3.1 REACTIVITY CONTROL SYSTEM

3.1.5 Control Rod Scram Accumulators

LCO 3.1.5 Each control rod scram accumulator shall be OPERABLE.

APPLICABILITY: MODES 1 and 2

ACTIONS

NOTE

Separate Condition entry is allowed for each control rod scram accumulator

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more control rod scram accumulator(s) inoperable	A.1 Declare the associated control rod(s) or control rod pair(s) inoperable.	1 hour

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.5.1	Verify each control rod scram accumulator pressure is ≥ [1850] psig.	7 days

Explanation for Differences in ABWR Specification Relative to Draft ITS

The ABWR CRD system differs from past BWR designs in several key respects. With regards to the tech spec for control rod scram accumulator operability the pertinent differences are that each HCU provides the scram force for a pair of control rods (except for the center control rod which has its own accumulator) and because there is no scram discharge volume the scram function must be accomplished against reactor pressure (i.e. there is no scram assist from reactor pressure). Thus, a properly charged accumulator is the only means for assuring scram. To protect against the simultaneous loss of adequate pressure in multiple scram accumulators (such as would occur on loss of CRD charging water due to the trip of the running CRD pump) an automatic scram is initiated by the RPS system on sensed low CRD charging water header pressure. This assures a scram occurs while there is still sufficient accumulator charge to scram all rods.

The ABWR spec for this function is based on the traditional BWR spec for the case with low RPV pressure. However, there is no need to make the spec conditional on low charging water header pressure as there is an automatic safety function in place to address this concern. Consequently, affected rods are simply declared inoperable within a short time. This assures that they are fully inserted and disarmed, via the spec on control rod operability, such that the accumulator function is no longer needed.

3.4 REACTOR COOLANT SYSTEM

3.4.1 Reactor Internal Pumps (RIPs) Operating

LCO 3.4.1 At least nine RIPs shall be in operation,
OR
With only eight RIPs in operation THERMAL POWER shall be ≤ 95% RTP,
OR
With only seven RIPs in operation THERMAL POWER shall be ≤ 90% RTP.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Five or six RIPs in operation.	A.1	Reduce THERMAL POWER to ≤ 25% RTP.	4 hours
	AND		
	A.2	Restore at least seven RIPs to operation.	12 hours
B. Four or less RIPs in operation.	B.1	Reduce THERMAL POWER to ≤ 5% RTP.	4 hours
	AND		
	B.2	Restore at least seven RIPs to operation.	12 hours
C. Required Action and associated Completion Time of Condition A or B not met.	C.1	Be in MODE 3.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.1.1	Verify at least nine RIPs are in operation at any THERMAL POWER level, OR With only eight RIPs in operation, verify THERMAL POWER is ≤ 95% RTP, OR With only seven RIPs in operation, verify THERMAL POWER is ≤ 90% RTP.	24 hours

Explanation for Differences in ABWR Specification Relative to Draft ITS

The ABWR has 10 recirculation pumps internal to the vessel rather than two recirc pumps located on external loops as with recent BWRs. However, the bases for this LCO is essentially the same as in the past, i.e. the operating state of the recirculation system must be consistent with the power/flow operating conditions assumed in the plant LOCA and transient analyses.

For ABWR rated core flow can be attained with only nine of ten RIPs in operation. However, the core flow that can be attained with less than nine RIPs operating is less. Therefore, at least nine RIPs are required to be in operation to ensure during a LOCA the assumptions of the LOCA analysis are satisfied without restriction. With less than nine RIPs in operation, all potential power and flow operating states have not been accounted for in either the LOCA or transient analysis. Therefore, certain restrictions apply depending on the number of RIPs operating.

With less than nine RIPs in operation the THERMAL POWER must be restricted so that the assumptions of the LOCA and transient analyses are met. With only seven or eight RIPs operating THERMAL POWER is restricted to $\leq$ 90% and $\leq$ 95% RTP, respectively. However, operation may continue indefinitely. With less than seven pumps operating, THERMAL POWER is restricted even further and operation may only continue for a short time.

For the case of 5 or 6 pumps running, THERMAL POWER must be reduced to $\leq$ 25% RTP because of potential stability concerns. With less than 5 pumps operating, power must be reduced to $\leq$ 5% RTP due to the lack of detailed analysis of the actual flow distribution with less than half of the pumps in operation providing forced flow at higher power levels.

With less than seven RIPs operating the steady state power and flow characteristics of the core have not been fully analyzed. Therefore, even at reduced power levels, continued operation is allowed for only a short time while an attempt is made to restore at least seven pumps to operating status. With less than seven pumps restored to operating status within the Required Completion Time, the reactor is required to be in MODE 3. In this condition, the RIPs are not required to be operating because of the reduced severity of design basis accidents and minimal dependence on the forced flow characteristics.

Because of the increased number of pumps involved, and their distribution around the periphery of the bottom head region, pump to pump flow mismatch is not of concern for the ABWR. Thus, the surveillance requirement specified simply checks for pumps in operation, and not for flow mismatch.

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.1 ECCS - Operating

LCO 3.5.1 All ECCS subsystems shall be OPERABLE,

AND

All Automatic Depressurization System (ADS) valves shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3, except that:
(a) ADS is not required to be OPERABLE with reactor steam dome pressure ≤ 50 psig; and,
(b) RCIC is not required to be OPERABLE with reactor steam dome pressure ≤ 150 psig.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One injection subsystem inoperable.	A.1 Restore inoperable subsystem to OPERABLE status.	30 days
B. Two injection subsystems inoperable, each in a different division.	B.1 Restore one inoperable subsystem to OPERABLE status	14 days
C. Two injection subsystems inoperable, both in the same division.	C.1 Restore one inoperable subsystem to OPERABLE status	7 days
D. Three injection subsystems inoperable, each in a different division.	D.1 Restore one inoperable subsystem to OPERABLE status.	72 hours
E. Required Action and associated Completion Time of Condition A, B, or C not met.	E.1 Be in MODE 3 AND E.2 Be in MODE 4.	12 hours 36 hours
F. Three injection subsystems inoperable, two of which are in the same division, OR Four or more injection subsystems inoperable.	F.1 Enter LCO 3.0.3	Immediately

CONDITION	REQUIRED ACTION	COMPLETION TIME
G. ---------NOTE--------- This Condition may exist concurrently with Conditions A through D. --- One ADS valve inoperable.	G.1 ---------NOTE--------- Provisions of LCO 3.0.4 are not applicable. --- Restore ADS valve to OPERABLE status.	Prior to startup from next refueling outage
H. ---------NOTE--------- This Condition may exist concurrently with Conditions A through D. --- Two ADS valves inoperable.	H.1 Verify at least two high pressure ECCS injection subsystems are OPERABLE. AND H.2 Restore one ADS valve to OPERABLE status.	Immediately 30 days
I. Three or more ADS valves inoperable. OR Required Action and associated Completion Time of Condition H not met.	I.1 Be in Mode 3. AND I.2 Reduce reactor steam dome pressure to ≤ 50 psig.	12 hours 36 hours

SURVEILLANCE		FREQUENCY
SR 3.5.1.1	Demonstrate that ECCS subsystem piping is filled with water from the pump discharge valve to the isolation valve.	31 days
SR 3.5.1.2	----------NOTE---------- LPFL subsystems may be considered OPERABLE during alignment to and operation in the RHR shutdown cooling mode when below 135 psig in MODE 3, if capable of being manually realigned and not otherwise inoperable. --- Verify that each ECCS subsystem manual, power-operated and automatic valve in the flow path, that is not locked, sealed or otherwise secured in position, is in its correct position.	31 days
SR 3.5.1.3	Verify Atmospheric Control System supply pressure to ADS valves ≥ 161 psig.	31 days

	SURVEILLANCE	FREQUENCY
SR 3.5.1.4	Demonstrate that each ECCS pump develops the specified flow rate against a system head corresponding to the specified reactor pressure: SYSTEM: LPFL — FLOW RATE: ≥ 4200 gpm — SYSTEM HEAD CORRESPONDING TO REACTOR PRESSURE OF: ≥ 40 psig SYSTEM: HPCF — FLOW RATE: ≥ 800 gpm — SYSTEM HEAD CORRESPONDING TO REACTOR PRESSURE OF: ≥ 1177 psig	In accordance with the Inservice Testing Program or 92 days
SR 3.5.1.5	Demonstrate, with reactor pressure ≤ 1177 psig, that the RCIC pump can develop a flowrate ≥ 800 gpm against a system head corresponding to reactor pressure ≥ 1177 psig.	92 days OR 12 hours when reactor steam dome pressure is ≥ 920 psig.
SR 3.5.1.6	----------NOTE---------- SR 3.0.4 is not applicable. ---------- Demonstrate with reactor pressure ≤ 165 psig, that the RCIC pump can develop a flow rate ≥ 800 gpm against a system head corresponding to reactor pressure ≥ 150 psig.	18 months OR Once only, 12 hours when reactor steam dome pressure is ≥ 150 psig.
SR 3.5.1.7	----------NOTE---------- Vessel injection may be excluded. ---------- Demonstrate that each ECCS subsystem actuates on an actual or simulated automatic initiation signal.	18 months

	SURVEILLANCE	FREQUENCY
SR 3.5.1.8	----------NOTE---------- Valve actuation may be excluded. ---------- Demonstrate that the ADS actuates on an actual or simulated automatic initiation signal.	18 months
SR 3.5.1.9	---------- SR 3.0.4 is not a ---------- Demonstrate that each [illegible] manually actuated at reactor steam dom[illegible]	18 months OR Once only, 12 hours after reactor steam dome pressure is ≥ [ ] psig.

Explanation for Differences in ABWR Specification Relative to Draft ITS

The ABWR ECCS network consists of 3 completely separate divisions of injection capability, with each division having both a high pressure and a low pressure injection subsystem. Each division can be powered from its own dedicated emergency diesel generator. There is also an ADS system. Overall, the ABWR ECCS has greater redundancy when compared with past designs because of its 3 independent divisions and its increased high pressure capability. ABWR ECCS capability is also improved because of the elimination of the external recirculation loops and their associated spectrum of potential breaks. The ECCS LCO has thus been developed to reflect the improved ABWR performance. The AOTs for situations where there are 1, 2 and in some cases 3, subsystems out of service have been extended accordingly. However, with 2 or 3 subsystems out special sensitivity has been given to combinations that result in reduced divisional redundancy. This approach is intended to provide any necessary operating flexibility that might be anticipated without having to resort to overly complicated specifications. Similarly, for simplicity, the ADS requirements have been specified relatively independently from the injection subsystems. However, for the case with multiple ADS valves out the increased importance of high pressure injection capability has been reflected.

3.6 CONTAINMENT SYSTEMS

3.6.2.3 Residual Heat Removal (RHR) Suppression Pool Cooling

LCO 3.6.2.3 Three RHR Suppression Pool Cooling subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One RHR suppression pool cooling subsystem inoperable.	A.1 Restore RHR suppression pool cooling subsystem to OPERABLE status.	30 days
B. Two RHR suppression pool cooling subsystems inoperable.	B.1 Restore one RHR suppression pool cooling subsystem to OPERABLE status.	7 days
C. Three RHR Suppression Pool Cooling subsystems inoperable.	C.1 Restore one RHR suppression pool cooling subsystem to OPERABLE status.	8 hours
D. Required Action and associated Completion Time of Condition A, B or C not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 4	12 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.2.3.1	Verify each RHR Suppression Pool Cooling manual, automatic, or power operated valve not locked, sealed or otherwise secured in position, is in its correct position or can be aligned to its correct position.	31 days
SR 3.6.2.3.2	Demonstrate each RHR pump develops a flow rate ≥ 4200 gpm through the associated RHR heat exchanger while operating in the Suppression Pool Cooling mode.	In accordance with the Inservice Testing Program, or 92 days

Explanation for Differences in ABWR Specification Relative to Draft ITS

The ABWR differs from BWR/6 only in that all three RHR subsystems have heat exchangers such that each loop is capable of operating in the suppression pool cooling mode. This extra redundancy results in a higher overall level of capability and reliability for the containment heat removal function. Additionally, the RHR heat exchanger is in the loop providing heat removal capability in all normal modes of operation, including after automatic initiation in response to a LOCA signal. Thus, even in the post-LOCA core flooding mode containment heat is being removed via the RHR heat exchangers. For ABWR, having a single subsystem inoperable does not present as severe a problem as having one of two loops out in currently operating plants. Consequently, although the LCO for ABWR requires that the suppression pool cooling function of all three subsystems be OPERABLE (as opposed to just two) during applicable MODES, the Completion Time for the initial subsystem out of service has been accordingly extended.

3.7 PLANT SYSTEMS

3.7.1 Ultimate Heat Sink (UHS)] **[NOTE: The UHS is a Site Specific Item]**

LCO 3.7.1 The UHS shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. The UHS is inoperable.	A.1 Restore the UHS to OPERABLE status.	12 hours
	OR	
	A.2 Declare the associated RCW/RSW subsystem(s) inoperable.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.1.1	Verify the UHS water level is ≥ [that equivalent to a volume representing a 30 day supply].	24 hours
SR 3.7.1.2	Verify the UHS water temperature is ≤ 95°F.	24 hours
[SR 3.7.1.3	Operate each UHS active component for ≥ 15 minutes.	31 days]

Explanation for Differences in ABWR Specification Relative to Draft ITS

The UHS LCO for ABWR has been separated from the service water LCO for simplicity as it is site specific and the exact details of the specification wil have to be supplied by the applicant referencing the ABWR SSAR. There is not intended to be any difference in the Tech Spec requirements for the ABWR UHS as compared to those included in the ITS. Basically, if the UHS is inoperable, the affected RCW/RSW subsystem(s) must be declared inoperable. The site specific specification may also need to address dagraded UHS conditions that do not require that the UHS be immediately declared inoperable.

3.7 PLANT SYSTEMS

3.7.2 Reactor Building Cooling Water (RCW) and Reactor Building Service Water (RSW) Systems

LCO 3.7.2 The Divisions 1, 2, and 3 RCW and RSW subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ----------NOTE---------- Each of the three subsystems may be in this Condition concurrently. ---------- One RCW pump, one RSW pump and/or one RCW/RSW heat exchanger inoperable in the same subsystem.	A.1 ----------NOTE---------- 1. Enter applicable Conditions and Required Actions of LCO 3.6.2.3 for RHR Suppression Pool Cooling made inoperable by inoperable RCW/RSW. 2. Provisions of LCO 3.0.4 are not applicable. ---------- Restore the inoperable RCW/RSW component(s) to OPERABLE status.	30 days
	OR	
	A.2 Declare affected RCW/RSW subsystem inoperable.	30 days
B. One RCW/RSW subsystem inoperable for reasons other than Condition A.	B.1 ----------NOTE---------- 1. Enter applicable Conditions and Required Actions of LCO 3.8.1 for Diesel Generators made inoperable by inoperable RCW/RSW. 2. Enter applicable Conditions and Required Actions of LCO 3.5.1 for ECCS made inoperable by inoperable RCW/RSW. 3. Enter applicable Conditions and Required Actions of LCO 3.6.2.3 for RHR Suppression Pool Cooling made inoperable by inoperable RCW/RSW. 4. Enter applicable Conditions and Required Actions of LCO 3.4.9 for RHR Shutdown Cooling made inoperable by RCW/RSW. ---------- Restore the inoperable RCW/RSW subsystem to OPERABLE status.	7 days

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Two RCW/RSW Divisions inoperable for reasons other than Condition A.	C.1 Restore one inoperable RCW/RSW subsystem to OPERABLE status.	12 hours
D. Required Action and associated Completion Time of Condition A, B or C not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 4.	12 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.2.1	Verify water level in the RSW pump well of the intake structure is ≥ [ ] feet.	14 days AND 12 hours when pump well level is ≤ [ ] feet.
SR 3.7.2.2	Verify for each required RCW/RSW subsystem each manual, power operated or automatic valve in RCW/RSW flow paths servicing safety related systems or components not locked, sealed or otherwise secured in position is in its correct position.	31 days
SR 3.7.2.3	Verify each RCW/RSW subsystem actuates and/or reconfigures to the safety related mode of operation on an actual or simulated initiation signal.	18 months

Explanation for Differences in ABWR Specification Relative to Draft ITS

This LCO is not intended to be different in function from that contained in the ITS, but has been modifed to reflect the ABWR design. In ABWR, all safety related cooling is performed by an intermediate cooling water loop, the RCW system. The RCW system in turn is cooled by the RSW system which then rejects the heat to the UHS. The combined RCW/RSW system also removes heat during normal operation. There are 3 divsional RCW subsystems, each cooled by an associated divisional RSW subsystem. Each RCW subsystem contains 2 pumps in parallel and 3 heat exchangers in parallel. Each RSW subsystem contains 2 pumps in parallel circulate water fro the UHS through the 3 parallel RCW heat exchangers and back to the UHS. During normal operation each combined RCW/RSW subsystem is in operation but with one of each component in standby. During DBA condiditons all components are put in operation. However, only the containment cooling function (i.e. suppression pool cooling) requires a full compliment of components. Other design basis accident mitigation features will fully perform their intended function even when serviced by a RCW/RSW subsystem that has some parallel components out of service. Thus, this slightly degraded state is allowed for a limited time. However, support system operability requirements will assure that the appropriate actions are taken for those systems relying on a fully functional RCW/RSW subsystem. Each RCW/RSW subsystem also requires an OPERABLE UHS in order to be OPERABLE. However, because the UHS is a site specific item for ABWR, its requirements have been segregated into a separate specification in order to facillitate its downstream application as part of a site specific submittal.

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 A.C. Sources - Operating

LCO 3.8.1 The following A.C. Electrical Power Sources shall be OPERABLE:

A. Two circuits between the offsite transmission network and the onsite Class 1E Distribution System, and

B. Three diesel generators (DGs).

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One of the required circuits from off-site inoperable.	A.1 Perform SR 3.8.1.1 (offsite circuit check) for OPERABLE required offsite circuit.	1 hour AND Once per 8 hours thereafter
	AND	
	A.2 Declare supported features with no offsite power available, associated with cross division failure, inoperable.	24 hours from discovery of no offsite power to one divison concurrent with cross division failure
	AND	
	A.3.1 Restore required offsite circuit to OPERABLE status.	72 hours
	OR	
	A.3.2.1 Verify onsite combustion turbine is available and capable of being aligned to each of the three essential AC buses	4 hours AND Once per 24 hours thereafter
	AND	
	A.3.2.2 Restore required offsite circuit to OPERABLE status.	14 days

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. --------NOTE-------- Required Actions B.3.1 or B.3.2 shall be completed if this Condition is entered. ----------	B.1 Perform SR 3.8.1.1 (offsite circuit check) for OPERABLE required offsite circuit.	1 hour AND Once per 8 hours thereafter
One required diesel generator (DG) inoperable.	AND	
	B.2 Declare supported features, associated with cross divsion failure, inoperable.	4 hours from discovery of Condition B concurrent with cross division failure
	AND	
	B.3.1 Determine OPERABLE DGs are not inoperable due to common cause failure.	24 hours
	OR	
	B.3.2 Perform SR 3.8.1.2 (DG start) for OPERABLE DGs.	24 hours
	AND	
	B.4.1 Restore required DG to OPERABLE status.	14 days
	OR	
	B.4.2.1 Verify onsite combustion turbine is available and capable of being aligned to the associated essential AC bus	4 hours AND Once per 24 hours thereafter
	AND	
	B.4.2.2 Restore required offsite circuit to OPERABLE status.	14 days

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. Two required offsite circuits inoperable.	C.1	Declare supported features, associated with cross divsion failure, inoperable.	12 hours from discovery of Condition C concurrent with cross division failure
	AND		
	C.2	Restore one required offsite circuit to OPERABLE status.	24 hours
D. One required offsite circuit inoperable. AND One required DG inoperable.	D.1	----------NOTE---------- Enter Applicable Conditions and Required Actions for Deenergized AC Distribution Subsystem, LCO 3.8.9. ---------- Restore required offsite circuit to OPERABLE status.	24 hours
	OR		
	D.2	Restore required DG to OPERABLE status.	24 hours
E. Two required DGs inoperable.	E.1	Restore one required DG to OPERABLE status.	24 hours
F. Required Action and associated Completion Time of Condition A, B, C, D or E not met.	F.1	Be in MODE 3.	12 hours
	AND		
	F.2	Be in MODE 4.	36 hours
G. Three or more required AC sources inoperable.	G.1	Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.1.1	Verify correct breaker alignment and indicated power availability for each required off-site circuit.	7 days
SR 3.8.1.2	----------NOTES---------- 1. Performance of SR 3.8.1.8 satisfies this surveillance. 2. All diesel generator starts may be preceded by an engine prelube period, warmup procedures and gradually loaded as recommended by the manufacturer. ---------- Verify each DG starts from standby conditions and achieves steady state voltage and frequency: A. ≥ 6210 V and ≤ 7590 V; and B. ≥ 58.8 and ≤ 61.2 Hz.	As specified by Table 3.8.1-1
SR 3.8.1.3	----------NOTES---------- 1. DG loadings may include gradual loading as recommended by the manufacturer. 2. Momentary transients outside the load range do not invalidate this test. 3. This SR shall be conducted on only one DG at a time. 4. This SR shall be performed prior to DG shutdown following a successful performance of SR 3.8.1.2 or SR 3.8.1.8. ---------- Verify each DG is synchonized and loaded and operates for ≥ 60 minutes at a load of: A. ≥ [ ] kW and [ ] kW for Diesel Generator A. B. ≥ [ ] kW and [ ] kW for Diesel Generator B. C. ≥ [ ] kW and [ ] kW for Diesel Generator C.	As specified by Table 3.8.1-1
SR 3.8.1.4	Verify pressure in required air-start receivers ≥ [ ] psig.	31 days
SR 3.8.1.5	Verify each fuel day tank [and engine mounted fuel tank] contains ≥ [ ] gal of fuel.	31 days
SR 3.8.1.6	Check for and remove accumulated water from each day tank [and engine mounted tank].	31 days
SR 3.8.1.7	Verify the fuel transfer operates to [automatically] transfer fuel from storage tank[s] to the day tank [and engine mounted tank].	92 days

	SURVEILLANCE	FREQUENCY
SR 3.8.1.8	----------NOTES---------- All DG starts may be preceded by an engine prelube period. ---------- Verify each DG starts from standby condition and achieves in ≤ 13 seconds, voltage and frequency: A. ≥ 6210 V and ≤ 7590 V; and B. ≥ 58.8 and ≤ 61.2 Hz.	184 days
SR 3.8.1.9	Verify [automatic/manual] transfer of [unit power supply] from the [normal circuit to each required alternate off-site circuit and between the required alternate off-site] circuits.	18 months
SR 3.8.1.10	Verify each DG rejects a load ≥ [ ] kW for [Division 1, 2 and 3] DGs and: a. Following load rejection , the frequency is ≤ [ ] Hz; and b. Within [ ] seconds following load rejection, the voltage is ≥ [ ] V and ≤ [ ] V; and c. Within [ ] seconds following load rejection, the frequency is ≥ [ ] Hz and ≤ [ ] Hz.	18 months
SR 3.8.1.11	Verify each DG does not trip and voltage is maintained ≤ [ ] V during and following a load rejection of ≥ [ ] kW and ≤ [ ] kW for [Divisins 1, 2 and 3] DGs.	18 months
SR 3.8.1.12	----------NOTES---------- All DG starts may be preceded by an engine prelube period. ---------- Verify on an actual or simulated loss of offsite power signal: A. Deenergization of emergency buses; B. Load shedding from emergency buses; and C. DG auto-starts from standby condition and: 1. energizes permanently connected loads in ≤ [13] seconds; 2. energizes auto-connected shutdown loads through [automatic load sequencer]; 3. maintains steady state voltage ≥ [6210] V and ≤ [7590] V; 4. maintains steady state frequency ≥ [58.8] Hz and ≤ [61.2] Hz; and 5. supplies permanently and auto-connected shutdown loads for ≥ [5] minutes.	18 months

SURVEILLANCE		FREQUENCY
SR 3.8.1.13	----------NOTES---------- All DG starts may be preceded by an engine prelube period and warmup procedures as recommended by the manufacturer. ---------- Verify on an actual or simulated ECCS initiation signal each DG auto-starts from standby condition and: A. In ≤ [13] seconds after auto-start and during tests, achieves and maintains voltage ≥ [6210] V and ≤ [7590] V; B. In ≤ [13] seconds after auto-start and during tests, achieves and maintains frequency ≥ [58.8] Hz and ≤ [61.2] Hz; C. Operates for ≥ [5] minutes; D. Permanently connected loads remain energized from the offsite power system; and E. Emergency loads are energized [or auto-connected through the automatic load sequencer]to the offsite power system.	18 months
SR 3.8.1.14	Verify each DG's automatic trips are bypassed on [actual or simulated loss of voltage signal on the emergency bus concurrent with an actual or simulated ECCS initiation signal] except: A. Engine overspeed; B. Generator differential current; and C. Low lube oil pressure.	18 months
SR 3.8.1.15	----------NOTES---------- Momentary transients outside the load range do not invalidate this test. ---------- Verify each DG [operating at a power factor of ≤ [ ] for Divisions 1, 2 and 3 DGs] operates for ≥ 24 hours: A. During the first [2] hours loaded ≥ [ ] kW and ≤ [ ] kW for [Divisins 1, 2 and 3] DGs; and B. During the remaining [22] hours loaded ≥ [ ] kW and ≤ [ ] kW for [Divisins 1, 2 and 3] DGs.	18 months

	SURVEILLANCE	FREQUENCY
SR 3.8.1.16	----------NOTES---------- 1. This surveillance shall be performed within 5 minutes of shutting down the DG after the DG has operated ≥ 2 hours at a load of ≥ [ ] kW and ≤ [ ] kW for [Divisins 1, 2 and 3] DGs. Momentary transients outside the load range do not invalidate this test. 2. All DG starts may be preceded by prelube procedures as recommended by the manufacturer. ---------- Verify each DG starts and achieves in ≤ [13] seconds, voltage and frequency: A. ≥ 6210 V and ≤ 7590 V; and B. ≥ 58.8 and ≤ 61.2 Hz.	18 months
SR 3.8.1.17	Verify each DG: A. Synchronizes with offsite power source while loaded with emergency loads upon a simulated restoration of off-site power: B. Transfers loads to the off-site power source; and C. Returns to ready-to-load operation.	18 months
SR 3.8.1.18	Verify with a DG operating in test mode and connected to its bus, an actual or simulated ECCS initiation signal overrides the test mode by: A. Returning DG to ready-to-load operation; and B. Automatically energizing the emergency load with offsite power.	18 months
SR 3.8.1.19	Verify interval between each load block is within ± [10% of design interval] for each [load sequence timer].	18 months

SURVEILLANCE		FREQUENCY
SR 3.8.1.20	----------NOTES---------- All DG starts may be preceded by prelube period procedures as recommended by the manufacturer. ---------- Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ECCS initiation signal: A. Deenergization of emergency buses; B. Load shedding from emergency buses; and C. DG auto-starts from a standby condition and: 1. Energizes permanently connected loads in ≤ [13] seconds. 2. Energizes auto-connected shutdown loads through [load sequencer]. 3. maintains steady state voltage ≥ [6210] V and ≤ [7590] V; 4. maintains steady state frequency ≥ [58.8] Hz and ≤ [61.2] Hz; and 5. supplies permanently connected and auto-connected emergency loads for ≥ [5] minutes.	18 months
SR 3.8.1.21	----------NOTES---------- All DG starts may be preceded by prelube period procedures as recommended by the manufacturer. ---------- VErify when started simultaneously from standby condition, the [Division 1, 2 and 3] DGs each achieve in ≤ [13] seconds voltage and frequency: A. ≥ 6210 V and ≤ 7590 V; and B. ≥ 58.8 and ≤ 61.2 Hz.	10 years

Table 3.8.1-1 (Page 1 of 1)

Diesel Generator Test Schedule

NUMBER OF FAILURES IN LAST 25 VALID TESTS (a)	FREQUENCY
≤ 3	31 days
≥ 4	7 days(b) (but no less than 24 hours)

(a) Criteria for determining number of valid failures and valid tests shall be in accordance with Regulatory Position C.2.1 of Regulatory Guide 1.9, Revision 3, where the number of tests is determined on a per DG basis.

(b) This test frequency shall be maintained until seven consecutive failure-free starts from standby conditions and load-run demands have been performed. This is consistent with Regulatory Position [ ], of Regulatory Guide 1.9, Revision 3. If subsequent to the seven failure-free tests one or more additional failures occur such that there are again four or more failures in the last 25 tests, the testing interval shall again be reduced as noted above and maintained until seven consecutive failure-free tests have been performed.

[Note: If Revision 3 of Regulatory Guide 1.9 is not approved, the above table will be modified to be consistent with the existing version of Regulatory Guide 1.108, GL 84-15, or other approved version.

Explanati Differences in ABWR Specification Relative to Draft ITS

The ABWR ign includes 3 completely indepe: dent ECCS divisions, each with its own emergency DG. Thus, the A ... AC power system is similar to that for BWR/6, except that each division is essentially identical. Thus, this LCO is intended to closely approximate the ITS. However, in the ABWR each of the 3 divisions is capable of safely shutting down the plant under accident conditions. Because of this increased capability, selected AC power source AOTs for ABWR have been lengthened. Additionally, the ABWR design includes an onsite combustion turbine that can be aligned to, and has sufficient capacity to power, any of the essential AC buses. Thus, an option has been included to extend the AOT for conditions where either a single offsite AC source or a single onsite DG is out of service, provided the availability of the onsite combustion turbine as a backup source can be verified.

Surveillance requirements for DG fuel and lubricating oil have been intentionally omitted from this specification at the present time, pending outcome of the ITS effort regarding their location (i.e. in a sparate specification or as part of this one). Such requirements are applicable to the ABWR DGs and are intended to be included as is appropriate consistent with the final ITS product. The issues of support system operability and cross divisional failure have been partially addressed to indicate their applicability for ABWR. The way in which these issues are fully reflected in the ABWR specifications will be consistent with the final outcome of the ITS program.

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 D.C. Sources - Operating

LCO 3.8.4 The Divisions 1, 2, 3 and 4 DC electrical power subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Division 4 DC electrical power subsystem inoperable.	A.1	Restore Division 4 DC electrical power subsystem to OPERABLE status	30 days
B. Division 1, 2 or 3 DC electrical power subsystem inoperable.	B.1	Restore Division 1, 2 and 3 DC electrical power subsystems to OPERABLE status.	7 days
C. Two DC electrical power subsystems inoperable.	C.1	Restore one inoperable DC electrical power subsystem to OPERABLE status.	12 hours
D. Three or more DC electrical power subsystems inoperable. OR Required Action and associated Completion Time of Condition A, B or C not met.	D.1 AND	Be in MODE 3.	12 hours
	D.2	Be in MODE 4.	36 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is ≥ [129] V on float charge.	7 days
SR 3.8.4.2	Verify no visible corrosion at terminals or connectors. OR Verify connection resistance is [≤ 150 x 10 -6] ohms for [inter-cell, inter-rack, inter-tier and terminal connections]	92 days
SR 3.8.4.3	Verify cells, cell plates and battery racks show no visual indication of physical damage or abnormal deterioration.	18 months
SR 3.8.4.4	Verify cell-to-cell and terminal connections are clean, tight, free of visible corrosion, and coated with anti-corrosion material.	18 months
SR 3.8.4.5	Verify connection resistance is [≤ 150 x 10 -6] ohms for [inter-cell, inter-rack, inter-tier and terminal connections]	18 months
SR 3.8.4.6	Verify each required battery charger will supply ≥ 500 amperes for Divisions 1, 2, and 3, and ≥ 200 amperes for Division 4, at ≥ [125] V for ≥ [8] hours.	18 months
SR 3.8.4.7	----------NOTE---------- SR 3.8.4.8 may be performed in lieu of SR 3.8.4.7 once per 60 months. ---------- Verify battery capacity is adequate to supply, and maintain in OPERABLE status, the required emergency loads for the design duty cycle when subjected to a battery service test.	18 months
SR 3.8.4.8	Verify battery capacity is ≥ [80%] of the manufacturer's rating when subjected to a performance discharge test.	60 months AND ------NOTE------ Only applicable when battery shows degradation or has reached [85%] of the expected life. ---------- 12 months

Explanation for Differences in ABWR Specification Relative to Draft ITS

For ABWR the DC electrical power system differs primarily in the number of redundant divisions employed. However, the function and physical characteristics of each DC division are essentially the same as past designs. The ABWR has 4 DC divisions whereas current plants typically have only 2 or 3 depending on the vintage of the plant. Addtionally, the ABWR design typically utilizes a more independent and seperate design between and within each division.

Each DC divisional bus feeds instruments and controls of that same division. Each such bus is energized by either a divisional AC bus fed thru a battery charger on float, or by a backup battery bank. A dedicated divisional battery bank exists for each DC division. However, because there are only 3 seperate divisions of AC power, only the Divisions 1, 2 and 3 of the DC system battery chargers are fed from dedicated AC divisions. The division 4 battery charger is fed via the Division 1 AC system. However, the Division for 4 DC system is less critical because of its more limited role in actuating safety related functions.

Complete loss of any one of the DC divisions will affect all divisional 2 out to 4 logic trains, effectively making them either 2 out of 3 or 1 out of 3 logic, depending on the direction of the failure, and whether or not divisonal bypasses are activated. Thus, at the intrument trip level virtually all I&C systems could be effected. However, at the divisional equipment actuation level such a loss would only affect that division. For the most part this relates to the ECCS function. For example, if Division 2 DC is lost, both the RPS and the ECCS initiation logic could be affected for all divisions. However, assuming the other divisions continue to function properly, only the Division 2 ECCS equipment actuation would be potentially affected. Therefore, since Division 4 DC power does not feed or control any major mechanical components or systems, its' loss is not as critical and, relative to the loss of one of the other DC divisions, a longer AOT is justified.

The requirements regarding battery electrolyte have been intentionally omitted from this specification at the present time, pending outcome of the ITS effort regarding their location (i.e. in a sparate specification or as part of this one). Such requirements are applicable to the ABWR DC sources and are intended to be included as is appropriate.

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 D.C. Sources - Shutdown

LCO 3.8.5 Three of the Divisions 1, 2, 3 and 4 DC electrical power subsystems shall be OPERABLE.

APPLICABILITY: MODES 4 and 5,
When handling irradiated fuel in the secondary containment.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Less than the required D.C. electrical power subsystems OPERABLE.	A.1	Suspend CORE ALTERATIONS	Immediately
	AND		
	A.2	----------NOTE---------- Provisions of LCO 3.0.3 are not applicable. ---------- Suspend handling of irradiated fuel in the secondary containment.	Immediately
	AND		
	A.3	Suspend operations with a potential for draining the reactor vessel.	As soon as practicable
	AND		
	A.4	Restore at least three D.C. electrical power subsystems to OPERABLE status.	As soon as practicable

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.5.1 Perform SR 3.8.4.1 through SR 3.8.4.8	According to applicable SRs for the required equipment.

Explanation for Differences in ABWR Specification Relative to Draft ITS

The key difference between the ABWR and past designs with regard to DC power systems is the number of divisions employed. The ABWR has 4 divisions of DC power to supply power to the 2 out of 4 logic employed in its safety protection systems. Because the divisional logic will revert to 2 out of 3 logic with the loss of a single division of power, and because this configuration has sufficient reliability under shutdown conditions, only 3 of the 4 DC divsions need be OPERABLE during shutdown. Of course, if one of the 4 DC divisions is out of service, there may be some impact on supported systems and equipment. However, during shutdown conditions less of this equipment is required to be OPERABLE so that this situation is not of concern. Generic support system operability requirements will assure that DC power is available to those systems that need it during these conditions.

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Inverters - Operating

LCO 3.8.7 The Division 1, 2, 3 and 4 inverters shall be OPERABLE.

APPLICABILITY MODES 1, 2, and 3

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A One of the Division 1, 2, 3 or 4 inverters inoperable.	A.1	Verify associated AC vital bus is powered from its Class 1E constant voltage source transformer.	2 hours
	AND		
	A.2.1	Restore Division 1, 2, 3 and 4 inverters to OPERABLE status.	7 days
	OR		
	A.2.2	Declare affected equipment inoperable.	7 days
B Two of the Division 1, 2, 3 or 4 inverters inoperable.	B.1	Verify associated AC vital buses are powered from their respective Class 1E constant voltage source transformers.	2 hours
	AND		
	B.2	Restore one inoperable inverter to OPERABLE status.	12 hours
C. Required Action and associated Completion Time of Condition A or B not met.	C.1	Be in MODE 3.	12 hours
	AND		
	C.2	Be in MODE 4	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.7.1	Verify correct inverter voltage [and frequency], and alignment to required AC vital bus.	7 days

Explanation for Differences in ABWR Specification Relative to Draft ITS

The ABWR inverters are the same as those in previous BWRs. Because there are 4 divsions of instrument logic in ABWR there are also 4 divisional inverters. With the increased divisional reduncy of the ABWR logic, loss of a single divisional inverter is not nearly as critical. Thus, for the case of a single inverter inoperable, a longer time frame is allowed for its restoration. Additionally, if the inverter cannot be restored an option had been added to declare the affected equipment inoperable in lieu of entry into Condition C and consequently a shutdown. This is acceptable for ABWR since 3 divisions of instrument channel logic is an acceptable condition for a limited time.

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 Distribution Systems - Operating

LCO 3.8.9 Division 1, 2, and 3 AC electrical power distribution subsystems and Division 1, 2, 3 and 4 DC [and Vital bus] electrical power distribution subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Division 1, 2 or 3 AC electrical power distribution subsystem inoperable.	A.1	Restore Division 1, 2, and 3 AC electrical power distribution subsystems to OPERABLE status.	2 hours
	OR		
	A.2	Declare affected equipment inoperable.	2 hours
B. Division 1, 2, 3 or 4 DC electrical power distribution subsystem inoperable.	B.1	Restore Division 1, 2, 3 and 4 DC electrical power distribution subsystems to OPERABLE status.	2 hours
	OR		
	B.2	Declare affected equipment inoperable.	2 hours
C. Required Action and associated Completion Time of Condition A or B not met.	C.1	Be in MODE 3.	12 hours
	AND		
	C.2	Be in MODE 4.	36 hours

SURVEILLANCE		FREQUENCY
SR 3.8.9.1	Verify correct breaker alignment and voltage to required AC and DC electrical power distribution subsystems.	7 days

Explanation for Differences in ABWR Specification Relative to Draft ITS

The intent of this specification is the same for ABWR. It has been modified to reflect the number of AC and DC divisions in the ABWR design. Furthermore, because of the increased divisional separation and dedication within the ABWR design, this specification has been simplified in order to acknowledge support system relationships, and implement the associated requirements, in a more straight forward manner.