AP1000 Information Roadmap
for Structural Audit, October 6 – 10, 2003

DSER OI	Subject	Westinghouse Additional Information
2.5.1-1	COL Geotechnical Information	OI Response Rev 1 **
2.5.4-1	Lateral earth pressure	OI Response Rev 1
2.5.4-2	Bearing pressures	OI Response Rev 1 **
3.3.1-1	Design wind	OI Response Rev 1 **
3.3.1-2	ASCE shape factors	OI Response Rev 1 **
3.3.2-1	Vented buildings	OI Response Rev 1 **
3.3.2-2	COL structural failures	OI Response Rev 1 **
3.7.1.5-1	Bearing pressures	OI Response Rev 1 - See OI 2.5.4.2
3.7.2.1-1	Lateral earth pressure	Reaudit APP-1000-CCC- 005, Rev 0
3.7.2.3-1	NI basemat liftoff and shear wall stiffness	OI Response Rev 1 New results APP-1000-S2C-037, Rev 3 Reconciliation APP-1000-S3R-001, Rev 0 Lift off APP-1000-S2C-064, Rev 1
3.7.2.3-2	SCV vertical response	Results for one mass polar crane model on latest NI stick sent by e-mail 09/24/03
3.7.2.3-3	Shear wall stiffness	See OI 3.7.2.3-1
3.7.2.9-1	FRS broadening and shear wall stiffness	See OI 3.7.2.3-1
3.7.2.16-1	Sites outside site parameters	OI Response Rev 1

** Revisions shown in Open Item Response to be included in DCD Revision 8.

DSER OI	Subject	Westinghouse Additional Information
3.8.2.1-1	Containment vessel design	Audit containment vessel design specification and calculations APP-MV50-Z0-001, Rev 0 APP-MV50-S2C-001 thru 006, Rev 0
3.8.3.5-1	Provide guidance on slab flexibility	Guidance added in APP-GW-S1-008, Rev 1. Rev 0 was previously audited
3.8.3.5-2	Containment Internal Structures Summary Report	Audit APP-1100-S3R-001, Rev 0
3.8.3.5-3	CIS boundary elements	Maximum compression is less than 0.2 fc' APP-1100-S3R-001, Rev 0
3.8.4.2-1	ASB boundary elements	Typical reinforcement at openings shown on DCD Figure 3H.5-11 and APP-1100-CR-953 and 954, Rev 0
3.8.4.3-1	Rapid thermal transients on structural modules	OI response Rev 1 ** APP-GW-SUP-008, Rev 0
3.8.4.5-1	Auxiliary Building Summary Report	Audit APP-1200-S3R-001, Rev 0
3.8.4.5-2	Reinforcement design macro	OI response Rev 1 APP-1000-CCC-001, Rev 1 APP-1000-CCC-002, Rev 0
3.8.5.1-1	Mudmat	OI response Rev 1
3.8.5.4-1	CIS uplift	OI response Rev 1
3.8.5.4-2	Subgrade modulus	Appendix D, APP-1010-CCC-001, Rev 2
3.8.5.4-3	NI Basemat Design Report	APP-1010-CCC-001, Rev 2 Rev 0 was previously audited
3.8.5.5-1	NI sliding and overturning	Reaudit APP-1000-CCC-004, Rev 0
14.3.2-14	Containment vessel diameter	OI response Rev 1

DSER OI	Subject	Westinghouse Additional Information
19.2.6-1	Equipment hatch cover fragility	OI response Rev 1
19A.2-4	Analysis Modeling Error	OI response Rev 1
19A.2-6	Shield Building Roof	OI response Rev 1
19A.2-7	Equipment Design/Qualification Specification	OI response Rev 1
19A.2-8	NI Uplift	OI response Rev 1
19A.2-9	Generic Fragility Data	OI response Rev 1
19A.3-1	Major SMA Model Assumptions	OI response Rev 1
19A.3-2	COL Interface Requirements	OI response Rev 1 Mark up of PRA Table 55.1

Structural Design of Critical Sections
Auxiliary and Shield Buildings

Critical Sections	Design Calculation	Analysis Results
3-D Finite Element ASB Static Analyses		APP-1200-S2C-001, Rev 1
ASB Thermal Stress Analyses		APP-1200-S2C-002, Rev 0
Wall 1	APP-1200-CCC-106, Rev 1	APP-1200-S2C-106, Rev 1
Wall 7.3	APP-1200-CCC-102, Rev 2	APP-1200-S2C-102, Rev 0
Wall 11	APP-1200-CCC-101, Rev 0	APP-1200-S2C-101, Rev 0
Wall L	APP-1200-CCC-110, Rev 1	APP-1200-S2C-110, Rev 0
Wall L-2 (Fuel pit divider wall)	APP-1200-CCC-118, Rev 0	APP-1200-S2C-118, Rev 0
Shield building cylinder	APP-1200-CCC-119, Rev 1	APP-1200-S2C-119, Rev 0
Floor slab on metal decking at 135′-3″	APP-1250-CCC-001, Rev 0	APP-1250-S2C-001, Rev 0
Floor slab (tagging room ceiling) at 135′-3″	APP-1251-CCC-002, Rev 0	APP-1250-S2C-001, Rev 0
Finned floor in MCR at elevation 135′-3″	APP-1252-CCC-001, Rev 0	APP-1250-S2C-001, Rev 0
Fuel building roof slab at elevation 180′-0″	APP-1260-CCC-003, Rev 1	APP-1260-S2C-003, Rev 0
Shield building roof	APP-1277-S3C-006, Rev 2	
Nuclear Island base mat	APP-1010-CCC-001, Rev 2	APP-1010-S2C-001, Rev 1

Structural Design of Critical Sections
Containment Internal Structures

Finite Element Shell Model of CIS	APP-1000-S2C-034, Rev 1
Static Analysis - Seismic Equivalent Accelerations	APP-1100-S2C-002, Rev 1
Static Analysis - Pressures	APP-1100-S2C-003, Rev 1
Temperature distribution through wall	APP-1100-S2C-004, Rev 1
Static Analysis - Thermal Analyses.	APP-1100-S2C-005, Rev 1
Static Analysis - Load Combinations.	APP-1100-S2C-006, Rev 1
Required Steel Area Calculations of Main IRWST Concrete Filled Module Walls.	APP-1100-S2C-007, Rev 0
IRWST Steel Wall and Main Operating Floor Columns Verifications.	APP-1100-S2C-008, Rev 0
IRWST Seismic Sloshing and Wall Flexibility	APP-1100-S2C-009, Rev 0
Containment Internal Structures Summary Report	APP-1100-S3R-001, Rev 0

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Other References	
Civil and Structural Design Criteria	APP-GW-C1-001, Rev 0
Seismic Design Criteria	APP-GW-G1-003, Rev 0
Design Methodology for Structural Modules	APP-GW-SUP-001, Rev 0
Design Guide for calculation of reinforcement in walls and floor slabs	APP-GW-S1-008, Rev 1
Design Guide for evaluation of concrete structures for thermal loads	APP-GW-S1-009, Rev 0
Verification of design macro for reinforcement concrete walls and floors	APP-1000-CCC-001, Rev 1
Guidance on checking results of design macro calculation	APP-1000-CCC-002, Rev 0
Structural Modules Integrity – Initial thermal transient gradient	APP-GW-SUP-008, Rev 0
Nuclear Island - Design Loads, Exterior Walls below Grade	APP-1000-CCC-005, Rev 0
Combined Stick Model for hard rock and Fixed Base Case	APP-1000-S2C-037, Rev 3
Seismic Time History Analyses of Nuclear Island Shell Model	APP-1000-S2C-060, Rev 1
Additional Analyses of Nuclear Island	APP-1000-S2C-063, Rev 1
Effects of Basemat Liftoff on Seismic Response	APP-1000-S2C-064, Rev 1
Containment Vessel Stability Analysis	APP-1100-S2C-100, Rev 0
Independent Verification of Containment Vessel Stability Analysis (ANSYS)	APP-1100-S2C-101, Rev 0

TIER 2 REVISION 7 CHANGE ROADMAP

Section	Page No.	Type of Change[1]
VOLUME 2		
Tier 2 List of Effective Pages	1 through 35	Editorial
Master T of C	i through xxxii	Editorial
Tier 2 Revision 7 Change Roadmap	lxxxi through lxxxix	Editorial
1, T of C	ii through iv	Editorial
1.6	1.6-4	DSER OI 14.2.7-3 Editorial
1.6	1.6-18	DSER OI 20.7-2 Editorial
1.6	1.6-19 and 1.6-20	DSER OI 18.11.3.5-1 (R1)
1.8	1.8-11 and 1.8-12	Letter DCP NRC 1613 Editorial
1.8	1.8-13	DSER OI 4.4-1 DSER OI 6.2.1.8.3-1 (R2) Letter DCP NRC 1613 Editorial
1.8	1.8-14	DSER OI 9.5.1-1 DSER OI 14.3.2-7 (R1) Editorial
1.8	1.8-15 and 1.8-16	Letter DCP NRC 1613 Editorial
1.8	1.8-17	Editorial
1.9	1.9-56	DSER OI 13.3-1 (R1)
1.9	1.9-102	DSER OI 14.2.7-3 Editorial
1.9	1.9-112	Editorial
Appendix 1A	1A-12	DSER OI 17.3.2-3 (R1)
Appendix 1A	1A-46	Editorial
VOLUME 3		
2, T of C	i and ii	Editorial
2	2-2	DSER OI 3.3.1-1
2	2-3	DSER OI 2.3.4-1 Editorial

SECTION 2 REPAGINATED

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Section	Page No.	Type of Change[1]
2	2-4	Editorial
2	2-7 and 2-8	DSER OI 3.7.2.16-1
2	2-9 through 2-12	Editorial – partial OI 2.5.4-2(R1)
2	2-13 through 2-16	DSER OI 2.3.4-1
3, T of C	iii through vii	Editorial
3, T of C	xiv through xvi	Editorial
3, T of C	xviii through xxiii	Editorial
3.1	3.1-11	DSER OI 13.3-1 (R1) Editorial
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3.7	3.7-5	Editorial
3.7	3.7-8 and 3.7-9	Confirmatory Item 3.7.2.1-2
3.7	3.7-19 and 3.7-20	Editorial
3.7	3.7-47	Letter DCP NRC 1613
3.7	3.7-51 through 3.7-58	Editorial
3.7	3.7-65	Editorial
3.7	3.7-66	~~Confirmatory Item 3.7.2.1-2~~ Correction Editorial
3.7	3.7-69	~~Confirmatory Item 3.7.2.1-2~~ Correction Editorial
3.7	3.7-93	Editorial
3.7	3.7-130	Editorial
VOLUME 4		
3.8	3.8-1	DSER OI 14.3.2-3
3.8	3.8-4	DSER OI 3.8.2.2-2
3.8	3.8-21	Editorial
3.8	3.8-32	Editorial
3.8	3.8-58	Editorial
3.8	3.8-60	DSER OI 3.8.5.5-1 Editorial
3.8	3.8-61	Letter DCP NRC 1613 Editorial
3.8	3.8-82	Editorial
3.8	3.8-89	Editorial
3.8	3.8-90	Technical

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TIER 2 REVISION 7 CHANGE ROADMAP (Cont.)

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3.8	3.8-140	Editorial
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VOLUME 5 APPENDIX 3H REPAGINATED		
Appendix 3H	3H-4	Editorial
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4, T of C	ii	Editorial
4, T of C	vii	Editorial
4.3	4.3-28	Technical
4.4	4.4-1	Editorial
4.4	4.4-3	Editorial
4.4	4.4-16	Editorial
4.4	4.4-23	Editorial
4.4	4.4-31	DSER OI 4.4-1
4.4	4.4-39	Editorial
4.4	4.4-42	Editorial
5, T of C	iii	Editorial
5, T of C	vi and vii	Editorial
5.2	5.2-9	DSER OI 5.2.3-1
5.2	5.2-30	DSER OI 4.5.1-1 DSER OI 4.5.1-2
5.2	5.2-31	DSER OI 5.2.3-1
5.2	5.2-32 through 5.2-36	Editorial
5.3	5.3-21 and 5.3-22	Technical
5.3	5.3-23	DSER OI 14.3.2-11 (R1) Technical
5.3	5.3-26 and 5.3-27	Editorial
VOLUME 6		
6, T of C	i through iii	Editorial
6, T of C	vi and vii	Editorial

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Orr, Richard S.

From: Orr, Richard S.
Sent: Wednesday, September 24, 2003 3:44 PM
To: 'Tom Cheng'
Cc: Tunon-Sanjur, Leonardo J.; Corletti, Michael M.
Subject: Effect of polar crane model on seismic response

In our telecon yesterday with Tom Tsai we agreed to provide results for one more case to assist his review. This case and its results are described below. Please forward this to Tom. This material will be available for our discussions starting on October 6.

Figures 1 and 2 show a comparison of floor response spectra on the containment vessel at the polar crane and top elevations for the following two models:

- Nuclear Island stick fixed at elevation 60.5' with a multi mass polar crane model. These are the models of the auxiliary and shield building (asb), containment internal structure (cis), steel containment vessel (scv) and polar crane described in the Revision 7 of the Design Control Document.
  (Multimass PC model "mm")
- Nuclear Island stick fixed at elevation 60.5' with a single mass polar crane model. (Single mass PC model "1m")

Floor response spectra on the containment vessel are compared in Figures 1 and 2 for the two PC models. Note that the nuclear island stick model was revised in DCD Revisions 6 and 7 so that the base of the stick is now connected to the containment internal structure node at elevation 98' instead of to the auxiliary and shield building stick (DCD Revision 3).

Figures 1 and 2 show that the peak vertical frequencies occur between 15 to 17 Hz in both models and that the maximum accelerations are slightly lower with the multimass PC model. This is similar to the results for the models of the crane and containment vessel fixed at the base of the containment vessel presented in Figures 230.018-2 and 3 of the RAI response.

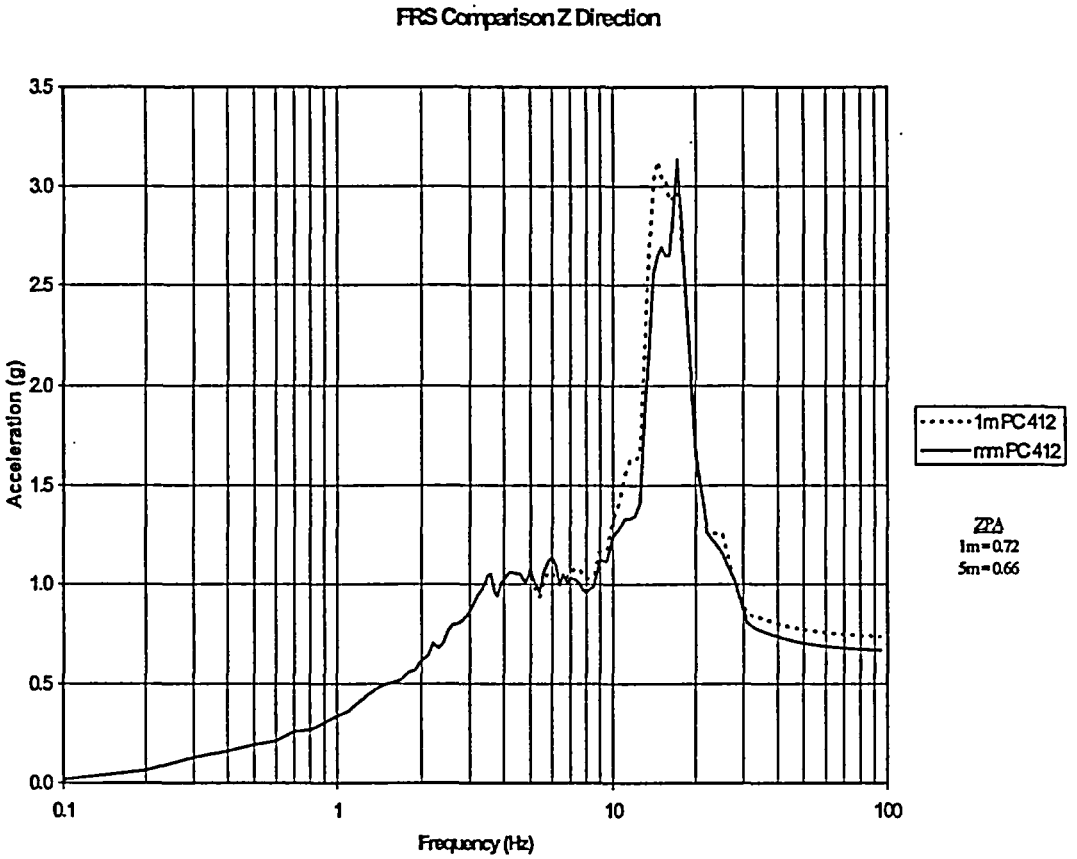

Figure 1 Comparison of Polar Crane Models - Vertical FRS at Polar Crane Elevation

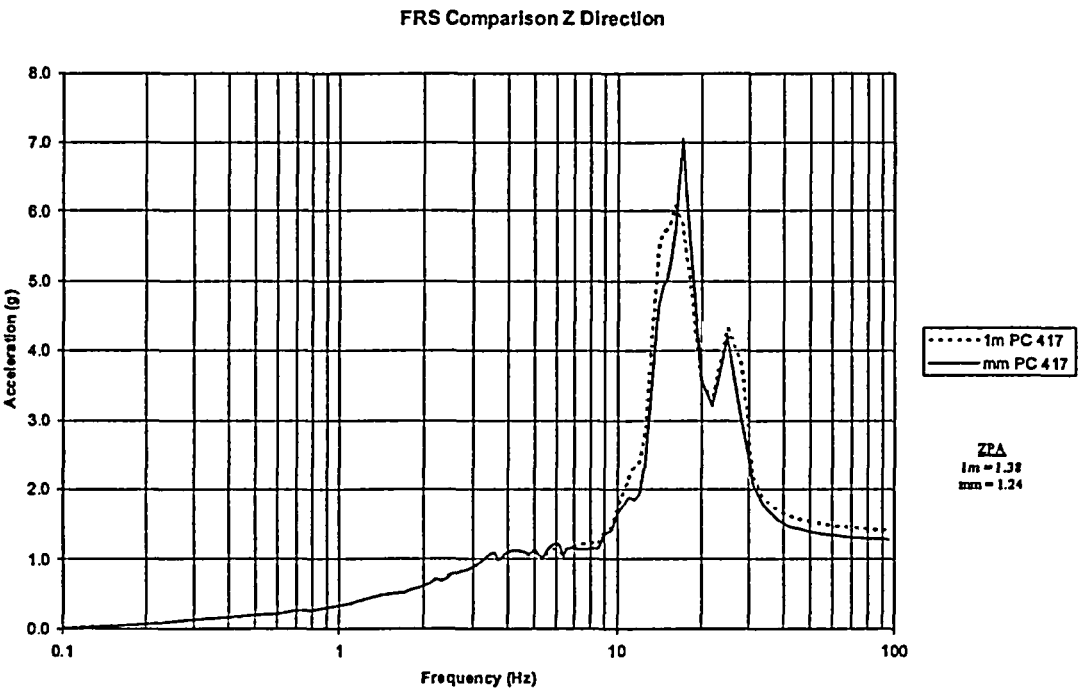

Figure 2 Comparison of Polar Crane Models - Vertical FRS at Top of Containment Vessel

Table 3H.5-2 (Sheet 2 of 2)

*[EXTERIOR WALL ON COLUMN LINE 1 FORCES AND MOMENTS IN CRITICAL LOCATIONS]**

Load Type	Load Description	Out-of-Plane Moment (k-ft/ft) Wall Section 7	8	9	10	11	12	Out-of-Plane Shear (kips/ft) Wall Section 7	9	10	12
D	DEAD LOAD										
	Wall Weight	-2.2	3.7	2.3	0.7	0.2	0.2	0.05	0.05	0.1	0.2
	Static Surcharge	0.3	0	0	0	0	0	0.03	0.03	0	0
L	LIVE LOAD										
	Floor Live Load	-1.6	2.0	1.3	1.4	-1.8	-0.6	0.3	-0.2	-1.6	-1.6
	Crane/Cask Load	0.4	-2.6	-2.9	9.8	0.9	-1.8	-0.2	-0.3	-0.4	-0.7
	Hydrostatic	-1.60	0	0.40	0.40	0	0	-0.1	0	0	0
H	LATERAL SOIL PRESSURE										
	At Rest Pressure	1.1	0	-0.30	-0.2	0	0	0	0	0	0
E_s	SEISMIC										
	Global Behavior	25.2	74.4	78.7	79.1	115.4	27.7	13.1	4.3	13.7	13.5
	Passive Soil Press.	8.6	0	-0.1	-0.3	0	0	0	0	0	0
	Dyn. Soil Press.	7.3	0	0	0	0	0	0	0	0	0
T_o	THERMAL										
	Operating	51.2	65.4	74.5	77.6	43.1	12.4	-0.6	-1.2	6.2	3.6

Notes:
Moment w/o sign indicates tension on the outside face of wall.
Moment w/- sign indicates tension on the inside face of wall.

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*NRC Staff approval is required prior to implementing a change in this information; see DCD Introduction Section 3.5.

Table 3H.5-3

*[EXTERIOR WALL ON COLUMN LINE 1 DETAILS OF WALL REINFORCEMENT (in^2/ft)]**

(See Figure 3H.5-2 for Locations of Wall Sections.)

Load Combination	Location	Required			Provided		
		Vertical	Horizontal	Shear	Vertical	Horizontal	Shear
WALL SECTION 1, 2, 3							
				0.5			0.80
$1.0D+1.0L+1.0H+1.0E_s$	Outside Face	2.9	1.1		4.16	1.27	
	Inside Face	1.9	1.1		2.67	1.27	
WALL SECTION 4, 5, 6							
				0.25			0.40
$1.0D+1.0L+1.0H+T_o$	Outside Face	1.4	1.0		3.12	1.27	
	Inside Face	1.4	1.15		2.67	1.27	
WALL SECTION 7, 8, 9							
				NR			None
$1.0D+1.0L+1.0H+1.0T_o$	Outside Face	2.5	3.0		3.12	3.12	
	Inside Face	2.1	1.2		3.12	1.69	
WALL SECTION 10, 11, 12							
				NR			None
$1.0D+1.0L+1.0H+1.0T_a$	Outside Face	2.8	2.5		3.74	3.12	
	Inside Face	1.2	1.5		3.12	2.34	

Note:
NR – Not Required

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*NRC Staff approval is required prior to implementing a change in this information; see DCD Introduction Section 3.5.

Table 3H.5-10

*[DESIGN SUMMARY OF ROOF AT ELEVATION 180'-0", AREA 6]**

(Near Shield Building Interface)

Governing Load Combination (Roof Girder)	
Combination Number	*3 – Extreme Environmental Condition Downward Seismic Acceleration*
Bending Moment	*= 6416 kips-ft*
Corresponding Stress	*= 24.4 ksi*
Allowable Stress	*= 33.3 ksi*
Shear Force	*= 403 kips*
Corresponding Stress	*= 15.3 ksi*
Allowable Stress	*= 20.1 ksi*
Governing Load Combination (Concrete Slab)	
Parallel to the Girders	
Combination Numbers	*3 – Extreme Environmental Condition Upward Seismic Acceleration*
Reinforcement (Each Face)	
Required	*= 1.50 in^2/ft*
Provided	*= 1.56 in^2/ft*
Perpendicular to the Girders	
Combination Numbers	*3 – Extreme Environmental Condition*
Reinforcement (Each Face)	
Required	*= 1.35 in^2/ft*
Provided	*= 3.12 in^2/ft*

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*NRC Staff approval is required prior to implementing a change in this information; see DCD Introduction Section 3.5.

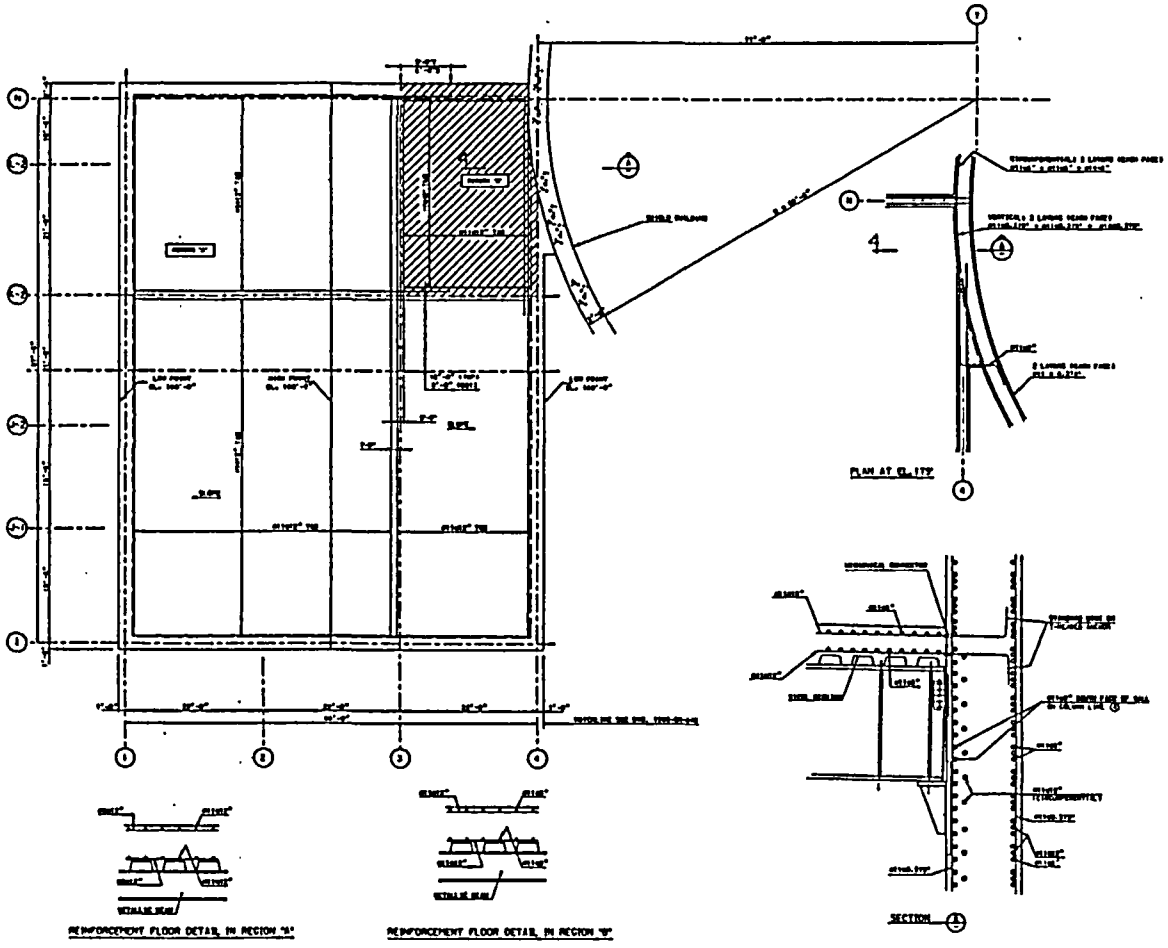

Figure 3H.5-7

*[Typical Reinforcement and Connection to Shield Building]**

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rmation; see DCD Introduction Section 3.5.

Draft Table 55-1 – Seismic Margin Parameters and HCLPF Values

Description	Median pga [8]	βc	HCLPF Value [8]	Basis
Buildings/structures				
Shield building Roof - Tension Ring	-	-	0.74g	[5]
Shield building Roof – Columns	-	-	0.60g	[5]
Containment Vessel - buckling	1.57 g	0.41	0.61g	[3]
Containment Vessel - overturning	5.74 g	0.62	1.38 g	[3]
Containment baffle Support Failure	-	-	1.4 g	[4]
Interior containment Structure & IRWST Tank			0.75g	[4]
Primary Components				
Reactor Pressure Vessel	-	-	0.74g	[4]
Reactor Pressure Vessel Supports	1.59g	0.36	0.69g	[3]
Reactor Internals and Core Assembly (includes fuel)	1.5g	0.51	0.5g	[1]
Control rod drive mechanism (CRDM) and hydraulic drive Units	2.2g	0.51	0.7g	[1]
Pressurizer	-	-	0.59g	[4]
Pressurizer Support	1.04g	0.29	0.53g	[3]
Steam generator	-	-	0.61g	[4]
Steam generator Supports	1.03g	0.22	0.62g	[3]
Reactor coolant pump & Supports	2.2g	0.51	0.68g	[1]
Mechanical Equipment				
Polar crane	-	-	0.94g	[4]
Piping - support controlled	3.3g	0.61	0.81g	[1]
Cable trays - support controlled	2.2g	0.61	0.54g	[1]
Heat Exchanger (PRHR)	-	-	0.93g	[4]
Accumulator Tank	2.2g	0.46	0.76g	[1]
Core Make Up Tank	-	-	0.72g	[4]
Valves				
Room Number 11202	-	-	0.86g	[4]

Description	Median pga [8]	βc	HCLPF Value [8]	Basis
Room Number 11206	-	-	0.86g	[4]
Room Number 11207	-	-	0.86g	[4]
Room Number 11208	-	-	0.86g	[4]
Room Number 11300	-	-	0.86g	[4]
Room Number 11301	-	-	0.86g	[4]
Room Number 11302	-	-	0.86g	[4]
Room Number 11304	-	-	0.86g	[4]
Room Number 11400	3.3g	0.61	0.81g	[1]
Room Number 11403	3.3g	0.61	0.81g	[1]
Room Number 11500	3.3g	0.61	0.81g	[1]
Room Number 11601	3.3g	0.61	0.81g	[1]
Room Number 11603	3.3g	0.61	0.81g	[1]
Room Number 11703	3.3g	0.61	0.81g	[1]
Room Number 12244	-	-	1.10g	[4]
Room Number 12254	-	-	0.86g	[4]
Room Number 12255	-	-	0.86g	[4]
Room Number 12256	-	-	0.86g	[4]
Room Number 12306	-	-	0.86g	[4]
Room Number 12362	3.3g	0.61	0.81g	[1]
Room Number 12401	3.3g	0.61	0.81g	[1]
Room Number 12404	3.3g	0.61	0.81g	[1]
Room Number 12405	3.3g	0.61	0.81g	[1]
Room Number 12406	3.3g	0.61	0.81g	[1]
Room Number 12452	3.3g	0.61	0.81g	[1]
Room Number 12454	3.3g	0.61	0.81g	[1]
Room Number 12555	3.3g	0.61	0.81g	[1]
Room Number 12701	3.3g	0.61	0.81g	[1]
Passive Containment Cooling System	-	-	0.60g	[5]
Electrical Equipment				

Description	Median pga [8]	βc	HCLPF Value [8]	Basis
Battery	-	-	0.79	[6]
Battery Racks	3.3g	0.46	1.14g	[1]
Battery Chargers	-	-	0.81	[6]
125 DC Distribution Panel	-	-	0.58	[6]
120 VAC Distribution Panel	-	-	0.58	[6]
Transfer Switches	-	-	0.58	[6]
125 VDC MCC	-	-	0.86	[6]
125 VDC Switchboard	-	-	0.58	[6]
Regulating Transformer	-	-	0.95	[6]
Inverter	-	-	0.60	[6]
4.16 KV Switchgear	-	-	0.69	[6]
Reactor Trip Switchgear	-	-	0.60	[6]
Hydrogen Monitor	-	-	1.03	[6]
CMT Level Switch	-	-	0.83	[6]
Neutron Detector	-	-	0.56	[6]
Radiation Monitor	-	-	0.61	[6]
RTD	-	-	3.75	[6]
Speed Sensors	-	-	2.89	[6]
Incore Thermocouple	-	-	3.94	[6]
RCP Bearing Water Temp Thermocouple	-	-	5.25	[6]
PCS Water Flow Trans (el. 135.3')	-	-	0.80	[6]
PCS Water Flow Trans (el. 261')	-	-	0.56	[6]
PRHR HX Flow Transmitter	-	-	0.93	[6]
RCS Flow Transmitter	-	-	0.93	[6]
SG Start Up Flow Transmitter	-	-	0.61	[6]
IRWST Level Transmitter	-	-	0.76	[6]
PZR Level Transmitter	-	-	0.76	[6]
SG Narrow Range Transmitter	-	-	0.77	[6]
SG Wide Range Transmitter	-	-	0.77	[6]

Description	Median pga [8]	βc	HCLPF Value [8]	Basis
Air Storage Tank Pressurizer Transmitter	-	-	0.65	[6]
Containment Pressurizer Sensor & Transmitter	-	-	0.82	[6]
RCS Wide Range Pressure Transmitter	-	-	0.76	[6]
PRZ Pressure Sensor	-	-	0.76	[6]
MSL Pressure Transmitter	-	-	0.65	[6]
ESFAC Cabinet	-	-	0.82	[6]
Protection Logic Cabinet	-	-	0.82	[6]
Integrated Protection Cabinet SWGR	-	-	0.82	[6]
Multiplex Cabinet	-	-	0.82	[6]
QDPS Cabinet	-	-	1.32	[6]
MCR Support Operation Station	2.8g	0.46	0.97g	[1]
MCR Switch Station	2.8g	0.46	0.97g	[1]
QDPS and MCR Display	-	-	1.08	[6]
MCR Isolation Damper	-	-	0.61	[6]
Hydrogen Recombiner	-	-	1.03	[6]
Power and Control Panels	-	-	1.03	[6]
Ceramic Insulators	0.2g	0.35	0.09g	[2]

Notes:

[1] HCLPF based on URD recommended generic fragility data
[2] HCLPF based on recognized generic fragility data
[3] HCLPF based probabilistic fragility analysis
[4] HCLPF based on deterministic approach
[5] HCLPF based on conservative deterministic failure margin approach
[6] HCLPF based on design margin as defined from test data
[7] Component support will control HCLPF value
[8] pga is the free field peak ground acceleration level for the seismic event