
CHAPTER 3—DESIGN OF STRUCTURES, SYSTEMS, COMPONENTS, AND EQUIPMENT

LIST OF FIGURES

Figure 3.6.2-1	Representative Mathematical Model of a Piping System and its Restraints.....	3.6-41
Figure 3.6.3-1	Plain View of U.S. EPR RCS Primary Piping.....	3.6-102
Figure 3.6.3-2	Elevation View of U.S. EPR RCS Primary Piping	3.6-103
Figure 3.6.3-3	Plan, Elevation, and Isometric View of the U.S. EPR Surge Line	3.6-104
Figure 3.6.3-4	Isometric View of the Main Steam Line.....	3.6-105
Figure 3.6.3-5	Minimum Moment versus Circumferential Leakage Crack Sizes for 5 gpm at Various Main Coolant Loop Locations	3.6-106
Figure 3.6.3-6	Minimum Moment versus Circumferential Leakage Crack Sizes for 5 gpm at Three Surge Line Locations.....	3.6-107
Figure 3.6.3-7	Pressure Only Leakage Rate versus Crack Length for Both Axial and Circumferential Crack Morphologies in Main Steam Line	3.6-108
Figure 3.6.3-8	Minimum Moment versus Circumferential Crack Leakage Sizes for 1 gpm in Main Steam Line Piping	3.6-109
Figure 3.6.3-9	Schematics of Analyzed Crack Geometries Considered for Straight Pipe Section	3.6-110
Figure 3.6.3-10	Schematic of J-Tearing Instability Diagram	3.6-111
Figure 3.6.3-11	Typical Allowable Load Limit (ALL) Diagram Considering Various Axial Loadings	3.6-112
Figure 3.6.3-12	ALL for Reactor Vessel Outlet Nozzle Region at Hot Leg (Location 1) ..	3.6-113
Figure 3.6.3-13	ALL for Hot Leg Pipe (Location 2).....	3.6-114
Figure 3.6.3-14	ALL for Steam Generator Inlet Nozzle at Hot Leg (Location 3) ..	3.6-115
Figure 3.6.3-15	ALL for Steam Generator Outlet Nozzle (Location 4)	3.6-116
Figure 3.6.3-16	ALL for Crossover & Cold Leg Pipe (Locations 5 & 8).....	3.6-117
Figure 3.6.3-17	ALL for RCP Inlet Nozzle (Location 6)	3.6-118
Figure 3.6.3-18	ALL for Pressurizer Surge Nozzle at Alloy 52 Weld.....	3.6-119
Figure 3.6.3-19	ALL for Surge Line Piping	3.6-120
Figure 3.6.3-20	ALL for Hot Leg Nozzle.....	3.6-121

Figure 3.6.3-21 Comparison of Base and Weld Metal ALL in Main Steam Line Piping ...	3.6-122
Figure 3.6.3-22 ALL for Main Steam Line Piping with Safety Factor of 2 on Flaw Size (Base Metal).....	3.6-123
Figure 3.6.3-23 Deleted.....	3.6-123
Figure 3.6.3-24 ALL for RCP Outlet Nozzle (Location 7)	3.6-124
Figure 3.6.3-25 ALL for RV Inlet Nozzle (Location 9).....	3.6-125
Figure 3.7.1-1 Design Response Spectra for EUR (hard, medium and soft sites) and HF Control Motions.....	3.7-27
Figure 3.7.1-2 Comparison of CSDRS to RG 1.60 and the Minimum Required Spectrum, Horizontal Motion.....	3.7-28
Figure 3.7.1-3 Comparison of CSDRS to RG 1.60, Vertical Motion.....	3.7-29
Figure 3.7.1-4 EUR Design Ground Spectra for Hard Conditions Normalized to 0.3g... 3.7-30	
Figure 3.7.1-5 EUR Design Ground Spectra for Medium Conditions Normalized to 0.3g 3.7-31	
Figure 3.7.1-6 EUR Design Ground Spectra for Soft Conditions Normalized to 0.3g 3.7-32	
Figure 3.7.1-7 Synthetic Acceleration Time Histories for EUR Hard CSDRS	3.7-33
Figure 3.7.1-8 Synthetic Velocity Time Histories for EUR Hard CSDRS	3.7-34
Figure 3.7.1-9 Synthetic Displacement Time Histories for EUR Hard CSDRS	3.7-35
Figure 3.7.1-10 Synthetic Acceleration Time Histories for EUR Medium CSDRS .	3.7-36
Figure 3.7.1-11 Synthetic Velocity Time Histories for EUR Medium CSDRS	3.7-37
Figure 3.7.1-12 Synthetic Displacement Time Histories for EUR Medium CSDRS	3.7-38
Figure 3.7.1-13 Synthetic Acceleration Time Histories for EUR Soft CSDRS.....	3.7-39
Figure 3.7.1-14 Synthetic Velocity Time Histories for EUR Soft CSDRS.....	3.7-40
Figure 3.7.1-15 Synthetic Displacement Time Histories for EUR Soft CSDRS.....	3.7-41
Figure 3.7.1-16 Damping Values for Cable Tray Systems	3.7-42
Figure 3.7.1-17 Response Spectrum of Time History H1 vs. Target Spectrum for EUR Hard Motion (TH1 Target, 1.30*Target and 0.90*Target at 5% Damping)	3.7-44
Figure 3.7.1-18 Response Spectrum of Time History H2 vs. Target Spectrum for EUR Hard Motion (TH2 Target, 1.30*Target and 0.90*Target at 5% Damping)	3.7-45

Figure 3.7.1-19	Response Spectrum of Time History H3 (Vertical) vs. Target Spectrum for EUR Hard Motion (TH3 Target, 1.30*Target and 0.90*Target at 5% Damping)	3.7-46
Figure 3.7.1-20	Response Spectrum of Time History H1 vs. Target Spectrum for EUR Medium Motion (TH1 Target, 1.30*Target and 0.90*Target at 5% Damping)	3.7-47
Figure 3.7.1-21	Response Spectrum of Time History H2 vs. Target Spectrum for EUR Medium Motion (TH2 Target, 1.30*Target and 0.90*Target at 5% Damping)	3.7-48
Figure 3.7.1-22	Response Spectrum of Time History H3 (Vertical) vs. Target Spectrum for EUR Medium Motion (TH3 Target, 1.30*Target and 0.90*Target at 5% Damping)	3.7-49
Figure 3.7.1-23	Response Spectrum of Time History H1 vs. Target Spectrum for EUR Soft Motion (TH1 Target, 0.90* Target and 1.30*Target at 5% Damping)	3.7-50
Figure 3.7.1-24	Response Spectrum of Time History H2 vs. Target Spectrum for EUR Soft Motion (TH2 Target, 1.30*Target and 0.90*Target at 5% Damping)	3.7-51
Figure 3.7.1-25	Response Spectrum of Time History H3 (Vertical) vs. Target Spectrum for EUR Soft Motion (TH3 Target, 1.30*Target and 0.90*Target at 5% Damping)	3.7-52
Figure 3.7.1-26	Cumulative Energy Ratio Plot for Time History H1, H2, and H3 for EUR Hard Motion	3.7-53
Figure 3.7.1-27	Cumulative Energy Ratio Plot for Time History H1, H2, and H3 for EUR Medium Motion	3.7-54
Figure 3.7.1-28	Cumulative Energy Ratio Plot for Time History H1, H2, and H3 for EUR Soft Motion.....	3.7-55
Figure 3.7.1-29	Deleted.....	3.7-55
Figure 3.7.1-30	Deleted.....	3.7-55
Figure 3.7.1-31	U.S. EPR Standard Plant Soil Profiles - Shear Wave Velocity for NI Common Basemat Structures for SSI Analysis Cases (EUR)	3.7-56
Figure 3.7.1-32	U.S. EPR Standard Plant Soil Profile- Shear Wave Velocity for NI Common Basemat Structures for SSI Analysis Cases (HF)	3.7-57
Figure 3.7.1-33	Input Motion for Structures not on the Nuclear Island Common Basemat, Horizontal Motion 5% Damping (EUR)	3.7-58
Figure 3.7.1-34	Input Motion for Structures not on the Nuclear Island Common Basemat, Vertical Motion 5% Damping (EUR).....	3.7-59

Figure 3.7.1-35	Synthetic Acceleration, Velocity, and Displacement Time Histories for Structures not on the Nuclear Island Common Basemat, Horizontal (SSSI1) Motion	3.7-60
Figure 3.7.1-36	Synthetic Acceleration, Velocity, and Displacement Time Histories for Structures not on the Nuclear Island Common Basemat, Horizontal (SSSI2) Motion	3.7-61
Figure 3.7.1-37	Synthetic Acceleration, Velocity, and Displacement Time Histories for Structures not on the Nuclear Island Common Basemat, Vertical (SSSI3) Motion.....	3.7-62
Figure 3.7.1-38	Time History Response Spectrum vs. Input Spectrum for Structures not on the Nuclear Island Common Basemat, Horizontal (SSSI1) Component	3.7-63
Figure 3.7.1-39	Time History Response Spectrum vs. Input Spectrum for Structures not on the Nuclear Island Common Basemat, Horizontal (SSSI2) Component	3.7-64
Figure 3.7.1-40	Time History Response Spectrum vs. Input Spectrum for Structures not on the Nuclear Island Common Basemat, Vertical (SSSI3) Component	3.7-65
Figure 3.7.1-41	Cumulative Energy Plot for Time Histories for Structures not on the Nuclear Island Common Basemat (EUR)	3.7-66
Figure 3.7.1-42	Synthetic Acceleration Time Histories for HF CSDRS	3.7-67
Figure 3.7.1-43	Synthetic Velocity Time Histories for HF CSDRS	3.7-68
Figure 3.7.1-44	Synthetic Displacement Time Histories for HF CSDRS	3.7-69
Figure 3.7.1-45	Response Spectrum of Time History H1 vs. Target Spectrum for HFH Motion (TH1 Target, 090* Target and 1.30*-Target at 5% Damping) ...	3.7-70
Figure 3.7.1-46	Response Spectrum of Time History H2 vs. Target Spectrum for HFH Motion (TH2 Target, 1.30* Target and 0.90*-Target at 5% Damping) ..	3.7-71
Figure 3.7.1-47	Response Spectrum of Time History H3 (Vertical) vs. Target Spectrum for HFV Motion (TH3 Target, 1.30* Target and 0.90*-Target at 5% Damping)	3.7-72
Figure 3.7.1-48	Cumulative Energy Ratio Plot for Time History H1, H2, and H3 for HF Motion	3.7-73
Figure 3.7.1-49	Input Motion for Structures Not on the NI Common Basemat, Horizontal (SSSIHF)	3.7-74
Figure 3.7.1-50	Input Motion for Structures Not on the NI Common Basemat, Vertical (SSSIHF)	3.7-75
Figure 3.7.1-51	Deleted.....	3.7-76

Figure 3.7.1-52 Deleted.....	3.7-76
Figure 3.7.1-53 Synthetic Acceleration, Velocity, and Displacement Time Histories for Structures not on the Nuclear Island Common Basemat, Horizontal (SSSI1HF) Motion	3.7-77
Figure 3.7.1-54 Synthetic Acceleration, Velocity, and Displacement Time Histories for Structures not on the Nuclear Island Common Basemat, Horizontal (SSSI2HF) Motion	3.7-78
Figure 3.7.1-55 Synthetic Acceleration, Velocity, and Displacement Time Histories for Structures not on the Nuclear Island Common Basemat, Vertical (SSSI3HF) Motion	3.7-79
Figure 3.7.1-56 Time History Response Spectrum vs. Input Spectrum for Structures not on the Nuclear Island Common Basemat, Horizontal (SSSI1HF) Component	3.7-80
Figure 3.7.1-57 Time History Response Spectrum vs. Input Spectrum for Structures not on the Nuclear Island Common Basemat, Horizontal (SSSI2HF) Component	3.7-81
Figure 3.7.1-58 Time History Response Spectrum vs. Input Spectrum for Structures not on the Nuclear Island Common Basemat, Horizontal (SSSI3HF) Component	3.7-82
Figure 3.7.1-59 Cumulative Energy Plot for Time Histories for Structures not on the Nuclear Island Common Basemat (HF)	3.7-83
Figure 3.7.1-60 U.S. EPR Standard Plant Soil Profiles - Shear Wave Velocity for EPGB SSI Analysis Cases (EUR).....	3.7-84
Figure 3.7.1-61 U.S. EPR Standard Plant Soil Profiles - Shear Wave Velocity for EPGB SSI Analysis Cases (HF)	3.7-85
Figure 3.7.1-62 U.S. EPR Standard Plant Soil Profiles - Shear Wave Velocity for ESWB SSI Analysis Cases (HF)	3.7-86
Figure 3.7.2-1 Decoupling of the Nuclear Island Common Basemat Interior Structures from the Outer Shield Walls	3.7-159
Figure 3.7.2-2 Deleted.....	3.7-159
Figure 3.7.2-3 Schematic Elevation View of Stick Model for Reactor Building Internal Structures in Global Y-Z Plane	3.7-160
Figure 3.7.2-4 Deleted.....	3.7-160
Figure 3.7.2-5 Static 3D Finite Element Model of Balance of NI Common Basemat Structures Perspective View	3.7-161
Figure 3.7.2-6 Static 3D Finite Element Model of Balance of NI Common Basemat Structures Cutoff View on Y-Z Plane	3.7-162
Figure 3.7.2-7 Static 3D Finite Element Model of Balance of NI Common Basemat Structures Cutoff View on X-Z Plane	3.7-163

Figure 3.7.2-8	Static 3D Finite Element Model of Reactor Containment Building.....	3.7-164
Figure 3.7.2-9	Static 3D Finite Element Model of Reactor Building Internal Structures.	3.7-165
Figure 3.7.2-10	Deleted.....	3.7-166
Figure 3.7.2-11	Deleted.....	3.7-166
Figure 3.7.2-12	Deleted.....	3.7-166
Figure 3.7.2-13	Stick Model STICK-1T for Reactor Building Internal Structure - Perspective View	3.7-167
Figure 3.7.2-14	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +200 ft, 5 in (+61.09m) (Dome Apex) of Reactor Shield Building, 5% Damping, X-Direction.....	3.7-168
Figure 3.7.2-15	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +200 ft, 5 in (+61.09m) (Dome Apex) of Reactor Shield Building, 5% Damping, Y-Direction.....	3.7-169
Figure 3.7.2-16	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +200ft, 5 in (+61.09m) (Dome Apex) of Reactor Shield Building, 5% Damping, Z-Direction.....	3.7-170
Figure 3.7.2-17	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +95 ft, 1-3/4 in (+29.00m) - Safeguard Building 1, 5% Damping, X-Direction.....	3.7-171
Figure 3.7.2-18	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +95 ft, 1-3/4 in (+29.00m) - Safeguard Building 1, 5% Damping, Y-Direction.....	3.7-172
Figure 3.7.2-19	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +95 ft, 1-3/4 in (+29.00m) - Safeguard Building 1, 5% Damping, Z-Direction	3.7-173
Figure 3.7.2-20	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +26 ft, 3 in (+8.00m) - Safeguard Building 1, 5% Damping, X-Direction	3.7-174
Figure 3.7.2-21	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +26 ft, 3 in (+8.00m) - Safeguard Building 1, 5% Damping, Y-Direction	3.7-175
Figure 3.7.2-22	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +26 ft, 3 in (+8.00m) - Safeguard Building 1, 5% Damping, Z-Direction.....	3.7-176
Figure 3.7.2-23	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +95 ft, 1-3/4 in (+29.00m) - Safeguard Building 4, 5% Damping, X-Direction.....	3.7-177
Figure 3.7.2-24	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +95 ft, 1-3/4 in (+29.00m) - Safeguard Building 4, 5% Damping, Y-Direction.....	3.7-178

-
- Figure 3.7.2-25 Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +95 ft, 1-3/
4 in (+29.00m) - Safeguard Building 4, 5% Damping, Z-Direction 3.7-179
- Figure 3.7.2-26 Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +26 ft, 3 in
(+8.00m) - Safeguard Building 4, 5% Damping, X-Direction 3.7-180
- Figure 3.7.2-27 Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +26 ft, 3 in
(+8.00m) - Safeguard Building 4, 5% Damping, Y-Direction 3.7-181
- Figure 3.7.2-28 Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +26 ft, 3 in
(+8.00m) - Safeguard Building 4, 5% Damping, Z-Direction 3.7-182
- Figure 3.7.2-29 Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +68 ft,
10-3/4 in (+21.00m) - Safeguard Building 2/3, 5% Damping, X-Direction
3.7-183
- Figure 3.7.2-30 Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +68 ft,
10-3/4 in (+21.00m) - Safeguard Building 2/3, 5% Damping, Y-Direction
3.7-184
- Figure 3.7.2-31 Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +68 ft,
10-3/4 in (+21.00m) - Safeguard Building 2/3, 5% Damping, Z-Direction
3.7-185
- Figure 3.7.2-32 Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +26 ft, 3 in
(+8.00m) - Safeguard Building 2/3, 5% Damping, X-Direction ... 3.7-186
- Figure 3.7.2-33 Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +26 ft, 3 in
(+8.00m) - Safeguard Building 2/3, 5% Damping, Y-Direction ... 3.7-187
- Figure 3.7.2-34 Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +26 ft, 3 in
(+8.00m) - Safeguard Building 2/3, 5% Damping, Z-Direction.... 3.7-188
- Figure 3.7.2-35 Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +62 ft, 4-1/
4 in (+19.00m) - Fuel Building, 5% Damping, X-Direction 3.7-189
- Figure 3.7.2-36 Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +62 ft, 4-1/
4 in (+19.00m) - Fuel Building, 5% Damping Y-Direction 3.7-190
- Figure 3.7.2-37 Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +62 ft, 4-1/
4 in (+19.00m) - Fuel Building, 5% Damping, Z-Direction 3.7-191
- Figure 3.7.2-38 Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +23 ft, 7-1/
2 in (+7.20m) - Fuel Building, 5% Damping, X-Direction 3.7-192
- Figure 3.7.2-39 Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +23 ft, 7-1/
2 in (+7.20m) - Fuel Building, 5% Damping, Y-Direction 3.7-193
- Figure 3.7.2-40 Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +23 ft, 7-1/
2 in (+7.20m) - Fuel Building, 5% Damping, Z-Direction 3.7-194
- Figure 3.7.2-41 Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +190 ft,
3-1/2 in (+58.00m) - Containment Dome Apex,
5% Damping, X-Direction..... 3.7-195

Figure 3.7.2-42	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +190 ft, 3-1/2 in (+58.00m) - Containment Dome Apex, 5% Damping, Y-Direction.....	3.7-196
Figure 3.7.2-43	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +190 ft, 3-1/2 in (+58.00m) - Containment Dome Apex, 5% Damping, Z-Direction 3.7-197	
Figure 3.7.2-44	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +123 ft, 4-1/4 in (+37.60m) - Containment Building, 5% Damping, X-Direction... 3.7-198	
Figure 3.7.2-45	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +123 ft, 4-1/4 in (+37.60m) - Containment Building, 5% Damping, Y-Direction... 3.7-199	
Figure 3.7.2-46	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +123 ft, 4-1/4 in (+37.60m) - Containment Building, 5% Damping, Z-Direction ... 3.7-200	
Figure 3.7.2-47	Deleted.....	3.7-201
Figure 3.7.2-48	Deleted.....	3.7-201
Figure 3.7.2-49	Deleted.....	3.7-201
Figure 3.7.2-50	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +63 ft, 11-3/4 in (+19.50m) - Reactor Building Internal Structure, 5% Damping, X-Direction.....	3.7-202
Figure 3.7.2-51	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +63 ft, 11-3/4 in (+19.50m) - Reactor Building Internal Structure, 5% Damping, Y-Direction.....	3.7-203
Figure 3.7.2-52	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +63 ft, 11-3/4 in (+19.50m) - Reactor Building Internal Structure, 5% Damping, Z-Direction.....	3.7-204
Figure 3.7.2-53	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +16 ft, 10-3/4 in (+5.15m) - Reactor Building Internal Structure, 5% Damping, X-Direction.....	3.7-205
Figure 3.7.2-54	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +16 ft, 10-3/4 in (+5.15m) - Reactor Building Internal Structure, 5% Damping, Y-Direction.....	3.7-206
Figure 3.7.2-55	Static FEM vs. Dynamic FEM Spectrum Comparison at Elev. +16 ft, 10-3/4 in (+5.15m) - Reactor Building Internal Structure, 5% Damping, Z-Direction.....	3.7-207
Figure 3.7.2-56	Simplified Stick Model of Reactor Coolant Loop.....	3.7-208
Figure 3.7.2-57	Isometric View of GTSTRUDL FEM for Emergency Power Generating Building	3.7-209

Figure 3.7.2-58	Section View of GTSTRUDL FEM for Emergency Power Generating Building	3.7-210
Figure 3.7.2-59	Isometric View of GTSTRUDL FEM for Essential Service Water Building (EUR Motions)	3.7-211
Figure 3.7.2-60	Section View of GTSTRUDL FEM for Essential Service Water Building (EUR Motions)	3.7-212
Figure 3.7.2-61	Deleted.....	3.7-212
Figure 3.7.2-62	Deleted.....	3.7-212
Figure 3.7.2-63	Deleted.....	3.7-212
Figure 3.7.2-64	Deleted.....	3.7-212
Figure 3.7.2-65	Deleted.....	3.7-212
Figure 3.7.2-66	Deleted.....	3.7-212
Figure 3.7.2-67	Elevation View of NAB Stick Model in Y-Z Plane.....	3.7-213
Figure 3.7.2-68	Response Spectra at NI Common Basemat Bottom Node 274 - 5% Damping, X-Direction.....	3.7-214
Figure 3.7.2-69	Response Spectra at NI Common Basemat Bottom Node 274 - 5% Damping, Y-Direction.....	3.7-215
Figure 3.7.2-70	Response Spectra at NI Common Basemat Bottom Node 274 - 5% Damping, Z-Direction.....	3.7-216
Figure 3.7.2-71	Soil Model Surface Response Spectra at Centers of Footprint of EPGB - 5% Damping, X-Direction	3.7-217
Figure 3.7.2-72	Soil Model Surface Response Spectra at Centers of Footprint of EPGB - 5% Damping, Y-Direction	3.7-218
Figure 3.7.2-73	Soil Model Surface Response Spectra at Centers of Footprint of EPGB - 5% Damping, Z-Direction	3.7-219
Figure 3.7.2-74	Spectrum Envelope of Reactor Building Internal Structure - Elev. +16 ft, 10-3/4 in (+5.15m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, X-Direction.....	3.7-220
Figure 3.7.2-75	Spectrum Envelope of Reactor Building Internal Structure - Elev. +16 ft, 10-3/4 in (+5.15m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Y-Direction.....	3.7-221
Figure 3.7.2-76	Spectrum Envelope of Reactor Building Internal Structure - Elev. +16 ft, 10-3/4 in (+5.15m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Z-Direction.....	3.7-222
Figure 3.7.2-77	Spectrum Envelope of Reactor Building Internal Structure - Elev. +63 ft, 11-3/4 in (+19.50m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, X-Direction.....	3.7-223

-
- Figure 3.7.2-78 Spectrum Envelope of Reactor Building Internal Structure - Elev. +63 ft, 11-3/4 in (+19.50m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Y-Direction..... 3.7-224
- Figure 3.7.2-79 Spectrum Envelope of Reactor Building Internal Structure - Elev. +63 ft, 11-3/4 in (+19.50m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Z-Direction..... 3.7-225
- Figure 3.7.2-80 Spectrum Envelope of Safeguard Building 1 - Elev. +26 ft, 7 in (+8.10m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, X-Direction..... 3.7-226
- Figure 3.7.2-81 Spectrum Envelope of Safeguard Building 1 - Elev. +26 ft, 7 in (+8.10m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Y-Direction..... 3.7-227
- Figure 3.7.2-82 Spectrum Envelope of Safeguard Building 1 - Elev. +26 ft, 7 in (+8.10m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Z-Direction..... 3.7-228
- Figure 3.7.2-83 Spectrum Envelope of Safeguard Building 1 - Elev. +68 ft, 11 in (+21.00m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, X-Direction 3.7-229
- Figure 3.7.2-84 Spectrum Envelope of Safeguard Building 1 - Elev. +68 ft, 11 in (+21.00m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Y-Direction 3.7-230
- Figure 3.7.2-85 Spectrum Envelope of Safeguard Building 1 - Elev. +68 ft, 11 in (+21.00m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Z-Direction 3.7-231
- Figure 3.7.2-86 Spectrum Envelope of Safeguard Building 2&3 - Elev. +26 ft, 7 in (+8.10m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, X-Direction 3.7-232
- Figure 3.7.2-87 Spectrum Envelope of Safeguard Building 2&3 - Elev. +26 ft, 7 in (+8.10m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Y-Direction 3.7-233
- Figure 3.7.2-88 Spectrum Envelope of Safeguard Building 2&3 - Elev. +26 ft, 7 in (+8.10m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Z-Direction 3.7-234
- Figure 3.7.2-89 Spectrum Envelope of Safeguard Building 2&3 - Elev. +53 ft, 6 in (+16.30m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, X-Direction 3.7-235
- Figure 3.7.2-90 Spectrum Envelope of Safeguard Building 2&3 - Elev. +53 ft, 6 in (+16.30m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Y-Direction 3.7-236
- Figure 3.7.2-91 Spectrum Envelope of Safeguard Building 2&3 - Elev. +53 ft, 6 in (+16.30m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Z-Direction 3.7-237
- Figure 3.7.2-92 Spectrum Envelope of Safeguard Building 4 - Elev. +68 ft, 11 in (+21.00m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, X-Direction 3.7-238

-
- Figure 3.7.2-93 Spectrum Envelope of Safeguard Building 4 - Elev. +68 ft, 11 in (+21.00m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Y-Direction
3.7-239
- Figure 3.7.2-94 Spectrum Envelope of Safeguard Building 4 - Elev. +68 ft, 11 in (+21.00m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Z-Direction
3.7-240
- Figure 3.7.2-95 Spectrum Envelope of Containment Building - Elev. +123 ft, 4-1/4 in (+37.60m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, X-Direction
3.7-241
- Figure 3.7.2-96 Spectrum Envelope of Containment Building - Elev. +123 ft, 4-1/4 in (+37.60m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Y-Direction
3.7-242
- Figure 3.7.2-97 Spectrum Envelope of Containment Building - Elev. +123 ft, 4-1/4 in (+37.60m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Z-Direction
3.7-243
- Figure 3.7.2-98 Spectrum Envelope of Containment Building - Elev. +190 ft, 3-1/2 in (+58.00m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, X-Direction
3.7-244
- Figure 3.7.2-99 Spectrum Envelope of Containment Building - Elev. +190 ft, 3-1/2 in (+58.00m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Y-Direction
3.7-245
- Figure 3.7.2-100 Spectrum Envelope of Containment Building - Elev. +190 ft, 3-1/2 in (+58.00m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Z-Direction
3.7-246
- Figure 3.7.2-101 Spectrum Envelope of EPGB at the Center of Basemat - 2%, 3%, 4%, 5%, 7%, and 10% Damping, X-Direction 3.7-247
- Figure 3.7.2-102 Spectrum Envelope of EPGB at the Center of Basemat - 2%, 3%, 4%, 5%, 7%, and 10% Damping, Y-Direction 3.7-248
- Figure 3.7.2-103 Spectrum Envelope of EPGB at the Center of Basemat - 2%, 3%, 4%, 5%, 7%, and 10% Damping, Z-Direction 3.7-249
- Figure 3.7.2-104 Spectrum Envelope of ESWB at Elev +63 ft, 0 in at Node 12733 - 2%, 3%, 4%, 5%, 7%, and 10% Damping, X-Direction 3.7-250
- Figure 3.7.2-105 Spectrum Envelope of ESWB at Elev +63 ft, 0 in at Node 12733 - 2%, 3%, 4%, 5%, 7%, and 10% Damping, Y-Direction 3.7-251
- Figure 3.7.2-106 Spectrum Envelope of ESWB at Elev +63 ft, 0 in at Node 12733 - 2%, 3%, 4%, 5%, 7%, and 10% Damping, Z-Direction 3.7-252
- Figure 3.7.2-107 Spectrum Envelope of ESWB at Elev +14 ft, 0 in at Node 10385 - 2%, 3%, 4%, 5%, 7%, and 10% Damping, X-Direction 3.7-253
- Figure 3.7.2-108 Spectrum Envelope of ESWB at Elev +14 ft, 0 in at Node 10385 - 2%, 3%, 4%, 5%, 7%, and 10% Damping, Y-Direction 3.7-254

Figure 3.7.2-109 Spectrum Envelope of ESWB at Elev +14 ft, 0 in at Node 10385 - 2%, 3%, 4%, 5%, 7%, and 10% Damping, Z-Direction	3.7-255
Figure 3.7.2-110 Spectrum Envelope of Fuel Building at Elev. +12 ft, 1-2/3 in (3.7 m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, X-Direction.....	3.7-256
Figure 3.7.2-111 Spectrum Envelope of Fuel Building at Elev. +12 ft, 1-2/3 in (3.7 m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Y-Direction.....	3.7-257
Figure 3.7.2-112 Spectrum Envelope of Fuel Building at Elev. +12 ft, 1-2/3 in (3.7 m) 2%, 3%, 4%, 5%, 7%, and 10% Damping, Z-Direction	3.7-258
Figure 3.7.2-113 Dynamic 3D Finite Element Model of Nuclear Island, Isometric View	
3.7-259	
Figure 3.7.2-114 Dynamic 3D Finite Element Model of Nuclear Island, Elevation View	
3.7-260	
Figure 3.7.2-115 Dynamic 3D Finite Element Model of Fuel Building (FB).....	3.7-261
Figure 3.7.2-116 Dynamic 3D Finite Element Model of Safeguard Building 1 (SB1).....	
3.7-262	
Figure 3.7.2-117 Dynamic 3D Finite Element Model of Safeguard Building 2/3 (SB2/3) ...	
3.7-263	
Figure 3.7.2-118 Dynamic 3D Finite Element Model of Safeguard Building 4 (SB4).....	
3.7-264	
Figure 3.7.2-119 Dynamic 3D Finite Element Model of Reactor Containment Building (RCB).....	3.7-265
Figure 3.7.2-120 Dynamic 3D Finite Element Model of Reactor Building Internal Structures (RBIS).....	3.7-266
Figure 3.7.2-121 SSI Analysis Model – Excavated Soil Solid Elements, Nuclear Island Foundation	3.7-267
Figure 3.7.2-122 SSI Analysis Model – Nuclear Island Beam Elements.....	3.7-268
Figure 3.7.2-123 SSI Analysis Model – Nuclear Island Shell Elements	3.7-269
Figure 3.7.2-124 SSI Analysis Model – Adjacent Structures Foundation Rigid Beam Elements	3.7-270
Figure 3.7.2-125 Deleted.....	3.7-270
Figure 3.7.2-126 SSI Analysis Model – Nuclear Auxiliary Building Foundation and Sidewall Rigid Beams	3.7-271
Figure 3.7.2-127 Deleted.....	3.7-271
Figure 3.7.2-128 SSI Analysis Model – Nuclear Auxiliary Building Stick Model....	3.7-272
Figure 3.7.2-129 SSI Analysis Model – Nuclear Auxiliary Building Foundation Excavated Soil	3.7-273
Figure 3.7.2-130 Nuclear Island and Nuclear Auxiliary Building Interface Nodes..	3.7-274

Figure 3.7.2-131 Deleted.....	3.7-274
Figure 3.7.2-132 Nuclear Island Foundation Layout Showing Basemat, Sidewalls, and Shear Key	3.7-275
Figure 3.7.2-133 Deleted.....	3.7-276
Figure 3.7.2-134 Deleted.....	3.7-276
Figure 3.7.2-135 Deleted.....	3.7-276
Figure 3.7.2-136 Deleted.....	3.7-276
Figure 3.7.2-137 Location of Response Output Nodes – NI Common Basemat...	3.7-277
Figure 3.7.2-138 Location of Response Output Nodes – Reactor Building Internal Structure – Elev. +16 ft, 10-3/4 in (+5.15 m).....	3.7-278
Figure 3.7.2-139 Location of Response Output Nodes – Reactor Building Internal Structure – Elev. +63 ft, 11-3/4 in (+19.50 m).....	3.7-279
Figure 3.7.2-140 Location of Response Output Nodes – Safeguard Building 1 – Elev. +26 ft, 3 in (+8.10 m).....	3.7-280
Figure 3.7.2-141 Location of Response Output Nodes – Safeguard Building 1 – Elev. +68 ft, 10-3/4 in (+21.00 m)	3.7-281
Figure 3.7.2-142 Location of Response Output Nodes – Safeguard Building 2 and 3 – Elev. +26 ft, 7 in (+8.10 m).....	3.7-282
Figure 3.7.2-143 Location of Response Output Nodes – Safeguard Building 2 & 3 – Elev. +50 ft, 6-1/4 in (+15.40 m)	3.7-283
Figure 3.7.2-144 Location of Response Output Nodes – Safeguard Building 4 – Elev. +68 ft, 10-3/4 in (+21.00 m)	3.7-284
Figure 3.7.2-145 Deleted.....	3.7-284
Figure 3.7.2-146 Deleted.....	3.7-284
Figure 3.7.2-147 Location of Response Output Nodes, Fuel Building at Elev. +12 ft, 1-2/3 in (3.7 m).....	3.7-285
Figure 3.7.2-148 Spectrum Envelope of EPGB at Elev. +51 ft, 6 in - 2%, 3%, 4%, 5%, 7%, and 10% Damping, X-Direction.....	3.7-286
Figure 3.7.2-149 Spectrum Envelope of EPGB at Elev. +51 ft, 6 in - 2%, 3%, 4%, 5%, 7%, and 10% Damping, Y-Direction.....	3.7-287
Figure 3.7.2-150 Spectrum Envelope of EPGB at Elev. +51 ft, 6 in - 2%, 3%, 4%, 5%, 7%, and 10% Damping, Z-Direction.....	3.7-288
Figure 3.7.2-151 Solid Element Basemat.....	3.7-289
Figure 3.7.2-152 Foundation Basemat Model with Solid Element Basemat	3.7-290
Figure 3.8-1 Reactor Building Plan at Elevation -50 Feet	3.8-173
Figure 3.8-2 Reactor Building Plan at Elevation -20 Feet	3.8-174

Figure 3.8-3	Reactor Building Plan at Elevation -8 Feet	3.8-175
Figure 3.8-4	Reactor Building Plan at Elevation +5 Feet	3.8-176
Figure 3.8-5	Reactor Building Plan at Elevation +17 feet	3.8-177
Figure 3.8-6	Reactor Building Plan at Elevation +29 feet	3.8-178
Figure 3.8-7	Reactor Building Plan at Elevation +45 feet	3.8-179
Figure 3.8-8	Reactor Building Plan at Elevation +64 feet	3.8-180
Figure 3.8-9	Reactor Building Plan at Elevation +79 feet	3.8-181
Figure 3.8-10	Reactor Building Plan at Elevation +94 feet	3.8-182
Figure 3.8-11	Reactor Building Section A-A.....	3.8-183
Figure 3.8-12	Reactor Building Section B-B.....	3.8-184
Figure 3.8-13	Reactor Building Section C-C	3.8-185
Figure 3.8-14	Finite Element Model of Reactor Containment Building	3.8-186
Figure 3.8-15	Finite Element Model of Reactor Containment Building Dome Concrete 3.8-187	
Figure 3.8-16	Finite Element Model of Reactor Containment Building Basemat Concrete	3.8-188
Figure 3.8-17	Finite Element Model of Reactor Containment Building Interface with Concrete Interior Structures.....	3.8-189
Figure 3.8-18	Finite Element Model of Reactor Containment Building Tendon Layout in Cylindrical Wall.....	3.8-190
Figure 3.8-19	Finite Element Model of Reactor Containment Building Tendon Layout in Dome.....	3.8-191
Figure 3.8-20	Accident Temperature versus Time (Reactor Containment Building).... 3.8-192	
Figure 3.8-21	Accident Pressure versus Time (Reactor Containment Building)3.8-193	
Figure 3.8-22	Temperature Gradient Through Cylinder Wall	3.8-194
Figure 3.8-23	Temperature Gradient Through Dome.....	3.8-195
Figure 3.8-24	Temperature Gradient Through Basemat	3.8-196
Figure 3.8-25	Equipment Hatch General Assembly	3.8-197
Figure 3.8-26	Personnel Airlock, Emergency Airlock General Overview	3.8-198
Figure 3.8-27	Containment Penetration for Feedwater Pipe	3.8-199
Figure 3.8-28	Containment Penetrations for High Energy Pipes	3.8-200
Figure 3.8-29	Containment Standard Piping Penetrations – Single Pipe.....	3.8-201
Figure 3.8-30	Containment Standard Piping Penetrations – Multiple Pipes	3.8-202

Figure 3.8-31	Fuel Transfer Tube Penetration (Conceptual View).....	3.8-203
Figure 3.8-32	Reactor Building Internal Structures ANSYS Model	3.8-204
Figure 3.8-33	Reactor Building Internal Structures ANSYS Model – Section through Center of Building Looking West.....	3.8-205
Figure 3.8-34	Reactor Building Internal Structures ANSYS Model – Section through Reactor Cavity and Refueling Canal.....	3.8-206
Figure 3.8-35	Reactor Building Internal Structures ANSYS Model – Section through Center of Building Looking North	3.8-207
Figure 3.8-36	Reactor Building Internal Structures ANSYS Model – Section through Center of Building Looking Northwest.....	3.8-208
Figure 3.8-37	Reactor Building Internal Structures ANSYS Model – View of IRWST and Internal Structures Basemat	3.8-209
Figure 3.8-38	Fuel Building Plan Elevation -31 Feet.....	3.8-210
Figure 3.8-39	Fuel Building Plan Elevation -20 Feet.....	3.8-211
Figure 3.8-40	Fuel Building Plan Elevation -11 Feet.....	3.8-212
Figure 3.8-41	Fuel Building Plan Elevation 0 Feet.....	3.8-213
Figure 3.8-42	Fuel Building Plan Elevation +12 Feet.....	3.8-214
Figure 3.8-43	Fuel Building Plan Elevation +24 Feet.....	3.8-215
Figure 3.8-44	Fuel Building Plan Elevation +36 Feet.....	3.8-216
Figure 3.8-45	Fuel Building Plan Elevation +49 Feet.....	3.8-217
Figure 3.8-46	Fuel Building Plan Elevation +64 Feet.....	3.8-218
Figure 3.8-47	Fuel Building Plan Elevation +79 Feet.....	3.8-219
Figure 3.8-48	Fuel Building Plan Elevation +90 Feet.....	3.8-220
Figure 3.8-49	Fuel Building Plan Elevation +112 Feet.....	3.8-221
Figure 3.8-50	Fuel Building Plan Section A-A.....	3.8-222
Figure 3.8-51	Fuel Building Plan Section B-B	3.8-223
Figure 3.8-52	Fuel Building Plan Section C-C.....	3.8-224
Figure 3.8-53	Safeguard Building 1 Plan Elevation -31 Feet	3.8-225
Figure 3.8-54	Safeguard Building 1 Plan Elevation -16 Feet	3.8-226
Figure 3.8-55	Safeguard Building 1 Plan Elevation 0 Feet	3.8-227
Figure 3.8-56	Safeguard Building 1 Plan Elevation +15 Feet	3.8-228
Figure 3.8-57	Safeguard Building 1 Plan Elevation +27 Feet	3.8-229
Figure 3.8-58	Safeguard Building 1 Plan Elevation +39 Feet	3.8-230
Figure 3.8-59	Safeguard Building 1 Plan Elevation +55 Feet	3.8-231

Figure 3.8-60	Safeguard Building 1 Plan Elevation +69 Feet	3.8-232
Figure 3.8-61	Safeguard Building 1 Plan Elevation +81 Feet	3.8-233
Figure 3.8-62	Safeguard Building 1 Plan Elevation +96 Feet	3.8-234
Figure 3.8-63	Safeguard Building 1 Section A-A.....	3.8-235
Figure 3.8-64	Safeguard Buildings 2 and 3 Plan Elevation -31 Feet	3.8-236
Figure 3.8-65	Safeguard Buildings 2 and 3 Plan Elevation -16 Feet	3.8-237
Figure 3.8-66	Safeguard Buildings 2 and 3 Plan Elevation 0 Feet.....	3.8-238
Figure 3.8-67	Safeguard Buildings 2 and 3 Plan Elevation +15 Feet	3.8-239
Figure 3.8-68	Safeguard Buildings 2 and 3 Plan Elevation +27 Feet	3.8-240
Figure 3.8-69	Safeguard Buildings 2 and 3 Plan Elevation +39 Feet	3.8-241
Figure 3.8-70	Safeguard Buildings 2 and 3 Plan Elevation +53 Feet	3.8-242
Figure 3.8-71	Safeguard Buildings 2 and 3 Plan Elevation +69 Feet	3.8-243
Figure 3.8-72	Safeguard Buildings 2 and 3 Plan Elevation +79 Feet	3.8-244
Figure 3.8-73	Safeguard Buildings 2 and 3 Plan Elevation +94 Feet	3.8-245
Figure 3.8-74	Safeguard Buildings 2 and 3 Section B-B.....	3.8-246
Figure 3.8-75	Safeguard Building 4 Plan Elevation -31 Feet	3.8-247
Figure 3.8-76	Safeguard Building 4 Plan Elevation -16 Feet	3.8-248
Figure 3.8-77	Safeguard Building 4 Plan Elevation 0 Feet	3.8-249
Figure 3.8-78	Safeguard Building 4 Plan Elevation +15 Feet	3.8-250
Figure 3.8-79	Safeguard Building 4 Plan Elevation +26 Feet	3.8-251
Figure 3.8-80	Safeguard Building 4 Plan Elevation +39 Feet	3.8-252
Figure 3.8-81	Safeguard Building 4 Plan Elevation +55 Feet	3.8-253
Figure 3.8-82	Safeguard Building 4 Plan Elevation +69 Feet	3.8-254
Figure 3.8-83	Safeguard Building 4 Plan Elevation +81 Feet	3.8-255
Figure 3.8-84	Safeguard Building 4 Plan Elevation +96 Feet	3.8-256
Figure 3.8-85	Safeguard Building 4 Section A-A.....	3.8-257
Figure 3.8-86	ANSYS Finite Element Model of Nuclear Island Common Basemat Structure - Outside View	3.8-258
Figure 3.8-87	ANSYS Finite Element Model of Nuclear Island Common Basemat Structure - Section Through Fuel Building and Safeguard Building 2/3 Island.....	3.8-259
Figure 3.8-88	ANSYS Finite Element Model of Nuclear Island Common Basemat Structure - Section Through Safeguard Buildings 4 and 1	3.8-260

Figure 3.8-89	Emergency Power Generating Buildings Plan Elevation 0'-0"	3.8-261
Figure 3.8-90	Emergency Power Generating Buildings Plan Elevation 33'-4" ..	3.8-262
Figure 3.8-91	Emergency Power Generating Buildings Plan Elevation 51'-6" ..	3.8-263
Figure 3.8-92	Emergency Power Generating Buildings Plan Elevation 68'-0" .	3.8-264
Figure 3.8-93	Emergency Power Generating Buildings Section A-A	3.8-265
Figure 3.8-94	Emergency Power Generating Buildings Section B-B	3.8-266
Figure 3.8-95	Essential Service Water Building Plan Elevation 0'-0"	3.8-267
Figure 3.8-96	Essential Service Water Building Plan Elevation 14'-0".....	3.8-268
Figure 3.8-97	Essential Service Water Building Plan Elevation 47'-0".....	3.8-269
Figure 3.8-98	Essential Service Water Building Plan Elevation 63'-0".....	3.8-270
Figure 3.8-99	Essential Service Water Building Plan Elevation 80'-0".....	3.8-271
Figure 3.8-100	Essential Service Water Building Roof Plan Elevation 96'-0"	3.8-272
Figure 3.8-101	Essential Service Water Building Section A-A	3.8-273
Figure 3.8-102	Essential Service Water Building Section B-B	3.8-274
Figure 3.8-103	Nuclear Island Common Basemat Structure Foundation Basemat ANSYS Model	3.8-275
Figure 3.8-104	Emergency Power Generating Building Foundation Basemat Model	3.8-276
Figure 3.8-105	Essential Service Water Building Foundation Basemat Model ...	3.8-277
Figure 3.8-106	Elastic Displacement for Soil Case 1u	3.8-278
Figure 3.8-107	Elastic Displacement for Soil Case 2u	3.8-279
Figure 3.8-108	Elastic Displacement for Soil Case 1n2u	3.8-280
Figure 3.8-109	Elastic Displacement for Soil Case 3u	3.8-281
Figure 3.8-110	Elastic Displacement for Soil Case 4u	3.8-282
Figure 3.8-111	Elastic Displacement for Soil Case 5a	3.8-283
Figure 3.8-112	Elastic Displacement for Soil Case 5u	3.8-284
Figure 3.8-113	Elastic Displacement for Soil Case 2sn4u	3.8-285
Figure 3.8-114	Elastic Displacement for Soil Case 2n3u	3.8-286
Figure 3.8-115	Elastic Displacement for Soil Case 3r3u.....	3.8-287
Figure 3.8-116	Deleted.....	3.8-287
Figure 3.8-117	Deleted.....	3.8-287
Figure 3.8-118	Jurisdictional Boundaries for the Design of Concrete Structures of the U.S. EPR Common Basemat Structure	3.8-288

Figure 3.8-119	Containment Dedicated Spare Penetration	3.8-289
Figure 3.8-120	Containment Penetration for Main Steam Pipe.....	3.8-290
Figure 3.8-121	Low Voltage Electrical Penetration Sleeve	3.8-291
Figure 3.8-122	Medium Voltage Electrical Penetration Sleeve	3.8-292
Figure 3.8-123	Construction Opening	3.8-293
Figure 3.8-124	Relative Differential Settlement Step 1, NI Basemat	3.8-294
Figure 3.8-125	Relative Differential Settlement Step 2, Walls up to Elevation -16 feet ..	3.8-295
Figure 3.8-126	Relative Differential Settlement Step 3, Floor Slabs at Elevation -16 feet	3.8-296
Figure 3.8-127	Relative Differential Settlement Step 4, Walls up to Grade Elevation....	3.8-297
Figure 3.8-128	Relative Differential Settlement Step 5, Floor Slabs at Grade Elevation	3.8-298
Figure 3.8-129	Relative Differential Settlement Step 6, Walls up to Elevation 55 feet....	3.8-299
Figure 3.8-130	Relative Differential Settlement Step 7, Floor Slabs at Elevation 55 feet	3.8-300
Figure 3.8-131	Relative Differential Settlement Step 8, Walls up to Elevation 96 feet....	3.8-301
Figure 3.8-132	Relative Differential Settlement Step 9, Floor Slabs at Elevation 96 feet	3.8-302
Figure 3.8-133	Relative Differential Settlement Step 10, Walls up to Elevation 144 feet	3.8-303
Figure 3.8-134	Relative Differential Settlement Step 11, Full NI Common Basemat Structure	3.8-304
Figure 3.8-135	Total Differential Settlement, EPGB.....	3.8-305
Figure 3.8-136	Total Differential Settlement, ESWB	3.8-306
Figure 3.8-137	Reactor Containment Building Door Locations at Elevation -8 feet	3.8-307
Figure 3.8-138	Reactor Containment Building Door Locations at Elevation +5 feet	3.8-308
Figure 3.8-139	Reactor Containment Building Door Locations at Elevation +17 feet	3.8-309
Figure 3.8-140	Reactor Containment Building Door Locations at Elevation +29 feet	3.8-310

Figure 3.8-141	Reactor Containment Building Door Locations at Elevation +45 feet	
	3.8-311	
Figure 3.8-142	Reactor Containment Building Door Locations at Elevation +64 feet	
	3.8-312	
Figure 3.8-143	Reactor Containment Building Door Locations at Elevation +79 feet	
	3.8-313	
Figure 3.8-144	Reactor Containment Building Door Locations at Elevation +94 feet	
	3.8-314	
Figure 3.8-145	Foundation Modulus for High Frequency Soil Cases.....	3.8-315
Figure 3.9.4-1	Control Rod Drive Mechanism Assembly	3.9-71
Figure 3.9.5-1	Reactor Pressure Vessel General Arrangement.....	3.9-85
Figure 3.9.5-2	Lower Reactor Internals.....	3.9-86
Figure 3.9.5-3	Reactor Pressure Vessel Heavy Reflector.....	3.9-87
Figure 3.9.5-4	Reactor Pressure Vessel Upper Internals.....	3.9-88
Figure 3.9.5-5	Section A-A Flow Distribution Device	3.9-89
Figure 3.9.5-6	Section B-B Upper Support Plate	3.9-90
Figure 3.9.5-7	Section C-C Upper Core Plate.....	3.9-91
Figure 3.9.5-8	Illustration of the Radial Keys and Clearances	3.9-92
Figure 3.11-1	Harsh and Mild Zones in Safeguard Buildings.....	3.11-168
Figure 3A-1	Demonstration of Modified ISRS for Frequency Determination Approach to Equivalent Static Load Method: High Frequency Peak Has Highest Spectral Acceleration	3A-16
Figure 3A-2	Demonstration of Modified ISRS for Frequency Determination Approach to Equivalent Static Load Method: Low Frequency Peak Has Highest Spectral Acceleration	3A-17
Figure 3A-3	Demonstration of Modified ISRS for Response Spectrum Method: High Frequency Peak Has Highest Spectral Acceleration	3A-18
Figure 3A-4	Demonstration of Modified ISRS for Response Spectrum Method: Low Frequency Peak Has Highest Spectral Acceleration	3A-19
Figure 3B-1	Dimensional Arrangement Reference Plant Building Location	3B-2
Figure 3B-2	Reactor Building Dimensional Plan at Elevation -15 m (-50 ft).....	3B-3
Figure 3B-3	Reactor Building Dimensional Plan at Elevation -6.15 m (-20 ft)....	3B-4
Figure 3B-4	Reactor Building Dimensional Plan at Elevation -2.3 m (-8 ft).....	3B-5
Figure 3B-5	Reactor Building Dimensional Plan at Elevation +1.5 m (+5 ft)	3B-6
Figure 3B-6	Reactor Building Dimensional Plan at Elevation +5.15 m (+17 ft) ...	3B-7

Figure 3B-7	Reactor Building Dimensional Plan at Elevation +8.7 m (+29 ft)	3B-8
Figure 3B-8	Reactor Building Dimensional Plan at Elevation +13.8 m (+45 ft) ...	3B-9
Figure 3B-9	Reactor Building Dimensional Plan at Elevation +19.5 m (+64 ft) .	3B-10
Figure 3B-10	Reactor Building Dimensional Plan at Elevation +24.1 m (+79 ft) .	3B-11
Figure 3B-11	Reactor Building Dimensional Plan at Elevation +28.5 m (+94 ft) .	3B-12
Figure 3B-12	Reactor Building Dimensional Section A-A.....	3B-13
Figure 3B-13	Reactor Building Dimensional Section B-B.....	3B-14
Figure 3B-14	Reactor Building Dimensional Section C-C	3B-15
Figure 3B-15	Fuel Building Dimensional Plan Elevation -9.6 m (-31 ft).....	3B-16
Figure 3B-16	Fuel Building Dimensional Plan Elevation -6.2 m (-20 ft).....	3B-17
Figure 3B-17	Fuel Building Dimensional Plan Elevation -3.4 m (-11 ft).....	3B-18
Figure 3B-18	Fuel Building Dimensional Plan Elevation 0 m (0 ft).....	3B-19
Figure 3B-19	Fuel Building Dimensional Plan Elevation +3.7 m (+12 ft).....	3B-20
Figure 3B-20	Fuel Building Dimensional Plan Elevation +7.4 m (+24 ft).....	3B-21
Figure 3B-21	Fuel Building Dimensional Plan Elevation +11.1 m (+36 ft).....	3B-22
Figure 3B-22	Fuel Building Dimensional Plan Elevation +14.8 m (+49 ft).....	3B-23
Figure 3B-23	Fuel Building Dimensional Plan Elevation +19.5 m (+64 ft).....	3B-24
Figure 3B-24	Fuel Building Dimensional Plan Elevation +24.2 m (+79 ft).....	3B-25
Figure 3B-25	Fuel Building Dimensional Plan Elevation +27.4 m (+90 ft).....	3B-26
Figure 3B-26	Fuel Building Dimensional Plan Elevation +34 m (+112 ft).....	3B-27
Figure 3B-27	Fuel Building Dimensional Section A-A	3B-28
Figure 3B-28	Fuel Building Dimensional Section B-B	3B-29
Figure 3B-29	Fuel Building Dimensional Section C-C	3B-30
Figure 3B-30	Safeguard Building 1 Dimensional Plan Elevation -9.6 m (-31 ft) ..	3B-31
Figure 3B-31	Safeguard Building 1 Dimensional Plan Elevation -5.0 m (-16 ft) ..	3B-32
Figure 3B-32	Safeguard Building 1 Dimensional Plan Elevation 0 m (0 ft)	3B-33
Figure 3B-33	Safeguard Building 1 Dimensional Plan Elevation +4.7 m (+15 ft)	3B-34
Figure 3B-34	Safeguard Building 1 Dimensional Plan Elevation +8.1 m (+27 ft)	3B-35
Figure 3B-35	Safeguard Building 1 Dimensional Plan Elevation +12 m (+39 ft) .	3B-36
Figure 3B-36	Safeguard Building 1 Dimensional Plan Elevation +16.8 m (+55 ft) ..	3B-37
Figure 3B-37	Safeguard Building 1 Dimensional Plan Elevation +21 m (+69 ft) .	3B-38

Figure 3B-38	Safeguard Building 1 Dimensional Plan Elevation +24.7 m (+81 ft)	
	3B-39	
Figure 3B-39	Safeguard Building 1 Dimensional Plan Elevation +29.3 m (+96 ft)	
	3B-40	
Figure 3B-40	Safeguard Building 1 Dimensional Section A-A.....	3B-41
Figure 3B-41	Safeguard Buildings 2 and 3 Dimensional Plan Elevation -9.6 m (-31 ft)	
	3B-42	
Figure 3B-42	Safeguard Buildings 2 and 3 Dimensional Plan Elevation -5 m (-16 ft) ..	
	3B-43	
Figure 3B-43	Safeguard Buildings 2 and 3 Dimensional Plan Elevation 0 m (0 ft).....	
	3B-44	
Figure 3B-44	Safeguard Buildings 2 and 3 Dimensional Plan Elevation +4.7 m (+15 ft)	
	3B-45	
Figure 3B-45	Safeguard Buildings 2 and 3 Dimensional Plan Elevation +8.1 m (+27 ft)	
	3B-46	
Figure 3B-46	Safeguard Buildings 2 and 3 Dimensional Plan Elevation +12 m (+39 ft)	
	3B-47	
Figure 3B-47	Safeguard Buildings 2 and 3 Dimensional Plan Elevation +16.3 m (+53 ft).....	
	3B-48	
Figure 3B-48	Safeguard Buildings 2 and 3 Dimensional Plan Elevation +21 m (+69 ft)	
	3B-49	
Figure 3B-49	Safeguard Buildings 2 and 3 Dimensional Plan Elevation +24 m (+79 ft)	
	3B-50	
Figure 3B-50	Safeguard Buildings 2 and 3 Dimensional Plan Elevation +28.8 m (+94 ft).....	
	3B-51	
Figure 3B-51	Safeguard Buildings 2 and 3 Dimensional Section B-B	3B-52
Figure 3B-52	Safeguard Building 4 Dimensional Plan Elevation -9.6 m (-31 ft) ..	3B-53
Figure 3B-53	Safeguard Building 4 Dimensional Plan Elevation -5 m (-16 ft)	3B-54
Figure 3B-54	Safeguard Building 4 Dimensional Plan Elevation 0 m (0 ft)	3B-55
Figure 3B-55	Safeguard Building 4 Dimensional Plan Elevation +4.7 m (+15 ft) ..	3B-56
Figure 3B-56	Safeguard Building 4 Dimensional Plan Elevation +8.1 m (+27 ft) ..	3B-57
Figure 3B-57	Safeguard Building 4 Dimensional Plan Elevation +12 m (+39 ft) ..	3B-58
Figure 3B-58	Safeguard Building 4 Dimensional Plan Elevation +16.8 m (+55 ft)	
	3B-59	
Figure 3B-59	Safeguard Building 4 Dimensional Plan Elevation +21 m (+69 ft) ..	3B-60
Figure 3B-60	Safeguard Building 4 Dimensional Plan Elevation +24.7 m (+81 ft)	
	3B-61	

Figure 3B-61	Safeguard Building 4 Dimensional Plan Elevation +29.3 m (+96 ft)	3B-62
Figure 3B-62	Safeguard Building 4 Dimensional Section A-A.....	3B-63
Figure 3B-63	Emergency Power Generating Buildings Dimensional Plan Elevation 0 m (0 ft).....	3B-64
Figure 3B-64	Emergency Power Generating Buildings Dimensional Plan Elevation +10.16 m (+33 ft)	3B-65
Figure 3B-65	Emergency Power Generating Buildings Dimensional Plan Elevation +15.7 m (+52 ft)	3B-66
Figure 3B-66	Emergency Power Generating Buildings Dimensional Plan Elevation +20.72 m (+68 ft)	3B-67
Figure 3B-67	Emergency Power Generating Buildings Dimensional Section A-A	3B-68
Figure 3B-68	Emergency Power Generating Buildings Dimensional Section B-B	3B-69
Figure 3B-69	Essential Service Water Building Dimensional Plan Elevation 0 m (0 ft)	3B-70
Figure 3B-70	Essential Service Water Building Dimensional Plan Elevation +4.27 m (+14 ft)	3B-71
Figure 3B-71	Essential Service Water Building Dimensional Plan Elevation +14.33 m (+47 ft)	3B-72
Figure 3B-72	Essential Service Water Building Dimensional Plan Elevation +19.2 m (+63 ft)	3B-73
Figure 3B-73	Essential Service Water Building Dimensional Plan Elevation +24.38 m (+80 ft)	3B-74
Figure 3B-74	Essential Service Water Building Roof Dimensional Plan Elevation +29.26 m (+96 ft)	3B-75
Figure 3B-75	Essential Service Water Building Dimensional Section A-A	3B-76
Figure 3B-76	Essential Service Water Building Dimensional Section B-B	3B-77
Figure 3C-1	RCS Primary Side Hydraulic Model	3C-31
Figure 3C-2	SG Secondary Side Hydraulic Model.....	3C-32
Figure 3C-3	RPV Isolated Hydraulic Model	3C-33
Figure 3C-4	ACP Hydraulic Model.....	3C-34
Figure 3C-5	RCS Four-Loop Structural Model.....	3C-35
Figure 3C-6	SG Detailed Structural Model	3C-38
Figure 3C-7	RCP Detailed Structural Model	3C-39

Figure 3C-8	RPV Isolated Structural Model	3C-40
Figure 3C-9	Rayleigh Damping Curve	3C-41
Figure 3D-1	Typical Combined LOCA/SLB Inside Containment Temperature Service Conditions Envelope	3D-34
Figure 3D-2	Typical Combined LOCA/SLB Inside Containment Pressure Service Conditions Envelope	3D-35
Figure 3D-3	Outside Containment Temperature Service Conditions Envelope (Feedwater Valve Compartment).....	3D-36
Figure 3D-4	Outside Containment Pressure Service Conditions Envelope (Feedwater Valve Compartment).....	3D-37
Figure 3D-5	Outside Containment Temperature Service Conditions Envelope (Main Steam Valve Compartment).....	3D-38
Figure 3D-6	Outside Containment Pressure Service Conditions Envelope (Main Steam Valve Compartment).....	3D-39
Figure 3D.D-1	Sample Arrhenius Plot for Material Activation Energy Based on 30% Retention of Elongation	3D-93
Figure 3E.1-1	ANSYS Analysis Results for Nuclear Island Elements	3E-101
Figure 3E.1-2	Gusset Section of RCB	3E-102
Figure 3E.1-3	Cross-Section of Gusset	3E-103
Figure 3E.1-4	180° FEM Gusset Segment of Containment Foundation.....	3E-104
Figure 3E.1-5	Gusset Section - Typical Reinforcement.....	3E-105
Figure 3E.1-6	Plan View of Equipment Hatch Area.....	3E-106
Figure 3E.1-7	FEM of Equipment Hatch Area - Outer View	3E-107
Figure 3E.1-8	FEM of Equipment Hatch Area - Inner View	3E-108
Figure 3E.1-9	Cross-Section of Equipment Hatch Area	3E-109
Figure 3E.1-10	Elevation View of Equipment Hatch Area Showing Cuts	3E-110
Figure 3E.1-11	Sections 1-1 and 2-2 of the Equipment Hatch Area.....	3E-111
Figure 3E.1-12	Reinforcement Pattern for Section 1-1 of the Equipment Hatch Area	3E-112
Figure 3E.1-13	Reinforcement Pattern for Section 2-2 of the Equipment Hatch Area	3E-113
Figure 3E.1-14	Reinforcement Pattern for Section 3-3 of the Equipment Hatch Area	3E-114
Figure 3E.1-15	Elevation View of the Entire RCB	3E-115
Figure 3E.1-16	Section Cut Through Entire RCB	3E-116

Figure 3E.1-17	Elevation View of Critical Section	3E-117
Figure 3E.1-18	Section View Cut Through Critical Section	3E-118
Figure 3E.1-19	Plan View Cut Through Critical Section	3E-119
Figure 3E.1-20	Elevation View of Buttress 3	3E-120
Figure 3E.1-21	Plan View Cut Through Typical Narrow Buttress.....	3E-121
Figure 3E.1-22	Plan View Cut Through Typical Wide Buttress	3E-122
Figure 3E.1-23	Containment Wall Reinforcement (Typical Section)	3E-123
Figure 3E.1-24	Containment Buttress Reinforcement (Typical Narrow Section)..	3E-124
Figure 3E.1-25	Containment Buttress Reinforcement (Typical Wide Section)	3E-125
Figure 3E.1-26	Floor Slab Plan View at Elevation 4'-11 1/16".....	3E-126
Figure 3E.1-27	Typical Cavity Walls Plan View.....	3E-127
Figure 3E.1-28	Isolated View of FEM For Floor Slab and SG/RCP Wing Wall	3E-128
Figure 3E.1-29	Isolated View of FEM For Floor Slab and SG/RCP Separation Wall	3E-129
Figure 3E.1-30	Area of Detail for Floor Slab at Elevation 4'-11 1/16" with Thickness 6'-6 3/4"	3E-130
Figure 3E.1-31	Reinforcement of Floor Slab at Elevation 4'-11 1/16", Section 1-1	3E-131
Figure 3E.1-32	Area of Detail for Floor Slab at Elevation 4'-11 1/16" with Thickness 3'-3 3/8"	3E-132
Figure 3E.1-33	Reinforcement of Floor Slab Section 3-3.....	3E-133
Figure 3E.1-34	Reinforcement of Floor Slab Section 2-2.....	3E-134
Figure 3E.1-35	Area of Detail for SG/RCP Wing Wall Bottom.....	3E-135
Figure 3E.1-36	SG/RCP Wing Wall Bottom Reinforcement	3E-136
Figure 3E.1-37	Area of Detail for SG/RCP Wing Wall Top.....	3E-137
Figure 3E.1-38	SG/RCP Wing Wall Top Reinforcement	3E-138
Figure 3E.1-39	Area of Detail for SG Separation Wall Bottom	3E-139
Figure 3E.1-40	SG Separation Wall Bottom Reinforcement.....	3E-140
Figure 3E.1-41	Area of Detail for SG Separation Wall Top	3E-141
Figure 3E.1-42	SG Separation Wall Top Reinforcement.....	3E-142
Figure 3E.1-43	Location of PZR Cubical	3E-143
Figure 3E.1-44	PZR Isometric View Showing Support Locations.....	3E-144
Figure 3E.1-45	Plan View of FEM for Floor Slab of PZR Cubical.....	3E-145
Figure 3E.1-46	Elevation View of FEM for Wall Section of PZR Cubical	3E-146

Figure 3E.1-47	PZR Floor Slab Section - Reinforcement at Support	3E-147
Figure 3E.1-48	PZR Wall Section - Typical Reinforcement.....	3E-148
Figure 3E.1-49	RB Operating Floor - Elevation 63'-11 11/16" Showing Section Locations 3E-149	
Figure 3E.1-50	Plan View of RB Operating Floor Showing Rooms.....	3E-150
Figure 3E.1-51	RB Operating Floor Reinforcement - Section 1-1	3E-151
Figure 3E.1-52	RB Operating Floor Reinforcement - Section 2-2	3E-152
Figure 3E.1-53	RB Operating Floor Reinforcement - Section 3-3 and 4-4	3E-153
Figure 3E.1-54	RB Operating Floor Reinforcement - Section 5-5	3E-154
Figure 3E.1-55	RB Operating Floor Reinforcement - Section 6-6	3E-155
Figure 3E.1-56	RB Operating Floor Reinforcement - Section 7-7	3E-156
Figure 3E.1-57	RB Operating Floor Reinforcement - Section 8-8	3E-157
Figure 3E.1-58	RSB Wall Vertical Design Boundaries	3E-158
Figure 3E.1-59	FB Roof and RSB Wall Design Boundaries	3E-159
Figure 3E.1-60	SB 2&3 Roof and RSB Wall Design Boundaries	3E-160
Figure 3E.1-61	Isometric FEM of FB Roof to RSB Wall Connection	3E-161
Figure 3E.1-62	Isometric FEM of SB 2 and 3 Roof to RSB Wall Connection.....	3E-162
Figure 3E.1-63	RSB Wall to Roof Connection - Typical Reinforcement.....	3E-163
Figure 3E.1-64	Location of SB1 South and West Walls Below Grade	3E-164
Figure 3E.1-65	Location of SB4 North and East Walls Below Grade	3E-165
Figure 3E.1-66	SB1 Wall A13001 Isometric View	3E-166
Figure 3E.1-67	SB1 Wall A13003 Isometric View	3E-167
Figure 3E.1-68	SB4 Wall A33008 Isometric View	3E-168
Figure 3E.1-69	SB4 Wall A33003 Isometric View	3E-169
Figure 3E.1-70	Cross Section of Walls A13001, A13003, A33008, and A33003 Showing Reinforcement.....	3E-170
Figure 3E.1-71	Isometric FEM of NI Foundation Basemat	3E-171
Figure 3E.1-72	Elevation View of RB Internal Structure Base Slab	3E-172
Figure 3E.1-73	Reinforcement Pattern for NI Foundation Base Mat (Except Below RCB) 3E-173	
Figure 3E.1-74	Reinforcement Pattern for RB Internal Structures Base Slab - Elevation -25'-7" to -20'-2"	3E-174
Figure 3E.1-75	Reinforcement Pattern for RB Internal Structures Base Slab - Elevation -25'-7" to -7'-6 1/2"	3E-175

Figure 3E.1-76	Reinforcement Pattern for NI Foundation Base Mat below RCB .3E-176
Figure 3E.2-1	Finite Element Planar Reference Frame Systems.....3E-195
Figure 3E.2-2	EPGB Basemat Foundation – FEM3E-196
Figure 3E.2-3	Reinforcement Sketch for EPGB Basemat Foundation3E-197
Figure 3E.2-4	EPGB Wall at Column Line 11 - GT STRUDL FEM.....3E-198
Figure 3E.2-5	EPGB Sign Convention for Horizontal and Vertical Cuts at Column Line 113E-199
Figure 3E.2-6	Nomenclature for Section Cuts through EPGB Wall at Column Line 11. 3E-200
Figure 3E.2-7	FEM of Highly Stressed Areas of EPGB Wall at Column Line 11 3E-201
Figure 3E.2-8	Reinforcement Sketch for EPGB Wall at Column Line 113E-202
Figure 3E.2-9	EPGB Slab at Elevation 51'-6"3E-203
Figure 3E.2-10	Elevation View of EPGB Critical Section at Elevation 51'-6"3E-204
Figure 3E.2-11	FEM View of EPGB Elevation 51'-6".....3E-205
Figure 3E.2-12	Design Sketch of EPGB Elevation 51'-6".....3E-206
Figure 3E.3-1	Finite Element Planar Reference Frame Systems.....3E-222
Figure 3E.3-2	ESWB Basemat Foundation - FEM3E-223
Figure 3E.3-3	Reinforcement Sketch for ESWB Basemat Foundation.....3E-224
Figure 3E.3-4	ESWB Wall at Column Line 4 - FEM3E-225
Figure 3E.3-5	Sign Convention for ESWB Horizontal and Vertical Cuts at Column Line 43E-226
Figure 3E.3-6	Vertical and Horizontal Section Cuts for ESWB Wall at Column Line 4 . 3E-227
Figure 3E.3-7	Reinforcement Configuration for ESWB Wall at Column Line 4 ..3E-228
Figure 3E.3-8	ESWB Fan Deck Slab at Elevation 63'-0" - FEM3E-229
Figure 3E.3-9	Reinforcement Sketch for ESWB Fan Deck Slab at Elevation 63'-0"3E-230
Figure 3E.3-10	Orientation of Positive Axis3E-231