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8C. CONTAINMENT PENETRATION SCREENING ANALYSIS

The purpose of this appendix is to present the screening analysis of the containment penetrations identified in DCD Section 6.2.

Section 4.18 documents containment isolation with the perspective of analyzing pipe breaks outside of containment for the Level 1 analysis. In this appendix, a screening evaluation is performed to identify those containment penetrations that could potentially lead to offsite consequences. The screening analysis found that there are two systems that require isolation during a severe accident: Main Steam and Feedwater. The Main Steam and Feedwater isolations are modeled with the same logic as the Level 1 break outside containment functions. The CIS node is therefore dependent on the Level 1 sequences because of the support systems for the isolation valves.

The screening analysis of the containment penetrations identified in DCD Section 6.2 is performed as follows:

Each of the containment penetrations included in Section 6.2 of the DCD (identified here as Table 8C-1) has been reviewed to select those that potentially could induce:

- a loss of reactor coolant outside the containment,
- a release of radioactive materials outside the containment, in the event of an accident concurrent with a failure of the isolation function.

Next the review identifies those containment penetrations that could potentially lead to off-site consequences. Containment penetrations were eliminated from further analysis if they met one of the following Level 2 screening criteria:

A. Penetrations with normally closed isolation valves.

B. Penetrations connected to a closed system inside the containment.

C. Penetrations having isolation valves plus a closed system outside the containment and with normal operating pressure greater than the expected accident pressure.

D. Penetrations for which isolation failure during an accident event without core damage would not result in an increase of radioactive release compared with normal operation.

E. Penetrations for lines 1” or less in diameter. Breaks below this size contribute negligibly to source term and offsite consequences and are not considered to be containment bypass scenarios.

A summary of the containment penetration screening task is shown in Table 8C-1.

Table 8C-1

Containment Penetrations

Penetration ID	Description	Valves				Level 2 Screening Criterion(1)	Level 1 Model
B21-MPEN-0001	MAIN STEAM LINE A	F001A	F002A			Modeled	Analyzed as BOC-MS
B21-MPEN-0002	MAIN STEAM LINE B	F001B	F002B			Modeled	Analyzed as BOC-MS
B21-MPEN-0003	MAIN STEAM LINE C	F001C	F002C			Modeled	Analyzed as BOC-MS
B21-MPEN-0004	MAIN STEAM LINE D	F001D	F002D			Modeled	Analyzed as BOC-MS
B21-MPEN-0005	MAIN STEAM LINE DRAINS	F010	F011			A (F010)	
B21-MPEN-0006	FEEDWATER SYSTEM (LINE A)	F102A	F101A			Modeled	Analyzed as BOC-FDWA
B21-MPEN-0007	FEEDWATER SYSTEM (LINE B)	F102B	F101B			Modeled	Analyzed as BOC-FDWB
B32-MPEN-0001	ISOLATION CONDENSER SYSTEM (LOOP A) STEAM SUPPLY	F001A	F002A			C	Analyzed as BOC-IC
B32-MPEN-0005	ISOLATION CONDENSER SYSTEM (LOOP A) CONDENSATE RETURN	F003A	F004A			C	Analyzed as BOC-IC
B32-MPEN-0009	ISOLATION CONDENSER SYSTEM (LOOP A) UPPER HEADER VENT	F007A	F008A			C	
B32-MPEN-0013	ISOLATION CONDENSER SYSTEM (LOOP A) LOWER HEADER VENT	F009A	F010A	F011A	F012A	C	
B32-MPEN-0017	ISOLATION CONDENSER SYSTEM (LOOP A) PURGE LINE	F013A	F014A			C	
B32-MPEN-0002	ISOLATION CONDENSER SYSTEM (LOOP B) STEAM SUPPLY	F001B	F002B			C	Analyzed as BOC-IC

Table 8C-1

Containment Penetrations

Penetration ID	Description	Valves				Level 2 Screening Criterion(1)	Level 1 Model
B32-MPEN-0006	ISOLATION CONDENSER SYSTEM (LOOP B) CONDENSATE RETURN	F003B	F004B			C	Analyzed as BOC-IC
B32-MPEN-0010	ISOLATION CONDENSER SYSTEM (LOOP B) UPPER HEADER VENT	F007B	F008B			C	
B32-MPEN-0014	ISOLATION CONDENSER SYSTEM (LOOP B) LOWER HEADER VENT	F009B	F010B	F011B	F012B	C	
B32-MPEN-0018	ISOLATION CONDENSER SYSTEM (LOOP B) PURGE LINE	F013B	F014B			C	
B32-MPEN-0003	ISOLATION CONDENSER SYSTEM (LOOP C) STEAM SUPPLY	F001C	F002C			C	Analyzed as BOC-IC
B32-MPEN-0007	ISOLATION CONDENSER SYSTEM (LOOP C) CONDENSATE RETURN	F003C	F004C			C	Analyzed as BOC-IC
B32-MPEN-0011	ISOLATION CONDENSER SYSTEM (LOOP C) UPPER HEADER VENT	F007C	F008C			C	
B32-MPEN-0015	ISOLATION CONDENSER SYSTEM (LOOP C) LOWER HEADER VENT	F009C	F010C	F011C	F012C	C	

Table 8C-1

Containment Penetrations

Penetration ID	Description	Valves				Level 2 Screening Criterion(1)	Level 1 Model
B32-MPEN-0019	ISOLATION CONDENSER SYSTEM (LOOP C) PURGE LINE	F013C	F014C			C	
B32-MPEN-0004	ISOLATION CONDENSER SYSTEM (LOOP D) STEAM SUPPLY	F001D	F002D			C	Analyzed as BOC-IC
B32-MPEN-0008	ISOLATION CONDENSER SYSTEM (LOOP D) CONDENSATE RETURN	F003D	F004D			C	Analyzed as BOC-IC
B32-MPEN-0012	ISOLATION CONDENSER SYSTEM (LOOP D) UPPER HEADER VENT	F007D	F008D			C	
B32-MPEN-0016	ISOLATION CONDENSER SYSTEM (LOOP D) LOWER HEADER VENT	F009D	F010D	F011D	F012D	C	
B32-MPEN-0020	ISOLATION CONDENSER SYSTEM (LOOP D) PURGE LINE	F013D	F014D			C	
G31-MPEN-0001	REACTOR WATER CLEANUP/SDC SYSTEM	F002A	F003A			C	
G31-MPEN-0002	REACTOR WATER CLEANUP/SDC SYSTEM	F002B	F003B			C	
G31-MPEN-0003	REACTOR WATER CLEANUP/SDC SYSTEM	F007A	F008A			C	
G31-MPEN-0004	REACTOR WATER CLEANUP/SDC SYSTEM	F007B	F008B			C	

Table 8C-1

Containment Penetrations

Penetration ID	Description	Valves				Level 2 Screening Criterion(1)	Level 1 Model
G31-MPEN-0005	REACTOR WATER CLEANUP/SDC SYSTEM	F038A	F039A			A	
G31-MPEN-0006	REACTOR WATER CLEANUP/SDC SYSTEM	F038B	F039B			A	
C41-MPEN-0001	STANDBY LIQUID CONTROL SYSTEM	F004A	F005A			C	
C41-MPEN-0002	STANDBY LIQUID CONTROL SYSTEM	F004B	F005B			C	
G21-MPEN-0001	FUEL AND AUXILIARY POOLS COOLING SYSTEM	F309	F310			C	
G21-MPEN-0002	FUEL AND AUXILIARY POOLS COOLING SYSTEM	F306A	F307A			C	
G21-MPEN-0006	FUEL AND AUXILIARY POOLS COOLING SYSTEM	F306B	F307B			C	
G21-MPEN-0004	FUEL AND AUXILIARY POOLS COOLING SYSTEM	F323	F324			C	
G21-MPEN-0003	FUEL AND AUXILIARY POOLS COOLING SYSTEM	F303	F304			C	
G21-MPEN-0005	FUEL AND AUXILIARY POOLS COOLING SYSTEM	F321A	F322A			C	
G21-MPEN-0007	FUEL AND AUXILIARY POOLS COOLING SYSTEM	F321B	F322B				
T31-MPEN-0001	CONTAINMENT INERTING SYSTEM	F009	F008			C/A	
		F025	F023			C/E	

Table 8C-1

Containment Penetrations

Penetration ID	Description	Valves				Level 2 Screening Criterion[1]	Level 1 Model
T31-MPEN-0002	CONTAINMENT INERTING SYSTEM	F007	F008			C/A	
		F023	F024			C/E	
T31-MPEN-0003	CONTAINMENT INERTING SYSTEM	F010	F011	F014	F015	A	
T31-MPEN-0004	CONTAINMENT INERTING SYSTEM	F013	F016			USED FOR MCOPS	USED FOR MCOPS
P25-MPEN-0001[2]	CHILLED COOLING WATER SYSTEM	F023A	F024A			B	
P25-MPEN-0002[2]	CHILLED COOLING WATER SYSTEM	F025A	F026A			B	
P25-MPEN-0003[2]	CHILLED COOLING WATER SYSTEM	F023B	F024B			B	
P25-MPEN-0004[2]	CHILLED COOLING WATER SYSTEM	F025B	F026B			B	
P54-MPEN-0001[2]	HIGH PRESSURE NITROGEN SUPPLY SYSTEM	F026	F027			C	
P54-MPEN-0002[2]	HIGH PRESSURE NITROGEN SUPPLY SYSTEM	F009	F010			C	
D11-MPEN-0001	PROCESS RADIATION MONITORING SYSTEM	F001	F002			C/E	
D11-MPEN-0002	PROCESS RADIATION MONITORING SYSTEM	F003	F004			C/E	

Table 8C-1

Containment Penetrations

Penetration ID	Description	Valves	Level 2 Screening Criterion(1)	Level 1 Model

Notes:

(1) Level 2 Screening Criteria

A) Penetrations with normally closed isolation valves.

B) Penetrations connected to a closed system inside the containment.

C) Penetrations having isolation valves plus a closed system outside the containment and with normal operating pressure greater than the expected accident pressure.

D) Penetrations for which isolation failure during an accident event without core damage would not result in an increase of radioactive release compared with normal operation.

E) Penetrations for lines 1” or less in diameter. Breaks below this size contribute negligibly to source term and offsite consequences and are not considered to be containment bypass scenarios.

(2) Assumed configuration. Detailed design specified as a COL Applicant responsibility in the DCD