

3.9 Mechanical Systems and Components

The information in this section of the reference ABWR DCD, including all subsections, tables, and figures, is incorporated by reference with the following departures and supplements.

STD DEP Admin	(Table 3.9-1)
STD DEP T1 2.4-3	
STD DEP T1 2.14-1	
STD DEP T1 2.4-1	(Table 3.9-8, MPL# E11)
STP DEP 9.2-5	(Table 3.9-8, MPL# P41)
STD DEP 9.3-2	(Table 3.9-8, MPL# P56)

STD DEP T1 2.4-3

The Reactor Core Isolation Cooling System (RCIC) alternate design description was provided in ABWR Licensing Topical Report NEDE-33299, "Advanced Boiling Water Reactor (ABWR) with Alternate RCIC Turbine-Pump," dated December 2006. The markup information on pages C-11 through C-20 of the Licensing Topical Report is incorporated by reference.

STD DEP T1 2.14-1

The Hydrogen Recombiner Requirements Elimination description was provided in ABWR Licensing Topical Report NEDO-33330, "Advanced Boiling Water Reactor (ABWR) Hydrogen Recombiner Requirements Elimination," Revision 1, dated September 2007. The markup information on page C-17, C-18, C-19, and C-175 of the Licensing Topical Report is incorporated by reference.

3.9.2.3 Dynamic Response of Reactor Internals Under Operational Flow Transients and Steady-State Conditions

The following standard supplement addresses Regulatory Guide (R.G.) 1.206, Rev. 0:

The analytical methods and procedures to predict vibration of ABWR pressure vessel internals (including the steam dryer and other main steam components) as discussed in Section 3.9.2.3 of R.G. 1.206 are addressed in ABWR Licensing Topical Report NEDO-33316, "Advanced Boiling Water Reactor (ABWR) Vibration Assessment Program in compliance with The United States Nuclear Regulatory Commission Regulatory Guide 1.20," dated April 2007.

3.9.2.4 Preoperational Flow-Induced Vibration Testing of Reactor Internals

The following standard supplement addresses Regulatory Guide (R.G.) 1.206, Rev. 0:

Analysis of potential adverse flow effects (e.g., flow-induced vibrations and acoustic resonances) that can impact ABWR reactor pressure vessel internals (including the

steam dryer and other Main Steam System components) as discussed in Sections 3.9.2.4 of R.G. 1.206 are addressed in ABWR Licensing Topical Report NEDO-33316, "Advance Boiling Water Reactor (ABWR) Vibration Assessment Program in compliance with The United States Nuclear Regulatory Commission Regulatory Guide 1.20," dated April 2007.

3.9.2.6 Correlations of Reactor Internals Vibration Tests with the Analytical Results

The following standard supplement addresses Regulatory Guide (R.G.) 1.206, Rev. 0:

The details of the test program to correlate the test measurements with the analytically predicted flow-induced dynamic response of the ABWR reactor internals (including steam dryers and other Main Steam System components) as discussed in Section 3.9.2.6 of R.G. 1.206 are addressed in ABWR Licensing Topical Report NEDO-33316, "Advance Boiling Water Reactor (ABWR) Vibration Assessment Program in compliance with The United States Nuclear Regulatory Commission Regulatory Guide 1.20," dated April 2007.

3.9.3.4.2 Reactor Pressure Vessel Support Skirt

STD DEP Admin

Replace the following ~~equasion~~ equation (3.9-1)

$$\left(\frac{P}{P_{crit}}\right) + \left(\frac{q}{q_{crit}}\right) + \left(\frac{\tau}{\tau_{crit}}\right) < \left(\frac{1}{S.F.}\right)$$

with

$$\left(\frac{P}{P_{crit}}\right) + \left(\frac{q}{q_{crit}}\right) + \left(\frac{\tau}{\tau_{crit}}\right)^2 < \left(\frac{1}{S.F.}\right)$$

3.9.6 Testing of Pumps and Valves

STD DEP Admin

The following change is made in the 3rd sentence of the 2nd paragraph of this subsection.

For example, the periodic leak testing of the reactor coolant pressure isolation valves (See Appendix 3M for design changes made to prevent intersystem LOCAs) in Table 3.9-9 will be performed in accordance with Chapter 16 Surveillance Requirement SR ~~3.6.1.5.10~~ 3.4.4.1.

3.9.7 COL License Information

3.9.7.1 Reactor Internals Vibration Analysis, Measurement and Inspection Program

The following standard supplement addresses COL License Information Item 3.27.

LTR NEDO-33316 addresses the ABWR Vibration Assessment Program in compliance with NRC Regulatory Guide 1.20. The plant specific information will provide assessment results in accordance with the applicable portion of position C.3 of Regulatory Guide 1.20 for non-prototype internals. The plant specific information will be available for review following preoperational and initial start up testing. (COM 3.9-1)

3.9.7.2 ASME Class 2 or 3 or Quality Group D Components with 60-Year Design Life

The following standard supplement addresses COL License Information Item 3.28.

The ASME Class 2 or 3 or Quality Group D components that are subjected to cyclic loadings, including operating vibration loads and thermal transients effects, of a magnitude and/or duration so severe the 60-year design life cannot be assured by required Code calculations and, if similar designs have not already been evaluated, will be identified and an appropriate analysis will be available to demonstrate the required design life or designs to mitigate the magnitude or duration of the cyclic loads will be available for review prior to fuel load. (COM 3.9-2)

3.9.7.3 Pump and Valve Testing Program

The following standard supplement addresses COL License Information Item 3.29.

The plant specific environmental parameters for the equipment qualification program will be available for NRC review as part of the ITAAC for basic configuration of systems, as provided in the reference ABWR DCD Tier 1 Section 1.2.

The pump and valve inservice testing and inspection program will be provided to the NRC as specified in section 13.4S. This program will include the following:

- (1) ~~(4)~~ Include baseline pre-service testing to support the periodic inservice testing of the components required by technical specifications. Provisions are included to disassemble and inspect the pump, check valves, POVs, and MOVs within the Code and safety-related classification as necessary, depending on test results.
- (2) ~~(2)~~ Provide a study to determine the optimal frequency of the periodic verification of the continuing MOV capability for design basis conditions.

The design qualification test, inspection and analysis criteria in Subsections 3.9.6.1, 3.9.6.2.1, 3.9.6.2.2 and 3.9.6.2.3 of Tier 2 of the reference ABWR DCD will be included in the respective safety-related pump and valve design specifications prior to fuel load. (COM 3.9-3)

The design, qualification, and preoperational testing for MOVs as discussed will conform to the provisions in Subsection 3.9.6.2.2 of Tier 2 of the reference ABWR DCD. (COM 3.9-4)

SRV IST requirements are included in Table 3.9-8 (B21 Nuclear Boiler System Valves) and additional SRV testing including technical specification testing is described in Section 5.2.2.10.

As is described for ISI in COL License Information item 6.6.9.1, inservice tests to verify operational readiness of pumps and valves, whose function is required for safety, conducted during the initial 120-month interval must comply with the requirements in the latest edition and addenda of the Code incorporated by reference in 10 CFR 50.55a(b) of this section on the date 12 months before the date of issuance of the operating license (or the optional ASME Code cases listed in NRC Regulatory Guide 1.192 that is incorporated by reference in 10 CFR 50.55a(b) of this section), subject to the limitations and modifications listed in 10 CFR 50.55a(b) of this section.

As is described for ISI in COL License information item 6.6.9.1, inservice tests to verify operational readiness of pumps and valves, whose function is required for safety, conducted during successive 120-month intervals must comply with the requirements of the latest edition and addenda of the Code incorporated by reference in 10 CFR 50.55a(b) of this section 12 months before the start of the 120- month interval (or the optional ASME Code cases listed in NRC Regulatory Guide 1.147, through Revision 14, or 1.192 that are incorporated by reference in 10 CFR 50.55a(b) of this section), subject to the limitations and modifications listed in 10 CFR 50.55a(b) of this section.

3.9.7.4 Audit of Design Specification and Design Reports

The following site-specific supplement addresses COL License Information Item 3.30.

The design specification and design reports required by ASME Code for vessels, pumps, valves and piping systems for the purpose of audit will be made available for NRC review.

The piping system design is consistent with the construction practices, including inspection and examination methods, of the ASME Code 1989 edition with no addenda.

ASME Code editions and addenda other than those listed in Tables 1.8-21 and 3.2-3, will not be used to design ASME Code Class 1, 2 and 3 pressure retaining components and supports.

Table 3.9-1 Plant Events

B. Dynamic Loading Events⁵		
	ASME Code Service Limit¹	No. of Cycles/Events²
13. Safe Shutdown Earthquake (SSE) at Rated Power Operating Conditions	D ⁸	1 <i>Cycle</i> Event⁴

Table 3.9-8 Inservice Testing Safety-Related Pumps and Valves

MPL	System	Pump Page No.	Valve Page No.
P56	Breathing Air System		3.9-132

Table 3.9-8 Inservice Testing Safety-Related Pumps and Valves (Continued)

No.	Qty	Description (h) (i)	Safety Class (a)	Code Cat. (c)	Valve Func (d)	Test Para (e)	Test Freq (f)	Tier 2 Fig. (g)
E11 Residual Heat Removal System Valves								
F015	23	Fuel Pool Cooling supply line outboard MOV	2	B	A	P S	2 yr,3 mo	5.4-10 sh. 3,5,7
F016	23	Gate valve-line from Fuel Pool Cooling (FPC)	2	B	A	S	3 mo	5.4-10 sh. 2
P41 Reactor Service Water System Valves								
F601	6	RSW Cooling tower drain valves	3	C	P		E1	9.2-7 sh. 1,2,3
F110	6	RSW return to cooling tower A & D MOV	3	C	A	P S	2 yr 3mo	9.2-7 sh. 1,2,3
F109	3	RSW cold bypass to cooling tower basin MOV	3	C	A	P S	2 yr 3mo	9.2-7 sh. 1,2,3
F115	1	Makeup water to UHS basin MOV	3	C	A	P S	2 yr 3mo	9.2-7 sh. 1,2,3
F113	2	Makeup water to UHS basin Manual Isolation valves	3	C	I,P	P	2 yr	9.2-7 sh. 1,2,3
F114	2	Makeup water to UHS basin Check valves	3	C	A	P S	2 yr 3mo	9.2-7 sh. 1,2,3
F101	3	RSW line to HVAC Air Conditioning Condenser Manual Isolation valves	3	C	I,P		E1	9.2-7 sh. 1,2,3
F102	3	RSW blowdown line to Main Cooling Reservoir MOV	3	C	A	P S	2 yr 3mo	9.2-7 sh. 1,2,3
P56 Breathing Air System								
F002	2	Inboard Isolation check valves (h1)	2	A,C	I,A	L,S	RO	9.3-10
F001	2	Outboard Isolation Manual valves	2	A	I,P	L	RO	9.3-10