


UFSAR Revision 30.0

 <p>INDIANA MICHIGAN POWER An AEP Company</p>	<p style="text-align: center;">INDIANA MICHIGAN POWER D. C. COOK NUCLEAR PLANT UPDATED FINAL SAFETY ANALYSIS REPORT</p>	<p>Revised: 28.0 Table: 5.1-1 Page: 1 of 3</p>
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Potential Missiles Considered in Class I (Seismic) Structure Design


Item	Description	Weight	Velocity	Impact Area	Origin
Bolted Wood Decking	12' x 12' x 4"	450 lbs	200 mph	4 ft ²	Tornado Borne
Corrugated Siding	4' x 4'	100 lbs	225 mph	0.25 ft ²	Tornado Borne
Passenger Car	-	4000 lbs	50 mph traveling on the ground	10 ft ²	Tornado Borne
Schedule 40 Pipe ¹	2 1/2" Dia x 8'	46 lbs	195 ft/sec	6.5 in ²	Tornado Borne
Reactor Control Rod Drive Mechanism	-	1623 lbs	25 fps for 3 ft travel to missile shield	11.3 in ²	Reactor Coolant Pressure Driven after R. C. Housing Mech. Failure
Unit 1 Turbine ^{2 3}					
Vane of Last Stage Bucket	-	54 lbs	1170 ft/sec	0.82 ft ²	Mech. Failure During Turbine Overspeed
Last Stage Wheel Segment	120° Segment	8264 lbs	409 ft/sec	8.43 ft ²	Mech. Failure During Turbine Overspeed

¹ Considered as a missile only for design of the Auxiliary Building east of Spent Fuel Storage Pool.

² Impact area for turbine items is the average of the minimum and maximum cross-section areas.

³ The missile information in this table is for the removed General Electric low pressure turbines as this analysis bounds other Unit 1 rotating elements. The current missile analysis for the low pressure turbines is based on the missile probability analysis discussed in Section 1.4.7.

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Potential Missiles Considered in Class I (Seismic) Structure Design

Item	Description	Weight	Velocity	Impact Area	Origin
Unit 2 Turbine^{2 4}					
Vane of Last Stage Bucket	-	168 lbs	1135 ft/sec	1.87 ft ²	Mech. Failure During Turbine Overspeed
Disc 1 Segment	120° Segment	13,350 lbs	634 ft/sec	15.08 ft ²	Mech. Failure During Turbine Overspeed
Disc 2 Segment	120° Segment	12,100 lbs	574 ft/sec	13.92 ft ²	Mech. Failure During Turbine Overspeed
Disc 3 Segment	120° Segment	8,360 lbs	551 ft/sec	13.2 ft ²	Mech. Failure During Turbine Overspeed
Disc 4 Segment	120° Segment	16,600 lbs	595 ft/sec	15.7 ft ²	Mech. Failure During Turbine Overspeed

⁴ In 2016, the Brown-Boveri turbines were retro-fitted with turbines manufactured by Alstom Power, Inc. Probability analysis (Reference 1.4.11.17) for the Alstom Unit 2 turbines indicates the probability of generation of a turbine missile (including overspeed conditions) is less than the NRC limit. Therefore, no additional missile analysis is required for the Unit 2 Alstom turbines. However, the missile information is still provided for the (removed) Brown-Boveri turbines, as these analyses are used in structural design criteria analysis that bounds other Unit 2 rotating elements as shown in Table 5.1-1.

The postulated turbine missile information in this table is for the removed Brown Boveri low pressure turbine that was considered in Class I (Seismic) structure design. The current missile analysis for the Unit 2 low pressure turbines is based on missile probability analysis discussed in Section 1.4.7.

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Note:

1. Miscellaneous missiles such as valve stems, bonnets, instruments wells, thimbles, and pipe rupture whip were considered in the design of the structures where applicable; however, tornado generated and turbine missiles, or radiation and structural considerations, generally, were the determining factors in the design of Class I structures.
2. The population of missiles used in the TORMIS analysis was based on a physical walk down of non-safety-related buildings, trailers, fencing, trees and parking lots within a 2000 feet radius of the plant. Also included were missiles from plant buildings with siding not designed for tornado winds. This walk down resulted in a potential missile population in excess of 55,000 objects.


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WIND VELOCITIES AND VELOCITY PRESSURES

Height (ft)	Ungusted Wind Velocity (mph)	Gusted Wind Velocity (mph)	Velocity Pressure (Gusted Wind) (psf)
0-50	90	99	25
50-150	115	126	41
150-400	145	159	65

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SITE SOIL RESISTIVITY MEASUREMENTS


DATA TAKEN APRIL 10 AND 11, 1969

Location	Direction	Elevation (Feet)	Pin Spacing (Feet)	Reading (Ohms)	Multiplier	Average Ohm-Cm*
Unit No. 1 Reactor	North-South	584	50	2.2	191.5	21,000
			40	5.8	191.5	44,400
			30	9.9	191.5	56,900
			20	18.0		69,000
			10	100.0		191,500
Unit No. 2 Reactor	North-South	584	50	1.4	191.5	13,400
			40	2.0	191.5	15,300
			30	8.0	191.5	46,000
			20	25.0	191.5	95,900
			10	130.0	191.5	249,000
Between No. 1 and 2 Reactors	East-West	584	50	70.0	191.5	727,000
			40	19.0	191.5	145,600

Average Ohm-Cm = Reading Pin Spacing x Multiplier

* Actually Ohms per cubic centimeter

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SITE SOIL RESISTIVITY MEASUREMENTS

DATA TAKEN APRIL 10 AND 11, 1969

Location	Direction	Elevation (Feet)	Pin Spacing (Feet)	Reading (Ohms)	Multiplier	Average Ohm-Cm*
			30	22.0	191.5	126,500
			20	26.0	191.5	99,700
			10	91.0	191.5	174,200
Unit No. 2 Turbine	North-South	589	50	4.3	191.5	41,100
			40	7.8	191.5	59,800
			30	22.0	191.5	126,500
			20	46.0	191.5	176,300
			10	110.0	191.5	210,800
Unit No. 1 Turbine	North-South	589	50	No. Reading	191.5	----
			40	4.9	191.5	36,800
			30	18.0	191.5	103,500
			20	40.0	191.5	153,300
			10	112.0	191.5	214,300

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SITE SOIL RESISTIVITY MEASUREMENTS

DATA TAKEN APRIL 10 AND 11, 1969

Location	Direction	Elevation (Feet)	Pin Spacing (Feet)	Reading (Ohms)	Multiplier	Average Ohm-Cm*
Unit No. 1 Turbine	East-West	589	50	8.0	191.5	76,500
			30	21.0	191.5	120,800
			10	104.0	191.5	199,300
On Beach Near Water (Sand)	North-South	580	50	7.05	191.5	67,500
			40	5.40	191.5	41,400
			30	8.50	191.5	48,900
			20	13.0	191.5	49,800
			10	18.0	191.5	34,500

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ELECTRICAL PENETRATION - PROTOTYPE TESTS

PENETRATIONS¹

Test & Sequence	5 Kv Power Penetration	600 Volt Power & Control Penetration	Instrumentation Penetration
High Potential ²	X	X	X
Leakage ²	X	X	X
Ampacity	X	X	
Accident Operating Environment	X	X	X
Short Circuit	X	X	

¹ Prototype testing compliance was allowed to be demonstrated by the submittal of test data from tests conducted on penetrations of equivalent type and design as those furnished for Donald C. Cook nuclear Plant.

² Conducted after Ampacity, Accident Operating Environment, and Short Circuit Tests.

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TABLE OF DAMPING VALUES

Type of Structure	Percent of Critical Damping	
	Operating Basis Earthquake	Design Basis Earthquake
Containment Structure and all internal concrete structures	4%*, 2%**	7%*, 5%**
Other conventionally reinforced concrete structures above grade, such as shear walls or rigid frames	2%	5%
Welded structural steel assemblies	1%	1%
Bolted or riveted steel assemblies	2%	2%
Piping	0.5%	0.5%

* Analyzed with accident conditions


** Analyzed without accident conditions

Note 1: See Section 5.3.7 for the damping values utilized in the seismic qualification of the Ice Condenser.

Note 2: For the Dry Cask Storage Project, the East Auxiliary Building crane, crane rails and the Auxiliary Building columns supporting the crane rails were reanalyzed utilizing the guidance provided in Regulatory Guide 1.60, Rev.1 and the damping values specified in Regulatory Guide 1.61, Rev. 1 to increase the main hoist Maximum Critical Load (MCL) to 45 tons.

Note 3 : See WCAP-7332-L and WCAP-12828 for the damping values utilized in the seismic qualification of the reactor internals.

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SUMMARY OF ANALYSES-JET FORCES IMPACTING ON INTERNAL STRUCTURES

Source	Diameter	Elevation	Jet Travel (ft)	Critical Target	Normal Operating Pressure Psia.	Jet Effect	Remarks
Break #1	29"I.D.	614'-0"	Note ¹ (2)		2250	c	
#2	27.5"I.D.	614'-0"	Note ⁽¹⁾ (2)		2250	c	
#3	29"I.D.	615'-0"±	23.0 ²	Crane Wall	2250	c	
#4	31"I.D.	612'-9"+	37.0 ⁽²⁾	Operating Deck	2250	d	
#5	31"I.D.	607'-9"±	42.0 ⁽²⁾	Operating Deck	2250	d	
#6	27.5"I.D.	614'-0"	11.0 ⁽²⁾	Crane Wall	2250	d	
#7	29"I.D.	615'-3+	39.5 ⁽²⁾	Operating Deck	2250	c	
#8	31"I.D.	607'-9"±	42.0 ⁽²⁾	Operating Deck	2250	d	
#9	31"I.D.	603'- 8 1/4"	13.0 ⁽²⁾	Crane Wall	2250	d	
#10	27.5"I.D.	614'-0"	14.0	Crane Wall	2250	d	
#11 ³	29"I.D.	614'-0"	19.5 ⁴	Crane Wall	2250	c	
#12 ⁵	29"I.D.	614'-0"	20.0	Crane Wall	2250	c	
#13	11"I.D.	620'-0"±	6.0 ⁽⁴⁾	Pressurizer Slab	2250	d	
#14	30"I.D.	686'-10 3/16"	16.0	Steam Gen. Encl	1020	d	

¹ Jet blocked; restraints prevent further movement.


² This break does not require consideration of Jet Forces since LBB methodology adopted. Maintained for historical purposes.

³ Surge line connection on loop 3 only.

⁴ Unit 2 only. LBB accepted for Unit 1.

⁵ 14" connection on loop 2 only.


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SUMMARY OF ANALYSES-JET FORCES IMPACTING ON INTERNAL STRUCTURES

Source	Diameter	Elevation	Jet Travel (ft)	Critical Target	Normal Operating Pressure Psia.	Jet Effect	Remarks
#15	28" I.D.	635'-0"	4.0	Containment Wall	1020	d	

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(Refer to Fig. 5.2.2-6)

SUMMARY OF DYNAMIC MOTIONS

At Point	O.B.E.			D.B.E		
	Relative Differential Of Vertical Motion	Relative Differential Of Horizontal Motion		Relative Differential Of Vertical Motion	Relative Differential Of Horizontal Motion	
		X Direction	Y Direction		X Direction	Y Direction
A	0.185"	0.234"	0.227"	0.253"	0.374"	0.344"
B	0.225"	0.234"	0.227"	0.321"	0.374"	0.344"
C	0.097"	0.149"	0.149"	0.187"	0.322"	0.289"
D	0.041"	0.180"	0.173"	0.071"	0.360"	0.330"
Betw. Aux. Bldg. & Turbine Bldg. E	0.094"	0.180"	0.173"	0.176"	0.360"	0.330"
Betw. Aux. Bldg. & Diesel Bldg. E	0.136"	0.169"	0.162"	0.276"	0.362"	0.299"
Betw. Diesel Bldg. & Turbine Bldg. E	0.094"	0.149"	0.149"	0.182"	0.322"	0.289"

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DYNAMIC ROTATIONS

	O.B.E.		D.B.E.	
Structure	X Earthquake	Y Earthquake	X Earthquake	Y Earthquake
Containment	17.6 (10 ⁻⁵) Radians	17.6 (10 ⁻⁵) Radians	22.7 (10 ⁻⁵) Radians	22.7 (10 ⁻⁵) Radians
Aux. Building	3.05 (10 ⁻⁵) Radians	1.43 (10 ⁻⁵) Radians	6.10 (10 ⁻⁵) Radians	2.81 (10 ⁻⁵) Radians
Turbine Building	0.2 (10 ⁻⁵) Radians	1.91 (10 ⁻⁵) Radians	0.31 (10 ⁻⁵) Radians	3.03 (10 ⁻⁵) Radians
Diesel Building (Switchgear)	3.78 (10 ⁻⁵) Radians	8.0 (10 ⁻⁵) Radians	8.85 (10 ⁻⁵) Radians	15.1 (10 ⁻⁵) Radians

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CONTAINMENT INTERNAL STRUCTURAL ELEMENT DESIGN PRESSURES

<u>STRUCTURAL ELEMENT</u>	<u>TMD ANALYSIS (SECTION 14.3.4.2)</u>		<u>DESIGN PRESSURE CAPABILITY</u>
	<u>SUBCOMPARTMENT</u>	<u>NODES</u>	
Unit 1 Elevation 640 slab (upward pressure)	Fan/Accumulator	27-42	17.19 psid ¹
Unit 1 Elevation 640 slab (downward pressure)	Loop	40-27	10.5 psid ¹
Unit 2 Elevation 640 slab (upward pressure)	Fan/Accumulator	27-42	16.02 psid ¹
Unit 2 Elevation 640 slab (downward pressure)	Loop	40-27	10.4 psid ¹
Unit 1 Azimuth 54 wall (CEQ Fan Room Wall)	Fan/Accumulator	57-25	14.99 psid ¹
Unit 1 Azimuth 126 wall (CEQ Fan Room Wall)	Fan/Accumulator	57-25	13.42 psid ¹
Unit 1 Azimuth 234 wall (Non-Divider Barrier)	Fan/Accumulator	27-29	15.60 psid ¹
Unit 1 Azimuth 307 wall (Non-Divider Barrier)	Fan/Accumulator	27-29	24.91 psid ¹
Unit 2 Azimuth 54 wall (CEQ Fan Room Wall)	Fan/Accumulator	57-25	15.16 psid ¹
Unit 2 Azimuth 126 wall (CEQ Fan Room Wall)	Fan/Accumulator	57-25	15.27 psid ¹
Unit 2 Azimuth 234 wall (Non-Divider Barrier)	Fan/Accumulator	27-29	16.25 psid ¹
Unit 2 Azimuth 307 wall (Non-Divider Barrier)	Fan/Accumulator	27-29	27.24 psid ¹
Unit 1 & 2 Steam Generator Enclosure (uniform)	N/A	N/A	35.1 psi ¹
Unit 1 & 2 Steam Generator Enclosure (stratified)	Steam Generator	55-25	50.3 psid ¹
Unit 1 & 2 Operating Deck	Loop	1-25, 6-25	20.2 psid ¹
Upper Crane Wall (above 640 slab)	Loop	7,8,9 - 25	11.8 psid ¹
Lower Crane Wall (below 640 slab)	Loop	1-25, 6-25	20.2 psid ¹
Upper Reactor Cavity (Primary Shield Wall)	Reactor Cavity	38-51	72.4 psid ¹
Lower Reactor Cavity	Reactor Cavity	2	20.8 psig
Ice Condenser End Wall at Lower Plenum	Loop	40-25	14.8 psid ¹
Ice Condenser End Wall for Lower 16 Feet of Ice Bed	Loop	7-25	11.8 psid ¹
Ice Condenser End Wall for Middle 16 Feet of Ice Bed	Loop	8-25	9.2 psid ¹
Ice Condenser End Wall for Top 16 Feet of Ice Bed	Loop	9-25	7.4 psid ¹
Reactor Missile Shield & Vertical Bulkhead	Reactor Cavity	38-59	53.9 psid ¹
Pressurizer Enclosure	Pressurizer	46-25	80 psid ²
Reactor Cavity Reactor Vessel Annulus	Reactor Cavity	1-3	1000 psid ²
RCS Loop Piping Annulus Through Primary Shield Wall	Reactor Cavity	1-46	2000 psid ²

¹ Equivalent Design Pressure Capability Determined During 2001 Re-Analysis (The capabilities given in this Table represent the relative equivalent pressure capacities for the currently calculated accident pressures as given in Unit 1 UFSAR Section 14.3.4.2, when factored per the requirements of UFSAR Section 5.2)

² Design Pressure Capability Determined During Initial Plant Licensing

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ICE CONDENSER DESIGN PARAMETERS

Reactor Containment Volume (net free volume)	
Upper Compartment, ft ³	745,896
Ice Condenser, ft ³	126,940
Lower Compartment (active), ft ³	306,800
Total Active Volume, ft ³	1,179,636
Lower Compartment (dead-ended), ft ³	61,702
Total Containment volume, ft ³	1,241,338
Reactor Containment Air Compression Ratio ¹	1.41
Reactor power, MWt (design basis)	3391
Design Energy Release to Containment	
Initial blowdown mass release, lb	549,000
Initial blowdown energy release, Btu	346.7 x 10 ⁶
Allowance for undefined energy release in addition to core residual heat, Btu	50 x 10 ⁶
Ice Condenser parameters	
Required weight of ice in condenser, lb	REFER TO TECHNICAL SPECIFICATIONS
Dimensions of ice condenser	
O.D., ft	115
I.D., ft.	89
Average Arc length, ft	267
Width (less insulation panels), ft	11
Ice bed height, ft	48
Inlet door flow area, ft ²	1000
Ice condenser flow area, ft ²	1326
Ice Condenser inlet door opening pressure, lb/ft ²	1/2 to 1.0
Ice boron concentration, ppm boron	1800-2300
Refrigeration cooling capacity (current as of 1/82)	

¹ Defined in Section 14.3.

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ICE CONDENSER DESIGN PARAMETERS

Installed cooling capacity for compartment, Tons	75
Maximum compartment heat input, Tons (per unit)	35
Total cooling capacity for plant, Tons (capacity shared by two units)	250

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ICE CONDENSER ALLOWABLE LIMITS⁽¹⁾

Load Combination	Elastic Analysis			Limit Analysis (Load Factors) ⁽²⁾	Test (Load Factors)
	Mechanical ⁽³⁾	Mechanical & Thermal	Fatigue		
D + OBE	S ⁽⁴⁴⁾	3S	AISC-69 Part I	1.7	1.87
D + DBA	1.33 S	N/A	N/A	1.3	1.43
D + DBE	1.33 S	N/A	N/A	1.3	1.43
D + DBE + DBA	1.65 S	N/A	N/A	1.18	1.3

¹ For particular components that do not meet these limits specific justification shall be provided on a case by case basis.

² For mechanical loads only. Mechanical plus thermal expansion, combination and fatigue shall satisfy the elastic analysis limits.

³ Membrane (direct) stresses shall be less than or equal to 0.7 Su (70% of ultimate stress).

⁴ S = Allowable stresses as defined in Sections 1.5 and 1.6 of the AISC-69 Part I Specification.

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SUMMARY OF RESULTS FOR WEAR SLAB STRUCTURAL ANALYSIS

Stress	Loading Condition	Stress Ratio ¹	Basis
Wear Slab Bending - Tension on Top	D+ DBE+DBA	≤ 1.0	A
Wear Slab Bending - Tension on Bottom	Defrost	≤ 1.0	A
Shear on Bottom Plate Shear Connections	Defrost	≤ 1.0	B
Tie-Down Bolt Tension	D+DBE+DBA	≤ 1.0	B
Shear in Grout at Tie-Down Bolts	D+DBE+DBA	≤ 1.0	A
Pipe Stress Due to Slab Loading	Defrost	≤ 1.0	B
Compression of Foam Concrete	D+DBE+DBA	≤ 1.0	C

NOTES:

- A. Allowable stress per ACI 318-71
- B. Allowable stress per AISC-69
- C. Vendor Qualification Test

¹ Max Calculated Stress
Code Allowable Stress

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SUMMARY OF RESULTS FOR WALL PANELS¹

Item	Stress Ratio ²	Basis
Maximum general membrane stress	≤ 1.0	Allowable from Section 5.3.4.3.2
Maximum local membrane stress	≤ 1.0	Allowable from Section 5.3.4.3.2
Load on Each Leg of Corrugated Core	≤ 1.0	Critical load by Formula of Reference 5

¹ For conservatism, a DBA pressure of 21.7 psig was used in the analysis. The DBA pressure of 21.7 psig includes a 20% margin. The dynamic load factor (DLF) is 1.53.

² Max. Calculated Stress
Code Allowable Stress

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SUMMARY OF RESULTS FOR WALL PANEL TRANSVERSE BEAM STRESS

Loading Conditions	D + OBE	D + DBE	D + DBE + DBA
Allowable Stress Criteria, Section 5.3.4.3.2	1.0S	1.33S	1.65S
Bending Allowable Stress (Psi)	33,000	43,890	54,450
Combined Stress Ratio ¹	≤ 1.00	≤ 1.00	≤ 1.00

¹ Max. Calculated Stress
Code Allowable Stress

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SUMMARY OF STRESS RESULTS FOR LATTICE FRAME

	D + OBE	D + DBA	D + DBE	D + DBA + DBE
Criteria	S per AISC-69	1.33S	1.33S	1.65S
Bending Allowable Stress(psi)	37,500 ¹	49,875 ⁽¹⁾	49,875 ⁽¹⁾	68,060 ²
Combined Stress Ratio ³	≤ 1.00	≤ 1.00	≤ 1.00	≤ 1.00

¹ ASTM-A441 with minimum yield strength = 50 K/in²

² ASTM-A441 with actual yield strength = 55 K/in²

³ Max. Calculated Stress
Code Allowable

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SUMMARY OF RESULTS OF FATIGUE ANALYSIS FOR LATTICE FRAME ¹

Member Type	Stress Ratio ²	Allowable Stress range ³ ,psi
Radial Stringers	≤ 1.0	60,000
Fillet Welds	≤ 1.0	22,500

¹ Based on 400 OBE cycles

² Max. Calculated Stress
Code Allowable Stress

³ AISC-69 specification, Appendix B

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SUMMARY OF RESULTS FOR MEMBER STRESSES IN LOWER SUPPORT STRUCTURE COMPARED TO DESIGN ALLOWABLE MEMBER STRESSES

DESCRIPTION 1	MAXIMUM STRESSES D+DBE+DBA				MAXIMUM STRESSES D+OBE				REMARKS 2
	$\sigma_{\text{allowable}}$ ksi	Stress Ratio σ^3	$\tau_{\text{allowable}}$ ksi	Stress Ratio $\tau^{(3)}$	$\sigma_{\text{allowable}}$ ksi	Stress Ratio $\sigma^{(3)}$	$\tau_{\text{allowable}}$ ksi	Stress Ratio $\tau^{(3)}$	
Columns Line 1 - Inner	40.5	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Columns Line 1 - Middle	40.5	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Columns Line 1 - Outer	40.5	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Columns Line 2 - Inner	40.5	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Columns Line 2 - Middle	40.5	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Columns Line 2 - Outer	40.5	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Circumferential BEAMS - Inner	40.5	≤ 1.0	26.6	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Circumferential Beams - Middle	40.5	≤ 1.0	26.6	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Circumferential Beams - Outer	40.5	≤ 1.0	26.6	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Radial Beam 1	45.0	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Radial Beam 2	45.0	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Radial Beam 3	45.0	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Radial Beam 4	45.0	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Radial Beam 5	45.0	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Radial Beam 6	45.0	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Radial Beam 7	45.0	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Radial Beam 8	45.0	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	

¹ Columns, Line 1 – Odd column lines starting at the end wall
Columns, Line 2 – Even column lines starting at the end wall
Radial Beams – numbers from column line 1

² All Stresses Are Within Allowable Values

³ Max. Calculated Stress
Code Allowable Stress

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SUMMARY OF RESULTS FOR MEMBER STRESSES IN LOWER SUPPORT STRUCTURE COMPARED TO DESIGN ALLOWABLE MEMBER STRESSES

DESCRIPTION 1	MAXIMUM STRESSES D+DBE+DBA				MAXIMUM STRESSES D+OBE				REMARKS 2
	$\sigma_{allowable}$ ksi	Stress Ratio σ^3	$\tau_{allowable}$ ksi	Stress Ratio $\tau^{(3)}$	$\sigma_{allowable}$ ksi	Stress Ratio $\sigma^{(3)}$	$\tau_{allowable}$ ksi	Stress Ratio $\tau^{(3)}$	
Radial Beam 9	45.0	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Horizontal Bracing – Inner Platform	40.5	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Horizontal Bracing – Outer Platform	40.5	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Vertical Cross-Bracing	40.5	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Ice Basket Hold-Down Bars	40.5	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Turning Vane Assembly Mounting Plate - Column 1	40.5	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	
Turning Vane Assembly Mounting Plate - Column 2	40.5	≤ 1.0	23.4	≤ 1.0	27.0	≤ 1.0	18.0	≤ 1.0	

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SUMMARY OF RESULTS FOR LOWER PERSONNEL ACCESS DOOR ANALYSES DUE TO LOCA

Item	Load	Stress Ratio ¹	Basis ²
1	Shear stress of anchor rod	≤ 1.0	A
2	Shear stress of frame	≤ 1.0	A
3	Compressive stress of inner door panel	≤ 1.0	A
4	Compressive stress of U channel (door panel bracing)	≤ 1.0	A
5	Compressive stress of wedges	≤ 1.0	A

¹ Max. Calculated Stress
Code Allowable Stress

² A – Allowable stress from Section 5.3.4.3.2

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SUMMARY OF RESULTS FOR INLET DOOR STRUCTURAL ANALYSIS – LOCA

ITEM	AREA	STRESS RATIO ¹	BASIS ²
1	Bending of FRP Plate	≤ 1.0	D
2	Tension + Bending of Reinforcing Ribs	≤ 1.0	A
3	Slip of Plate/Rib Bolts	≤ 1.0	C
4	Compression + Bending of Compr. Sleeves	≤ 1.0	A
5	Bearing in Fiber Reinforced Plastic (FRP) Plate at Bolts	≤ 1.0	D
6	Pullout of Bolts from FRP Plate	≤ 1.0	D
7	Crushing of Foam Insulation	≤ 1.0	E
8	Shear of Foam Insulation	≤ 1.0	E
9	Tension in Hinge Adapter	≤ 1.0	A
10	Shear in Adapter/Rib Weld	≤ 1.0	A
11	Bending + Shear of Hinge Bar	≤ 1.0	A
12	Bearing Loads in Hinge Bearing	≤ 1.0	B
13	Bending + Shear + Torsion of Hinge Bracket	≤ 1.0	A
14	Tension in Bearing Housing	≤ 1.0	A
15	Unloading of Bracket/Frame Bolts	≤ 1.0	C
16	Bending of Door Frame	≤ 1.0	A
17	Pullout of 1" Anchor Bolts	≤ 1.0	E
18	Bending of Tie Bars	≤ 1.0	G
19	Extension of Proportioning Springs	≤ 1.0	F
20	Bending of Spring Housing Supports	≤ 1.0	A
21	Tension of Tie Bar Bolts	≤ 1.0	G
22	Bending of Frame Center Beam	≤ 1.0	A
23	Shear of Center Beam Connecting Bolts	≤ 1.0	A
24	Shear of Center Beam ½" Anchor Bolts	≤ 1.0	E

¹ Max. Calculated Stress

Code Allowable Stress

² Bases

- a). Allowable value per AISC-69 limits.
- b). Anti-Friction Bearing Manufacturers Association (AFBMA) Basic Dynamic Capacity.
- c). Side load to overcome pre-tensioning.
- d). Design load per manufacturer's recommendations.
- e). Strength values per manufacturer's literature.
- f). Stress to permanent set.
- g). Allowable stress from Section 5.3.4.3.

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SUMMARY OF RESULTS FOR TOP DECK DOOR STRUCTURAL ANALYSIS – LOCA

Item	Area	Stress Ratio ¹	Basis ²
1	Hinge band direct tension	≤ 1.0	B
2	Hinge bar - bending	≤ 1.0	A
3	Anchor bolts - tension	≤ 1.0	A
4	Floor grating - bending	≤ 1.0	C
5	Insulation tip stress - tear	≤ 1.0	C
6	Insulation tip stress - tensile	≤ 1.0	C

¹ Max Calculated Stress
Code Allowable Stress

² Basis

- A. Allowable value per Section 5.3.4.3.2
- B. ASTM-177 minimum tensile with AISC allowable
- C. Strength values per Manufacturer's literature

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SUMMARY OF RESULTS FOR TOP DECK STRUCTURE (STRESS LEVELS WITHIN THE ICE CONDENSER)

Description Of Member	Load Combination		Allowable Stress (ksi)	Stress Ratio ¹
Radial Beam	Blowdown Pressure (DL + DBA)		36.0	≤ 1.0
Radial Beam	Service Load (DL+OBE)		27.0	≤ 1.0
Radial Beam	Service Load (DL+Thermal Load+OBE)		81.0	≤ 1.0
Radial Beam	Design Load (DL+DBE)		36.0	≤ 1.0
Radial Beam	Design Load (DL+DBA+DBE)		45.0	≤ 1.0
Crane Rails	DL+LL		21.6	≤ 1.0
Crane Rails	DL+LL+Thermal		21.6	≤ 1.0
Circumferential Struts (A-36 steel)	DL+LL+Thermal		21.6	≤ 1.0
Circumferential Struts	DBA + DL		21.6	≤ 1.0
Circumferential Struts	DL+OBE		21.6	≤ 1.0
Circumferential Struts	DL+TH+OBE		21.6	≤ 1.0
Circumferential Struts	DL+DBE		21.6	≤ 1.0
Circumferential Struts	DL+DBA+DBE		21.6	≤ 1.0
Radial Beam ²	Service Load (Dead Load+OBE)		27.0	≤ 1.0
Radial Beam ⁽²⁾	Design Load (Dead Load+DBE)		36.0	≤ 1.0

¹ Max Calculated Stress
Code Allowable Stress

² Stress levels outside the ice condenser – crane mass located outside ice condenser compartment

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SUMMARY OF RESULTS FOR INTERMEDIATE DECK AND DOOR ASSEMBLY STRUCTURAL ANALYSIS - LOCA

Item	Area	Stress Ratio ¹	Basis ²
1	Bending of main support beams	≤ 1.0	A
2	Tension and bending hinge arm	≤ 1.0	A
3	Bending and shear of hinge pin	≤ 1.0	A
4	Hinge bracket bolts - tension	≤ 1.0	A
5	Hinge arm - tension across hole	≤ 1.0	A
6	Shear, hinge arm to box beam	≤ 1.0	A
7	Box beam bending	≤ 1.0	A
8	Shear of foam insulation	≤ 1.0	B
9	Skin plug welds - shear	≤ 1.0	A
10	Bending - door frame angles	≤ 1.0	A
11	Bending - door frame tie beam	≤ 1.0	A

¹ Max. Calculated Stress
Code Allowable Stress

² Basis

A. Allowable value per Section 5.3.4.3.2

B. Strength values per manufacturer's literature

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SUMMARY OF RESULTS FOR AIR HANDLING UNIT SUPPORT BEAMS

(A500 GR B STEEL)

Load Combination		Allowable Stress, ksi	Stress Ratio ¹
DBA + DL		27.6	≤ 1.0
DL+OBE		27.6	≤ 1.0
DL+TH+OBE		27.6	≤ 1.0
DL+DBE		27.6	≤ 1.0
DL+DBA+DBE		27.6	≤ 1.0

¹ Max.Calculated Stress
Code Allowable Stress

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UNIT 1 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-1	G	Blind Flange	N/A ¹	Fuel Transfer Tube	20	N/A
CPN-2	F	N/A ²	N/A ⁽²⁾	Steam Generator Main Steam Outlet	30	N/A
CPN-3	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator Main Steam Outlet	30	N/A
CPN-4	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator Main Steam Outlet	30	N/A
CPN-5	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator Main Steam Outlet	30	N/A
CPN-6	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator No.1 Blowdown Outlet	2	N/A
CPN-7	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator Feedwater Inlet	14	N/A
CPN-8	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator Feedwater Inlet	14	N/A
CPN-9	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator Feedwater Inlet	14	N/A
CPN-10	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator Feedwater Inlet	14	N/A
CPN-11	D	Closed System	CS-442-1 Check	Reactor Coolant Pump Seal Water Supply	2	N/A
CPN-12	D	Closed System	CS-442-2 Check	Reactor Coolant Pump Seal Water Supply	2	N/A
CPN-13	D	Closed System	CS-442-3 Check	Reactor Coolant Pump Seal Water Supply	2	N/A
CPN-14	D	Closed System	CS-442-4 Check	Reactor Coolant Pump Seal Water Supply	2	N/A
CPN-15	D	Closed System	SI-189 Check	R.C. Relief Valve Vent Header	4	N/A
CPN-16	D	Closed System	ICM-111 Remote Manual MOV	Residual Heat Removal Inlet to R.C. Cold Legs	12	N/A
CPN-16	D	Closed System	SV-102	Residual Heat Removal Inlet to R.C. Cold Legs	12	N/A
CPN-17	A	WCR-900 Auto Trip AOV ³	WCR-901 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to Lower Containment Ventilation Unit #1	6	10

¹ Not required, 2 seals on inner flange per FSAR Q5.118.

² Not Required, extension of Containment Liner per FSAR Appendix Q.

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UNIT 1 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-18	A	WCR-904 Auto Trip AOV ⁽³⁾	WCR-905 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to Lower Containment Ventilation Unit #2	6	10
CPN-19	A	WCR-908 Auto Trip AOV ⁽³⁾	WCR-909 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to Lower Containment Ventilation Unit #3	6	10
CPN-20	A	WCR-912 Auto Trip AOV ⁽³⁾	WCR-913 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to the Lower Containment Ventilation Unit #4	6	10
CPN-21	A	WCR-902 Auto Trip AOV ⁽³⁾	WCR-903 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Lower Containment Ventilation Unit #1	6	10
CPN-22	A	WCR-906 Auto Trip AOV ⁽³⁾	WCR-907 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Lower Containment Ventilation Unit #2	6	10
CPN-23	A	WCR-910 Auto Trip AOV ⁽³⁾	WCR-911 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Lower Containment Ventilation Unit #3	6	10
CPN-24	A	WCR-914 Auto Trip AOV ⁽³⁾	WCR-915 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Lower Containment Ventilation Unit #4	6	10
CPN-25	D	Closed System	CCM-431 Remote Manual MOV	Component Cooling Water from the Pressure Equalizing Fans	1.5	N/A
CPN-25	D	Closed System	CCR-440 Remote Manual AOV	Component Cooling Water from the Main Steam Penetrations.	1.5	N/A
CPN-25	D	Closed System	CCW-244-25 Check Valve	Component Cooling Water to the Main Steam Penetrations	1	N/A
CPN-25	D	Closed System	CCW-243-25 Check Valve	Component Cooling Water to the Main Steam Penetrations	1	N/A

³ Exception in Class A piping functional class applies to this penetration.


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UNIT 1 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-25	D	Closed System	CCM-430 Remote Manual MOV	Component Cooling Water to the Pressure Equalizing Fans	1.5	N/A
CPN-26	A	WCR-923 Auto Trip AOV ⁽³⁾	WCR-922 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Upper Containment Ventilation Unit #1	3	10
CPN-26	A	WCR-955 Auto Trip AOV ⁽³⁾	WCR-945 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Reactor Coolant Pump #1 Motor Air Cooler	3	10
CPN-26	A	WCR-920 Auto Trip AOV ⁽³⁾	WCR-921 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to the Upper Containment Ventilation Unit #1	3	10
CPN-26	A	WCR-941 Auto Trip AOV ⁽³⁾	WCR-951 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to the Reactor Coolant Pump #1 Motor Air Cooler	3	10
CPN-27	A	WCR-927 Auto Trip AOV ⁽³⁾	WCR-926 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Upper Containment Ventilation Unit #2	3	10
CPN-27	A	WCR-956 Auto Trip AOV ⁽³⁾	WCR-946 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Reactor Coolant Pump #2 Motor Air Cooler	3	10
CPN-27	A	WCR-924 Auto Trip AOV ⁽³⁾	WCR-925 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to the Upper Containment Ventilation Unit #2	3	10
CPN-27	A	WCR-942 Auto Trip AOV ⁽³⁾	WCR-952 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to the Reactor Coolant Pump #2 Motor Air Cooler	3	10
CPN-28	Spare	Welded Closed	N/A	Spare	18 in sleeve	N/A
CPN-29	A	PA -343 Check Valve	PCR-40 MOV	Service Air	2	10
CPN-29	A	XCR-103 Auto Trip AOV	XCR-102 Auto Trip AOV	Instrument Air	1	10
CPN-30	Spare	Welded Cap	N/A	N/A	N/A	N/A


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UNIT 1 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-30	E	NPX-151-V1 Manual	N/A	Dead Weight Test Connection	0.5	N/A
CPN-31	A	N-160 Check Valve	DCR-207 Auto Trip AOV	Nitrogen Supply to the Reactor Coolant Drain Tank	1	10
CPN-31	A	DCR-201 Auto Trip AOV	DCR-203 Auto Trip AOV	Vents from the Reactor Coolant Drain Tank and the Pressurizer Relief Tank	1	10
CPN-31	A	DCR-611 Auto Trip AOV	DCR-610 Auto Trip AOV	Drain from the Ice Condenser Vent	3	10
CPN-31	A	DCR-621 Auto Trip AOV	DCR-620 Auto Trip AOV	Drain from the Containment Ventilation Units	1	10
CPN-31	A	ECR-33 Auto Trip AOV	ECR-35 Auto Trip AOV	Containment Air Particulate and Noble Gas Detector Sample Return	1	10
CPN-32	A	SI-171 or SI-172 Manual Valves	SI-194 Manual Valve	Safety Injection Test Line and Accumulator Test Line	0.75	N/A
CPN-32	A	N-102 Check Valve	GCR-314 Auto Test AOV	Nitrogen Supply to the Accumulators	1	10
CPN-32	A	ECR-31 Auto Trip AOV	ECR-32 Auto Trip AOV	Sample Line to the Containment Air Particulate and Noble Gas Detector	1	10
CPN-32	A	ECR-535 Auto Trip AOV	ECR-536 Auto Trip AOV	Sample Line to the Containment Air Particulate and Radio Gas Detector -Lower Containment	0.5	10
CPN-33	Spare	Plugged	N/A	Spare	N/A	N/A
CPN-33	A	PW-275 Check Valve	NCR-252 Auto Trip AOV	Primary Water Supply to the Pressurizer Relief Tank	3	10
CPN-34	A	QCR-301 Auto Trip AOV	QCR-300 Auto Trip AOV	Letdown Line (CVCS)	2	10


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UNIT 1 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-35	D	Closed System	CS-321 Check Valve	Charging Line (CVCS)	3	N/A
CPN-36	A	SF-153 Manual Valve	SF-151 Manual Valve	Refueling Water Supply to the Refueling Cavity	2.5	N/A
CPN-36	A	1-QCR-920 Auto Trip AOV ⁽³⁾	1-QCR-919 Auto Trip AOV ⁽³⁾	Demineralized Water to the Refueling Cavity	2	10
CPN-37	A	QCM-250 Auto Trip MOV	QCM-350 Auto Trip MOV	R.C. Pumps Seal Water & Excess Letdown Heat Exchanger Discharges	4	15
CPN-38	A	CCM-459 Auto Trip MOV	CCM-458 Auto Trip MOV	R.C.Pump Motor and Thermal Barrier Cooling Water Supply	8	60
CPN-39	A	CCM-451 Auto Trip MOV	CCM-452 Auto Trip MOV	R.C.Pump Motor and Thermal Barrier Cooling Water Discharge	8	60
CPN-40	A	DCR-205 Auto Trip AOV ⁽³⁾	DCR-206 Auto Trip AOV ⁽³⁾	Reactor Coolant Drain Tank Pump Suction	4	10
CPN-41	A	DCR-600 Auto Trip AOV ⁽³⁾	DCR-601 Auto Trip AOV ⁽³⁾	Containment Sump Pump Discharge to Waste Disposal	3	10
CPN-42	A	SF-159 Manual Valve	SF-160 Manual Valve	Refueling Cavity Drain to Purification System	3	N/A
CPN-43	D	Closed System	ICM-260 Remote Manual MOV	Safety Injection to the RCS Hot/Cold Legs	4	N/A


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UNIT 1 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-44	D	Closed System	ICM-250 Remote Manual MOV or ICM-251 Remote Manual MOV	Boron Injection Inlet	3	N/A
CPN-45	D	Closed System	ICM-305 Remote Manual MOV	Residual Heat Removal Suction from Recirc Sump	18	N/A
CPN-46	D	Closed System	ICM-306 Remote Manual MOV	Residual Heat Removal Suction from Recirc Sump	18	N/A
CPN-47	D	Closed System	ICM-129 Remote Manual MOV	Residual Heat Removal Inlet to RHR Pumps	14	N/A
CPN-47	D	Closed System	SV-103 Relief Valve	Residual Heat Removal Inlet to RHR Pumps	14	N/A
CPN-48	D	Closed System	ICM-321 Remote Manual MOV	Residual Heat Removal to R.C. Hot Legs - Low Head S.I.	8	N/A
CPN-49	D	Closed System	ICM-311 Remote Manual MOV	Residual Heat Removal to R.C. Hot Legs - Low Head S.I.	8	N/A
CPN-50	D	Closed System	RH-142 Check Valve	RHR to Containment Spray	8	N/A
CPN-51	D	Closed System	RH-141 Check Valve	RHR to Containment Spray	8	N/A
CPN-52	D	Closed System	CTS-131W Check Valve	Upper Containment Spray Inlet	8	N/A
CPN-53	D	Closed System	CTS-131E Check Valve	Upper Containment Spray Inlet	8	N/A


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Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-54	D	Closed System	CTS-127W Check Valve	Lower Containment Spray Inlet	6	N/A
CPN-55	D	Closed System	CTS-127E Check Valve	Lower Containment Spray Inlet	6	N/A
CPN-56	A	VCR-21 Auto Trip AOV or R157 Check Valve	VCR-20 Auto Trip AOV	Glycol to Ice Condenser Fan Coolers	3	10
CPN-57	G	Blind Flange	Blind Flange	Ice Loading Line	4	N/A
CPN-58	A	CCM-453 Auto Trip MOV	CCM-454 Auto Trip MOV	Reactor Coolant Pump Thermal Barrier Cooling Water Discharge	4	30
CPN-59	A	VCR-105 Auto Trip AOV	VCR-205 Auto Trip AOV	Upper Containment Purge Air Inlet	30	5
CPN-60	A	VCR-106 Auto Trip AOV	VCR-206 Auto Trip AOV	Upper Containment Purge Air Outlet	24	5
CPN-61	A	VCR-101 Auto Trip AOV	VCR-201 Auto Trip AOV	Purge Air Inlet (Instrumentation Room)	14	5
CPN-62	A	VCR-102 Auto Trip AOV	VCR-202 Auto Trip AOV	Purge Air Outlet (Instrumentation Room)	14	5
CPN-63	A	VCR-104 Auto Trip AOV	VCR-204 Auto Trip AOV	Lower Containment Purge Air Outlet	30	5
CPN-64	A	VCR-103 Auto Trip AOV	VCR-203 Auto Trip AOV	Lower Containment Purge Air Inlet	24	5
CPN-65	A	VCR-107 Auto Trip AOV	VCR-207 Auto Trip AOV	Upper Containment Pressure Relief Line	12	5


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Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-66	A	NCR-105 Auto Trip AOV	NCR-106 Auto Trip AOV	Sample Line from the RCS Hot Legs	0.5	10
CPN-66	A	NCR-107 Auto Trip AOV	NCR-108 Auto Trip AOV	Sample Line from the Pressurizer Liquid Space	0.5	10
CPN-66	A	NCR-109 Auto Trip AOV	NCR-110 Auto Trip AOV	Sample Line from the Pressurizer Steam Space	0.5	10
CPN-66	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator #1 Blowdown Sample	0.5	N/A
CPN-66	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator #2 Blowdown Sample	0.5	N/A
CPN-66	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator #3 Blowdown Sample	0.5	N/A
CPN-66	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator #4 Blowdown Sample	0.5	N/A
CPN-66	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator #1 Steam Space Steam Sample	0.5	N/A
CPN-66	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator #2 Steam Space Steam Sample	0.5	N/A
CPN-66	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator #3 Steam Space Steam Sample	0.5	N/A
CPN-66	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator #4 Steam Space Steam Sample	0.5	N/A
CPN-67	A	ECR-416 Auto Trip AOV	ECR-417 Auto Trip AOV	Post Accident Sampling System	0.5	10
CPN-67	A	NS - 357 Check Valve	ECR-496 or ECR-497 Auto Trip AOV	Post Accident Sampling System Return	0.5	10
CPN-68	D	Closed System	ICM-265 Remote Manual MOV	Safety Injection to the RCS Hot/ColdLegs	4	N/A
CPN-69	Spare	Welded Closed	N/A	Spare	18 in sleeve	N/A
CPN-70	Spare	Welded Closed	N/A	Spare	1	N/A
CPN-70	Spare	Welded Closed	N/A	Spare	1	N/A


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Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-70	Spare	Welded Closed	N/A	Spare	1	N/A
CPN-70	Spare	Welded Closed	N/A	Spare	1	N/A
CPN-70	Spare	Welded Closed	N/A	Spare	1	N/A
CPN-70	A	SM-1 Check Valve	ECR-36 Auto Trip AOV	Radiation Monitor ERS-2400 Isolation Valve	1	10
CPN-71	G	Blind Flange	Hinged Flange	Containment Service Penetration	18	N/A
CPN-72	D	Closed System	CCM-433 Remote Manual MOV	Component Cooling Water from the Pressure Equalizing Fans	1.5	N/A
CPN-72	D	Closed System	CCR-441 Remote Manual MOV	Component Cooling Water from the Main Steam Penetrations.	2	N/A
CPN-72	D	Closed System	CCW-244-72 Check Valve	Component Cooling Water to the Main Steam Penetrations	1	N/A
CPN-72	D	Closed System	CCW-243-72 Check Valve	Component Cooling Water to the Main Steam Penetrations	1	N/A
CPN-72	D	Closed System	CCM-432 Remote Manual MOV	Component Cooling Water to the Pressure Equalizing Fans	1.5	N/A
CPN-73	A	WCR-960 Auto Trip AOV ⁽³⁾	WCR-961 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to the Instrument Room Ventilation Unit E	2.5	10
CPN-73	A	WCR-962 Auto Trip AOV ⁽³⁾	WCR-963 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Instrument Room Ventilation Unit E	2.5	10
CPN-73	A	WCR-964 Auto Trip AOV ⁽³⁾	WCR-965 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to the Instrument Room Ventilation Unit W	2.5	10
CPN-73	A	WCR-966 Auto Trip AOV ⁽³⁾	WCR-967 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Instrument Room Ventilation Unit W	2.5	10


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Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-74	A	XCR-100 Auto Trip AOV	XCR-101 Auto Trip AOV	Instrument Air	1	10
CPN-74	A	N-159 Check Valve	GCR-301 Auto Trip AOV	Nitrogen Supply to the Pressurizer Relief Tank	0.75	10
CPN-75	C	Closed System	CCR-460 Auto Trip AOV	Excess Letdown Heat Exchanger Component Cooling Water Outlet	4	10
CPN-75	C	Closed System	CCR - 462 Auto Trip AOV	Excess Letdown Heat Exchanger Component Cooling Water Inlet	4	10
CPN-76	G	Blind Flange	Blind Flange	Incore Flux Detection System	8	N/A
CPN-77	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator No.2 Blowdown Outlet	2	N/A
CPN-78	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator No.3 Blowdown Outlet	2	N/A
CPN-79	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator No.4 Blowdown Outlet	2	N/A
CPN-80	G	Blind Flange	Blind Flange	Ice Loading Return	5	N/A
CPN-81	A	RCR-100 Auto Trip AOV	RCR-101 Auto Trip AOV	Sample Line from the Pressurizer Relief Tank to the Gas Analyzer	0.5	10
CPN-81	A	DCR-202 Auto Trip AOV	DCR-204 Auto Trip AOV	Sample Line from the Reactor Coolant Drain Tank to the Gas Analyzer	0.5	10
CPN-81	A	ICR-5 Auto Trip AOV	ICR-6 Auto Trip AOV	Sample Line from the Accumulators	0.5	10
CPN-82	A	CCR-456 Auto Trip AOV	CCR-457 Auto Trip AOV	Reactor Support Cooling Water Outlet	2.5	10
CPN-82	A	CCW-135 Check Valve	CCR-455 Auto Trip AOV	Reactor Support Cooling Water Inlet	2.5	10
CPN-83	G	Hinged Flange	Hinged Flange	Containment Service Penetration	N/A	N/A


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Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-84	A	WCR-954 Auto Trip AOV ⁽³⁾	WCR-944 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to the Reactor Coolant Pump #4 Motor Air Cooler	3	10
CPN-84	A	WCR-948 Auto Trip AOV ⁽³⁾	WCR-958 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Reactor Coolant Pump #4 Motor Air Cooler	3	10
CPN-84	A	WCR-933 Auto Trip AOV ⁽³⁾	WCR-932 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to the Upper Containment Ventilation Unit #4	3	10
CPN-84	A	WCR-934 Auto Trip AOV ⁽³⁾	WCR-935 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Upper Containment Ventilation Unit #4	3	10
CPN-85	A	WCR-953 Auto Trip AOV ⁽³⁾	WCR-943 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to the Reactor Coolant Pump #3 Motor Air Cooler	3	10
CPN-85	A	WCR-947 Auto Trip AOV ⁽³⁾	WCR-957 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Reactor Coolant Pump #3 Motor Air Cooler	3	10
CPN-85	A	WCR-929 Auto Trip AOV ⁽³⁾	WCR-928 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to the Upper Containment Ventilation Unit #3	3	10
CPN-85	A	WCR-930 Auto Trip AOV ⁽³⁾	WCR-931 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Upper Containment Ventilation Unit #3	3	10
CPN-86	A	VCR-11 Auto Trip AOV or R156 Check Valve	VCR-10 Auto Trip AOV	Glycol Supply from Ice Condenser Fan Coolers	3	10
CPN-87	Spare	Welded Closed	N/A	Spare	6 in sleeve	N/A
CPN-88	Spare	Welded Closed	N/A	Spare	6 in sleeve	N/A
CPN-89	A	SM-8 Manual Valve	SM-10 Manual Valve	Upper Containment Radiation Sampling System	0.5	N/A
CPN-90	Spare	Welded Closed	N/A	Spare	6 in sleeve	N/A

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UNIT 1 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-91	E	Membrane (Sensor Bellows)	HI ⁴	Reactor Vessel Level Instrumentation System 1-NLS-111	0.5	N/A
CPN-91	E	Membrane (Sensor Bellows)	HI ⁽⁴⁾	Reactor Vessel Level Instrumentation System 1-NLS-121	0.5	N/A
CPN-91	E	Membrane (Sensor Bellows)	HI ⁽⁴⁾	Reactor Vessel Level Instrumentation System 1-NLS-131	0.5	N/A
CPN-91	E	PPP-302-V1 Manual Valve	N/A	Containment Pressure Transmitter	0.5	N/A
CPN-91	Spare	Welded Closed	N/A	Spare	0.5	N/A
CPN-91	Spare	Welded Closed	N/A	Spare	0.5	N/A
CPN-92	E	PPP-301-V1 Manual Valve	N/A	Containment Pressure Transmitter	0.5	N/A
CPN-92	A	SM-6 Manual Valve	SM-4 Manual Valve	Instrument Room Air Sample Piping	0.5	N/A
CPN-93	A	ECR-14 Auto Trip AOV	ECR-24 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 4	0.5	10
CPN-93	A	ECR-16 Auto Trip AOV	ECR-26 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 6	0.5	10
CPN-93	A	ECR-17 Auto Trip AOV	ECR-27 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 7	0.5	10
CPN-93	A	ECR-18 Auto Trip AOV	ECR-28 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 8	0.5	10

⁴ Hydraulically Isolated (HI)


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Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-93	A	ECR-19 Auto Trip AOV	ECR-29 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 9	0.5	10
CPN-94	E	PPP-300-V1 Manual Valve	N/A	Containment Pressure Transmitter	0.5	N/A
CPN-94	E	Membrane (Sensor Bellows)	HI ⁽⁴⁾	Reactor Vessel Level Instrumentation System 1- NLS-120	0.5	N/A
CPN-95	A	ECR-11 Auto Trip AOV	ECR-21 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 1	0.5	10
CPN-95	A	ECR-12 Auto Trip AOV	ECR-22 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 2	0.5	10
CPN-95	A	ECR-13 Auto Trip AOV	ECR-23 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 3	0.5	10
CPN-95	A	ECR-15 Auto Trip AOV	ECR-25 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 5	0.5	10
CPN-95	A	ECR-10 Auto Trip AOV or ECR-20 Auto Trip AOV	NS-283 Check Valve	Containment Hydrogen Monitoring System - Hydrogen Sample Return	0.5	10
CPN-96	E	PPP-303-V1 Manual Valve	N/A	Containment Pressure Transmitter	0.5	N/A
CPN-96	E	PPX-301-V1 Manual Valve	N/A	Containment Pressure Transmitter	0.5	N/A
CPN-97	E	PPA-310-V1 Manual Valve	N/A	Containment Pressure Transmitter	0.5	N/A


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Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-97	E	Membrane (Sensor Bellows)	HI ⁽⁴⁾	Reactor Vessel Level Instrumentation System 1-NLS-130	0.5	N/A
CPN-98	E	PPA-312-V1 Manual Valve	N/A	Containment Pressure Transmitter	0.5	N/A
CPN-98	E	Membrane (Sensor Bellows)	HI ⁽⁴⁾	Reactor Vessel Level Instrumentation System 1-NLS-110	0.5	N/A


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UNIT 2 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-1	G	Blind Flange	N/A ⁽¹⁾	Fuel Transfer Tube	20	N/A
CPN-2	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator Main Steam Outlet	30	N/A
CPN-3	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator Main Steam Outlet	30	N/A
CPN-4	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator Main Steam Outlet	30	N/A
CPN-5	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator Main Steam Outlet	30	N/A
CPN-6	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator No.1 Blowdown Outlet	2	N/A
CPN-7	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator Feedwater Inlet	14	N/A
CPN-8	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator Feedwater Inlet	14	N/A
CPN-9	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator Feedwater Inlet	14	N/A
CPN-10	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator Feedwater Inlet	14	N/A
CPN-11	D	Closed System	CS-442-1 Check	Reactor Coolant Pump Seal Water Supply	2	N/A
CPN-12	D	Closed System	CS-442-2 Check	Reactor Coolant Pump Seal Water Supply	2	N/A
CPN-13	D	Closed System	CS-442-3 Check	Reactor Coolant Pump Seal Water Supply	2	N/A
CPN-14	D	Closed System	CS-442-4 Check	Reactor Coolant Pump Seal Water Supply	2	N/A
CPN-15	D	Closed System	SI-189 Check	R.C.Relief Valve Vent Header	4	N/A
CPN-16	D	Closed System	ICM-111 Remote Manual MOV	Residual Heat Removal Inlet to R.C. Cold Legs	12	N/A
CPN-16	D	Closed System	SV-102	Residual Heat Removal Inlet to R.C. Cold Legs	12	N/A
CPN-17	A	WCR-901 Auto Trip AOV ⁽³⁾	WCR-900 AutoTrip AOV ⁽³⁾	Non-Essential Service Water to Lower Containment Ventilation Unit #1	6	10
CPN-18	A	WCR-905 Auto Trip AOV ⁽³⁾	WCR-904 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to Lower Containment Ventilation Unit #2	6	10


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UNIT 2 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-19	A	WCR-909 Auto Trip AOV ⁽³⁾	WCR-908 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to Lower Containment Ventilation Unit #3	6	10
CPN-20	A	WCR-913 Auto Trip AOV ⁽³⁾	WCR-912 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to the Lower Containment Ventilation Unit #4	6	10
CPN-21	A	WCR-902 Auto Trip AOV ⁽³⁾	WCR-903 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Lower Containment Ventilation Unit #1	6	10
CPN-22	A	WCR-906 Auto Trip AOV ⁽³⁾	WCR-907 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Lower Containment Ventilation Unit #2	6	10
CPN-23	A	WCR-910 Auto Trip AOV ⁽³⁾	WCR-911 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Lower Containment Ventilation Unit #3	6	10
CPN-24	A	WCR-914 Auto Trip AOV ⁽³⁾	WCR-915 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Lower Containment Ventilation Unit #4	6	10
CPN-25	D	Closed System	CCM-431 Remote Manual MOV	Component Cooling Water from the Pressure Equalizing Fans	1.5	N/A
CPN-25	D	Closed System	CCR-440 Remote Manual AOV	Component Cooling Water from the Main Steam Penetrations.	1.5	N/A
CPN-25	D	Closed System	CCW-244-25 Check Valve	Component Cooling Water to the Main Steam Penetrations	1	N/A
CPN-25	D	Closed System	CCW-243-25 Check Valve	Component Cooling Water to the Main Steam Penetrations	1	N/A
CPN-25	D	Closed System	CCM-430 Remote Manual MOV	Component Cooling Water to the Pressure Equalizing Fans	1.5	N/A
CPN-26	A	WCR-922 Auto Trip AOV	WCR-923 Auto Trip AOV	Non-Essential Service Water from the Upper Containment Ventilation Unit #1	3	10


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Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-26	A	WCR-945 Auto Trip AOV	WCR-955 Auto Trip AOV	Non-Essential Service Water from the Reactor Coolant Pump #1 Motor Air Cooler	3	10
CPN-26	A	WCR-921 Auto Trip AOV	WCR-920 Auto Trip AOV	Non-Essential Service Water to the Upper Containment Ventilation Unit #1	3	10
CPN-26	A	WCR-951 Auto Trip AOV	WCR-941 Auto Trip AOV	Non-Essential Service Water to the Reactor Coolant Pump #1 Motor Air Cooler	3	10
CPN-27	A	WCR-926 Auto Trip AOV	WCR-927 Auto Trip AOV	Non-Essential Service Water from the Upper Containment Ventilation Unit #2	3	10
CPN-27	A	WCR-946 Auto Trip AOV	WCR-956 Auto Trip AOV	Non-Essential Service Water from the Reactor Coolant Pump #2 Motor Air Cooler	3	10
CPN-27	A	WCR-925 Auto Trip AOV	WCR-924 Auto Trip AOV	Non-Essential Service Water to the Upper Containment Ventilation Unit #2	3	10
CPN-27	A	WCR-952 Auto Trip AOV	WCR-942 Auto Trip AOV	Non-Essential Service Water to the Reactor Coolant Pump #2 Motor Air Cooler	3	10
CPN-28	Spare	Welded Closed	N/A	Spare	18 in sleeve	N/A
CPN-29	A	PA-342 Check Valve	PCR-40 Auto Trip AOV	Service Air	2	10
CPN-29	A	XCR-102 Auto Trip AOV	XCR-103 Auto Trip AOV	Instrument Air	1	10
CPN-30	Spare	Welded Cap	N/A	N/A	N/A	N/A
CPN-30	E	NPX-151-V1 Manual	N/A	Dead Weight Test Connection	0.5	N/A
CPN-31	A	DCR-207 Auto Trip AOV	N-160 Check Valve	Nitrogen Supply to the Reactor Coolant Drain Tank	1	10


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UNIT 2 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-31	A	DCR-201 Auto Trip AOV	DCR-203 Auto Trip AOV	Vents from the Reactor Coolant Drain Tank and the Pressurizer Relief Tank	1	10
CPN-31	A	DCR-610 Auto Trip AOV	DCR-611 Auto Trip AOV	Drain from the Ice Condenser Vent	3	10
CPN-31	A	DCR-620 Auto Trip AOV	DCR-621 Auto Trip AOV	Drain from the Containment Ventilation Units	1	10
CPN-31	A	ECR-33 Auto Trip AOV	ECR-35 Auto Trip AOV	Containment Air Particulate and Radio Gas Detector Sample Return	1	10
CPN-32	A	SI-171 or SI-172 Manual Valves	SI-194 Manual Valve	Safety Injection Test Line and Accumulator Test Line	0.75	N/A
CPN-32	A	N-102 Check Valve	GCR-314 Auto Test AOV	Nitrogen Supply to the Accumulators	1	10
CPN-32	A	ECR-31 Auto Trip AOV	ECR-32 Auto Trip AOV	Sample Line to the Containment Air Particulate and Radio Gas Detector	1	10
CPN-32	A	ECR-535 Auto Trip AOV	ECR-536 Auto Trip AOV	Sample Line to the Containment Air Particulate and Radio Gas Detector -Lower Containment	0.5	10
CPN-33	Spare	N/A	N/A	N/A	N/A	N/A
CPN-33	A	PW-275 Check Valve	NCR-252 Auto Trip AOV	Primary Water Supply to the Pressurizer Relief Tank	3	10
CPN-34	A	QCR-301 Auto Trip AOV	QCR-300 Auto Trip AOV	Letdown Line (CVCS)	2	10
CPN-35	D	Closed System	CS-321 Check Valve	Charging Line (CVCS)	3	N/A
CPN-36	A	2S-152 Manual Valve	2SF-154 Manual Valve	Refueling Water Supply to the Refueling Cavity	2.5	N/A


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UNIT 2 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-36	A	QCR-919 Auto Trip AOV ⁽³⁾	QCR-920 Auto Trip AOV ⁽³⁾	Demineralized Water to the Refueling Cavity	2	10
CPN-37	A	QCM-250 Auto Trip MOV	QCM-350 Auto Trip MOV	R.C. Pumps Seal Water & Excess Letdown Heat Exchanger Discharges	4	15
CPN-38	A	CCM-458 Auto Trip MOV	CCM-459 Auto Trip MOV	R.C.Pump Motor and Thermal Barrier Cooling Water Supply	8	60
CPN-39	A	CCM-451 Auto Trip MOV	CCM-452 Auto Trip MOV	R.C.Pump Motor and Thermal Barrier Cooling Water Discharge	8	60
CPN-40	A	DCR-205 Auto Trip AOV ⁽³⁾	DCR-206 Auto Trip AOV ⁽³⁾	Reactor Coolant Drain Tank Pump Suction	4	10
CPN-41	A	DCR-600 Auto Trip AOV	DCR-601 Auto Trip AOV	Containment Sump Pump Discharge to Waste Disposal	3	10
CPN-42	A	SF-159 Manual Valve	SF-160 Manual Valve	Refueling Cavity Drain to Purification System	3	N/A
CPN-43	D	Closed System	ICM-265 Remote Manual MOV	Safety Injection to the RCS Hot/Cold Legs	4	N/A
CPN-44	D	Closed System	ICM-250 Remote Manual MOV or ICM - 251 Remote Manual MOV	Boron Injection Inlet	3	N/A
CPN-45	D	Closed System	ICM-305 Remote Manual MOV	Residual Heat Removal Suction from Recirc Sump	18	N/A
CPN-46	D	Closed System	ICM-306 Remote Manual MOV	Residual Heat Removal Suction from Recirc Sump	18	N/A


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UNIT 2 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-47	D	Closed System	ICM-129 Remote Manual MOV	Residual Heat Removal Inlet to RHR Pumps	14	N/A
CPN-47	D	Closed System	SV-103 Relief Valve	Residual Heat Removal Inlet to RHR Pumps	14	N/A
CPN-48	D	Closed System	ICM-321 Remote Manual MOV	Residual Heat Removal to R.C. Hot Legs - Low Head S.I.	8	N/A
CPN-49	D	Closed System	ICM-311 Remote Manual MOV	Residual Heat Removal to R.C. Hot Legs - Low Head S.I.	8	N/A
CPN-50	D	Closed System	RH-142 Check Valve	RHR to Containment Spray	8	N/A
CPN-51	D	Closed System	RH-141 Check Valve	RHR to Containment Spray	8	N/A
CPN-52	D	Closed System	CTS-131W Check Valve	Upper Containment Spray Inlet	8	N/A
CPN-53	D	Closed System	CTS-131E Check Valve	Upper Containment Spray Inlet	8	N/A
CPN-54	D	Closed System	CTS-127W Check Valve	Lower Containment Spray Inlet	6	N/A
CPN-55	D	Closed System	CTS-127E Check Valve	Lower Containment Spray Inlet	6	N/A
CPN-56	A	R157 Check Valve or VCR-21 Auto Trip AOV	VCR-20 Auto Trip AOV	Glycol to Ice Condenser Fan Coolers	3	10
CPN-57	G	Blind Flange	Blind Flange	Ice Loading Line	4	N/A


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UNIT 2 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-58	A	CCM-453 Auto Trip MOV	CCM-454 Auto Trip MOV	Reactor Coolant Pump Thermal Barrier Cooling Water Discharge	4	30
CPN-59	A	VCR-105 Auto Trip AOV	VCR-205 Auto Trip AOV	Upper Containment Purge Air Inlet	30	5
CPN-60	A	VCR-106 Auto Trip AOV	VCR-206 Auto Trip AOV	Upper Containment Purge Air Outlet	24	5
CPN-61	A	VCR-101 Auto Trip AOV	VCR-201 Auto Trip AOV	Purge Air Inlet (Instrumentation Room)	14	5
CPN-62	A	VCR-102 Auto Trip AOV	VCR-202 Auto Trip AOV	Purge Air Outlet (Instrumentation Room)	14	5
CPN-63	A	VCR-104 Auto Trip AOV	VCR-204 Auto Trip AOV	Lower Containment Purge Air Outlet	30	5
CPN-64	A	VCR-103 Auto Trip AOV	VCR-203 Auto Trip AOV	Lower Containment Purge Air Inlet	24	5
CPN-65	A	VCR-107 Auto Trip AOV	VCR-207 Auto Trip AOV	Upper Containment Pressure Relief Line	12	5
CPN-66	A	NCR-105 Auto Trip AOV	NCR-106 Auto Trip AOV	Sample Line from the RCS Hot Legs	0.5	10
CPN-66	A	NCR-107 Auto Trip AOV	NCR-108 Auto Trip AOV	Sample Line from the Pressurizer Liquid Space	0.5	10
CPN-66	A	NCR-109 Auto Trip AOV	NCR-110 Auto Trip AOV	Sample Line from the Pressurizer Steam Space	0.5	10
CPN-66	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator #1 Blowdown Sample	0.5	N/A
CPN-66	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator #2 Blowdown Sample	0.5	N/A
CPN-66	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator #3 Blowdown Sample	0.5	N/A


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UNIT 2 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-66	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator #4 Blowdown Sample	0.5	N/A
CPN-66	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator #1 Steam Space Steam Sample	0.5	N/A
CPN-66	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator #2 Steam Space Steam Sample	0.5	N/A
CPN-66	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator #3 Steam Space Steam Sample	0.5	N/A
CPN-66	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator #4 Steam Space Steam Sample	0.5	N/A
CPN-67	A	ECR-416 Auto Trip AOV	ECR-417 Auto Trip AOV	Containment Sump Sample	0.5	10
CPN-67	A	ECR-496 Auto Trip AOV or ECR-497 Auto Trip AOV	NS-357 Check Valve	Post Accident Sampling System Return	0.5	10
CPN-67	G	Blind Flange	Blind Flange	For Maintenance to the Containment Annulus for Outage	2	N/A
CPN-68	D	Closed System	ICM-260 Remote Manual MOV	Safety Injection to the RCS Hot/Cold Legs	4	N/A
CPN-69	Spare	Welded Closed	N/A	Spare	18 in sleeve	N/A
CPN-70	Spare	Welded Closed	N/A	Spare	1	N/A
CPN-70	Spare	Welded Closed	N/A	Spare	1	N/A
CPN-70	Spare	Welded Closed	N/A	Spare	1	N/A
CPN-70	Spare	Welded Closed	N/A	Spare	1	N/A
CPN-70	Spare	Welded Closed	N/A	Spare	1	N/A
CPN-70	A	SM-1 Check Valve	ECR-36 Auto Trip AOV	Radiation Monitor ERS-2400 Isolation Valve	1	10
CPN-71	G	Blind Flange	Blind Flange	Containment Service Penetration	18	N/A


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UNIT 2 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-72	D	Closed System	CCM-433 Remote Manual MOV	Component Cooling Water from the Pressure Equalizing Fans	1.5	N/A
CPN-72	D	Closed System	CCR-441 Remote Manual MOV	Component Cooling Water from the Main Steam Penetrations.	1.5	N/A
CPN-72	D	Closed System	CCW-244-72 Check Valve	Component Cooling Water to the Main Steam Penetrations	1	N/A
CPN-72	D	Closed System	CCW-243-72 Check Valve	Component Cooling Water to the Main Steam Penetrations	1	N/A
CPN-72	D	Closed System	CCM-432 Remote Manual MOV	Component Cooling Water to the Pressure Equalizing Fans	1.5	N/A
CPN-73	A	WCR-961 Auto Trip AOV ⁽³⁾	WCR-960 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to the Instrument Room Ventilation Unit E	2.5	10
CPN-73	A	WCR-963 Auto Trip AOV ⁽³⁾	WCR-962 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Instrument Room Ventilation Unit E	2.5	10
CPN-73	A	WCR-965 Auto Trip AOV ⁽³⁾	WCR-964 Auto Trip AOV ⁽³⁾	Non-Essential Service Water to the Instrument Room Ventilation Unit W	2.5	10
CPN-73	A	WCR-967 Auto Trip AOV ⁽³⁾	WCR-966 Auto Trip AOV ⁽³⁾	Non-Essential Service Water from the Instrument Room Ventilation Unit W	2.5	10
CPN-74	A	XCR-100 Auto Trip AOV	XCR-101 Auto Trip AOV	Instrument Air	1	10
CPN-74	A	N-159 Check Valve	GCR-301 Auto Trip AOV	Nitrogen Supply to the Pressurizer Relief Tank	0.75	10
CPN-75	C	Closed System	CCR-460 Auto Trip AOV	Excess Letdown Heat Exchanger Component Cooling Water Outlet	4	10


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UNIT 2 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-75	C	Closed System	CCR-462 Auto Trip AOV	Excess Letdown Heat Exchanger Component Cooling Water Inlet	4	10
CPN-76	G	Blind Flange	Blind Flange	Incore Flux Detection System	8	N/A
CPN-76	A	SM-4 Needle Valve	SM-6 Needle Valve	Instrument Room Air Sample Piping	0.5	N/A
CPN-77	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator No.2 Blowdown Outlet	2	N/A
CPN-78	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator No.3 Blowdown Outlet	2	N/A
CPN-79	F	N/A ⁽²⁾	N/A ⁽²⁾	Steam Generator No.4 Blowdown Outlet	2	N/A
CPN-80	G	Blind Flange	Blind Flange	Ice Loading Return	5	N/A
CPN-81	A	RCR-100 Auto Trip AOV	RCR-101 Auto Trip AOV	Sample Line from the Pressurizer Relief Tank to the Gas Analyzer	0.5	10
CPN-81	A	DCR 202 Auto Trip AOV	DCR-204 Auto Trip AOV	Sample Line from the Reactor Coolant Drain Tank to the Gas Analyzer	0.5	10
CPN-81	A	ICR-5 Auto Trip AOV	ICR-6 Auto Trip AOV	Sample Line from the Accumulators	0.5	10
CPN-82	A	CCR-456 Auto Trip AOV	CCR-457 Auto Trip AOV	Reactor Support Cooling Water Outlet	2.5	10
CPN-82	A	CCW-135 Check Valve	CCR-455 Auto Trip AOV	Reactor Support Cooling Water Inlet	2.5	10
CPN-83	Spare	Capped per RFC-2895	N/A	Containment Weld Channel Pressurization Air Supply	0.5	N/A
CPN-83	Spare	Capped per RFC-2895	N/A	Containment Weld Channel Pressurization Air Supply	0.5	N/A
CPN-84	A	WCR-954 Auto Trip AOV	WCR-944 Auto Trip AOV	Non-Essential Service Water to the Reactor Coolant Pump #4 Motor Air Cooler	3	10


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UNIT 2 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-84	A	WCR-948 Auto Trip AO	WCR-958 Auto Trip AOV	Non-Essential Service Water from the Reactor Coolant Pump #4 Motor Air Cooler	3	10
CPN-84	A	WCR-933 Auto Trip AOV	WCR-932 Auto Trip AOV	Non-Essential Service Water to the Upper Containment Ventilation Unit #4	3	10
CPN-84	A	WCR-934 Auto Trip AOV	WCR-935 Auto Trip AOV	Non-Essential Service Water from the Upper Containment Ventilation Unit #4	3	10
CPN-85	A	WCR-953 Auto Trip AOV	WCR-943 Auto Trip AOV	Non-Essential Service Water to the Reactor Coolant Pump #3 Motor Air Cooler	3	10
CPN-85	A	WCR-947 Auto Trip AOV	WCR-957 Auto Trip AOV	Non-Essential Service Water from the Reactor Coolant Pump #3 Motor Air Cooler	3	10
CPN-85	A	WCR-929 Auto Trip AOV	WCR-928 Auto Trip AOV	Non-Essential Service Water to the Upper Containment Ventilation Unit #3	3	10
CPN-85	A	WCR-930 Auto Trip AOV	WCR-931 Auto Trip AOV	Non-Essential Service Water from the Upper Containment Ventilation Unit #3	3	10
CPN-86	A	VCR-11 Auto Trip AOV or R-156 Check Valve	VCR-10 Auto Trip AOV	Glycol Supply from Ice Condenser Fan Coolers	3	10
CPN-87	Spare	Welded Closed	N/A	Spare	6 in sleeve	N/A
CPN-88	Spare	Welded Closed	N/A	Spare	6 in sleeve	N/A
CPN-89	A	SM-8 Manual Valve	SM-10 Manual Valve	Upper Containment Radiation Sampling System	0.5	N/A
CPN-90	Spare	Welded Closed	N/A	Spare	6 in sleeve	N/A
CPN-91	E	Membrane (Sensor Bellows)	HI ⁽⁴⁾	Reactor Vessel Level Instrumentation System	0.5	N/A


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UNIT 2 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-91	E	Membrane (Sensor Bellows)	HI ⁽⁴⁾	Reactor Vessel Level Instrumentation System	0.5	N/A
CPN-91	E	PPP-302-V1 Manual Valve	N/A	Containment Pressure Transmitter	0.5	N/A
CPN-92	E	PPP-301-V1 Manual Valve	N/A	Containment Pressure Transmitter	0.5	N/A
CPN-93	A	ECR-14 Auto Trip AOV	ECR-24 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 4	0.5	10
CPN-93	A	ECR-16 Auto Trip AOV	ECR-26 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 6	0.5	10
CPN-93	A	ECR-17 Auto Trip AOV	ECR-27 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 7	0.5	10
CPN-93	A	ECR-18 Auto Trip AOV	ECR-28 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 8	0.5	10
CPN-93	A	ECR-19 Auto Trip AOV	ECR-29 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 9	0.5	10
CPN-94	E	PPP-300-V1 Manual Valve	N/A	Containment Pressure Transmitters	0.5	N/A
CPN-94	E	Membrane (Sensor Bellows)	HI ⁽⁴⁾	Reactor Vessel Level Instrumentation System	0.5	N/A
CPN-95	A	ECR-11 Auto Trip AOV	ECR-21 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 1	0.5	10
CPN-95	A	ECR-12 Auto Trip AOV	ECR-22 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 2	0.5	10

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UNIT 2 CONTAINMENT PENETRATION ISOLATION BARRIERS

Containment Penetration Number	Class	Barrier Number 1	Barrier Number 2	Line Isolated (Service)	Line Size (in)	Closure Time (Sec.)
CPN-95	A	ECR-13 Auto Trip AOV	ECR-23 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 3	0.5	10
CPN-95	A	ECR-15 Auto Trip AOV	ECR-25 Auto Trip AOV	Containment Hydrogen Monitoring System - From Sample Point ESR - 5	0.5	10
CPN-95	A	NS-283 Check Valve	ECR-10 Auto Trip AOV or ECR-20 Auto Trip AOV	Containment Hydrogen Monitoring System - Hydrogen Sample Return	0.5	10
CPN-96	E	PPP-303-V1 Manual Valve	N/A	Containment Pressure Transmitter	0.5	N/A
CPN-96	E	PPA-312-V1 Manual Valve	N/A	Containment Pressure Transmitter	0.5	N/A
CPN-97	E	PPA-310-V1 Manual Valve	N/A	Containment Pressure Transmitter	0.5	N/A
CPN-97	E	Membrane (Sensor Bellows)	HI ⁽⁴⁾	RVLIS (NLS-130)	0.5	N/A
CPN-98	E	Membrane (Sensor Bellows)	HI ⁽⁴⁾	RVLIS (NLS-110, NLS-120)	0.5	N/A

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CONTAINMENT REGIONAL DESIGNATION / IGNITER ASSEMBLY LOCATIONS

UNIT 1

TRAIN 'A'				TRAIN 'B'	
Region	Compartment/Area	No.	Region	Compartment/Area-Elevation	No.
1	Upper Volume Dome Area - 760'	A-13	1	Upper Volume Dome Area - 760'	B-13
1	Upper Volume Dome Area - 760'	A-14	1	Upper Volume Dome Area - 760'	B-14
1	Upper Volume Dome Area - 760'	A-15	1	Upper Volume Dome Area - 760'	B-15
2	Upper Volume Dome Area - 748'	A-16	2	Upper Volume Dome Area - 748'	B-16
2	Upper Volume Dome Area - 748'	A-17	2	Upper Volume Dome Area - 748'	B-17
2	Upper Volume Dome Area - 748'	A-18	2	Upper Volume Dome Area - 748'	B-18
3	Ice Cond. Upper Plenum 709'	A-1	3	Ice Cond. Upper Plenum 709'	B-1
3	Ice Cond. Upper Plenum 709'	A-2	3	Ice Cond. Upper Plenum 709'	B-2
4	Ice Cond. Upper Plenum 709'	A-3	4	Ice Cond. Upper Plenum 709'	B-3
4	Ice Cond. Upper Plenum 709'	A-4	4	Ice Cond. Upper Plenum 709'	B-4
4	Ice Cond. Upper Plenum 709'	A-5	4	Ice Cond. Upper Plenum 709'	B-5
5	Ice Cond. Upper Plenum 709'	A-6	5	Ice Cond. Upper Plenum 709'	B-6
5	Ice Cond. Upper Plenum 709'	A-7	5	Ice Cond. Upper Plenum 709'	B-7
6	Outside #2 SG Enclosure 662'	A-12	6	Outside #2 SG Enclosure 659'	B-12
6	Outside #3 SG Enclosure 662'	A-11	6	Outside #3 SG Enclosure 659'	B-11
7	Outside #1 SG Enclosure 662'	A-8	7	Outside #1 SG Enclosure 659'	B-8
7	Outside #4 SG Enclosure 662'	A-9	7	Outside #4 SG Enclosure 659'	B-9
7	Outside PRZ Enclosure 662'	A-10	7	Outside PRZ Enclosure 659'	B-10
8	East Fan/Accumulator Room 635'	A-25	8	East Fan/Accumulator Room 630'	B-25
8	East Fan/Accumulator Room 632'	A-26	8	East Fan/Accumulator Room 634'	B-26
9	West Fan/Accumulator Room 632'	A-27	9	West Fan/Accumulator Room 634'	B-27
9	West Fan/Accumulator Room 634'	A-28	9	West Fan/Accumulator Room 634'	B-28
10	Instrument Room 623'	A-35	10	Instrument Room 630'	B-35
11	Primary Shield Wall 643'	A-19	11	Primary Shield Wall 646'	B-19
11	Primary Shield Wall 640'	A-20	11	Primary Shield Wall 646'	B-20
11	Primary Shield Wall 644'	A-21	11	Primary Shield Wall 648'	B-21
11	Primary Shield Wall 641'	A-22	11	Primary Shield Wall 648'	B-22
11	Primary Shield Wall 642'	A-23	11	Primary Shield Wall 646'	B-23

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CONTAINMENT REGIONAL DESIGNATION / IGNITER ASSEMBLY LOCATIONS

UNIT 1

TRAIN 'A'				TRAIN 'B'	
Region	Compartment/Area	No.	Region	Compartment/Area-Elevation	No.
11	Primary Shield Wall 642'	A-24	11	Primary Shield Wall 646'	B-24
12	Inside #1 SG Enclosure 689'	A-30	12	Inside #1 SG Enclosure 689'	B-30
13	Inside #2 SG Enclosure 689'	A-34	13	Inside #2 SG Enclosure 689'	B-34
14	Inside #3 SG Enclosure 689'	A-33	14	Inside #3 SG Enclosure 689'	B-33
15	Inside #4 SG Enclosure 689'	A-31	15	Inside #4 SG Enclosure 689'	B-31
16	Inside PRZ Enclosure 689'	A-32	16	Inside PRZ Enclosure 687'	B-32
17	Vicinity PRT-618'	A-29	17	Vicinity of PRT-618'	B-29

KEY

SG – Steam Generator

PZR – Pressurizer

PRT – Pressurizer Relief tank

Note: The locations given are for Cook Nuclear Plant Unit 1. For similar locations, in some cases the igniter assembly identification numbers are different, between Unit 1 and Unit 2.

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IGNITER ASSEMBLY LOCATIONS ¹

UNIT 2

TRAIN 'A'			TRAIN 'B'		
No.	Compartment/Area	Elevation	No.	Compartment/Area	Elevation
A-1	Ice Cond. Upper Plenum	708'	B-1	Ice Cond. Upper Plenum	709'
A-2	Ice Cond. Upper Plenum	709'	B-2	Ice Cond. Upper Plenum	709'
A-3	Ice Cond. Upper Plenum	709'	B-3	Ice Cond. Upper Plenum	709'
A-4	Ice Cond. Upper Plenum	709'	B-4	Ice Cond. Upper Plenum	709'
A-5	Ice Cond. Upper Plenum	709'	B-5	Ice Cond. Upper Plenum	709'
A-6	Ice Cond. Upper Plenum	710'	B-6	Ice Cond. Upper Plenum	709'
A-7	Ice Cond. Upper Plenum	709'	B-7	Ice Cond. Upper Plenum	709'
A-8	Inside #1 SG Enclosure	686'	B-8	Inside #1 SG Enclosure	686'
A-9	Inside #2 SG Enclosure	686'	B-9	Inside #2 SG Enclosure	686'
A-10	Inside #3 SG Enclosure	686'	B-10	Inside #3 SG Enclosure	686'
A-11	Inside #4 SG Enclosure	686'	B-11	Inside #4 SG Enclosure	685'
A-12	Inside PZR Enclosure	682'	B-12	Inside PZR Enclosure	686'
A-13	Outside #1 SG Enclosure	659'	B-13	Outside #1 SG Enclosure	662'
A-14	Outside #2 SG Enclosure	662'	B-14	Outside #2 SG Enclosure	659'
A-15	Outside #3 SG Enclosure	662'	B-15	Outside #3 SG Enclosure	659'
A-16	Outside #4 SG Enclosure	662'	B-16	Outside #4 SG Enclosure	659'
A-17	Outside PZR Enclosure	662'	B-17	Outside PZR Enclosure	659'
A-18	Primary Shield Wall	647'	B-18	Primary Shield Wall	642'
A-19	Primary Shield Wall	648'	B-19	Primary Shield Wall	637'
A-20	Primary Shield Wall	648'	B-20	Primary Shield Wall	636'
A-21	Primary Shield Wall	648'	B-21	Primary Shield Wall	636'
A-22	Primary Shield Wall	641'	B-22	Primary Shield Wall	637'

¹ The locations given are for Cook Nuclear Plant Unit 2 and are typical for Unit 1.

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IGNITER ASSEMBLY LOCATIONS ¹

UNIT 2

TRAIN 'A'			TRAIN 'B'		
No.	Compartment/Area	Elevation	No.	Compartment/Area	Elevation
A-23	Primary Shield Wall	648'	B-23	Primary Shield Wall	645'
A-24	East Fan/Accumulator Room	631'	B-24	East Fan/Accumulator Room	630'
A-25	East Fan/Accumulator Room	629'	B-25	East Fan/Accumulator Room	629'
A-26	West Fan/Accumulator Room	629'	B-26	West Fan/Accumulator Room	623'
A-27	West Fan/Accumulator Room	634'	B-27	West Fan/Accumulator Room	634'
A-28	Vicinity of PRT	618'	B-28	Vicinity of PRT	618'
A-29	Upper Volume Dome Area	760'	B-29	Upper Volume Dome Area	760'
A-30	Upper Volume Dome Area	760'	B-30	Upper Volume Dome Area	760'
A-31	Upper Volume Dome Area	760'	B-31	Upper Volume Dome Area	760'
A-32	Upper Volume Dome Area	748'	B-32	Upper Volume Dome Area	748'
A-33	Upper Volume Dome Area	748'	B-33	Upper Volume Dome Area	748'
A-34	Upper Volume Dome Area	748'	B-34	Upper Volume Dome Area	748'
A-35	Instrument Room	620'	B-35	Instrument Room	620'

KEY: SG - Steam Generator
PZR - Pressurizer
PRT - Pressurizer Relief Tank