysis shows that, assuming a failure of the HPCI System, operation of only five ADS valves will provide the required depressurization. However, overall reliability of the ADS is reduced, because a single failure in the OPERABLE ADS valves could result in a reduction in depressurization capability. Therefore, operation is only allowed for a limited time. The 14 day Completion Time is consistent with the recommendations provided in a reliability study cited in Reference 11 and has been found to be acceptable through operating experience.

F.1 and F.2

If any one low pressure ECCS injection/spray subsystem is inoperable in addition to one ADS valve inoperable, adequate core cooling is ensured by the OPERABILITY of HPCI and the remaining low pressure ECCS injection/spray subsystem. However, overall ECCS reliability is reduced because a single active component failure concurrent with a design basis LOCA could result in the minimum required ECCS equipment not being available. Since both a high pressure system (ADS) and a low pressure subsystem are inoperable, a more restrictive Completion Time of 72 hours is required to restore either the low pressure ECCS subsystem or the ADS valve to OPERABLE status. This Completion Time is consistent with the recommendations provided in a reliability study cited in Reference 11 and has been found to be acceptable through operating experience.

(continued)

BASES

ACTIONS (continued)

G.1 and G.2

If any Required Action and associated Completion Time of Condition C, D, E, or F is not met, or if two or more ADS valves are inoperable, the plant must be brought to a condition in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and reactor steam dome pressure reduced to $\leq$ 150 psig within 36 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.

H.1

When multiple ECCS subsystems are inoperable, as stated in Condition H, the plant is in a condition outside of the accident analyses. Therefore, LCO 3.0.3 must be entered immediately.

SURVEILLANCE REQUIREMENTS

SR 3.5.1.1

The flow path piping has the potential to develop voids and pockets of entrained air. Maintaining the pump discharge lines of the HPCI System, CS System, and LPCI subsystems full of water ensures that the ECCS will perform properly, injecting its full capacity into the RCS upon demand. This will also prevent a water hammer following an ECCS initiation signal. One acceptable method of ensuring that the lines are full is to vent at the high points. The 31 day Frequency is based on the gradual nature of void buildup in the ECCS piping, the procedural controls governing system operation, and operating experience.

SR 3.5.1.2

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 applies only to valves affecting the direct flow path. This SR excludes valves that, if mispositioned, would not affect system or subsystem

(continued)

BASES

ACTIONS

G.1 and G.2 (continued)

≤ 150 psig within 36 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.

H.1

When multiple ECCS subsystems are inoperable, as stated in Condition H, the plant is in a condition outside of the accident analyses. Therefore, LCO 3.0.3 must be entered immediately.

SURVEILLANCE REQUIREMENTS

SR 3.5.1.1

The flow path piping has the potential to develop voids and pockets of entrained air. Maintaining the pump discharge lines of the HPCI System, CS System, and LPCI subsystems full of water ensures that the ECCS will perform properly, injecting its full capacity into the RCS upon demand. This will also prevent a water hammer following an ECCS initiation signal. One acceptable method of ensuring that the lines are full is to vent at the high points. The 31 day Frequency is based on the gradual nature of void buildup in the ECCS piping, the procedural controls governing system operation, and operating experience.

SR 3.5.1.2

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 applies only to valves affecting the direct flow path. This SR excludes valves that, if mispositioned, would not affect system or subsystem OPERABILITY. Also, 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 initiation signal is allowed to be in a nonaccident position provided the valve will automatically reposition in the

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.1.2 (continued)

OPERABILITY. Also, 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 initiation signal is allowed to be in a nonaccident position provided the valve will automatically reposition in the proper stroke time. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of potentially being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves. For the HPCI System, this SR also includes the steam flow path for the turbine and the flow controller position.

The 31 day Frequency of this SR was derived from the Inservice Testing Program requirements for performing valve testing at least once every 92 days. The Frequency of 31 days is further justified because the valves are operated under procedural control and because improper valve position would only affect a single subsystem. This Frequency has been shown to be acceptable through operating experience.

In Mode 3 with reactor steam dome pressure less than the actual shutdown cooling permissive pressure, the RHR System may be required to operate in the shutdown cooling mode to remove decay heat and sensible heat from the reactor. Therefore, this SR is modified by a Note that allows LPCI subsystems to be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned (remote or local) to the LPCI mode and not otherwise inoperable. Alignment and operation for decay heat removal includes when the required RHR pump is not operating or when the system is realigned from or to the RHR shutdown cooling mode. At the low pressures and decay heat loads associated with operation in MODE 3 with reactor steam dome pressure less than the shutdown cooling permissive pressure, a reduced complement of low pressure ECCS subsystems should provide the required cooling, thereby allowing operation of RHR shutdown cooling, when necessary.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.1.3

Verification every 31 days that ADS pneumatic supply header pressure is ≥ 88 psig ensures adequate pneumatic pressure for reliable ADS operation. Prior to startup, the normal pneumatic supply is from instrument air, and after startup, the normal supply is from instrument nitrogen. The accumulator on each ADS valve provides pneumatic pressure for valve actuation. The design pneumatic supply pressure requirements for the accumulator are such that, following a failure of the pneumatic supply to the accumulator, at least two valve actuations can occur with the drywell at 70% of design pressure (Ref. 12). The ECCS safety analysis assumes only one actuation to achieve the depressurization required for operation of the low pressure ECCS. This minimum required pressure of ≥ 88 psig is provided by the ADS instrument pneumatic supply. The 31 day Frequency takes into consideration administrative controls over operation of the pneumatic system and alarms for low pneumatic pressure.

SR 3.5.1.4

Verification every 31 days that the RHR System cross tie shutoff valve is closed ensures that each LPCI subsystem remains independent and a failure of the flow path in one subsystem will not affect the flow path of the other LPCI subsystem. If the RHR System cross tie shutoff valve is open, both LPCI subsystems must be considered inoperable. The 31 day Frequency has been found acceptable, considering that the valve is under strict administrative controls that will ensure the valve continues to remain closed.

SR 3.5.1.5

Cycling the recirculation pump discharge valves through one complete cycle of full travel demonstrates that the valves are mechanically OPERABLE and will close when required. Upon initiation of an automatic LPCI subsystem injection signal, these valves are required to be closed to ensure full LPCI subsystem flow injection in the reactor via the recirculation jet pumps. De-energizing the valve in the closed position will also ensure the proper flow path for

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.1.5 (continued)

the LPCI subsystem. Acceptable methods of de-energizing the valve include de-energizing breaker control power, racking out the breaker or removing the breaker.

The specified Frequency is once during reactor startup before THERMAL POWER is > 25% RTP. However, this SR is modified by a Note that states the Surveillance is only

required to be performed if the last performance was more than 31 days ago. Therefore, implementation of this Note requires this test to be performed during reactor startup before exceeding 25% RTP. Verification during reactor startup prior to reaching > 25% RTP is an exception to the normal Inservice Testing Program generic valve cycling Frequency of 92 days, but is considered acceptable due to the demonstrated reliability of these valves. If the valve is inoperable and in the open position, the associated LPCI subsystem must be declared inoperable.

SR 3.5.1.6, SR 3.5.1.7, and SR 3.5.1.8

The performance requirements of the low pressure ECCS pumps are determined through application of the 10 CFR 50, Appendix K criteria (Ref. 7). This periodic Surveillance is performed (in accordance with the ASME Code, Section XI, requirements for the ECCS pumps) to verify that the ECCS pumps will develop the flow rates required by the respective analyses. The low pressure ECCS pump flow rates ensure that adequate core cooling is provided to satisfy the acceptance criteria of Reference 8. The pump flow rates are verified against a system head equivalent to the RPV pressure expected during a LOCA. The total system pump outlet pressure is adequate to overcome the elevation head pressure between the pump suction and the vessel discharge, the piping friction losses, and RPV pressure present during a LOCA.

The flow tests for the HPCI System are performed at two different pressure ranges such that system capability to provide rated flow against a system head corresponding to reactor pressure is tested at both the higher and lower operating ranges of the system. The required system head

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.1.6, SR 3.5.1.7, and SR 3.5.1.8 (continued)

should overcome the RPV pressure and associated discharge line losses. Adequate reactor pressure must be available to perform these tests. Additionally, adequate steam flow must be passing through the main turbine or turbine bypass valves to continue to control reactor pressure when the HPCI System diverts steam flow. Therefore, sufficient time is allowed after adequate pressure and flow are achieved to perform these tests. Adequate reactor steam pressure must be $\geq$ 920 psig to perform SR 3.5.1.7 and $\geq$ 150 psig to perform SR 3.5.1.8. Adequate steam flow is represented by turbine bypass valves at least 30% open, or total steam flow $\geq 10^6$ lb/hr. Reactor startup is allowed prior to performing the low pressure Surveillance test because the reactor pressure is low and the time allowed to satisfactorily perform the Surveillance test is short. The reactor pressure is allowed to be increased to normal operating pressure since it is assumed that the low pressure test has been satisfactorily completed and there is no indication or reason to believe that HPCI is inoperable.

A

A

Therefore, SR 3.5.1.7 and SR 3.5.1.8 are modified by Notes that state the Surveillances are not required to be performed until 12 hours after the reactor steam pressure and flow are adequate to perform the test. The 12 hours allowed for the flow tests after required pressure and flow are reached are sufficient to achieve stable conditions for testing and provides a reasonable time to complete the SRs.

The Frequency for SR 3.5.1.6 and SR 3.5.1.7 is in accordance with the Inservice Testing Program requirements. The 18 month Frequency for SR 3.5.1.8 is based on the need to perform the Surveillance under the conditions that apply just prior to or during a startup from a plant outage. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.1.9

The ECCS subsystems are required to actuate automatically to perform their design functions. This Surveillance verifies that, with a required system initiation signal (actual or simulated), the automatic initiation logic of HPCI, CS, and LPCI will cause the systems or subsystems to operate as designed, including actuation of the system throughout its emergency operating sequence, automatic pump startup and actuation of all automatic valves to their required positions. This SR also ensures that the HPCI System will automatically restart on an RPV low water level (Level 2) signal received subsequent to an RPV high water level (Level 8) trip and that the suction is automatically transferred from the ECSTs to the suppression pool. The LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.1 overlaps this Surveillance to provide complete testing of the assumed safety function.

The 18 month Frequency is based on the need to perform the Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power.

Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by Note 1 that says for HPCI only the Surveillance is not required to be performed until 12 hours after the reactor steam pressure and flow are adequate to perform the test. The time allowed for this test after required pressure and flow are reached is sufficient to achieve stable conditions for testing and provides a reasonable time to complete the SR. Adequate reactor pressure must be available to perform this test. Additionally, adequate steam flow must be passing through the main turbine or turbine bypass valves to continue to control reactor pressure when the HPCI System diverts steam flow. Thus, sufficient time is allowed after adequate pressure and flow are achieved to perform this test. Adequate reactor steam pressure is > 150 psig. Adequate steam flow is represented by turbine bypass valves at least

A

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.1.9 (continued)

30% open, or a total steam flow of 10^6 lb/hr. Reactor startup is allowed prior to performing this test because the reactor pressure is low and the time allowed to satisfactorily perform the test is short.

This SR is modified by Note 2 that excludes vessel injection/spray during the Surveillance. Since all active components are testable and full flow can be demonstrated by recirculation through the test line, coolant injection into the RPV is not required during the Surveillance.

SR 3.5.1.10

The ADS designated SRVs are required to actuate automatically upon receipt of specific initiation signals. A system functional test is performed to demonstrate that the mechanical portions of the ADS function (i.e., solenoids) operate as designed when initiated either by an actual or simulated initiation signal, causing proper actuation of all the required components. SR 3.5.1.11 and the LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.1 overlap this Surveillance to provide complete testing of the assumed safety function.

The 18 month Frequency is based on the need to perform the Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by a Note that excludes valve actuation since the valves are individually tested in accordance with SR 3.5.1.11. This also prevents an RPV pressure blowdown.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.1.11

A manual actuation of each ADS valve is performed to verify that the valve and solenoid are functioning properly and that no blockage exists in the SRV discharge lines. This is demonstrated by the response of the turbine control or bypass valve or by a change in the measured flow or by any other method suitable to verify steam flow. Adequate reactor steam dome pressure must be available to perform this test to avoid damaging the valve. Also, adequate steam flow must be passing through the main turbine or turbine bypass valves to continue to control reactor pressure when the ADS valves divert steam flow upon opening. Sufficient time is therefore allowed after the required pressure and flow are achieved to perform this SR. Adequate pressure at which this SR is to be performed is $\geq$ 500 psig (consistent with the recommendations of the vendor). Adequate steam flow is represented by turbine bypass valves at least 30% open, or total steam flow $\geq 10^6$ lb/hr. Reactor startup is allowed prior to performing this SR because valve OPERABILITY and the setpoints for overpressure protection are verified, per ASME requirements, prior to valve installation. Therefore, this SR is modified by a Note that states the Surveillance is not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. The 12 hours allowed for manual actuation after the required pressure is reached is sufficient to achieve stable conditions and provides adequate time to complete the Surveillance. SR 3.5.1.10 and the LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.1 overlap this Surveillance to provide complete testing of the assumed safety function.

The Frequency is based on the need to perform the Surveillance under the conditions that apply just prior to or during a startup from a plant outage. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

REFERENCES

1. USAR, Section VI-4.3.

2. USAR, Section VI-4.4.

(continued)

BASES

REFERENCES (continued)

3. USAR, Section VI-4.1.

4. USAR, Section VI-4.2.

5. USAR, Section XIV-6.

6. USAR, Appendix G.

7. 10 CFR 50, Appendix K.

8. 10 CFR 50.46.

9. NEDC-32687P, "Cooper Nuclear Station SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis," December 1996.

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

11. Memorandum from R.L. Baer (NRC) to V. Stello, Jr. (NRC), "Recommended Interim Revisions to LCOs for ECCS Components," December 1, 1975.

12. NEDE-24956, "BWR ADS Pneumatic System Comparison to NUREG-0737 Requirement II.K.3.2.8."

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS) AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

B 3.5.2 ECCS – Shutdown

BASES

BACKGROUND

A description of the Core Spray (CS) System and the low pressure coolant injection (LPCI) mode of the Residual Heat Removal (RHR) System is provided in the Bases for LCO 3.5.1, "ECCS – Operating."

APPLICABLE SAFETY ANALYSES

The ECCS performance is evaluated for the entire spectrum of break sizes for a postulated loss of coolant accident (LOCA). The long term cooling analysis following a design basis LOCA (Ref. 1) demonstrates that only one low pressure ECCS injection/spray subsystem is required, post LOCA, to maintain adequate reactor vessel water level in the event of an inadvertent vessel draindown. It is reasonable to assume, based on engineering judgement, that while in MODES 4 and 5, one low pressure ECCS injection/spray subsystem can maintain adequate reactor vessel water level. To provide redundancy, a minimum of two low pressure ECCS injection/spray subsystems are required to be OPERABLE in MODES 4 and 5.

The low pressure ECCS subsystems satisfy Criterion 3 of 10 CFR 50.36 (c)(2)(ii)(Reference 2).

LCO

Two low pressure ECCS injection/spray subsystems are required to be OPERABLE. The low pressure ECCS injection/spray subsystems consist of two CS subsystems and two LPCI subsystems. Each CS subsystem consists of one motor driven pump, piping, and valves to transfer water from the suppression pool or condensate storage tank (CST) to the reactor pressure vessel (RPV). Each LPCI subsystem consists of one motor driven pump, piping, and valves to transfer water from the suppression pool or CST to the RPV. Only a single LPCI pump is required per subsystem because of the larger injection capacity in relation to a CS subsystem. In MODES 4 and 5, the RHR System cross tie shutoff valve is not required to be closed. The necessary portions of the

(continued)

BASES

LCO (continued)

Service Water System and the Reactor Equipment Cooling System are also required to each required low pressure ECCS injection/spray subsystem.

One LPCI subsystem may be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned (remote or local) to the LPCI mode and not otherwise inoperable. Alignment and operation for decay heat removal includes when the required RHR pump is not operating or when the system is realigned from or to the RHR shutdown cooling mode. Because of low pressure and low temperature conditions in MODES 4 and 5, sufficient time will be available to manually align and initiate LPCI subsystem operation to provide core cooling prior to postulated fuel uncovery.

APPLICABILITY

OPERABILITY of the low pressure ECCS injection/spray subsystems is required in MODES 4 and 5 to ensure adequate coolant inventory and sufficient heat removal capability for the irradiated fuel in the core in case of an inadvertent draindown of the vessel. Requirements for ECCS OPERABILITY during MODES 1, 2, and 3 are discussed in the Applicability section of the Bases for LCO 3.5.1. ECCS subsystems are not required to be OPERABLE during MODE 5 with the spent fuel storage pool gates removed and the water level maintained at $\geq$ 21 ft above the RPV flange. This provides sufficient coolant inventory to allow operator action to terminate the inventory loss prior to fuel uncovery in case of an inadvertent draindown. A

The Automatic Depressurization System is not required to be OPERABLE during MODES 4 and 5 because the RPV pressure is $\leq$ 150 psig, and the CS System and the LPCI subsystems can provide core cooling without any depressurization of the primary system.

The High Pressure Coolant Injection System is not required to be OPERABLE during MODES 4 and 5 since the low pressure ECCS injection/spray subsystems can provide sufficient flow to the vessel.

(continued)

BASES (continued)

ACTIONS

A.1 and B.1

If any one required low pressure ECCS injection/spray subsystem is inoperable, the inoperable subsystem must be restored to OPERABLE status in 4 hours. In this condition, the remaining OPERABLE subsystem can provide sufficient vessel flooding capability to recover from an inadvertent vessel draindown. However, overall system reliability is reduced because a single failure in the remaining OPERABLE subsystem concurrent with a vessel draindown could result in the ECCS not being able to perform its intended function. The 4 hour Completion Time for restoring the required low pressure ECCS injection/spray subsystem to OPERABLE status is based on engineering judgment that considered the remaining available subsystem and the low probability of a vessel draindown event.

With the inoperable subsystem not restored to OPERABLE status in the required Completion Time, action must be immediately initiated to suspend operations with a potential for draining the reactor vessel (OPDRVs) to minimize the probability of a vessel draindown and the subsequent potential for fission product release. Actions must continue until OPDRVs are suspended.

C.1, C.2, D.1, D.2, and D.3

With both of the required ECCS injection/spray subsystems inoperable, all coolant inventory makeup capability may be unavailable. Therefore, actions must immediately be initiated to suspend OPDRVs to minimize the probability of a vessel draindown and the subsequent potential for fission product release. Actions must continue until OPDRVs are suspended. One ECCS injection/spray subsystem must also be restored to OPERABLE status within 4 hours. The 4 hour Completion Time to restore at least one low pressure ECCS injection/spray subsystem to OPERABLE status ensures that prompt action will be taken to provide the required cooling capacity or to initiate actions to place the plant in a condition that minimizes any potential fission product release to the environment.

(continued)

BASES

ACTIONS

C.1, C.2, D.1, D.2, and D.3 (continued)

If at least one low pressure ECCS injection/spray subsystem is not restored to OPERABLE status within the 4 hour Completion Time, additional actions are required to minimize any potential fission product release to the environment. This includes ensuring secondary containment is OPERABLE; one standby gas treatment subsystem is OPERABLE; and secondary containment isolation capability is available in each associated penetration flow path not isolated that is assumed to be isolated to mitigate radioactivity releases (i.e., one secondary containment isolation valve and associated instrumentation are OPERABLE or other acceptable administrative controls to assure isolation capability. These administrative controls consist of stationing a dedicated operator, who is in continuous communication with the Control Room at the controls of the isolation device. In this way, the penetration can be rapidly isolated when a need for secondary containment isolation is indicated). OPERABILITY may be verified by an administrative check, or by examining logs or other information, to determine whether the components are out of service for maintenance or other reasons. It is not necessary to perform the Surveillances needed to demonstrate the OPERABILITY of the components. If, however, any required component is inoperable, then it must be restored to OPERABLE status. In this case, the Surveillance may need to be performed to restore the component to OPERABLE status. Actions must continue until all required components are OPERABLE.

SURVEILLANCE REQUIREMENTS

SR 3.5.2.1

The minimum water level of 12 ft 7 inches required for the suppression pool is periodically verified to ensure that the suppression pool will provide adequate net positive suction head (NPSH) for the CS System and LPCI subsystem pumps, recirculation volume, and vortex prevention. With the suppression pool water level less than the required limit, all ECCS injection/spray subsystems are inoperable unless they are aligned to the OPERABLE CST A. A

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.2.1 (continued)

When suppression pool level is < 12 ft 7 inches, the CS System and LPCI subsystems are considered OPERABLE only if they can take suction from CST A, and the CST A water level is sufficient to provide the required NPSH for the required CS pump and LPCI pumps. (LPCI pumps "A" and "D" are the only LPCI pumps that can be aligned to CST A.) Therefore, a verification that either the suppression pool water level is ≥ 12 ft 7 inches, or that the required CS and LPCI subsystems are aligned to take suction from CST A and CST A contains ≥ 150,000 gallons of water, equivalent to 14 ft, ensures that the CS System and LPCI subsystems (LPCI pumps "A" and "D") can supply at least 50,000 gallons of makeup water to the RPV. The excess 100,000 gallons remains as a supplementary volume and to ensure adequate ECCS pump NPSH. However, as noted, only one required CS or LPCI subsystem may take credit for the CST option during OPDRVs. During OPDRVs, the volume in CST A may not provide adequate makeup if the RPV were completely drained. Therefore, only one CS or LPCI subsystem is allowed to use the CST option. This ensures the other required ECCS subsystem has adequate makeup volume.

The 12 hour Frequency of these SRs was developed considering operating experience related to suppression pool water level and CST A water level variations and instrument drift during the applicable MODES. Furthermore, the 12 hour Frequency is considered adequate in view of other indications available in the control room, including alarms, to alert the operator to an abnormal suppression pool or CST A water level condition.

SR 3.5.2.2, SR 3.5.2.4, and SR 3.5.2.5

The Bases provided for SR 3.5.1.1, SR 3.5.1.6, and SR 3.5.1.9 are applicable to SR 3.5.2.2, SR 3.5.2.4, and SR 3.5.2.5, respectively.

SR 3.5.2.3

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

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.2.3 (continued)

operation. This SR applies only to valves affecting the direct flow path. This SR exclused valves that, if mispositioned, would not affect system or subsystem OPERABILITY. Also, this SR does not apply to valves that are locked, sealed, or otherwise secured in position, since these valves were verified to be in the correct position prior to locking, sealing, or securing. A valve that receives an initiation signal is allowed to be in a nonaccident position provided the valve will automatically reposition in the proper stroke time. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of potentially being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves. The 31 day frequency is appropriate because the valves are operated under procedural control and the probability of their being mispositioned during this time period is low.

A

In MODES 4 and 5, the RHR System may be required to operate in the shutdown cooling mode to remove decay heat and sensible heat from the reactor. Therefore, this SR is modified by a Note that allows one LPCI subsystem to be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned (remote or local) to the LPCI mode and not otherwise inoperable. Alignment and operation for decay heat removal includes when the required RHR pump is not operating or when the system is being realigned from or to the RHR shutdown cooling mode. Because of the low pressure and low temperature conditions in MODES 4 and 5 sufficient time will be available to manually align and initiate LPCI subsystem operation to provide core cooling prior to postulated fuel uncovery. This will ensure adequate core cooling if an inadvertent RPV draindown should occur.

REFERENCES

1. GENE-187-18-0892, "Loss of Coolant Accident Analysis with 125 Volt DC Power Source Failure for Cooper Nuclear Station," August 1992.

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

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS) AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

B 3.5.3 RCIC System

BASES

BACKGROUND

The RCIC System is not part of the ECCS; however, the RCIC System is included with the ECCS section because of their similar functions.

The RCIC System is designed to operate either automatically or manually following reactor pressure vessel (RPV) isolation accompanied by a loss of coolant flow from the feedwater system to provide adequate core cooling and control of the RPV water level. Under these conditions, the High Pressure Coolant Injection (HPCI) and RCIC systems perform similar functions. The RCIC System design requirements ensure that the criteria of Reference 1 are satisfied.

The RCIC System (Ref. 2) consists of a steam driven turbine pump unit, piping, and valves to provide steam to the turbine, as well as piping and valves to transfer water from the suction source to the core via the feedwater system line, where the coolant is distributed within the RPV through the feedwater sparger. Suction piping is provided from the emergency condensate storage tanks (ECSTs) and the suppression pool. Pump suction is normally aligned to the ECSTs to minimize injection of suppression pool water into the RPV. However, if the ECST water supply is low, an automatic transfer to the suppression pool water source ensures a water supply for continuous operation of the RCIC System. The steam supply to the turbine is piped from a main steam line upstream of the associated inboard main steam line isolation valve.

The RCIC System is designed to provide core cooling for a wide range of steam inlet pressures, 150 to 1120 psia. Upon receipt of an initiation signal, the RCIC turbine accelerates to a specified speed. As the RCIC flow increases, the turbine control valve is automatically adjusted to maintain design flow. Exhaust steam from the RCIC turbine is discharged to the suppression pool. A full flow test line is provided to route water to the ECST to allow testing of the RCIC System during normal operation without injecting water into the RPV.

(continued)

BASES

BACKGROUND (continued)

The RCIC pump is provided with a minimum flow bypass line, which discharges to the suppression pool. The valve in this line automatically opens to prevent pump damage due to overheating when other discharge line valves are closed. To ensure rapid delivery of water to the RPV and to minimize water hammer effects, the RCIC System discharge piping is kept full of water. The RCIC System is normally aligned to the ECSTs. The RCIC discharge line is kept full of water using a "keep fill" system (Pressure Maintenance System).

APPLICABLE SAFETY ANALYSES

The function of the RCIC System is to respond to transient events by providing makeup coolant to the reactor. The RCIC System is not an Engineered Safety Feature System and no credit is taken in the safety analyses for RCIC System operation. Based on its contribution to the reduction of overall plant risk, however, the system satisfies Criterion 4 of Reference 3.

LCO

The OPERABILITY of the RCIC System provides adequate core cooling such that actuation of any of the low pressure ECCS subsystems is not required in the event of RPV isolation accompanied by a loss of feedwater flow. The RCIC System has sufficient capacity for maintaining RPV inventory during an isolation event.

APPLICABILITY

The RCIC System is required to be OPERABLE during MODE 1, and MODES 2 and 3 with reactor steam dome pressure > 150 psig, since RCIC is the primary non-ECCS water source for core cooling when the reactor is isolated and pressurized. In MODES 2 and 3 with reactor steam dome pressure $\leq$ 150 psig, and in MODES 4 and 5, RCIC is not required to be OPERABLE since the low pressure ECCS injection/spray subsystems can provide sufficient flow to the RPV.

(continued)

BASES (continued)

ACTIONS

A.1 and A.2

If the RCIC System is inoperable during MODE 1, or MODE 2 or 3 with reactor steam dome pressure > 150 psig, and the HPCI System is verified to be OPERABLE, the RCIC System must be restored to OPERABLE status within 14 days. In this Condition, loss of the RCIC System will not affect the overall plant capability to provide makeup inventory at high reactor pressure since the HPCI System is the only high pressure system assumed to function during a loss of coolant accident (LOCA). OPERABILITY of HPCI is therefore verified within 1 hour when the RCIC System is inoperable. This may be performed as an administrative check, by examining logs or other information, to determine if HPCI is out of service for maintenance or other reasons. It does not mean it is necessary to perform the Surveillances needed to demonstrate the OPERABILITY of the HPCI System. If the OPERABILITY of the HPCI System cannot be verified, however, Condition B must be immediately entered. For transients and certain abnormal events with no LOCA, RCIC (as opposed to HPCI) is the preferred source of makeup coolant because of its relatively small capacity, which allows easier control of the RPV water level. Therefore, a limited time is allowed to restore the inoperable RCIC to OPERABLE status.

The 14 day Completion Time is consistent with the recommendations in a reliability study (Ref. 4) that evaluated the impact on ECCS availability, assuming various components and subsystems were taken out of service. The results were used to calculate the average availability of ECCS equipment needed to mitigate the consequences of a LOCA as a function of allowed outage times (AOTs). Because of similar functions of HPCI and RCIC, the AOTs (i.e., Completion Times) determined for HPCI are also applied to RCIC.

B.1 and B.2

If the RCIC System cannot be restored to OPERABLE status within the associated Completion Time, or if the HPCI System is simultaneously inoperable, the plant must be brought to a condition in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within

(continued)

BASES

ACTIONS

B.1 and B.2 (continued)

12 hours and reactor steam dome pressure reduced to ≤ 150 psig within 36 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.

SURVEILLANCE REQUIREMENTS

SR 3.5.3.1

The flow path piping has the potential to develop voids and pockets of entrained air. Maintaining the pump discharge line of the RCIC System full of water ensures that the system will perform properly, injecting its full capacity into the Reactor Coolant System upon demand. This will also prevent a water hammer following an initiation signal. One acceptable method of ensuring the line is full is to vent at the high points. The 31 day Frequency is based on the gradual nature of void buildup in the RCIC piping, the procedural controls governing system operation, and operating experience.

SR 3.5.3.2

Verifying the correct alignment for manual, power operated, and automatic valves in the RCIC flow path provides assurance that the proper flow path will exist for RCIC operation. This SR applies only to valves affecting the direct flow path. This SR excludes valves that, if mispositioned, would not affect system or subsystem OPERABILITY. Also, this SR does not apply to valves that are locked, sealed, or otherwise secured in position since these valves were verified to be in the correct position prior to locking, sealing, or securing. A valve that receives an initiation signal is allowed to be in a nonaccident position provided the valve will automatically reposition in the proper stroke time. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of potentially being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves. For the

A

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.3.2 (continued)

RCIC System, this SR also includes the steam flow path for the turbine and the flow controller position.

The 31 day Frequency of this SR was derived from the Inservice Testing Program requirements for performing valve testing at least once every 92 days. The Frequency of 31 days is further justified because the valves are operated under procedural control and because improper valve position would affect only the RCIC System. This Frequency has been shown to be acceptable through operating experience.

SR 3.5.3.3 and SR 3.5.3.4

The RCIC pump flow rates ensure that the system can maintain reactor coolant inventory during pressurized conditions with the RPV isolated. The flow tests for the RCIC System are performed at two different pressure ranges such that system capability to provide rated flow against a system head corresponding to reactor pressure is tested both at the higher and lower operating ranges of the system. The required system head should overcome the RPV pressure and associated discharge line losses. Adequate reactor steam pressure must be available to perform these tests. Additionally, adequate steam flow must be passing through the main turbine or turbine bypass valves to continue to control reactor pressure when the RCIC System diverts steam flow. Therefore, sufficient time is allowed after adequate pressure and flow are achieved to perform these SRs. Adequate reactor steam pressure to perform SR 3.5.3.3 is 920 psig and 150 psig to perform SR 3.5.3.4. Adequate steam flow is represented by turbine bypass valves at least 30% open, or total steam flow $\geq 10^6$ lb/hr. Reactor startup is allowed prior to performing the low pressure Surveillance because the reactor pressure is low and the time allowed to satisfactorily perform the Surveillance is short. The reactor pressure is allowed to be increased to normal operating pressure since it is assumed that the low pressure Surveillance has been satisfactorily completed and there is no indication or reason to believe that RCIC is inoperable. Therefore, these SRs are modified by Notes that state the Surveillances are not required to be performed until 12 hours after the reactor steam pressure and flow are

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.3.3 and SR 3.5.3.4 (continued)

adequate to perform the test. The 12 hours allowed for the flow tests after the required pressure and flow are reached are sufficient to achieve stable conditions for testing and provides a reasonable time to complete the SRs.

A 92 day Frequency for SR 3.5.3.3 is consistent with the Inservice Testing Program requirements. The 18 month Frequency for SR 3.5.3.4 is based on the need to perform the Surveillance under conditions that apply just prior to or during a startup from a plant outage. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.5.3.5

The RCIC System is required to actuate automatically in order to verify its design function satisfactorily. This Surveillance verifies that, with a required system initiation signal (actual or simulated), the automatic initiation logic of the RCIC System will cause the system to operate as designed, including actuation of the system throughout its emergency operating sequence; that is, automatic pump startup and actuation of all automatic valves to their required positions. This test also ensures the RCIC System will automatically restart on an RPV low water level (Level 2) signal received subsequent to an RPV high water level (Level 8) trip and that the suction is automatically transferred from the ECST to the suppression pool. The LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.2 overlaps this Surveillance to provide complete testing of the assumed design function.

The 18 month Frequency is based on the need to perform the Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

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(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.3.5 (continued)

This SR is modified by Note 1 that says the Surveillance is not required to be performed until 12 hours after the reactor steam pressure and flow are adequate to perform the test. The time allowed for this test after required pressure and flow are reached is sufficient to achieve stable conditions for testing and provides a reasonable time to complete the SR. Adequate reactor pressure must be available to perform this test. Additionally, adequate steam flow must be passing through the main turbine or turbine bypass valves to continue to control reactor pressure when the RCIC System diverts steam flow. Thus, sufficient time is allowed after adequate pressure and flow are achieved to perform this test. Adequate reactor steam pressure is 150 psig. Adequate steam flow is represented by turbine bypass valves at least 30% open, or a total steam flow of 10^6 lb/hr. Reactor startup is allowed prior to performing this test because the reactor pressure is low and the time allowed to satisfactorily perform the test is short. (A)

This SR is modified by Note 2 that excludes vessel injection during the Surveillance. Since all active components are testable and full flow can be demonstrated by recirculation through the test line, coolant injection into the RPV is not required during the Surveillance.

REFERENCES

1. USAR, Appendix F.

2. USAR, Section IV-7.

3. 10 CFR 50.36(c)(2)(ii).

4. Memorandum from R.L. Baer (NRC) to V. Stello, Jr. (NRC), "Recommended Interim Revisions to LCOs for ECCS Components," December 1, 1975.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.A (cont'd.)	4.5.A (cont'd.)

2. From and after the date that one of the Core Spray subsystems is made or found to be inoperable for any reason, continued reactor operation is permissible during the succeeding seven days provided that during such seven days all active components that affect operability of the operable Core Spray subsystem and all active components that affect operability of both LPCI subsystems and the diesel generators are operable.

2. When it is determined that one Core Spray subsystem is inoperable, the operable Core Spray subsystem and both LPCI subsystems shall be verified to be operable immediately. The operable Core Spray subsystem shall be verified to be operable daily thereafter.

3. Both LPCI subsystems shall be operable:

(1) prior to reactor startup from a Cold Condition, except as specified in 3.22.B.1, or

(2) when there is irradiated fuel in the vessel and when the reactor vessel pressure is greater than atmospheric pressure, except as specified in 3.5.A.4 and 3.5.A.5 below.

3. LPCI subsystem testing shall be as follows:

Item	Frequency
a. Simulated Automatic Actuation Test	Once/Operating Cycle
b. Pump Operability	Once/month
c. Motor Operated Valve Operability	Once/month
d. Pump Flow Rate	Once/3 months

During single pump LPCI, each RHR pump shall deliver at least 7700 GPM but no more than 8400 GPM against a system head equivalent to a reactor vessel pressure of 20 psid above drywell pressure with water level below the jet pumps. At the same conditions, two pump LPCI flow shall be at least 15,000 GPM.

e. Recirculation pump discharge valves shall be tested each refueling outage to verify full open to full closed in $t \leq 26$ seconds.

f. An air test shall be performed on the drywell and torus headers and nozzles once/5 years.

4. From and after the date that one of the RHR (LPCI) pumps is made or found to be inoperable for any reason, continued reactor operation is permissible only during the succeeding thirty days provided that during such thirty days the remaining active components that affect operability of the LPCI subsystem containing the inoperable pump, and all active components that affect operability of the operable LPCI subsystem, both Core Spray subsystems, and both diesel generators are operable.

4. When it is determined that one of the RHR (LPCI) pumps is inoperable at a time when it is required to be operable, the remaining active components that affect operability of the LPCI subsystem containing the inoperable pump, all active components that affect operability of the operable LPCI subsystem, and both Core Spray subsystems shall be verified to be operable immediately and the operable LPCI pumps daily thereafter.

A.1

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.A (Cont'd.)	4.5.A. (Cont'd.)

4. From and after the date that one LPCI subsystem is made or found to be inoperable for any reason, continued reactor operation is permissible only during the succeeding 7 days, unless it is sooner made operable, provided that during such 7 days all active components that affect operability of the operable LPCI subsystem, both Core Spray subsystems, the RHR Service Water subsystem associated with the operable LPCI subsystem, and both diesel generators shall be operable.

Action A · Action G · L.15 · L.4

5. When it is determined that a LPCI subsystem is inoperable, the operable LPCI subsystem, both Core Spray subsystems, and the RHR Service Water Subsystem associated with the operable LPCI subsystem, shall be verified to be operable immediately and daily thereafter.

L.17 · L.15 · B

6. All recirculation pump discharge valves shall be operable prior to reactor startup (or closed if permitted elsewhere in these specifications).

SR 3.5.1.5 · M.9 · deenergized

SR 3.5.1.5

6. All recirculation pump discharge valves shall be tested for operability during any period of Reactor cold shutdown exceeding 48 hours, if operability tests have not been performed during the preceding 31 days.

M.3 · Once each startup prior to exceeding 25% RTP

7. The reactor shall not be started up with the RHR system supplying cooling to the fuel pool.

LCO 3.0.4

8. If the requirements of 3.5.A 1,2,3,4,5,6 or 7 cannot be met, an orderly shutdown of the reactor shall be initiated and the reactor shall be in the cold shutdown condition within 24 hours.

Action B · Action H · L.6 · L.9 · L.12 · 36 · L.5 · be in MODE 3 within 12 hours · M.4 · B

B. Residual Heat Removal (RHR) Service Water System

1. Except as specified in 3.5.B.2, 3.5.B.3, and 3.5.F.3 below, both RHR Service Water subsystems shall be operable whenever irradiated fuel is in the reactor vessel and reactor coolant temperature is greater than 212°F, and prior to reactor startup from a Cold Condition.

B. Residual Heat Removal (RHR) Service Water System

1. RHR Service Water System testing shall be as follows:

	Item	Frequency
a.	Pump & Valve Operability	Once/3 months
b.	Pump Capacity Test. Each RHR service water booster pump shall deliver 4000 gpm.	After pump maintenance and every 3 months

B

See ITS: 3.7.1

M.5 · Add SR 3.5.1.4 →

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENT
3.5.C HPCI System (cont'd.)	4.5.C. HPCI System (cont'd.)

From and after the date that the HPCI System is made or found to be inoperable for any reason, continued reactor operation is permissible only during the succeeding seven days unless such system is sooner made operable, providing that during such seven days all active components that affect operability of the ADS, the RCIC System, both LPCI subsystems and both Core Spray subsystems are operable.

With the surveillance requirements of 4.5.C not performed at the required intervals due to reactor shutdown, a reactor startup may be conducted provided the appropriate surveillance is performed within 48 hours of achieving 150 psig reactor steam pressure and adequate flow.

If the requirements of 3.5.C.1 cannot be met, an orderly shutdown shall be initiated and the reactor pressure shall be reduced to 150 psig or less within 24 hours.

Item	Frequency
Flow Rate at approximately 1000 psig Steam Press.	Once/3 months
Flow Rate at approximately 150 psig Steam Press.	Once/operating cycle

The HPCI pump shall be demonstrated to be capable of delivering at least 4250 gpm for a system head corresponding to a reactor pressure of ≥ 920 and ≤ 1020 psig and ≤ 165.

When it is determined that the HPCI System is inoperable, the RCIC System, both LPCI subsystems, and both Core Spray subsystems shall be verified to be operable immediately. The RCIC System shall be verified to be operable daily thereafter. In addition, the ADS logic shall be demonstrated to be operable immediately and daily thereafter.

D. Reactor Core Isolation Cooling (RCIC) System	D. Reactor Core Isolation Cooling (RCIC) System
1. The RCIC System shall be operable whenever there is irradiated fuel in the reactor vessel, the reactor pressure is greater than 113 psig, and prior to reactor startup from a Cold Condition, except as specified in 3.5.D.2 and 3.5.D.3 below.	1. RCIC System testing shall be performed as follows:
	Item: a. Simulated Automatic Actuation Test — Frequency: Once/operating cycle

A.1

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.E (cont'd)	4.5.E (cont'd)
From and after the date that one valve in the Automatic Depressurization System is made or found to be inoperable for any reason, continued reactor operation is permissible only during the succeeding seven days unless such valve is sooner made operable, provided that during such seven days the HPCI System is operable.	2. When it is determined that one valve of the ADS is inoperable, the ADS actuation logic for the other ADS valves shall be demonstrated to be operable immediately. In addition, the HPCI System shall be verified to be operable immediately.
With the surveillance requirements of 4.6.D.5 not performed at the required intervals due to reactor shutdown, a reactor startup may be conducted provided the appropriate surveillance is performed within 12 hours of achieving [1] psig reactor steam pressure.	
If the requirements of 3.5.E.1 or 3.5.E.2 cannot be met, an orderly shutdown shall be initiated and the reactor pressure shall be reduced to at least [2] psig within [3] hours.	
F. Minimum Low Pressure Cooling and Diesel Generator Availability	F. Minimum Low Pressure Cooling and Diesel Generator Availability
1. During any period when one diesel generator is inoperable, continued reactor operation is permissible only during the succeeding seven days unless such diesel generator is sooner made operable, provided that the operable diesel generator and its associated LPCI, Core Spray, and RHR Service Water subsystems are operable, the requirements of 4.5.F.1 and the remaining requirements of 3.9.A.1 are met. If these requirements cannot be met, the requirements of 3.5.F.2 shall be met.	1. When it is determined that one diesel generator is inoperable, the following requirements shall be met. a. Immediately and daily thereafter, the redundant diesel generator shall be verified to be OPERABLE. b. Immediately and daily thereafter, the LPCI, Core Spray, and RHR Service Water subsystems associated with the OPERABLE diesel generator shall be verified to be operable. c. Within 24 hours determine OPERABLE diesel generator is not inoperable due to common cause failure, or perform Surveillance 4.9.A.2.a.1. d. Within 72 hours and every 72 hours thereafter, the OPERABLE diesel generator shall be demonstrated to be OPERABLE if the inoperable diesel generator is not sooner declared OPERABLE.

ACTION E — 7 — 14 — L.12

Add ACTION F — M.7

L.3 — L.17 — B

Note for SR 3.5.1.11 — 9

ACTION G — 11

ACTION H — 12

L.6 — L.9 — L.12 — L.11 — 150

M.4 — be in MODE 3 within 12 hours

and flow — L.13 — adequate

Add proposed SR 3.5.1.3 — M.8 — A — B

36 — L.5

See ITS: 3.8.1

ADMINISTRATIVE

A.5 CTS 3.5.F.3, which states any combination of inoperable components shall not defeat the capability of remaining components to fulfill their cooling function, is proposed to be deleted because proposed LCO 3.0.6 and Specification 5.5.11, Safety Function Determination Program, covers these requirements in significantly more detail. As such, the change is considered administrative.

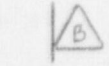
TECHNICAL CHANGES - MORE RESTRICTIVE

M.1 An additional requirement, proposed SR 3.5.1.2, is to be added to existing Specifications for surveillance testing of CS (CTS 4.5.A.1), LPCI (CTS 4.5.A.3), and HPCI (CTS 4.5.C.1). SR 3.5.1.2 adds a requirement that each ECCS spray/injection subsystem manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, will be verified to be in the correct position every 31 days. This SR provides assurance that the proper flow path will exist for ECCS operation. The addition of new requirements to the Technical Specifications constitutes a more restrictive change.

M.2 The Completion Time for CTS 3.5.A.4 (proposed ITS 3.5.1 ACTION A) is proposed to be decreased from 30 days to 7 days. Because loss of a LPCI pump causes one LPCI subsystem to become inoperable (a LPCI subsystem consists of two LPCI pumps and piping and valves), the Completion Times for loss of a LPCI pump and loss of a LPCI subsystem should be the same. Reducing the Completion Time to restore an inoperable LPCI pump to service from 30 days to 7 days constitutes a more restrictive change necessary to ensure timely action is taken in the event of an inoperable LPCI pump.

M.3 CTS 4.5.A.6 requires that recirculation pump discharge valves be demonstrated Operable (capable of being closed) following "any period of reactor cold shutdown exceeding 48 hours". This requirement is proposed to be replaced by SR 3.5.1.5 which requires that recirculation pump discharge valve Operability verification be performed once each startup prior to exceeding > 25% RTP. Recirculation pump discharge valves are not required while the plant is shutdown. The requirement to perform the verification once each startup prior to exceeding 25% RTP is more restrictive than the existing requirement to perform the test since the test will now be required to be performed within 31 days of any startup not just a startup from a Cold Shutdown that exceeded 48 hours. Testing prior to need is more restrictive than one test per outage. This change is necessary to ensure the Operability of the recirculation pump discharge valves is adequately maintained.

M.4 CTS 3.5.A.8 requires that "an orderly shutdown of the reactor shall be initiated" when the ACTIONS or Completion Times associated with an inoperable LPCI or CS System cannot be satisfied. CTS 3.5.C.4 and CTS 3.5.E.4 require that "an orderly shutdown shall be initiated" when the ACTIONS associated with an inoperable HPCI or ADS System cannot be satisfied. This requirement is proposed to be replaced by LCO 3.5.1 Required Actions B.1 and G.1 which require the plant be in MODE 3 within



TECHNICAL CHANGES - MORE RESTRICTIVE

M.4 (continued)

12 hours under the same conditions. Based on operating experience, this Completion Time limit still allows for an orderly transition to MODE 3 without challenging plant systems. This change is more restrictive because it provides an additional requirement to place the plant in MODE 3 vice simply initiating a shutdown. This change is necessary to ensure timely action is taken to place the unit in a MODE outside of the Applicability.

M.5 SR 3.5.1.4 is proposed to be added to existing Specifications for surveillance testing of the RHR System. This SR requires verification that the RHR System cross tie shutoff valve is closed every 31 days to ensure reliable operation of the LPCI System during an accident. The addition of a new SR constitutes a more restrictive change.

M.6 CTS 3.5.C.3 is proposed, in the Note to ITS SR 3.5.1.8, to require that CTS 4.5.C.1.e (the low pressure test, proposed SR 3.5.1.8) be performed within 12 hours after adequate steam pressure (150 psig) and adequate steam flow are achieved, vice 48 hours. This change is more restrictive since it stipulates that proposed SR 3.5.1.8 be completed within a smaller time frame with respect to suitable reactor steam pressure and flow. This also applies to CTS 4.5.C.1.a (the simulated automatic actuation test, proposed SR 3.5.1.9), as proposed in Note 1 to SR 3.5.1.9. In addition, CTS 4.5.C.1.d (the high pressure test, proposed SR 3.5.1.7) must be performed within 12 hours after adequate steam pressure and flow are available per the Note to ITS SR 3.5.1.7. Because this is generally satisfied within 48 hours after exceeding 150 psig, this addition is also considered more restrictive. This change is necessary to ensure the HPCI pump is tested at the earliest opportunity after conditions are reached to perform the testing.

M.7 The proposed change adds a requirement, LCO 3.5.1 ACTION F, that limits continued reactor operation to 72 hours when there is a simultaneous inoperability of one ADS valve and one low pressure ECCS (CS or LPCI) subsystem. This requirement is more restrictive because current requirements will allow 7 days of continued operation under the same conditions. The current specifications do not require that the Operability of low pressure ECCS Systems be considered when an ADS valve is inoperable. With both an ADS valve and a low pressure ECCS subsystem inoperable, another single failure may place the plant in a condition where adequate core cooling may not be available during an accident. Therefore, an allowable outage time of 72 hours has been assigned to either restore the inoperable ADS valve or the low pressure ECCS subsystem. The addition of a new requirement to the Technical Specifications constitutes a more restrictive change.

M.8 SR 3.5.1.3 is proposed to be added to existing Specifications for surveillance testing of the ADS System. This SR requires ADS pneumatic supply header pressure to be verified $\geq$ 88 psig every 31 days to ensure

TECHNICAL CHANGES - LESS RESTRICTIVE

L.3 (continued)

equipment availability. Also, the ITS and current BWR operating philosophy accept the philosophy of system Operability based on satisfactory performance of monthly, quarterly, refueling interval, post maintenance or other specified performance tests without requiring additional testing when another system is inoperable (except for diesel generator testing, which is not being changed).

L.4 This change proposes to delete the requirements in CTS 3.5.A.2, 3.5.A.4, and 3.5.A.5 to ensure that the diesel generators (DG) are Operable. Requiring an Operable DG in the same division as an inoperable LPCI pump, LPCI subsystem, or CS pump is overly restrictive, because the CNS accident analysis in USAR Section VI - 5.0, "Safety Evaluation", assumes an inoperable DG in this situation. Additionally, ACTIONS to be performed if an inoperable DG exists with an inoperable LPCI pump, LPCI subsystem, or CS pump in the opposite division are proposed to be retained, but moved to proposed Specification 3.8.1, AC Sources - Operating, Required Action B.2. Currently, CTS 3.5.A.2, 3.5.A.4, and 3.5.A.5 specify no Completion Time for this verification, while proposed Specification 3.8.1 allows 4 hours to declare required features supported by the inoperable DG inoperable when the redundant required features are inoperable. This 4 hour Completion Time will allow the operator time to evaluate and repair any discovered inoperabilities, which minimize the risk due to subjecting the unit to transients associated with a shutdown. The Completion Time also considers the capacity and capability of the remaining AC sources and the low probability of a DBA occurring during this period. The deletion of the requirement to ensure Operability of the DGs and the allowance of 4 hours to declare the required features supported by an inoperable DG inoperable when the redundant required features are inoperable constitutes a less restrictive change.

L.5 CTS 3.5.A.3 requires that "the reactor shall be in Cold Shutdown condition within 24 hours" when the ACTIONS for LPCI or CS cannot be satisfied, CTS 3.5.C.4 requires that "reactor pressure shall be reduced to 150 psig or less within 24 hours" when the ACTIONS for HPCI cannot be satisfied, and 3.5.E.4 requires that "reactor pressure shall be reduced to at least 113 psig within 24 hours" when the Required Actions for an inoperable ADS valve cannot be satisfied. For ADS, the pressure of 113 psig in the Applicability and corresponding shutdown requirement is revised to 150 psig. This change is addressed in Discussion of Changes for ITS: 3.5.1 Change L.11. The proposed requirements, LCO 3.5.1, Required Actions B.2 and G.2, extend the time allowed for the plant to reduce pressure or be in MODE 4, from 24 hours to 36 hours. This extension provides the necessary time to cool the plant and reduce pressure in a controlled and orderly manner. The additional time to complete these ACTIONS reduces the potential for a plant event that could challenge plant safety systems. The 36 hours proposed is a reasonable amount of time to reach the required plant operating conditions. (B)

TECHNICAL CHANGES - LESS RESTRICTIVE

L.6 CTS 3.5.C.2 allows continued operation for a maximum of 7 days after HPCI is determined to be inoperable. Proposed Specification 3.5.1 ACTION C allows continued operation for a maximum of 14 days under the same conditions. As in the existing Specification, the 14 day Completion Time for restoring HPCI is contingent upon the Operability of RCIC and all of the ECCS subsystems (ADS, LPCI, and CS). The exception, LCO 3.5.1 ACTION D, which allows operation for 72 hours with HPCI and one low pressure ECCS subsystem inoperable is addressed in Discussion of Changes for ITS: 3.5.1 Comment L.9. The 14 day completion time is based on a reliability study that evaluated the impact on ECCS availability (Memorandum from R.L. Baer (NRC) to V. Stello, JR. (NRC), "Recommended Interim Revisions to LCOs for ECCS Components," December 1,1975). Factors contributing to the acceptability of allowing continued operation for 14 days with HPCI inoperable include: the similar functions of HPCI and RCIC, and that the RCIC is capable of performing the HPCI function, although at a substantially lower capacity; the continued availability of the full complement of ADS valves and the ADS system's capability in response to a small break LOCA; and, the continued availability of the full complement of low pressure ECCS subsystems which, in conjunction with ADS, are capable of responding to a small break LOCA. For combinations of inoperable ECCS not bounded by the safety analysis, ITS 3.5.1 Required Action H.1 is provided to direct entry into LCO 3.0.3 since this condition results in operation outside of the CNS design and licensing basis.

L.7 CTS 4.5.C.1.d requires verification that HPCI is capable of delivering at least 4250 gpm "at approximately 1000 psig reactor steam pressure." The proposed Specification, SR 3.5.1.7, requires verification of a minimum 4250 gpm HPCI flow rate with reactor pressure $\geq$ 920 psig and $\leq$ 1020 psig, providing a specific pressure band in which the testing is to be performed. The HPCI performance test at high pressure is the second part of a two part test that verifies HPCI pump performance at the upper and lower end of the range of steam supply and pump discharge pressures in which the HPCI pump is expected to perform. Performance of the HPCI test at both ends of the expected operating pressure range confirms that the HPCI pump and turbine are functioning in accordance with design specifications. The ability of the HPCI pump to perform at the highest required pressure has already been demonstrated. A small decrease in the pressure to as low as 920 psig at which the performance to design specifications is verified will not affect the validity of the test to determine that the pump and turbine are still operating at the design specifications.

L.8 This change proposes to raise the steam pressure in CTS 3.5.C.3 and 4.5.C.e at which the HPCI pump flow rate tests are performed from approximately 150 psig to less than or equal to 165 psig. This additional pressure can provide additional time for test performance by making additional steam pressure available. Operating experience has shown that the Digital Electro-Hydraulic (DEH) Control System can better maintain stable steam pressure at 165 psig vice 150 psig. The ability of the HPCI System to perform at the lowest required design pressure (150 psig) has already been demonstrated. The proposed small increase in pressure at which this low pressure test is performed will not

TECHNICAL CHANGES - LESS RESTRICTIVE

L.8 (continued)

significantly delay or affect the validity of the test. This change also effectively extends the initial entry into the applicable condition for performing the surveillance. However, this is considered to be acceptable since the most common outcome of the performance of a surveillance is the successful demonstration that the acceptance criteria are satisfied. The change also ensures that performance of the surveillance can be delayed until plant conditions exist where performance of the surveillance is unlikely to result in a pressure transient.

L.9 Proposed LCO 3.5.1 ACTION D establishes Required Actions and Completion Times for the situation when the HPCI System and one low pressure ECCS (CS or LPCI) subsystem are inoperable. The proposed Specification is less restrictive than existing LCO 3.5.C.2, which allows continued operation if HPCI is inoperable only if the ADS subsystem, the RCIC System, both LPCI subsystems and both core spray subsystems are Operable. The accident analysis presented in NEDC-32687P, Revision 1, "Cooper Nuclear Station SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis," March 1997; approved in J.R. Hall (NRC) to G.R. Horn (NPPD), "Approval of SAFER/GESTR-LOCA Analysis for Cooper Nuclear Station (TAC No. M98293)," September 23, 1997, indicates that the plant is protected by the ADS System and the remaining ECCS subsystems when the HPCI System and one low pressure ECCS subsystem are inoperable. However, with both the HPCI System and one low pressure ECCS subsystem inoperable, another single failure may place the plant in a condition where adequate core cooling may not be available during an accident. Therefore, an allowable outage time of 72 hours has been assigned to either restore the inoperable HPCI System or the low pressure ECCS subsystem. For combinations of inoperable ECCS not bounded by the safety analysis, ITS 3.5.1 Required Action H.1 is added to direct entry into LCO 3.0.3 since this condition results in operation outside of the CNS design basis.

L.10 Not used.

L.11 The pressure at which ADS is required to be Operable is proposed to be increased to > 150 psig in CTS 4.5.E.1 to provide consistency with the Operability requirements for HPCI. Small break loss of coolant accidents (i.e., between 113 and 150 psig) are bounded by analyses performed at higher pressures. The ADS is required to operate to lower the pressure sufficiently so that the LPCI and CS Systems can provide makeup to mitigate such accidents. Since these systems can begin to inject water into the reactor pressure vessel at pressures well above 150 psig (217 psig for LPCI and 390 psig for CS), there is no safety significance in ADS not being Operable between 113 and 150 psig.

L.12 CTS 3.5.E.2 allows continued operation for a maximum of 7 days after an ADS valve is determined to be inoperable. Proposed LCO 3.5.1 ACTION E

TECHNICAL CHANGES - LESS RESTRICTIVE

L.12 (continued)

allows continued operation for a maximum of 14 days under the same conditions. The 14 day Completion Time for restoring the ADS valve is contingent upon the Operability of the HPCI System. The 14 day Completion Time is based on a reliability study that evaluated the impact on ECCS availability (Memorandum from R.L. Baer (NRC) to V. Stello, JR. (NRC), "Recommended Interim Revisions to LCOs for ECCS Components," December 1, 1975). Factors contributing to the acceptability of allowing continued operation for 14 days with an ADS valve inoperable include the continued availability of HPCI and the accident analysis for CNS indicating that the plant remains protected with only 5 ADS valves Operable. For combinations of inoperable ECCS not bounded by the safety analysis, ITS 3.5.1 Required Action H.1 is provided to direct entry into LCO 3.0.3 since this condition results in operation outside of the CNS design and licensing basis. B

L.13 This change proposes to modify the periodic surveillance in CTS 4.6.D.5 and the conditional surveillance in CTS 3.5.E.3. The Note to proposed ITS SR 3.5.1.11 would require performance of the ADS manual operation test within 12 hours after achieving adequate steam pressure and flow. The proposed Bases B 3.5.1 for SR 3.5.1.11 defines adequate steam pressure as $\geq$ 500 psig, instead of the current $\geq$ 100 psig of CTS 4.6.D.5 and within 12 hours of achieving 113 psig in CTS 3.5.E.3. Adequate steam flow is defined in the proposed Bases as turbine bypass valves at least 30% open or total steam flow $\geq 10^6$ lb/hr. This allows for sufficient conditions to exist and allows the plant to stabilize within these conditions prior to performing the Surveillance. The valve manufacturer's recommended test pressure is $\geq$ 500 psig. This recommendation comes after the recently concluded mid-cycle-18 outage at CNS, during which all of the pilot valves for the ADS valves were replaced, and the old valves were examined by the manufacturer. The manufacturer believes that testing the valves at steam pressures less than 500 psig may have contributed to the degraded condition of the pilot valves. The Note to SR 3.5.1.11 allows the valve testing to not be performed until 12 hours after achieving adequate steam pressure and flow. This time is sufficient to achieve stable conditions and allow performance of the Surveillance. The time to achieve proper conditions for and to perform testing and operations that must occur at startup justifies the additional time for performing the ADS manual actuation test. The time to achieve proper conditions for and to perform testing and operations that must occur at startup justifies the additional time for performing the ADS manual actuation test. The estimated time to proceed from 113 psig to $\geq$ 500 psig is approximately 8 hours. This requires the testing to be completed in 4 hours. Doing this along with other plant startup activities also in progress is not recommended. The proposed Note will provide sufficient time to complete the testing of all six ADS valves in a controlled, expeditious manner. The added time is acceptable because of the low probability of an accident requiring ADS. Since the normal outcome of the performance of this Surveillance is that the ADS valves are verified Operable, this change is considered acceptable. A A A

TECHNICAL CHANGES - LESS RESTRICTIVE

L.14 Not used.

A

L.15 CTS 3.5.A.5 provides an allowed outage time of 7 days for an inoperable LPCI subsystem provided certain conditions are satisfied. One of these conditions is that the Residual Heat Removal Service Water (RHRSW) subsystem associated with the Operable LPCI subsystem must be Operable. This condition is not included in ITS 3.5.1. CTS 3.5.A.5 and ITS 3.5.1 provide requirements for the CNS Emergency Core Cooling Systems (ECCS) and include requirements for LPCI subsystems to be Operable. The LPCI mode of the RHR System is included as part of the CNS ECCS. The RHRSW System does not support the Operability of the LPCI subsystems for ECCS. As a result, the inoperability of the RHRSW subsystems does not impact the Operability of the remaining LPCI subsystem when one LPCI subsystem is inoperable. Therefore, the associated requirement in CTS 3/4.5.A.5 for the Operability verification of the RHRSW subsystem associated with the Operable LPCI subsystem is unnecessary for assuring LPCI subsystem Operability and is deleted.

L.16 Not used.

A

L.17 This proposed change deletes most of the requirements to periodically verify the Operability of other systems, subsystems, or components when an ECCS component, subsystem, or system is inoperable (CTS 4.5.A.2; 4.5.A.4; 4.5.A.5; 4.5.C.2, except RCIC immediately; and 4.5.E.2). This verification is an implicit part of using Technical Specifications and determining the appropriate Conditions to enter and Actions to take in the event of inoperability of Technical Specification equipment. In addition, plant and equipment status is continuously monitored by control room personnel. The results of this monitoring process are documented in records/logs maintained by control room personnel. The continuous monitoring process includes re-evaluating the status of compliance with Technical Specification requirements when Technical Specification equipment becomes inoperable using the control room records/logs as aids. Therefore, the explicit requirements to periodically verify the Operability of other systems, subsystems, or components when an ECCS component, subsystem, or system is inoperable are considered to be unnecessary for ensuring compliance with the applicable Technical Specification actions.

A

L.18 Not used.

B

TECHNICAL CHANGES - LESS RESTRICTIVE

L.18 (continued)

Not used.

B

L.19 The proposed change will modify CTS 4.5.C.2 to verify RCIC Operability within 1 hour when the HPCI System in inoperable. CTS 4.5.C.2 now requires immediately verifying the RCIC System to be OPERABLE. Proposed ACTION C.1 of LCO 3.5.1 allows 1 hour to verify RCIC Operability by administrative means. The present CTS verification is an implicit part of using Technical Specifications and determining the appropriate Conditions to enter and Actions to take due to inoperability of Technical Specification equipment. Control room personnel continuously monitor plant and equipment status. They maintain records/logs that document the results of this monitoring process. This continuous monitoring process, using the control room records/logs as aids, includes re-evaluating the status of compliance with Technical

A

B

A

TECHNICAL CHANGES - LESS RESTRICTIVE

L.19 (continued)

Specification requirements when Technical Specification equipment becomes inoperable. The hour allowed to verify RCIC Operability provides a period of time to correct the problem commensurate with the importance of maintaining HPCI OPERABLE during MODES 1, 2, and 3, with reactor steam dome pressure > 150 psig. Initiation of an analyzed event does not assume a completion time to verify RCIC Operability, and the consequences of an event during the proposed 1 hour Completion Time are the same as those during the current completion time of "immediately". A

RELOCATED SPECIFICATIONS

None

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS) AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.1 ECCS—Operating

LCO 3.5.1 Each ECCS injection/spray subsystem and the Automatic Depressurization System (ADS) function of [seven] safety/relief valves shall be OPERABLE. [1] SIX

APPLICABILITY: MODE 1,
MODES 2 and 3, except high pressure coolant injection (HPCI) and ADS valves are not required to be OPERABLE with reactor steam dome pressure ≤ [150] psig. [1]

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One low pressure ECCS injection/spray subsystem inoperable.	A.1	Restore low pressure ECCS injection/spray subsystem to OPERABLE status.	7 days
B. Required Action and associated Completion Time of Condition A not met.	B.1	Be in MODE 3.	12 hours
	AND		
	B.2	Be in MODE 4.	36 hours
C. HPCI System inoperable.	C.1	Verify by administrative means RCIC System is OPERABLE.	1 hour
	AND		
	C.2	Restore HPCI System to OPERABLE status.	14 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
D. HPCI System inoperable. AND One low pressure ECCS injection/spray subsystem is inoperable.	D.1 OR D.2	Restore HPCI System to OPERABLE status. Restore low pressure ECCS injection/spray subsystem to OPERABLE status.	72 hours 72 hours
E. One ADS valve inoperable.	E.1	Restore ADS valve to OPERABLE status.	14 days
F. One ADS valve inoperable. AND One low pressure ECCS injection/spray subsystem inoperable.	F.1 OR F.2	Restore ADS valve to OPERABLE status. Restore low pressure ECCS injection/spray subsystem to OPERABLE status.	72 hours 72 hours
G. Two or more ADS valves inoperable. OR Required Action and associated Completion Time of Condition C, D, E, or F not met.	G.1 AND G.2	Be in MODE 3. Reduce reactor steam dome pressure to ≤ [1]150[N] psig.	12 hours 36 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
H. Two or more low pressure ECCS injection/spray subsystems inoperable. OR HPCI System and one or more ADS valves inoperable.	H.1 Enter LCO 3.0.3.	Immediately

B

JUSTIFICATION FOR DEVIATION FROM NUREG 1433
ITS: 3.5.1 - ECCS-OPERATING

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

2. Not used.

3. Change made for consistency with the Writer's Guide.

4. The SRs performing verification that LPCI inverter output voltage is appropriate is not required due to the plant specific design of CNS. Subsequent SRs have been renumbered.

5. The CNS design does not include recirculation pump bypass valves. Additionally, CNS is analyzed and licensed for single loop operation. Therefore, SR 3.5.1.4 of NUREG-1433 is revised accordingly.

6. The ECCS pump testing requirements are revised to reflect the CNS specific design and analysis or current licensing basis. The subsequent Note has been renumbered.

7. The ADS valves at CNS have a single valve solenoid for each valve, therefore this Surveillance Frequency is not applicable and may be deleted.

8. Not used.

8. (continued)

Not used.

BASES

APPLICABILITY (continued) is ≤ 150 psig, ADS and HPCI are not required to be OPERABLE because the low pressure ECCS subsystems can provide sufficient flow below this pressure. ECCS requirements for MODES 4 and 5 are specified in LCO 3.5.2, "ECCS—Shutdown."

ACTIONS

A.1

If any one low pressure ECCS injection/spray subsystem is inoperable, the inoperable subsystem must be restored to OPERABLE status within 7 days. In this Condition, the remaining OPERABLE subsystems provide adequate core cooling during a LOCA. However, overall ECCS reliability is reduced, because a single failure in one of the remaining OPERABLE subsystems, concurrent with a LOCA, may result in the ECCS not being able to perform its intended safety function. The 7 day Completion Time is based on a reliability study (Ref. 12) that evaluated the impact on ECCS availability, assuming various components and subsystems were taken out of service. The results were used to calculate the average availability of ECCS equipment needed to mitigate the consequences of a LOCA as a function of allowed outage times (i.e., Completion Times).

B.1 and B.2

If the inoperable low pressure ECCS subsystem cannot be restored 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 12 hours and to MODE 4 within 36 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.

C.1 and C.2

If the HPCI System is inoperable and the RCIC System is verified to be OPERABLE, the HPCI System must be restored to OPERABLE status within 14 days. In this Condition, adequate core cooling is ensured by the OPERABILITY of the redundant and diverse low pressure ECCS injection/spray subsystems in

(continued)

INSERT 1

Not used.

B

BASES

ACTIONS

C.1 and C.2 (continued)

conjunction with ADS. Also, the RCIC System will automatically provide makeup water at most reactor operating pressures. Verification of RCIC OPERABILITY within 1 hour is therefore required when HPCI is inoperable. This may be performed as an administrative check by examining logs or other information to determine if RCIC is out of service for maintenance or other reasons. It does not mean to perform the Surveillances needed to demonstrate the OPERABILITY of the RCIC System. If the OPERABILITY of the RCIC System cannot be verified, however, Condition G must be immediately entered. If a single active component fails concurrent with a design basis LOCA, there is a potential, depending on the specific failure, that the minimum required ECCS equipment will not be available. A 14 day Completion Time is based on a reliability study cited in Reference 12 and has been found to be acceptable through operating experience.

Consistent with the recommendations provided in

D.1 and D.2

If any one low pressure ECCS injection/spray subsystem is inoperable in addition to an inoperable HPCI System, the inoperable low pressure ECCS injection/spray subsystem or the HPCI System must be restored to OPERABLE status within 72 hours. In this Condition, adequate core cooling is ensured by the OPERABILITY of the ADS and the remaining low pressure ECCS subsystems. However, the overall ECCS reliability is significantly reduced because a single failure in one of the remaining OPERABLE subsystems concurrent with a design basis LOCA may result in the ECCS not being able to perform its intended safety function. Since both a high pressure system (HPCI) and a low pressure subsystem are inoperable, a more restrictive Completion Time of 72 hours is required to restore either the HPCI System or the low pressure ECCS injection/spray subsystem to OPERABLE status. This Completion Time is based on a reliability study cited in Reference 12 and has been found to be acceptable through operating experience.

Consistent with the recommendations provided in

E.1

The LCO requires seven ADS valves to be OPERABLE in order to provide the ADS function. Reference 13 contains the results

(continued)

BASES

ACTIONS

E.1 (continued)

of an analysis that evaluated the effect of one ADS valve being out of service. Per this analysis, operation of only six ADS valves will provide the required depressurization. However, overall reliability of the ADS is reduced, because a single failure in the OPERABLE ADS valves could result in a reduction in depressurization capability. Therefore, operation is only allowed for a limited time. The 14 day Completion Time is based on a reliability study cited in Reference 12 and has been found to be acceptable through operating experience.

F.1 and F.2

If any one low pressure ECCS injection/spray subsystem is inoperable in addition to one inoperable ADS valve, adequate core cooling is ensured by the OPERABILITY of HPCI and the remaining low pressure ECCS injection/spray subsystem. However, overall ECCS reliability is reduced because a single active component failure concurrent with a design basis LOCA could result in the minimum required ECCS equipment not being available. Since both a high pressure system (ADS) and a low pressure subsystem are inoperable, a more restrictive Completion Time of 72 hours is required to restore either the low pressure ECCS subsystem or the ADS valve to OPERABLE status. This Completion Time is based on a reliability study cited in Reference 12 and has been found to be acceptable through operating experience.

G.1 and G.2

If any Required Action and associated Completion Time of Condition C, D, E, or F is not met, or if two or more ADS valves are inoperable, the plant must be brought to a condition in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and reactor steam dome pressure reduced to ≤ 150 psig within 36 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.

(continued)

INSERT 2

Not used.

B

BASES

ACTIONS (continued)

H.1

When multiple ECCS subsystems are inoperable, as stated in Condition H, the plant is in a condition outside of the accident analyses. Therefore, LCO 3.0.3 must be entered immediately.

SURVEILLANCE REQUIREMENTS

SR 3.5.1.1

The flow path piping has the potential to develop voids and pockets of entrained air. Maintaining the pump discharge lines of the HPCI System, CS System, and LPCI subsystems full of water ensures that the ECCS will perform properly, injecting its full capacity into the RCS upon demand. This will also prevent a water hammer following an ECCS initiation signal. One acceptable method of ensuring that the lines are full is to vent at the high points. The 31 day Frequency is based on the gradual nature of void buildup in the ECCS piping, the procedural controls governing system operation, and operating experience.

B

Insert 4

SR 3.5.1.2

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 initiation signal is allowed to be in a nonaccident position provided the valve will automatically reposition in the proper stroke time. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of potentially being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves. For the HPCI System, this SR also includes the steam flow path for the turbine and the flow controller position.

A

The 31 day Frequency of this SR was derived from the Inservice Testing Program requirements for performing valve

(continued)