PBAPS

TABLE OF CONTENTS

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.A Core Spray & LPCI Subsystem (cont'd) Both CSS shall be operable whenever irradiated fuel is in the vessel and prior to reactor startup from a Cold Shutdown condition except as specified in 3.5.A.2 and 3.5.F below:	4.5.A Core Spray & LPCI Subsystem (cont'd) Item — Frequency (d) Pump Flow Rate — Once/3 months Each pump in each loop shall deliver at least 3125 gpm against a system head corresponding to a reactor vessel pressure of 105 psig. (e) Core Spray Header ΔP Instrumentation Check — Once/day Calibrate — Once/3 months (f) DELETED
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 only during the succeeding seven days provided that during such seven days all active components of the other core spray subsystem and active components of the LPCI subsystem are operable.	2. DELETED
	3. LPCI Subsystem Testing shall be as follows: Item — Frequency (a) Simulated Automatic Actuation Test — Once/operating Cycle (b) Pump operability — Once/1 month

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.A Core Spray and LPCI Subsystem (cont'd)	4.5.A Core Spray and LPCI Subsystem (cont'd)
3. Two independent Low Pressure Coolant Injection (LPCI) subsystems will be operable with each subsystem comprised of:	Item / Frequency
a. (Two 33-1/3%) capacity pumps,	(c) Motor Operated valve operability — Once/month
b. An operable flow path capable of taking suction from the suppression pool and transferring the water to the reactor pressure vessel, and	(d) Pump Flow Rate — Once/3 months Each LPCI pump shall deliver 10,900 gpm against a system head corresponding to a vessel pressure of 20 psig based on individual pump tests.
c. During power operation the LPCI system cross-tie valve closed and the associated valve motor operator circuit breaker locked in the off position.	(e) DELETED
Both LPCI subsystems shall be operable whenever irradiated fuel is in the reactor vessel, and prior to reactor startup from the Cold Shutdown Condition, except as specified in 3.5.A.4, 3.5.A.5, and 3.5.F below.	
4. From and after the date that one of the four LPCI pumps is made or found to be inoperable for any reason, continued reactor operation is permissible only during the succeeding seven days provided that during such seven days the remaining active components of the LPCI subsystems, and all active components of both core spray subsystems are operable.	4. DELETED
5. 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 of both core spray subsystems and the remaining LPCI subsystem are operable.	5. DELETED

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.A Core Spray and LPCI Subsystem (cont'd)	4.5.A Core Spray and LPCI Subsystem (cont'd)
6. All recirculation pump discharge valves shall be operable prior to reactor startup (or closed if permitted elsewhere in these specifications).	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.
7. If the requirements of 3.5.A cannot be met, an orderly shutdown of the reactor shall be initiated and the reactor shall be in the Cold Shutdown Condition within 48 hours.	
B. Containment Cooling System (HPSW, Torus Cooling, Drywell Spray, and Torus Spray)	B. Containment Cooling System (HPSW, Torus Cooling, Drywell Spray, and Torus Spray)
1. Except as specified in 3.5.B.2, 3.5.B.3, 3.5.B.4, 3.5.B.5, and 3.5.B.6 below, the containment cooling system shall be operable whenever irradiated fuel is in the reactor vessel and reactor coolant temperature is greater than 212 degrees F, and prior to reactor startup from a Cold Shutdown Condition.	1. Containment Cooling System components shall be tested as follows:

Item		Frequency
(a)	Each HPSW Pump Operability.	Once/month
(b)	Each HPSW motor operated valve operability.	Once/month
(c)	HPSW Pump Capacity Test. Each HPSW pump shall deliver 4500 gpm at 233 psig.	After pump maintenance and every 3 months.
(d)	Each Torus Cooling motor operated valve operability.	Once/month
(e)	Each Drywell Spray motor operated valve operability.	Once/month
(f)	Each Torus Spray motor operated valve operability.	Once/month
(g)	Air test on drywell and torus headers and nozzles.	Once/5 years

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.F Minimum Low Pressure Cooling Availability	4.5.F Minimum Low Pressure Cooling Availability
1. The following low pressure ECCS subsystems shall be OPERABLE when irradiated fuel is in the reactor vessel and the reactor is in the Cold Condition except when the reactor vessel head is removed, the spent fuel storage pool gates are removed, and water level is at least 458 inches above reactor pressure vessel instrument zero: a. Two Core Spray (CS) subsystems with each subsystem comprised of: (1) Two OPERABLE motor driven pumps, and (2) Piping and valves capable of taking suction from the required water source and transferring the water through a spray sparger above the core to the reactor vessel. OR b. One CS subsystem comprised of the equipment specified in 3.5.F.1.a above, and one Low Pressure Coolant Injection subsystem comprised of: (1) One OPERABLE motor driven pump, and (2) Piping and valves capable of taking suction from the required water source and transferring the water to the reactor vessel.	1. At least once per 12 hours, verify for each required Low Pressure Coolant Injection (LPCI) subsystem that the suppression pool water level is at least 11.0 feet. 2. At least once per 12 hours, verify for each required Core Spray (CS) subsystem: (a) Suppression pool water level is at least 11.0 feet, or (b) Condensate storage tank water level is at least 17.3 feet.* 3. At least once per month, verify for each required CS and LPCI subsystem that the piping is filled with water from the pump discharge valve to the injection valve. 4. At least once per month, verify for each required CS and LPCI 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.**

* Only one required CS subsystem may take credit for this option during operations with a potential for draining the reactor vessel.

** One LPCI subsystem may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.F Minimum Low Pressure Cooling Availability (Cont.)	4.5.F Minimum Low Pressure Cooling Availability (Cont.)
2. With one of the subsystems required by 3.5.F.1 inoperable, restore the required subsystem to OPERABLE status within 4 hours or immediately initiate action to suspend operations with a potential for draining the reactor vessel.	5. At least once per 92 days, verify each required CS subsystem pump and LPCI subsystem pump develops the flow rate specified below against a system head corresponding to the specified reactor pressure.
3. With two of the subsystems required by 3.5.F.1 inoperable, immediately initiate action to suspend operations with a potential for draining the reactor vessel and restore at least one subsystem to OPERABLE status within 4 hours or immediately initiate action to establish Secondary Containment Integrity.	6. At least once per operating cycle, verify each required CS and LPCI subsystem actuates on an actual or simulated automatic initiation signal.***

SYSTEM	FLOW RATE	NUMBER OF PUMPs	SYSTEM HEAD CORRESPONDING TO A REACTOR PRESSURE OF
CS	≥ 3,125 gpm	1	≥ 105 psig
LPCI	≥ 10,900 gpm	1	≥ 20 psig

***Vessel injection/spray may be excluded.

3.5.A BASES

Core Spray and LPCI Subsystems

Core Spray Subsystem (CSS)

The CSS is provided to assure that the core is adequately cooled following a loss-of-coolant accident. Two redundant loops each provide adequate core cooling capacity for all break sizes from 0.2 ft^2 up to and including the double-ended reactor recirculation line break, and for smaller breaks following depressurization by the Automatic Depressurization System (ADS).

The CSS specifications are applicable whenever irradiated fuel is in the core because the CSS is a primary source of emergency core cooling after the reactor vessel is depressurized.

With one CSS inoperable, the verified operability (see 4.5 Bases) of the redundant full capacity CSS and the full capacity Low Pressure Coolant Injection system provides assurance of adequate core cooling and justifies and specified 7 days out-of-service period.

The surveillance requirements provide adequate assurance that the CSS will be operable when required. Although all active components are testable and full flow can be demonstrated by recirculation during reactor operation, a complete functional test requires reactor shutdown. The pump discharge piping is maintained full to prevent water hammer damage to piping and to start cooling at the earliest moment.

Low Pressure Coolant Injection System (LPCIS)

The LPCIS is provided to assure that the core is adequately cooled following a loss-of-coolant accident. Two loops each with two pumps provide adequate core flooding for all break sizes from 0.2 ft^2 up to and including the double-ended reactor recirculation line break, and for small breaks following depressurization by the ADS.

The LPCIS specifications are applicable whenever there is irradiated fuel in the reactor vessel because LPCIS is a primary source of water for flooding the core after the reactor vessel is depressurized.

With one LPCIS pump inoperable, or one LPCIS loop inoperable, adequate core flooding is assured by the verified operability (see 4.5 Bases) of the redundant LPCIS pumps or loop, and both CSS loops. The reduced redundancy justifies the specified 7 day out-of-service period.

The surveillance requirements provide adequate assurance that the LPCI will be operable when required. Although all active components are testable and full flow can be demonstrated by recirculation during reactor operation, a complete functional test requires reactor shutdown. The pump discharge piping is maintained full to prevent water hammer damage to piping and to start cooling at the earliest moment.

3.5.E BASES (Cont'd.)

With one ADS valve known to be incapable of automatic operation, four valves remain operable to perform their ADS function. However, since the ECCS Loss-of-Coolant Accident analysis for small line breaks assumed that all five ADS valves were operable, reactor operation with one ADS valve inoperable is only allowed to continue for seven (7) days provided that the HPCI system is verified to be operable and that the actuation logic for the (remaining) four ADS valves is verified to be operable (see 4.5 Bases).

F. Minimum Low Pressure Cooling Availability

The purpose of Specification F is to assure that adequate core cooling capability is available while the reactor is in the Cold Condition. The long term cooling analyses following a design basis LOCA demonstrates that only one low pressure ECCS subsystem is required, post-LOCA, to maintain adequate reactor vessel water level in the event of an inadvertent vessel draindown. It is therefore reasonable to assume, based on engineering judgment, that while the reactor is in the Cold Condition one low pressure ECCS subsystem can maintain adequate reactor vessel water level. To provide redundancy, a minimum of two low pressure ECCS subsystems are required to be OPERABLE while the reactor is in the Cold Condition. ECCS subsystems are not required to be OPERABLE with the reactor in the Cold Condition with the spent fuel storage pool gates removed and the water level maintained at least 458 inches above reactor pressure vessel instrument zero. This provides sufficient coolant inventory to allow operator action to terminate the inventory loss prior to fuel uncovery in case of an inadvertent draindown.

G. Maintenance of Filled Discharge Pipe

If the discharge piping of the core spray, LPCI subsystem, HPCI, and RCIC are not filled, a water hammer can develop in this piping when the pump and/or pumps are started. If a water hammer were to occur at the time at which the system were required, the system would still perform its design function. However, to minimize damage to the discharge piping and to ensure added margin in the operation of these systems, this Technical Specification requires the discharge lines to be filled whenever the system is in an operable condition.

4.5 BASES

Core and Containment Cooling Systems Surveillance Frequencies

The performance of individual emergency core cooling systems (HPCI, LPCI, Core Spray and ADS) and the integrated performance of the emergency core cooling systems are described in analyses referenced in Section 6.5 of the Updated Final Safety Analysis Report. Periodic surveillance of pumps and valves is performed in accordance with ASME Code, Section XI, to the extent described in the Inservice Testing Plan, to verify that the systems will provide the flow rates required by the respective analyses. HPCI and RCIC flow tests are performed at two pressures so that the systems' capability to provide rated flow over their operating range is verified. To avoid damaging Core Spray system valves during Core Spray pump flow testing, throttling is not normally performed to obtain a system head corresponding to a reactor pressure of ≥ 105 psig. Pump curves are used to determine equivalent values for flow rate and test pressure for the Core Spray pumps in order to meet the Surveillance Requirements. HPSW flow tests verify that rated flow can be delivered to the RHR heat exchangers.

The testing interval for the core and containment cooling systems is based on industry practice, sound engineering judgment and practicality. The core cooling systems have not been designed to be fully testable during operation. For example, in the case of the HPCI, automatic initiation during power operation would result in pumping cold water into the reactor vessel which is not desirable. Complete ADS testing during power operation causes an undesirable loss-of-coolant inventory. To increase the availability of the core and containment cooling systems, the components which make up the system; i.e., instrumentation, pumps, valves, etc., are tested frequently. The pumps and motor operated injection valves are also tested each month to assure their operability. A simulated automatic actuation test once each cycle combined with frequent tests of the pumps and injection valves is deemed to be adequate testing of these systems.

The flow path piping of the emergency core cooling systems (ECCS) has the potential to develop voids and pockets of entrained air. Maintaining the pump discharge lines of the HPCI system, Core Spray system, and LPCI subsystems full of water ensures that the ECCS will perform properly, injecting its full capacity into the reactor pressure vessel 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. An acceptable method of ensuring the LPCI and Core Spray system discharge lines are full is to verify the absence of the associated "keep fill" system accumulator alarms.

While the reactor is in the Cold Condition one low pressure ECCS subsystem can maintain adequate reactor vessel water level. To provide redundancy, a minimum of two low pressure ECCS subsystems are required to be OPERABLE with the reactor in the Cold Condition.

4.5 BASES (Cont'd.)

Core and Containment Cooling Systems Surveillance Frequencies

However, one LPCI subsystem may be aligned for decay heat removal and considered OPERABLE for the ECCS function, if it can be manually realigned (remote or local) to the LPCI mode and is not otherwise inoperable. RHR valves that are required for LPCI subsystem operation may be aligned for decay heat removal. A note allows one LPCI subsystem of the RHR system to be considered OPERABLE for the ECCS function if all the required valves in the LPCI flow path can be manually realigned (remote or local) to allow injection into the reactor vessel, and the system is not otherwise inoperable. Manual realignment to allow injection into the reactor vessel in the LPCI mode may also include opening the drag valve to establish the required LPCI subsystem flow rate. This will ensure adequate core cooling if an inadvertent reactor vessel draindown should occur. Sufficient time will be available to manually align and initiate LPCI subsystem operation to provide core cooling prior to postulated fuel uncovery. Only one required Core Spray subsystem may take credit for the condensate storage tank supply option during operations with a potential for draining the reactor vessel as stated in the note to Surveillance Requirement 4.5.F.2(b). During operations with a potential for draining the reactor vessel, the volume in the condensate storage tank may not provide adequate makeup if the reactor vessel were completely drained. Therefore, only one Core Spray subsystem is allowed to use the condensate storage tank as a source of water. This ensures the other required ECCS subsystem has adequate makeup volume.

When components and subsystems are out-of-service, overall core and containment cooling reliability is maintained by verifying the operability of the remaining redundant cooling systems that the Limiting Conditions for Operation require to be operable during the allowable out-of-service time period. Verifying operability in this context means to administratively ensure that the remaining required systems or subsystems are not known to be inoperable (for example: confirming that equipment necessary for the systems or subsystems to perform their safety functions are not blocked out of service for maintenance, checking the status of selected surveillances on the remaining required systems or subsystems and checking that selected valves are in the correct position as indicated on the control room panels). Performance of operability tests is not required.

4.5 I&J Surveillance Requirements Bases

Average and Local LHGR

The LHGR shall be checked daily to determine if fuel burnup or control rod movement has caused changes in power distribution. Since changes due to burnup are slow and only a few control rods are moved daily, a daily check of power distribution is adequate.

4.5.K Minimum Critical Power Ratio (MCPR) - Surveillance Requirement

At core thermal power levels less than or equal to 25%, the reactor will be operating at minimum recirculation pump speed and the moderator void content will be very small. For all designated control rod patterns which may be employed at this point, operating plant experience indicated that the resulting MCPR value is in excess of requirements by a considerable margin. With this low void content, any inadvertent core flow increase would only place operation in a more conservative mode relative to MCPR. During initial start-up testing of the plant, a MCPR evaluation will be made at 25% thermal power level with minimum recirculation pump speed. The MCPR margin will thus be demonstrated such that future MCPR evaluation below this power level will be shown to be unnecessary. The daily requirement for calculating MCPR above 25% rated thermal power is sufficient since power distribution shifts are very slow when there have not been significant power or control rod changes. The requirement for calculating MCPR when a limiting control rod pattern is approached ensures that MCPR will be known following a change in power or power shape (regardless of magnitude) that could place operation at a thermal limit.

4.5.L MCPR Limits for Core Flows Other Than Rated

The purpose of the K_f factor is to define operating limits at other than rated flow conditions. At less than 100% flow the required MCPR is the product of the operating limit MCPR and the K_f factor. Specifically, the K_f factor provides the required thermal margin to protect against a flow increase transient. The most limiting transient initiated from less than rated flow conditions is the recirculation pump speed up caused by a motor-generator speed control failure.

For operation in the automatic flow control mode, the K_f factors assure that the operating limit MCPR will not be violated should the most limiting transient occur at less than rated flow. In the manual flow control mode, the K_f factors assure that the Safety Limit MCPR will not be violated for the same postulated transient event.

The K_f factor curves in the CORE OPERATING LIMITS REPORT were developed generically and are applicable to all BWR/2, BWR/3, and BWR/4 reactors. The K_f factors were derived using the flow control line corresponding to rated thermal power at rated core flow.

For the manual flow control mode, the K_f factors were calculated such that at the maximum flow rate (as limited by the pump scoop tube set point) and the corresponding core power (along the rated flow control line), the limiting bundle's relative power was adjusted until the MCPR was slightly above the Safety Limit. Using this relative bundle power, the MCPR's were calculated at different points along the rated flow control line corresponding to different core flows. The ratio of the MCPR calculated at a given point of the core flow, divided by the operating limit MCPR determines the K_f.

For operation in the automatic flow control mode, the same procedure was employed except the initial power distribution was established such that the MCPR was equal to the operating limit MCPR at rated power and flow.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS

3.7 CONTAINMENT SYSTEMS

Applicability:

Apples to the operating status of the primary and secondary containment systems.

Objective:

To assure the integrity of the primary and secondary containment system.

Specification:

A. Primary Containment

1. Whenever the nuclear system is pressurized above atmospheric pressure or work is being done which has the potential to drain the vessel, the pressure suppression pool water volume and temperature shall be maintained within the following limits except as specified by 3.7.A.2, or when inoperability of the core spray systems, the LPCI and containment cooling subsystems is permissible as provided for in 3.5.F:

   a. Minimum water volume- 122,900 ft^3

   b. Maximum water volume- 127,300 ft^3

4.7 CONTAINMENT SYSTEMS

Applicability:

Applies to the primary and secondary containment integrity.

Objective:

To verify the integrity of the primary and secondary containment.

Specification:

1. The suppression chamber water level and temperature shall be checked once per day.

2. Whenever there is indication of relief valve operation (except when the reactor is being shutdown and torus cooling is being established) or testing which adds heat to the suppression pool, the pool temperature shall be continually monitored and also observed and logged every 5 minutes until the heat addition is terminated.

3. Whenever there is indication of relief valve operation with the local suppression pool temperature reaching 200°F or more, an external visual examination of the suppression chamber shall be conducted before resuming power operation.

4. A visual inspection of the suppression chamber interior, including water line regions shall be made at each major refueling outage.

PBAPS

TABLE OF CONTENTS

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.A Core Spray & LPCI Subsystem (cont'd) Both CSS shall be operable whenever irradiated fuel is in the vessel and prior to reactor startup from a Cold Shutdown condition except as specified in 3.5.A.2 and 3.5.F below:	4.5.A Core Spray & LPCI Subsystem (cont'd) Item — Frequency (d) Pump Flow Rate — Once/3 months Each pump in each loop shall deliver at least 3125 gpm against a system head corresponding to a reactor vessel pressure of 105 psig. (e) Core Spray Header ΔP Instrumentation Check — Once/day Calibrate — Once/3 months (f) DELETED
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 only during the succeeding seven days provided that during such seven days all active components of the other core spray subsystem and active components of the LPCI subsystem are operable.	2. DELETED 3. LPCI Subsystem Testing shall be as follows: Item — Frequency (a) Simulated Automatic Actuation Test — Once/operating Cycle (b) Pump operability — Once/1 month

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.A Core Spray and LPCI Subsystem (cont'd)	4.5.A Core Spray and LPCI Subsystem (cont'd)
3. Two independent Low Pressure Coolant Injection (LPCI) subsystems will be operable with each subsystem comprised of:	Item / Frequency (c) Motor Operated valve operability — Once/month (d) Pump Flow Rate — Once/3 months Each LPCI pump shall deliver 10,900 gpm against a system head corresponding to a vessel pressure of 20 psig based on individual pump tests.
a. (Two 33-1/3%) capacity pumps,	
b. An operable flow path capable of taking suction from the suppression pool and transferring the water to the reactor pressure vessel, and	
c. During power operation the LPCI system cross-tie valve closed and the associated valve motor operator circuit breaker locked in the off position.	(e) DELETED
Both LPCI subsystems shall be operable whenever irradiated fuel is in the reactor vessel, and prior to reactor startup from the Cold Shutdown Condition, except as specified in 3.5.A.4, 3.5.A.5, and 3.5.F below.	
4. From and after the date that one of the four LPCI pumps is made or found to be inoperable for any reason, continued reactor operation is permissible only during the succeeding seven days provided that during such seven days the remaining active components of the LPCI subsystems, and all active components of both core spray subsystems are operable.	4. DELETED
5. 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 of both core spray subsystems and the remaining LPCI subsystem are operable.	5. DELETED

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.A Core Spray and LPCI Subsystem (cont'd)	4.5.A Core Spray and LPCI Subsystem (cont'd)
6. All recirculation pump discharge valves shall be operable prior to reactor startup (or closed if permitted elsewhere in these specifications).	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.
7. If the requirements of 3.5.A cannot be met, an orderly shutdown of the reactor shall be initiated and the reactor shall be in the Cold Shutdown Condition within 48 hours.	
B. Containment Cooling System (HPSW, Torus Cooling, Drywell Spray, and Torus Spray)	B. Containment Cooling System (HPSW, Torus Cooling, Drywell Spray, and Torus Spray)
1. Except as specified in 3.5.B.2, 3.5.B.3, 3.5.B.4, 3.5.B.5, and 3.5.B.6 below, the containment cooling system shall be operable whenever irradiated fuel is in the reactor vessel and reactor coolant temperature is greater than 212 degrees F, and prior to reactor startup from a Cold Shutdown Condition.	1. Containment Cooling System components shall be tested as follows:

Item		Frequency
(a)	Each HPSW Pump Operability.	Once/month
(b)	Each HPSW motor operated valve operability.	Once/month
(c)	HPSW Pump Capacity Test. Each HPSW pump shall deliver 4500 gpm at 233 psig.	After pump maintenance and every 3 months.
(d)	Each Torus Cooling motor operated valve operability.	Once/month
(e)	Each Drywell Spray motor operated valve operability.	Once/month
(f)	Each Torus Spray motor operated valve operability.	Once/month
(g)	Air test on drywell and torus headers and nozzles.	Once/5 years

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.F Minimum Low Pressure Cooling Availability	4.5.F Minimum Low Pressure Cooling Availability
1. The following low pressure ECCS subsystems shall be OPERABLE when irradiated fuel is in the reactor vessel and the reactor is in the Cold Condition except when the reactor vessel head is removed, the spent fuel storage pool gates are removed, and water level is at least 458 inches above reactor pressure vessel instrument zero: a. Two Core Spray (CS) subsystems with each subsystem comprised of: (1) Two OPERABLE motor driven pumps, and (2) Piping and valves capable of taking suction from the required water source and transferring the water through a spray sparger above the core to the reactor vessel. OR b. One CS subsystem comprised of the equipment specified in 3.5.F.1.a above, and one Low Pressure Coolant Injection subsystem comprised of: (1) One OPERABLE motor driven pump, and (2) Piping and valves capable of taking suction from the required water source and transferring the water to the reactor vessel.	1. At least once per 12 hours, verify for each required Low Pressure Coolant Injection (LPCI) subsystem that the suppression pool water level is at least 11.0 feet. 2. At least once per 12 hours, verify for each required Core Spray (CS) subsystem: (a) Suppression pool water level is at least 11.0 feet, or (b) Condensate storage tank water level is at least 17.3 feet.* 3. At least once per month, verify for each required CS and LPCI subsystem that the piping is filled with water from the pump discharge valve to the injection valve. 4. At least once per month, verify for each required CS and LPCI 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.**

* Only one required CS subsystem may take credit for this option during operations with a potential for draining the reactor vessel.

** One LPCI subsystem may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.5.F Minimum Low Pressure Cooling Availability (Cont.)	4.5.F Minimum Low Pressure Cooling Availability (Cont.)
2. With one of the subsystems required by 3.5.F.1 inoperable, restore the required subsystem to OPERABLE status within 4 hours or immediately initiate action to suspend operations with a potential for draining the reactor vessel.	5. At least once per 92 days, verify each required CS subsystem pump and LPCI subsystem pump develops the flow rate specified below against a system head corresponding to the specified reactor pressure.
3. With two of the subsystems required by 3.5.F.1 inoperable, immediately initiate action to suspend operations with a potential for draining the reactor vessel and restore at least one subsystem to OPERABLE status within 4 hours or immediately initiate action to establish Secondary Containment Integrity.	6. At least once per operating cycle, verify each required CS and LPCI subsystem actuates on an actual or simulated automatic initiation signal.***

SYSTEM	FLOW RATE	NUMBER OF PUMPs	SYSTEM HEAD CORRESPONDING TO A REACTOR PRESSURE OF
CS	≥ 3,125 gpm	1	≥ 105 psig
LPCI	≥ 10,900 gpm	1	≥ 20 psig

***Vessel injection/spray may be excluded.

3.5.A BASES

Core Spray and LPCI Subsystems

Core Spray Subsystem (CSS)

The CSS is provided to assure that the core is adequately cooled following a loss-of-coolant accident. Two redundant loops each provide adequate core cooling capacity for all break sizes from 0.2 ft^2 up to and including the double-ended reactor recirculation line break, and for smaller breaks following depressurization by the Automatic Depressurization System (ADS).

The CSS specifications are applicable whenever irradiated fuel is in the core because the CSS is a primary source of emergency core cooling after the reactor vessel is depressurized.

With one CSS inoperable, the verified operability (see 4.5 Bases) of the redundant full capacity CSS and the full capacity Low Pressure Coolant Injection system provides assurance of adequate core cooling and justifies and specified 7 days out-of-service period.

The surveillance requirements provide adequate assurance that the CSS will be operable when required. Although all active components are testable and full flow can be demonstrated by recirculation during reactor operation, a complete functional test requires reactor shutdown. The pump discharge piping is maintained full to prevent water hammer damage to piping and to start cooling at the earliest moment.

Low Pressure Coolant Injection System (LPCIS)

The lPCIS is provided to assure that the core is adequately cooled following a loss-of-coolant accident. Two loops each with two pumps provide adequate core flooding for all break sizes from 0.2 ft^2 up to and including the double-ended reactor recirculation line break, and for small breaks following depressurization by the ADS.

The LPCIS specifications are applicable whenever there is irradiated fuel in the reactor vessel because LPCIS is a primary source of water for flooding the core after the reactor vessel is depressurized.

With one LPCIS pump inoperable, or one LPCIS loop inoperable, adequate core flooding is assured by the verified operability (see 4.5 Bases) of the redundant LPCIS pumps or loop, and both CSS loops. The reduced redundancy justifies the specified 7 day out-of-service period.

The surveillance requirements provide adequate assurance that the LPCI will be operable when required. Although all active components are testable and full flow can be demonstrated by recirculation during reactor operation, a complete functional test requires reactor shutdown. The pump discharge piping is maintained full to prevent water hammer damage to piping and to start cooling at the earliest moment.

3.5.E BASES (Cont'd.)

With one ADS valve known to be incapable of automatic operation, four valves remain operable to perform their ADS function. However, since the ECCS Loss-of-Coolant Accident analysis for small line breaks assumed that all five ADS valves were operable, reactor operation with one ADS valve inoperable is only allowed to continue for seven (7) days provided that the HPCI system is verified to be operable and that the actuation logic for the (remaining) four ADS valves is verified to be operable (see 4.5 Bases).

F. Minimum Low Pressure Cooling Availability

The purpose of Specification F is to assure that adequate core cooling capability is available while the reactor is in the Cold Condition. The long term cooling analyses following a design basis LOCA demonstrates that only one low pressure ECCS subsystem is required, post-LOCA, to maintain adequate reactor vessel water level in the event of an inadvertent vessel draindown. It is therefore reasonable to assume, based on engineering judgment, that while the reactor is in the Cold Condition one low pressure ECCS subsystem can maintain adequate reactor vessel water level. To provide redundancy, a minimum of two low pressure ECCS subsystems are required to be OPERABLE while the reactor is in the Cold Condition. ECCS subsystems are not required to be OPERABLE with the reactor in the Cold Condition with the spent fuel storage pool gates removed and the water level maintained at least 458 inches above reactor pressure vessel instrument zero. This provides sufficient coolant inventory to allow operator action to terminate the inventory loss prior to fuel uncovery in case of an inadvertent draindown.

G. Maintenance of Filled Discharge Pipe

If the discharge piping of the core spray, LPCI subsystem, HPCI, and RCIC are not filled, a water hammer can develop in this piping when the pump and/or pumps are started. If a water hammer were to occur at the time at which the system were required, the system would still perform its design function. However, to minimize damage to the discharge piping and to ensure added margin in the operation of these systems, this Technical Specification requires the discharge lines to be filled whenever the system is in an operable condition.

4.5 BASES

Core and Containment Cooling Systems Surveillance Frequencies

The performance of individual emergency core cooling systems (HPCI, LPCI, Core Spray and ADS) and the integrated performance of the emergency core cooling systems are described in analyses referenced in Section 6.5 of the Updated Final Safety Analysis Report. Periodic surveillance of pumps and valves is performed in accordance with ASME Code, Section XI, to the extent described in the Inservice Testing Plan, to verify that the systems will provide the flow rates required by the respective analyses. HPCI and RCIC flow tests are performed at two pressures so that the systems' capability to provide rated flow over their operating range is verified. To avoid damaging Core Spray system valves during Core Spray pump flow testing, throttling is not normally performed to obtain a system head corresponding to a reactor pressure of ≥ 105 psig. Pump curves are used to determine equivalent values for flow rate and test pressure for the Core Spray pumps in order to meet the Surveillance Requirements. HPSW flow tests verify that rated flow can be delivered to the RHR heat exchangers.

The testing interval for the core and containment cooling systems is based on industry practice, sound engineering judgment and practicality. The core cooling systems have not been designed to be fully testable during operation. For example, in the case of the HPCI, automatic initiation during power operation would result in pumping cold water into the reactor vessel which is not desirable. Complete ADS testing during power operation causes an undesirable loss-of-coolant inventory. To increase the availability of the core and containment cooling systems, the components which make up the system; i.e., instrumentation, pumps, valves, etc., are tested frequently. The pumps and motor operated injection valves are also tested each month to assure their operability. A simulated automatic actuation test once each cycle combined with frequent tests of the pumps and injection valves is deemed to be adequate testing of these systems.

The flow path piping of the emergency core cooling systems (ECCS) has the potential to develop voids and pockets of entrained air. Maintaining the pump discharge lines of the HPCI system, Core Spray system, and LPCI subsystems full of water ensures that the ECCS will perform properly, injecting its full capacity into the reactor pressure vessel 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. An acceptable method of ensuring the LPCI and Core Spray system discharge lines are full is to verify the absence of the associated "keep fill" system accumulator alarms.

While the reactor is in the Cold Condition one low pressure ECCS subsystem can maintain adequate reactor vessel water level. To provide redundancy, a minimum of two low pressure ECCS subsystems are required to be OPERABLE with the reactor in the Cold Condition.

4.5 BASES (Cont'd.)
Core and Containment Cooling Systems Surveillance Frequencies

However, one LPCI subsystem may be aligned for decay heat removal and considered OPERABLE for the ECCS function, if it can be manually realigned (remote or local) to the LPCI mode and is not otherwise inoperable. RHR valves that are required for LPCI subsystem operation may be aligned for decay heat removal. A note allows one LPCI subsystem of the RHR system to be considered OPERABLE for the ECCS function if all the required valves in the LPCI flow path can be manually realigned (remote or local) to allow injection into the reactor vessel, and the system is not otherwise inoperable. Manual realignment to allow injection into the reactor vessel in the LPCI mode may also include opening the drag valve to establish the required LPCI subsystem flow rate. This will ensure adequate core cooling if an inadvertent reactor vessel draindown should occur. Sufficient time will be available to manually align and initiate LPCI subsystem operation to provide core cooling prior to postulated fuel uncovery. Only one required Core Spray subsystem may take credit for the condensate storage tank supply option during operations with a potential for draining the reactor vessel as stated in the note to Surveillance Requirement 4.5.F.2(b). During operations with a potential for draining the reactor vessel, the volume in the condensate storage tank may not provide adequate makeup if the reactor vessel were completely drained. Therefore, only one Core Spray subsystem is allowed to use the condensate storage tank as a source of water. This ensures the other required ECCS subsystem has adequate makeup volume.

When components and subsystems are out-of-service, overall core and containment cooling reliability is maintained by verifying the operability of the remaining redundant cooling systems that the Limiting Conditions for Operation require to be operable during the allowable out-of-service time period. Verifying operability in this context means to administratively ensure that the remaining required systems or subsystems are not known to be inoperable (for example: confirming that equipment necessary for the systems or subsystems to perform their safety functions are not blocked out of service for maintenance, checking the status of selected surveillances on the remaining required systems or subsystems and checking that selected valves are in the correct position as indicated on the control room panels). Performance of operability tests is not required.

4.5 I&J Surveillance Requirements Bases

Average and Local LHGR

The LHGR shall be checked daily to determine if fuel burnup or control rod movement has caused changes in power distribution. Since changes due to burnup are slow and only a few control rods are moved daily, a daily check of power distribution is adequate.

4.5.K Minimum Critical Power Ratio (MCPR) - Surveillance Requirement

At core thermal power levels less than or equal to 25%, the reactor will be operating at minimum recirculation pump speed and the moderator void content will be very small. For all designated control rod patterns which may be employed at this point, operating plant experience indicated that the resulting MCPR value is in excess of requirements by a considerable margin. With this low void content, any inadvertent core flow increase would only place operation in a more conservative mode relative to MCPR. During initial start-up testing of the plant, a MCPR evaluation will be made at 25% thermal power level with minimum recirculation pump speed. The MCPR margin will thus be demonstrated such that future MCPR evaluation below this power level will be shown to be unnecessary. The daily requirement for calculating MCPR above 25% rated thermal power is sufficient since power distribution shifts are very slow when there have not been significant power or control rod changes. The requirement for calculating MCPR when a limiting control rod pattern is approached ensures that MCPR will be known following a change in power or power shape (regardless of magnitude) that could place operation at a thermal limit.

4.5.L MCPR Limits for Core Flows Other Than Rated

A flow dependent MCPR limit, MCPR(F), is necessary to assure that the safety limit MCPR is not violated during recirculation flow increase events. The design basis flow increase event is a slow-power increase event which is not terminated by scram, but which stabilizes at a new core power corresponding to the maximum possible core flow. Flow runout events are analyzed along a constant xenon flow control line assuming a quasi steady state heat balance.

The flow dependent MCPR limit, MCPR(F), is provided in the CORE OPERATING LIMITS REPORT. The MCPR(F) is independent of the rated flow limit provided in Specification 3.5.K.2 and 3.5.K.3. To verify applicability of this curve to PBAPS, recirculation flow runout events were analyzed with a PBAPS specific model at a typical mid cycle exposure condition. These flow runout events were simulated along the Maximum Extended Load Line Limit rod line to the maximum core flow runout value of 105%. The results of the analyses indicated that application of the MCPR(F) curve will preclude a violation of the MCPR safety limit in the event of a recirculation flow runout. The MCPR(F) curve is cycle independent.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS

3.7 CONTAINMENT SYSTEMS

Applicability:

Apples to the operating status of the primary and secondary containment systems.

Objective:

To assure the integrity of the primary and secondary containment system.

Specification:

A. Primary Containment

1. Whenever the nuclear system is pressurized above atmospheric pressure or work is being done which has the potential to drain the vessel, the pressure suppression pool water volume and temperature shall be maintained within the following limits except as specified by 3.7.A.2, or when inoperability of the core spray systems, the LPCI and containment cooling subsystems is permissible as provided for in 3.5.F:

   a. Minimum water volume- 122,900 ft^3

   b. Maximum water volume- 127,300 ft^3

4.7 CONTAINMENT SYSTEMS

Applicability:

Applies to the primary and secondary containment integrity.

Objective:

To verify the integrity of the primary and secondary containment.

Specification:

1. The suppression chamber water level and temperature shall be checked once per day.

2. Whenever there is indication of relief valve operation (except when the reactor is being shutdown and torus cooling is being established) or testing which adds heat to the suppression pool, the pool temperature shall be continually monitored and also observed and logged every 5 minutes until the heat addition is terminated.

3. Whenever there is indication of relief valve operation with the local suppression pool temperature reaching 200°F or more, an external visual examination of the suppression chamber shall be conducted before resuming power operation.

4. A visual inspection of the suppression chamber interior, including water line regions shall be made at each major refueling outage.