6.2 Containment Systems

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 T1 2.4-2

STD DEP T1 2.4-3 (Tables 6.2-7, 6.2-8 and 6.2-10)

STD DEP T1 2.14-1 (Tables 6.2-7, 6.2-8 and 6.2-10)

STD DEP T1 3.4-1

STD DEP 6.2-1 (Tables 6.2-7 and 6.2-8)

STD DEP 6.2-2 (Tables 6.2-1, 6.2-2 and 6.2-2a)

STD DEP 6.2-3 (Tables 6.2-7, 6.2-8 and 6.2-10)

STD DEP 9.3-2 (Tables 6.2-7, 6.2-8 and 6.2-10)

STD DEP Admin (Tables 6.2-5, 6.2-7, 6.2-8 and 6.2-10)

Licensing Topical Report (LTR), NEDO-33372, September 2007, provides a revised containment analysis. The markups provided in the LTR for Subsections 6.2.1 and 6.2.2; Tables 6.2-1, 6.2-2 and 6.2-2a; Figures 6.2-2 through 6.2-4; Figures 6.2-6 through 6.2-15 including new Figure 6.2-8a; Figures 6.2-17 and 6.2-18; and Figures 6.2-22 through 6.2-25 are incorporated by reference. LTR, NEDO-33330P, Rev. 1, September 2007, provides the justification for the elimination of the Hydrogen Recombiners. The markups for Subsections 6.2.5; a portion of Tables 6.2-7 and 6.2-8; and Figures 6.2-40 and 41 in that LTR are incorporated by reference.

6.2.1.1.7 Asymmetric Loading Conditions

STD DEP Admin

Localized pipe forces, pool swell and SRV actuation are asymmetric pressure loads which act on the containment and internal structure (see Subsection ~~6.2.1.1.5~~ 6.2.1.1.6 *for magnitudes of pool swell and SRV loads).*

6.2.4.3.2.1.1.6 Recirculation Pump Seal Purge Water Supply Line

STD DEP 6.2-3

The evaluations for previous similar designs show that the consequences of breaking the line are less severe than those of failing an instrument line. The recirculation pump seal water line is 20A Quality Group B from the manual shutoff valve located close to the recirculation pump motor housing through the ~~second~~ excess flow *check valve (located outside the containment). From the second excess flow check valve to the CRD connection, the line is Quality Group D.* An orifice is located inside the

containment and if ~~*If*~~ *the line is postulated to fail and* ~~*either one of*~~ *the* excess flow check valve ~~*check valves*~~ *is assumed not to close (single active failure), the flow rate through the broken line is calculated to be substantially less than permitted for a broken instrument line. Therefore,* ~~*the two check valves in series*~~ this configuration provides ~~*provide*~~ *sufficient isolation capability for postulated failure of the line.*

6.2.4.3.2.1.2 Effluent Lines

STD DEP Admin

Table ~~*6.2-3*~~ 6.2.7 *contains those effluent lines that comprise the reactor coolant pressure boundary and which penetrate the containment.*

6.2.4.3.2.2.1.2 RCIC Turbine Exhaust and Pump Minimum Flow Bypass Lines

STD DEP 6.2-3

The RCIC turbine exhaust line, which penetrates the containment and discharges to the suppression pool, is equipped with a normally open, motor-operated, remote-manually actuated gate valve located as close to the containment as possible. In addition, there is a simple check valve upstream of the gate valve, which provides positive actuation for immediate isolation in the event of a break upstream of this valve. The gate valve in the RCIC turbine exhaust is designed to be ~~*locked open in the control room*~~ normally open *and is interlocked to preclude opening of the inlet steam valve to the turbine until the turbine exhaust valve is in its full-open position. The RCIC pump minimum flow bypass line is isolated by a normally closed, remote manually actuated valve outside containment.*

6.2.4.3.2.2.2.3 ACS Lines to Containment

STD DEP 6.2-1

The Atmospheric Control System (ACS) has both influent and effluent ~~*550A*~~ 500A *lines which penetrate the containment. Both isolation valves on these lines are outside of the containment vessel to provide accessibility to the valves. The valves are located as close as practical to the containment vessel.*

The ACS also has two 50A makeup line isolation valves which are normally open during normal reactor operation to provide nitrogen makeup into the containment. If these isolation valves are placed in the normally closed position, nitrogen makeup will not be possible without opening. In either position, these valves need to open to provide nitrogen makeup. The normally open position provides automatic nitrogen makeup without frequent cycling that could cause damage to valves. In the event of a LOCA or an event requiring primary containment isolation, these valves automatically close upon receipt of the following signals: high drywell pressure, low water level, high radioactivity in the purge and vent exhaust line. These valves are redundant and meet ESF requirements as described above for the ~~*550A*~~ 500A *influent and effluent lines.*

6.2.4.3.4 Evaluation of Containment Purge and Vent Valves Isolation Barrier Design

STD DEP T1 3.4-1

STD DEP 6.2-3

Protection of the containment purge system CIVs from the effects of flood and dynamic effects of pipe breaks will be provided in accordance with Sections 3.4 and 3.6. The CIVs are air-operated with pilot ~~DC~~ AC solenoid valve. The power to the ~~DC~~ AC solenoid valve is supplied from the ~~DC~~ Vital AC distribution system to the ~~demultiplexer~~ I/O device for the valve. Both the supply and return lines for the ~~DC~~ AC are fused at the ~~multiplexer~~ I/O device so that faults are isolated and do not propagate back up into the portions of the ~~DC~~ Vital AC system common with other systems. This is also discussed in the Fire Hazard Analysis in Section 9A.5.

6.2.4.3.5 Evaluation of Simultaneous Venting of Drywell and Wetwell

STD DEP 6.2-1

The large (~~550A~~ 500A) purge and vent lines for the ACS, shown in Figure 6.2-39 are not used for purge or venting during normal reactor operation. The isolation valves in these lines are normally closed, they fail in the closed position, they receive an automatic closure signal in the event of a LOCA and they are not needed for pressure control of the containment during normal operation. Administrative controls are used to prevent opening of these valves except at the beginning and end of an operating cycle.

Pressure control of the containment during operation is maintained by a single, small (50A) nitrogen supply line, and a single, small (50A) vent line. The supply line is divided and provides makeup nitrogen to both drywell and wetwell. The small vent line is attached to the ~~550A~~ 500A drywell purge exhaust line and bypasses the closed ~~550A~~ 500A valve (F004). There is no equivalent vent line from the wetwell. Therefore, the drywell and wetwell are not vented simultaneously during operation and the system has only one supply and one exhaust line as required by BTP CSB 6-4.

6.2.5.2.6.1 General

STD DEP 6.2-3

(6) *The rupture disk is part of the primary containment boundary and is able to withstand the containment design pressure (309.9 kPa) with no leakage to the environment. It is also capable of withstanding full vacuum in the wetwell vapor space without leakage. The disk ruptures at 617.8 kPa due to overpressurization during a severe accident as required to assure containment structural integrity. As potential backup to a leaking, fractured or improperly sealed rupture disk, the two valves upstream of the disk can be closed. These valves are safety-related and are subjected to all testing required for normal isolation valves. The solenoids in these valves are ~~DC~~ powered by vital AC (VAC). These valves are capable of closing against pressures up to 617.8 kPaG.*

6.2.5.3 Design Evaluation

STD DEP 6.2-1

During normal operation, nitrogen makeup and containment pressure control are accomplished using only the 50A supply lines. The large valves (~~550A~~ 500A) in the containment ventilation lines are closed and flow to the plant stack through the overpressure protection line (250A) is prevented by the rupture disk.

The following conditions assure that the large (~~550A~~ 500A) containment purge and vent lines will be isolated following a LOCA:

6.2.5.6 Personnel Safety

The following standard supplement addresses the COL License Information Item in this subsection of the reference ABWR DCD.

A special maintenance procedure provides the requirements for controlling purged drywell entry. This procedure contains the following elements:

(1) Inerting and de-inerting of the drywell is in conformance with applicable Technical Specifications.

(2) Personnel access to the drywell is normally prohibited at all times when the drywell has an oxygen-deficient atmosphere, unless an emergency condition arises, in which case the procedure outlined in Subsection 6.2.5.6(8) should be followed.

(3) The status of the drywell atmosphere is posted at the drywell entrance at all times, and the entrance locked, except when cleared for entry.

(4) Suitable authorization, control and recording procedures are established and remain in effect throughout the entry process.

(5) Prior to initial entry, the drywell is purged with air in accordance with operating procedure until drywell samples indicate that the following conditions are met:

(a) Oxygen: Greater than 16.5% content by volume.

(b) Hydrogen: Less than 14% of the lower limit of flammability, or a limit of 0.57% hydrogen by volume. (The lower flammability limit is 4.1% hydrogen content by volume.)

(c) Carbon Monoxide: Less than 100 ppm.

(d) Carbon Dioxide: Less than 5000 ppm.

(e) Airborne Activity: Less than applicable limits in 10 CFR 20, or equivalent.

(6) During the purge, drywell atmosphere samples are drawn from a number of locations when the drywell oxygen analyzer indicates an oxygen concentration of 16.5% or greater. Samples are analyzed for oxygen, hydrogen, carbon monoxide, carbon dioxide and airborne activity. When the results of two successive samples taken at least one-half hour apart are found to be within the conditions in Subsection 6.2.5.6(5), initial entry may be authorized.

(7) Criteria for entry are:

(a) The initial entry will require a minimum of two (2) persons.

(b) Initial entry will require, in addition to normal protective clothing and protective equipment consisting of self-contained breathing apparatus (such as Scott Air Pack), portable air sampling and monitoring equipment, and portable radiation survey meters.

(c) A means of communication shall be established.

(8) Under certain conditions, the Plant General Manager (or his designee) may deem that an emergency condition exists which would justify drywell entry with an oxygen deficient atmosphere.

(9) When it has been determined from the results of the initial entry survey and samples that the entire drywell atmosphere meets the required conditions, the drywell may be cleared for general access and the drywell status posted at the drywell entrance.

6.2.7 COL License Information

6.2.7.1 Alternate Hydrogen Control

The following standard supplement addresses COL License Information Item 6.2.

The NRC has revised 10 CFR 50.44 to amend its standards for combustible gas control in light-water-cooled power reactors. The amended rule eliminates the requirements for hydrogen recombiners and relaxes the requirements for hydrogen and oxygen monitoring. The design departure describing the elimination of the hydrogen recombiners from the certified design was provided in ABWR Licensing Topical Report NEDE-33330P, “Advanced Boiling Water Reactor (ABWR) Hydrogen Recombiner Requirements Elimination,” dated May 2007 (Ref. 6.2-7). As discussed in the LTR, with the elimination of the requirement to provide hydrogen control equipment, the need to provide cost analysis for alternate control systems is also eliminated.

6.2.7.2 Administrative Control Maintaining Containment Isolation

The following standard supplement addresses COL License Information Item 6.3.

The necessary controls for maintaining the primary containment boundary in accordance with Subsection 6.2.6.3.1 are in various plant operating procedures which control operation, testing and maintenance requirements for containment barriers. These include administrative procedures for controlling access, surveillance and maintenance procedures for controlling testing and restoration of containment components and operating procedures for controlling the routine operation of containment valves and components.

6.2.7.3 Suppression Pool Cleanliness

The following standard supplement addresses COL License Information Item 6.4.

Appendix 6C provides a discussion of suppression pool cleanliness in support of preventing ECCS suction strainer plugging in accordance with Subsection 6.2.1.7. Periodic inspections of the suppression pool for cleanliness are performed during outage periods. Maintenance procedures provide procedure steps for removing, at periodic intervals, sediment and floating or sunk debris from the suppression pool that the SPCU does not remove.

6.2.7.4 Wetwell to Drywell Vacuum Breaker Protection

The following standard supplement addresses COL License Information Item 6.5.

The vacuum breakers are installed horizontally and located in the wetwell gas space. There is one valve per penetration (through the pedestal wall) with the valves opening into the lower drywell. The location protects vacuum breaker valves from being subjected to the cyclic pressure loading during LOCA steam condensation period. The location of these valves, both axially and azimuthally, is shown in Figures 1.2-3c and 1.2-13k. A Vacuum Breaker Shield (consisting of a solid "V" shaped plate) is provided below each vacuum breaker to protect the valves from LOCA pool swell loads. The pool swell loads in the wetwell space, where the vacuum breaker assemblies are exposed, are discussed in FSAR Appendix 3B.

6.2.7.5 Containment Penetration Leakage Rate Test (Type B)

The following standard supplement addresses COL License Information Item 6.5a.

Type B leakage rate tests are performed in conformance with 10 CFR 50 Appendix J for containment penetrations whose designs incorporate resilient seals, bellows, gaskets, or sealant compounds, airlocks and lock door seals, equipment and access hatch seals, and electrical canisters, and other such penetrations. The Containment Leakage Rate Program is described in Subsection 6.2.6.2.1.

6.2.8 References

The following supplement adds references to this subsection.

6.2-1 ABWR Licensing Topical Report NEDO-33372, “Advanced Boiling Water Reactor (ABWR) Containment Analysis,” dated September 2007.

6.2-2 ABWR Licensing Topical Report NEDE-33330P, “Advanced Boiling Water Reactor (ABWR) Hydrogen Recombiner Requirements Elimination,” Rev. 1, dated September 2007.

Table 6.2-5 Reactor Coolant Pressure Boundary (RCPB) Influent Lines Penetrating Drywell

Drywell	Inside Drywell	Outside Drywell
Influent Line		
5. Reactor water cleanup, reactor vessel head spray	~~MOV~~ **CV**	**MOV**

Table 6.2-7 Containment Isolation Valve Information

Standby Liquid Control System

Valve No.	*C41-F008*	*C41-F006A*	*C41-F006B*
Type C Leak Test	~~No (w)~~ **Yes**	~~No (w)~~ **Yes**	~~No (w)~~ **Yes**

Table 6.2-7 Containment Isolation Valve Information (Continued)

Containment Atmospheric Monitoring

Valve No.	**D23-F001A/B**	**D23-F004A/B**	**D23-F005A/B**	**D23-F006A/B**	**D23-F007A/B**	**D23-F008A/B**
Normal Position	Open	Close/**Open**	Close/**Open**	Close/**Open**	Close/**Open**	Close/**Open**
Containment Isolation Signal(c)	~~N/A~~ **RM**	~~N/A~~ **RM**	~~N/A~~ **RM**	~~N/A~~ **RM**	~~N/A~~ **RM**	~~N/A~~ **RM**

Table 6.2-7 Containment Isolation Valve Information (Continued)

Residual Heat Removal System Wetwell Spray

Valve No.	E11-F019B	E11-F019C
Post-accident Position	Close/**Open**	Close/**Open**
Closure Time (s)	~~20~~ **34**	~~20~~ **34**

Residual Heat Removeal System Drywell Spray

Valve No.	E11-F017B	E11-F018B	E11-F017C	E11-F018C
Post-accident Position	Close/**Open**	Close/**Open**	Close/**Open**	Close/**Open**

Residual Heat Removal System Minimum Flow Line

Valve No.	E11-F021A	E11-F021B	E11-F021C
Shutdown Position	~~Open~~ **Close**	~~Open~~ **Close**	~~Open~~ **Close**

Residual Heat Removal System S/P Cooling

Valve No.	E11-F008A		E11-F008B		E11-F008C
Line Size	~~200A~~ **250A**		~~200A~~ **250A**		~~200A~~ **250A**

Residual Heat Removal System S/P Suction (LPFL)

Valve No.	E11-F001A	E11-F001B	E11-F001C
Post-accident Position	~~Close~~ **Open**	~~Close~~ **Open**	~~Close~~ **Open**

Table 6.2-7 Containment Isolation Valve Information (Continued)

Residual Heat Removal System Injection and Testable Check

Valve No.	E11-F005B	E11-F006B	E11-F005C	E11-F006C
Post-accident Position	Close/**Open**	Close/**Open**	Close/**Open**	Close/**Open**

High Pressure Core Flooder System S\P Suction

Valve No.	E22-F006B	E22-F006C
Post-Accident Position	Close/**Open**	Close/**Open**
Containment Isolation Signal (c)	~~N/A~~ **RM**	~~N/A~~ **RM**

High Pressure Core Flooder System Test and Minimum Flow

Valve No.	E22-F009B	E22-F010B	E22-F009C	E22-F010C
Containment Isolation Signal (c)	~~N/A~~ **RM**	~~N/A~~ **RM**	~~N/A~~ **RM**	~~N/A~~ **RM**

High Pressure Core Flooder System Injection

Valve No.	E22-F003B	E22-F004B	E22-F003C	E22-F004C
Post-Accident Position	Close/**Open**	Close/**Open**	Close/**Open**	Close/**Open**

Nuclear Boiler System Main Steam Lines A, B, C and D

Valve No.	B21-F008A/B C/D	B21-F009A/B C/D
ESF	~~Yes~~ **No**	~~Yes~~ **No**
Type C Leak Test	Yes(e)~~(t)~~	Yes(e)~~(t)~~
Containment Isolation Signal (c)	C, ~~D~~, E, F, H, N, BB, RM	C, ~~D~~, E, F, H, N, BB, RM

Table 6.2-7 Containment Isolation Valve Information (Continued)

Nuclear Boiler System Main Steam Line Drains

Valve No.	B21-F011	B21-F012
ESF	~~Yes~~ **No**	~~Yes~~ **No**
Type C Leak Test	Yes(e)~~(t)~~	Yes(e)~~(t)~~
Normal Position	Open/**Close**	Open/**Close**
Containment Isolation Signal (c)	C, ~~D~~, E, F, H, N, BB, RM	C, ~~D~~, E, F, H, N, BB, RM
Power Source (Div)	~~II~~ **I**	~~I~~ **II**

Nuclear Boiler System Feedwater Line A and B

Valve No.	B21-F004A/B	B21-F003A/B
Type C Leak Test	Yes ~~(t)~~	Yes ~~(t)~~

Reactor Core Isolation Cooling System Steam Supply

Valve No.	E51-F035	E51-F048	E51-F036
Type C Leak Test	Yes(e) ~~(t)~~	Yes(e) ~~(t)~~	Yes ~~(t)~~

Reactor Core Isolation Cooling System Turbine Exhaust

Valve No.	E51-F039	E51-F038
Type C Leak Test	Yes(e) ~~(t)~~	Yes~~(t)~~

Table 6.2-7 Containment Isolation Valve Information (Continued)
Reactor Core Isolation Cooling System Vacuum Pump Discharge

Valve No.	E51-F047	E51-F046
Tier 2 Figure	5.4-8 (Sheet 1)	5.4-8 (Sheet 1)
Applicable Basis	GDC 56	GDC 56
Fluid	Steam	Steam
Line Size	50A	50A
ESF	Yes	Yes
Leakage Class	(a)	(a)
Location	O	O
Type C Leak Test	No(l)	No(l)
Valve Type	Gate	Check
Operator	Motor	Self
Primary Actuation	Electrical	N/A
Secondary Actuation	Manual	N/A
Normal Position	Open	Close
Shutdown Position	Open	Open
Post Accident Position	Close	Close
Power Fail Position	As is	N/A
Containment Isolation Signal (c)	RM	N/A
Closure Time (s)	<10	Instantaneous
Power Source (Div)	I	N/A
See page 6.2-167 for notes		

Table 6.2-7 Containment Isolation Valve Information (Continued)

Atmospheric Control System

Valve No.	T31-F001	T31-F002	T31-F003	T31-F004	T31-F005	T31-F006	T31-F007
Line Size	~~550A~~ **500A**	~~550A~~ **500A**	~~550A~~ **500A**	~~550A~~ **500A**	50A	~~550A~~ **500A**	250A
Containment Isolation Signal (c)	A, K, XX, YY, **RM**	A, K, XX, YY, **RM**	A, K, XX, YY, **RM**	A, K, XX, YY, **RM**	A, K, XX, YY, **RM**	A, K, XX, YY, **RM**	RM

Atmospheric Control System

Valve No.	T31-F008	T31-F009	T31-F025	T31-F039	T31-F040	T31-F041
Line Size	~~550A~~ **500A**	~~550A~~ **500A**	400A	50A	50A	50A
Leakage Class	~~(b)~~ **(a)**	~~(b)~~ **(a)**	~~(b)~~ **(a)**	~~(b)~~ **(a)**	~~(b)~~ **(a)**	~~(b)~~ **(a)**
Type C Leak Test	Yes **(b)**	Yes **(b)**~~)~~	Yes **(b)**	Yes **(b)**	Yes~~(e)~~	Yes~~(e)~~
Containment Isolation Signal (c)	A, K, XX, YY, **RM**	A, K, XX, YY, **RM**	A, K, XX, YY, **RM**	A, K, XX, YY, **RM**	A, K, XX, YY, **RM**	A, K, XX, YY, **RM**
Closure Time (s)	<20	<~~20~~ **15**	<20	<15	<15	<15

Atmospheric Control System

Valve No.	T31-F731	T31-~~F033A/B~~ F733A/B	T31-F~~035A-D~~ F735A-D	T31-F010	T31-F011
Line Size	20A	20A	20A	250A	~~550A~~ **500A**
Containment Isolation Signal (c)	RM	RM	RM	RM	A, K XX, YY, **RM**

Atmospheric Control System

Valve No.	T31-F805A/B	T31-D001	T31-D002
Type C Leak Test	No(m)	No~~(P)~~ **(p)**	No~~(P)~~ **(p)**

Table 6.2-7 Containment Isolation Valve Information (Continued)
Flammability Control System

Valve No.	T49-F001C	T49-F001B	T49-F002A	T49-F002E
Tier 2 Figure	6.2-40 (Sheet 2)	6.2-40 (Sheet 1)	6.2-40 (Sheet 1)	6.2-40 (Sheet 2)
Applicable Basis	GDC 56	GDC 56	GDC 56	GDC 56
Fluid	DW Atmosphere	DW Atmosphere	DW Atmosphere	DW Atmosphere
Line Size	100A	100A	100A	100A
ESF	Yes	Yes	Yes	Yes
Leakage Class	(a)	(a)	(a)	(a)
Location	O	O	O	O
Type C Leak Test	No(u)	No(u)	No(u)	No(u)
Valve Type	Gate	Gate	Gate	Gate
Operator	Motor	Motor	Pneumatic	Pneumatic
Primary Actuation	Electrical	Electrical	Electrical	Electrical
Secondary Actuation	Manual	Manual	Manual	Manual
Normal Position	Close	Close	Close	Close
Shutdown Position	Close	Close	Close	Close
Post Accident Position	Open	Open	Open	Open
Power Fail Position	As is	As is	As is	As is
Containment Isolation Signal(c)	A,K	A,K	A,K	A,K
Closure Time (s)	<30	<30	<30	<30
Power Source (Div)	III	II	I, III	I, II
See page 6.2-167 for notes				

Table 6.2-7 Containment Isolation Valve Information (Continued)
Flammability Control System

Valve No.	T49-F006A	T49-F006E	T49-F007C	T49-F007B
Tier 2 Figure	6.2-40 (Sheet 1)	6.2-40 (Sheet 2)	6.2-40 (Sheet 2)	6.2-40 Sheet 1)
Applicable Basis	GDC 56	GDC 56	GDC 56	GDC 56
Fluid	WW Atmosphere	WW Atmosphere	WW Atmosphere	WW Atmosphere
Line Size	150A	150A	150A	150A
ESF	Yes	Yes	Yes	Yes
Leakage Class	(a)	(a)	(a)	(a)
Location	O	O	O	O
Type C Leak Test	No(u)	No(u)	No(u)	No(u)
Valve Type	Gate	Gate	Gate	Gate
Operator	Pneumatic	Pneumatic	Motor	Motor
Primary Actuation	Electrical	Electrical	Electrical	Electrical
Secondary Actuation	Manual	Manual	Manual	Manual
Normal Position	Close	Close	Close	Close
Shutdown Position	Close	Close	Close	Close
Post-Accident Position	Open	Open	Open	Open
Power Fail Position	As is	As is	As is	As is
Containment Isolation Signal(c)	A,K	A,K	A,K	A,K
Closure Time (s)	<30	<30	<30	<30
Power Source (Div)	I, III	I, II	III	II
See page 6.2-167 for notes				

Table 6.2-7 Containment Isolation Valve Information (Continued)

Reactor Water Cleanup System

Valve No.	G31-F002	G31-F003	G31-F017	G31-F018
ESF	~~Yes(e)(t)~~ **No**	~~Yes(t)~~ **No**	~~Yes(t)~~ **No**	~~Yes(t)~~ **No**
Type C leak Test	Yes(e) ~~(t)~~	Yes ~~(t)~~	Yes ~~(t)~~	Yes ~~(t)~~
Containment Isolation Signal(c)	B,F,V,Z,AA**,RM**	B,F,V,Z,CC,AA**, RM**	B,F,V,Z,CC,AA**, RM**	N/A

Suppression Pool Cleanup System

Valve No.	G51-F001	G51-F002	G51-F006	G51-F007
Applicable Basis	GDC ~~56~~ 57	GDC ~~56~~ 57	GDC ~~56~~ 57	GDC ~~56~~ 57
ESF	~~Yes~~ **No**	~~Yes~~ **No**	~~Yes~~ **No**	~~Yes~~ **No**
Type C Leak Test	No~~(p)~~ **(r)**	No~~(p)~~ **(r)**	No(q)	No(q)
Shutdown Position	Open **/Close**	Open **/Close**	Open **/Close**	Open **/Close**
Post-Accident Position	Close	Close	~~N/A~~ Close	Close
Containment Isolation Signal(c)	A,K,**X,RM**	A,K,**X,RM**	A,K,**X,RM**	A,K,**X,RM**
Closure Time (s)	<~~30~~ **45**	<~~30~~ **45**	Inst.	<~~30~~ **60**

Reactor Building Cooling Water System

Valve No.	P21-F075A /F076A	P21-F081A /F080A	P21-F075B /F076B	P21-F081B /F080B
Applicable Basis	GDC ~~57~~ **56**	GDC ~~57~~ **56**	GDC ~~57~~ **56**	GDC ~~57~~ **56**
Leakage Class	~~(b)~~ **(a)**	~~(b)~~ **(a)**	~~(b)~~ **(a)**	~~(b)~~ **(a)**
Type C Leak Test	No~~(s)~~ (t)	No~~(s)~~ (t)	No~~(s)~~ (t)	No~~(s)~~ (t)
Post-Accident Position	Close**/Open**	Close**/Open**	Close**/Open**	Close**/Open**

Table 6.2-7 Containment Isolation Valve Information (Continued)

HVAC Normal Cooling Water System

Valve No.	P24-F053	P24-F054	P24-F0142	P21-F0141
Applicable Basis	GDC ~~57~~ **56**	GDC ~~57~~ **56**	GDC ~~57~~ **56**	GDC ~~57~~ **56**
Leakage Class	~~(b)~~ **(a)**	~~(b)~~ **(a)**	~~(b)~~ **(a)**	~~(b)~~ **(a)**
Containment Isolation Signal(c)	CX,K**,RM**	N/A	CX,K**,RM**	CX,K**,RM**
Power Source (Div)	I	N/A	~~I~~ **II**	~~III~~ **I**

Instrument Air System

Valve No.	P52-F276	P52-F277
Applicable Basis	GDC ~~57~~ **56**	GDC ~~57~~ **56**

High Pressure Nitrogen Gas Supply System

Valve No.	P54-F007A/F008A	P54-F007B/F008B	P54-F200/F209
Applicable Basis	GDC ~~57~~ **56**	GDC ~~57~~ **56**	GDC ~~57~~ **56**
Leakage Class	~~(b)~~ **(a)**	~~(b)~~ **(a)**	~~(b)~~ **(a)**
Type C Leak Test	No~~(r)~~ **(s)**	No~~(r)~~ **(s)**	No~~(r)~~ **(s)**

Leak Detection & Isolation System

Valve No.	E31-F002	E31-F003	E31-F004	E31-F005	E31-F009/ F010
Type C Leak Test	Yes(e)	Yes(e)	Yes(e)	Yes(e)	Yes(e) ~~(t)~~
Containment Isolation Signal(c)	B,K,**RM**	B,K,**RM**	B,K,**RM**	B,K,**RM**	N/A

Table 6.2-7 Containment Isolation Valve Information (Continued)

Radwaste System

Valve No.	K17-F003	K17-F004	K17-F103	K17-F104
Applicable Basis	GDC ~~57~~ **56**	GDC ~~57~~ **56**	GDC ~~57~~ **56**	GDC ~~57~~ **56**
Type C Leak Test	No~~(v)~~ (w)	No~~(v)~~ (w)	No~~(v)~~ (w)	No~~(v)~~ (w)
Containment Isolation Signal(c)	A/~~FF~~ **,K,RM**	FF,**A,K,RM**	A/~~FF~~ **,K,RM**	FF,**A,K,RM**

Breathing Air System

Valve No.	P56-F001	P56-F002
Tier 2 Figure	9.3-10	9.3-10
Applicable Basis	GDC 56	GDC 56
Fluid	Air	Air
Line Size	40A	40A
ESF	No	No
Leakage Class	(a)	(a)
Location	O	I
Type C Leak Test	Yes	Yes
Valve Type	Globe	Check
Operator	Manual	None
Primary Actuation	Electrical	Electrical
Secondary Actuation	Manual	Manual
Normal Position	Close	Close
Shutdown Position	Close/Open	Close/Open
Post-Accident Position	Close	Close
Power Fail Position	As is	As is
Containment Isolation Signal(c)	NA	NA
Closure Time (s)	NA	NA
Power Source (Div)	NA	NA

Table 6.2-8 Primary Containment Penetration List*

Penetration Number	Name	Elevation (mm)	Azimuth (deg)	Offset (mm)	Diameter (mm)	Barrier Type	Testing†‡
X-37	RCIC Turbine Steam	~~14450~~ **14414**	80	1200	550		A
X-70	IA	~~9000~~ **19000**	46	0	200		A
X-80	Drywell Purge Suction	13700	68	0	~~550~~ **500**		A
X-81	Drywell Purge Exhaust	19000	216	0	~~550~~ **500**		A
X-82	~~FCS Suction~~ **Spare**	14850	225	-600	150	**Welded Cap**	~~A~~ **C**
X-90	Spare	20100	46	0	400	**Welded Cap**	C
X-91	Spare	20100	296.5	1000	~~400~~ **300**	**Welded Cap**	C
X-92	Spare	16400	~~45~~ **55**	12700	~~400~~ **300**	**Welded Cap**	C
X-93	Spare	14700	135	-500	400	**Welded Cap**	C
X-94	**Spare**	**16400**	**300**	**-500**	**400**	**Welded Cap**	**C**
X-95	**Spare**	**9400**	**45**	**-400**	**400**	**Welded Cap**	**C**
X-100A	RIP Power	~~13500~~ **16400**	~~55~~ **51**	-1100	450	O-ring	B
X-100B	RIP Power	~~13500~~ **16400**	180	2650	450	O-ring	B
X-100C	RIP Power	~~13500~~ **16400**	180	-6550	~~450~~ **300**	O-ring	B
X-100D	RIP Power	~~13500~~ **16400**	280	0	450	O-ring	B
X-100E	RIP Power	~~13500~~ **16400**	~~180~~ **281**	-2650	450	O-ring	B
X-100F	RIP Power	16400	51	2800	450	O-ring	B
X-101A	LP Power	16400	~~45~~ **51**	0	~~300~~ **450**	O-ring	B
X-101B	LP Power	16400	180	50	~~300~~ **450**	O-ring	B
X-101D	FMCRD Power	~~19000~~ **20100**	~~279.5~~ **279**	1350	300	O-ring	B

Table 6.2-8 Primary Containment Penetration List* (Continued)

Penetration Number	Name	Elevation (mm)	Azimuth (deg)	Offset (mm)	Diameter (mm)	Barrier Type	Testing†‡
X-101E	FMCRD Power	~~19000~~ **20100**	81	-1350	300	O-ring	B
X-101G	FMCRD Power	~~19000~~ **20100**	99	-1350	300	O-ring	B
X-102A	I & C	16400	~~45~~ **51**	-1350	300	O-ring	B
X-102B	I & C	16400	180	1350	~~300~~ **450**	O-ring	B
X-102C	I & C	~~16400~~ **7630**	~~180~~ **220**	-2650	300	O-ring	B
X-102D	I & C	~~16100~~ **13500**	~~280~~ **51**	0	300	O-ring	B
X-102E	I & C	~~19000~~ **13500**	~~99~~ **180**	-1350	300	O-ring	B
X-102F	I & C	~~19000~~ **13500**	~~273.5~~ **180**	-1350	300	O-ring	B
X-102G	I & C	13500	~~180~~ **281**	-1350	300	O-ring	B
X-103A	I & C	~~16400~~ **6500**	~~45~~ **32**	1350	~~300~~ **150**	O-ring	B
X-103B	I & C	~~16400~~ **6500**	~~180~~ **306**	50	~~300~~ **150**	O-ring	B
X-103C	I & C	~~16400~~ **7630**	~~180~~ **213**	-5250	~~300~~ **150**	O-ring	B
X-103D	I & C	~~16400~~ **7630**	~~180~~ **138**	2650	~~300~~ **150**	O-ring	B
X-103E	I & C	~~16400~~ **7630**	~~45~~ **150**	2700	300	O-ring	B
X-104A	FMCRD Position Indicator	~~19000~~ **20100**	81	0	300	O-ring	B
X-104B	FMCRD Position Indicator	~~19000~~ **20100**	260.5	0	300	O-ring	B
X-104C	FMCRD Position Indicator	20100	99	0	~~300~~ **450**	O-ring	B
X-104D	FMCRD Position Indicator	20100	279.5	0	~~300~~ **450**	O-ring	B
X-104E	FMCRD Position Indicator	~~19000~~ **20100**	99	0	300	O-ring	B
X-104F	FMCRD Position Indicator	~~19000~~ **20100**	260.5	1350	~~300~~ **450**	O-ring	B
X-104G	FMCRD Position Indicator	~~19000~~ **20100**	81	1350	300	O-ring	B

Table 6.2-8 Primary Containment Penetration List* (Continued)

Penetration Number	Name	Elevation (mm)	Azimuth (deg)	Offset (mm)	Diameter (mm)	Barrier Type	Testing†‡
X-104H	FMCRD Position Indicator	~~19000~~ **20100**	279.5	0	~~300~~ **450**	O-ring	B
X-105A	Neutron Detection	~~20100~~ **19000**	81	~~-1350~~ **0**	~~300~~ **450**	O-ring	B
X-105B	Neutron Detection	~~20100~~ **19000**	260.5	~~-1350~~ **1300**	~~300~~ **450**	O-ring	B
X-105C	Neutron Detection	~~20100~~ **19000**	99	~~-5250~~ **0**	~~300~~ **450**	O-ring	B
X-105D	Neutron Detection	~~20100~~ **19000**	279.5	~~-1350~~ **1300**	~~300~~ **450**	O-ring	B
X-105E	**Neutron Detection**	**19000**	**81**	**-1300**	**450**	**O-ring**	**B**
X-105F	**Neutron Detection**	**19000**	**260.5**	**0**	**450**	**O-ring**	**B**
X-105G	**Neutron Detection**	**19000**	**99**	**1300**	**450**	**O-ring**	**B**
X-105H	**Neutron Detection**	**19000**	**279.5**	**0**	**450**	**O-ring**	**B**
X-106A	**Div I Instrumentation**	**13500**	**51**	**1370**	**300**	**O-ring**	**B**
X-106B	**Div II Instrumentation**	**13500**	**180**	**1157**	**300**	**O-ring**	**B**
X-106C	**Div III Instrumentation**	**13500**	**180**	**-1157**	**300**	**O-ring**	**B**
X-106D	**Div IV Instrumentation**	**13500**	**281**	**-1370**	**300**	**O-ring**	**B**
X-107A	**Group B Instr**	**13500**	**281**	**-1370**	**300**	**O-ring**	**B**
X-107B	**Power and Control**	**13500**	**180**	**-4850**	**450**	**O-ring**	**B**
X-110	~~FCS Suction~~ **Spare**	13500	55	1000	300	~~O-ring~~ **Welded Cap**	~~B~~ **C**
X-111	Spare	~~13500~~ **15000**	280	1350	300	O-ring	B
X-112	Spare	~~13500~~ **19000**	~~180~~ **81**	-5250	300	O-ring	B
X-113	Spare	~~13500~~ **19000**	~~180~~ **261**	1350	300	O-ring	B

Table 6.2-8 Primary Containment Penetration List* (Continued)

Penetration Number	Name	Elevation (mm)	Azimuth (deg)	Offset (mm)	Diameter (mm)	Barrier Type	Testing†‡
~~X-141B~~	~~I & C~~	~~13500~~	~~275~~	~~0~~	~~300~~	~~O-ring~~	~~B~~
X-161A	CAMS I & C	14700	45	-1000	250	~~O-ring~~ **Welded Cap**	~~B~~ C
X-161B	CAMS I & C	14700	290	0	250	~~O-ring~~ **Welded Cap**	~~B~~ C
X-162A	~~CAMS I & C~~ **Sample/Return Drywell Gas**	19000	116	0	250	~~O-ring~~ **Valve**	~~B~~ A
X-162B	~~CAMS I & C~~ **Sample/Return Drywell Gas**	19000	244	0	250	~~O-ring~~ **Valve**	~~B~~ A
~~X-171~~	~~I & C~~	~~14700~~	~~55~~	~~-1000~~	~~300~~	~~O-ring~~	~~B~~
X-204	RHR Pump Test (A)	1200	~~86~~ **266**	0	250		A
X-213	RCIC Turbine Exhaust	~~5800~~ **5848**	60	0	550		A
~~X-215~~	~~RCIC Vacuum Pump~~	~~2000~~	~~70~~	~~0~~	~~250~~		~~A~~
~~X-220~~	~~MSIV Leak-off~~	~~9200~~	~~45~~	~~-2000~~	~~250~~		~~B~~
X-240	Wetwell Purge Suction	9200	45	1200	~~550~~ **500**		A
X-241	Wetwell Purge Exhaust	9200	230	0	~~550~~ **500**		A
X-242	~~FCS Return~~ **Spare**	1500	225	-1000	150	**Welded Cap**	~~A~~ **C**
X-250	~~Spare~~ **Breathing** Air	~~8500~~ **20100**	~~45~~ **60**	0	~~400~~ **40**		A
~~X-251~~	~~Spare~~	~~9000~~	~~213~~	~~0~~	~~400~~		~~A~~
X-252	~~FCS Return~~ **Spare**	1500	50	0	300	**Welded Cap**	~~B~~ **C**
~~X-253~~	~~Spare~~	~~2650~~	~~135~~	~~1000~~	~~300~~		~~B~~

Table 6.2-8 Primary Containment Penetration List* (Continued)

Penetration Number	Name	Elevation (mm)	Azimuth (deg)	Offset (mm)	Diameter (mm)	Barrier Type	Testing†‡
~~X-255~~	~~Spare~~	~~1200~~	~~282~~	~~0~~	~~300~~		~~B~~
~~X-300A~~	~~I & C~~	~~7300~~	~~134~~	~~0~~	~~300~~	~~O-ring~~	~~B~~
~~X-300B~~	~~I & C~~	~~7300~~	~~211~~	~~0~~	~~300~~	~~O-ring~~	~~B~~
~~X-320~~	~~I & C~~	~~8900~~	~~74~~	~~0~~	~~90~~	~~O-ring~~	~~B~~
X-321A	I & C	2050	97.5	0	300	~~O-ring~~ **Valve**	~~B~~ **A**
X-321B	I & C	6000	262.5	0	300	~~O-ring~~ **Valve**	~~B~~ **A**
X-322A	I & C	400	78	0	90	~~O-ring~~ **Valve**	~~B~~ **A**
X-322B	I & C	400	258	0	90	~~O-ring~~ **Valve**	~~B~~ **A**
X-322C	I & C	400	102	0	90	~~O-ring~~ **Valve**	~~B~~ **A**
X-322D	I & C	400	282	0	90	~~O-ring~~ **Valve**	~~B~~ **A**
X-322E	I & C	2000	94	0	90	~~O-ring~~ **Valve**	~~B~~ **A**
X-322F	I & C	2000	266	0	90	~~O-ring~~ **Valve**	~~B~~ **A**
X-331A	CAMS Gamma Det.	7300	30	0	250	~~O-ring~~ **Welded Cap**	~~B~~ C
X-331B	CAMS Gamma Det.	7300	207	0	250	~~O-ring~~ **Welded Cap**	~~B~~ **C**
X-332A	CAMS Sampling Ret.	8900	94	0	300	~~O-ring~~ **Valve**	~~B~~ **A**
X-332B	CAMS Sampling Ret.	8900	266	0	300	~~O-ring~~ **Valve**	~~B~~ **A**
X-600A	TIP Drive	1580	0	-450	~~50~~ **40**		A
X-600B	TIP Drive	1580	0	0	~~50~~ **40**		A
X-600C	TIP Drive	1580	0	450	~~50~~ **40**		A
~~X-600D~~	~~TIP Drive Purge~~	~~1580~~	~~0~~	~~730~~	~~50~~		~~A~~
X-700A	RIP Purge Water Supply	-590	180	-1780	~~35~~ **25**		A
X-700B	RIP Purge Water Supply	-590	180	-1640	~~35~~ **25**		A

Table 6.2-8 Primary Containment Penetration List* (Continued)

Penetration Number	Name	Elevation (mm)	Azimuth (deg)	Offset (mm)	Diameter (mm)	Barrier Type	Testing†‡
X-700C	RIP Purge Water Supply	-590	180	-1500	~~35~~ **25**		A
X-700D	RIP Purge Water Supply	-760	180	-1780	~~35~~ **25**		A
X-700E	RIP Purge Water Supply	-760	180	-1640	~~35~~ **25**		A
X-700F	RIP Purge Water Supply	-760	180	-1500	~~35~~ **25**		A
X-700G	RIP Purge Water Supply	-930	180	-1780	~~35~~ **25**		A
X-700H	RIP Purge Water Supply	-930	180	-1640	~~35~~ **25**		A
X-700J	RIP Purge Water Supply	-1100	180	-1780	~~35~~ **25**		A
X-700K	RIP Purge Water Supply	-1100	180	-1640	~~35~~ **25**		A
X-740	Spare	250	180	1840	100	**Welded Cap**	~~A~~ **C**
X-750A	I&C (Core Diff Press.)	~~-250~~ **–900**	180	-1780	40	O-ring	B
X-780A	Spare	-250	180	-1500	40	**Welded Cap**	~~B~~ **C**
X-780B	Spare	-590	180	1640	40	**Welded Cap**	~~B~~ **C**

Table 6.2-8 Primary Containment Penetration List* (Continued)

Penetration Number	Name	Elevation (mm)	Azimuth (deg)	Offset (mm)	Diameter (mm)	Barrier Type	Testing†‡
X-620	Low Conductivity Drain	~~-590~~ **–650**	0	-1920	~~75~~ **65**		A
X-621	High Conductivity Drain	~~-590~~ **–650**	0	-1920	~~150~~ **65**		A
X-680B	Spare	~~-250~~ **–590**	0	-1430	40		B

Table 6.2-10 Potential Bypass Leakage Paths

Penetration Number	Name	Diameter (mm)	Termination Region	Leakage Barriers	Potential Bypass Path
X-80	Drywell Purge Suction	~~550~~ **500**	E	E/C/J	Yes
X-81	Drywell Purge Exhaust	~~550~~ **500**	E	E/C/J	Yes
X-82	~~FCS Suction~~ **Spare**	150	S	E/C/J	No
X-91	Spare	~~400~~ **300**	P	B/A	No
X-92	Spare	~~400~~ **300**	P	B/A	No
X-100C	IP Power	~~450~~ **300**	S	C/J	No
X-101A	LP Power	~~300~~ **450**	S	C/J	No
X-101B	LP Power	~~300~~ **450**	S	C/J	No
X-102B	I & C	~~300~~ **450**	S	C/J	No
X-103A	I & C	~~300~~ **150**	S	C/J	No
X-103B	I & C	~~300~~ **150**	S	C/J	No
X-103C	I & C	~~300~~ **150**	S	C/J	No
X-103D	**I & C**	**150**	S	C/J	No
X-104C	FMCRD Pos. Indicator	~~300~~ **450**	S	C/J	No
X-104D	FMCRD Pos. Indicator	~~300~~ **450**	S	C/J	No
X-104F	FMCRD Pos. Indicator	~~300~~ **450**	S	C/J	No
X-104H	FMCRD Pos. Indicator	~~300~~ **450**	S	C/J	No
X-105A	Neutron Detection	~~300~~ **450**	S	C/J	No
X-105B	Neutron Detection	~~300~~ **450**	S	C/J	No
X-105C	Neutron Indicator	~~300~~ **450**	S	C/J	No
X-105D	Neutron Indicator	~~300~~ **450**	S	C/J	No
X-105E	**Neutron Indicator**	**450**	**S**	**C/J**	**No**
X-105F	**Neutron Indicator**	**450**	**S**	**C/J**	**No**
X-105G	**Neutron Indicator**	**450**	**S**	**C/J**	**No**
X-105H	**Neutron Indicator**	**450**	**S**	**C/J**	**No**
X-110	~~FCS Suction~~ **Spare**	150	S	E/C/J	No
~~X-141B~~	~~I & C~~	~~300~~	~~S~~	~~C/J~~	~~No~~
~~X-171~~	~~I&C~~	~~300~~	~~S~~	~~C/J~~	~~No~~
~~X-220~~	~~MSIV Leakage~~	~~250~~	~~S~~	~~C/G~~	~~No~~
X-240	Wetwell Purge Suction	~~550~~ **500**	E	E/C/J	Yes
X-241	Wetwell Purge Exhaust	~~550~~ **500**	E	E/C/J	Yes
X-242	~~FCS Suction~~ **Spare**	150	S	E/C/J	No
~~X-250~~	~~Spare~~		~~P~~	~~B/A~~	~~No~~
X-251	Breathing Air	40	~~P~~ **E**	~~B/A~~ **E/C/H**	No

Table 6.2-10 Potential Bypass Leakage Paths (Continued)

Penetration Number	Name	Diameter (mm)	Termination Region	Leakage Barriers	Potential Bypass Path
X-252	~~FCS Suction~~ **Spare**	150	S	E/C/J	No
~~X-253~~	~~Spare~~	~~300~~	~~S~~	~~B/A~~	~~No~~
~~X-254~~	~~Spare~~	~~300~~	~~S~~	~~B/A~~	~~No~~
~~X-255~~	~~Spare~~	~~300~~	~~S~~	~~B/A~~	~~No~~
~~X-300A~~	~~I&C~~	~~300~~	~~S~~	~~C/J~~	~~No~~
~~X-300B~~	~~I&C~~	~~300~~	~~S~~	~~C/J~~	~~No~~
~~X-320~~	~~I&C~~	~~90~~	~~S~~	~~C/J~~	~~No~~
~~X-660D~~	~~TIP Drive Purge~~	~~50~~	~~S~~	~~C/K~~	~~No~~
X-700A	RIP Purge Water Supply	~~35~~ **25**	S	C/H	No
X-700B	RIP Purge Water Supply	~~35~~ **25**	S	C/H	No
X-700C	RIP Purge Water Supply	~~35~~ **25**	S	C/H	No
X-700D	RIP Purge Water Supply	~~35~~ **25**	S	C/H	No
X-700E	RIP Purge Water Supply	~~35~~ **25**	S	C/H	No
X-700F	RIP Purge Water Supply	~~35~~ **25**	S	C/H	No
X-700G	RIP Purge Water Supply	~~35~~ **25**	S	C/H	No
X-700H	RIP Purge Water Supply	~~35~~ **25**	S	C/H	No
X-700J	RIP Purge Water Supply	~~35~~ **25**	S	C/H	No
X-700K	RIP Purge Water Supply	~~35~~ **25**	S	C/H	No

Figures 6.2-38, 6.2-39, and 6.2-40 are revised and are located in Chapter 21:

Figure 6.2-38 Plant Requirements, Group Classification and Containment Isolation Diagram (Sheets 1 – 2)

STD DEP T1 2.4-3

The design departure describing the alternate design RCIC for ABWR was provided in ABWR Licensing Topical Report NEDE-33299P, "Advanced Boiling Water Reactor (ABWR) With Alternate RCIC Turbine-Pump Design," dated December 2006. This design eliminates the barometric condenser and discharge piping to the containment.

STD DEP T1 2.14-1

The design departure describing the elimination of the hydrogen recombiners from the certified design was provided in ABWR Licensing Topical Report NEDE-33330P, "Advanced Boiling Water Reactor (ABWR) Hydrogen Recombiner Requirements Elimination," Revision 1 dated September 2007.

STD DEP 9.3-2

This departure adds a new containment penetration for the Breathing Air System. The breathing air line has a check valve inside the containment and a manually operated valve outside containment which will be closed during normal operation.

Figure 6.2-39 Atmospheric Control System P&ID (Sheets 1 – 3)

STD DEP 6.2-1

The ACS line size has been changed from 550A to 500 mm.

Figure 6.2-40 Flammability Control System P&ID (Sheets 1 – 2)

STD DEP T1 2.14-1

The design departure describing the elimination of the hydrogen recombiners from the certified design was provided in ABWR Licensing Topical Report NEDE-33330P, "Advanced Boiling Water Reactor (ABWR) Hydrogen Recombiner Requirements Elimination," Revision 1 dated September 2007.