

# **Calvert Cliffs Nuclear Power Plant Unit 3**

## **Combined License Application**

### **Part 2: Final Safety Analysis Report**

Revision 7 |  
December 2010 |

This page intentionally left blank.

## Table of Contents

<b>1.0</b>	<b>Introduction And General Description of the Plant .....</b>	<b>1-1</b>
1.1	Introduction .....	1-2
1.1.1	Plant Location .....	1-3
1.1.2	Containment Type .....	1-4
1.1.3	Reactor Type .....	1-4
1.1.4	Power Output .....	1-5
1.1.5	Schedule .....	1-5
1.1.6	Format and Content .....	1-5
1.1.7	References .....	1-6
1.2	General Plant Description .....	1-16
1.2.1	Principal Design Criteria, Operating Characteristics, and Safety Considerations .....	1-16
1.2.2	Site Description .....	1-16
1.2.3	Plant Description .....	1-17
1.3	Comparisons with Similar Facility Designs .....	1-20
1.4	Identification of Agents and Contractors .....	1-21
1.4.1	Applicant – Program Manager .....	1-21
1.4.2	Other Contractors and Participants .....	1-21
1.5	Requirements for Further Technical Information .....	1-23
1.6	Material Referenced .....	1-24
1.7	Drawings and Other Detailed Information .....	1-26
1.7.1	Electrical and Instrumentation and Control Drawings .....	1-26
1.7.2	Piping and Instrumentation Diagrams .....	1-26
1.8	Interfaces with Standard Designs and Early Site Permits .....	1-29
1.8.1	COL Information Items .....	1-29
1.8.2	Departures .....	1-30
1.9	Conformance with Regulatory Criteria .....	1-52
1.9.1	Conformance with Regulatory Guides .....	1-52
1.9.2	Conformance with the Standard Review Plan .....	1-53
1.9.3	Generic Issues .....	1-53
1.9.4	Operational Experience (Generic Communications) .....	1-53
1.9.5	Advanced and Evolutionary Light-Water Reactor Design Issues .....	1-53
1.9.6	References .....	1-53
<b>2.0</b>	<b>Site Characteristics .....</b>	<b>2-1</b>
2.1	Geography and Demography .....	2-8
2.1.1	Site Location and Description .....	2-8
2.1.2	Exclusion Area Authority and Control .....	2-10
2.1.3	Population Distribution .....	2-11
2.1.4	References .....	2-16
2.2	Nearby Industrial, Transportation And Military Facilities .....	2-57
2.2.1	Location and Routes .....	2-57
2.2.2	Descriptions .....	2-58
2.2.3	Evaluation of Potential Accidents .....	2-67
2.2.4	References .....	2-86

2.3	Meteorology .....	2-114
2.3.1	Regional Climatology .....	2-114
2.3.2	Local Meteorology .....	2-136
2.3.3	Onsite Meteorological Measurement Program .....	2-145
2.3.4	Short Term Atmospheric Dispersion Estimates for Accident Releases .....	2-153
2.3.5	Long-term Atmospheric Dispersion Estimates for Routine Releases .....	2-157
2.3.6	References .....	2-161
2.4	Hydrologic Engineering .....	2-371
2.4.1	Hydrologic Description .....	2-371
2.4.2	Floods .....	2-380
2.4.3	Probable Maximum Flood (PMF) on Streams and Rivers .....	2-386
2.4.4	Potential Dam Failures .....	2-393
2.4.5	Probable Maximum Surge and Seiche Flooding .....	2-394
2.4.6	Probable Maximum Tsunami Flooding .....	2-403
2.4.7	Ice Effects .....	2-417
2.4.8	Cooling Water Canals and Reservoirs .....	2-425
2.4.9	Channel Diversions .....	2-426
2.4.10	Flooding Protection Requirements .....	2-430
2.4.11	Low Water Considerations .....	2-432
2.4.12	GroundWater .....	2-439
2.4.13	Pathways of Liquid Effluents in Ground and Surface Waters .....	2-477
2.4.14	Technical Specification and Emergency Operation Requirements .....	2-500
2.5	Geology, Seismology, and Geotechnical Engineering .....	2-778
2.5.1	Basic Geologic and Seismic Information .....	2-779
2.5.2	Vibratory Ground Motion .....	2-901
2.5.3	Surface Faulting .....	2-960
2.5.4	Stability of Subsurface Materials and Foundations .....	2-973
2.5.5	Stability of Slopes .....	2-1042
2.5.6	References .....	2-1050
<b>3.0</b>	<b>Design of Structures, Components, Equipment and Systems .....</b>	<b>3-1</b>
3.1	Compliance with Nuclear Regulatory Commission General Design Criteria .....	3-2
3.1.1	Overall Requirements .....	3-2
3.1.2	Protection by Multiple Fission Product Barriers .....	3-3
3.1.3	Protection and Reactivity Control Systems .....	3-3
3.1.4	Fluid Systems .....	3-3
3.1.5	Reactor Containment .....	3-3
3.1.6	Fuel and Reactivity Control .....	3-3
3.1.7	References .....	3-3
3.2	Classification of Structures, Systems, and Components .....	3-4
3.2.1	Seismic Classification .....	3-4
3.2.2	System Quality Group Classification .....	3-5
3.2.3	References .....	3-5
3.3	Wind and Tornado Loadings .....	3-16
3.3.1	Wind Loadings .....	3-16
3.3.2	Tornado Loadings .....	3-16
3.3.3	References .....	3-18
3.4	Water Level (Flood) Design .....	3-19
3.4.1	Internal Flood Protection .....	3-19
3.4.2	External Flood Protection .....	3-20

3.4.3	Analysis of Flooding Events .....	3-20
3.4.4	Analysis Procedures .....	3-22
3.4.5	References .....	3-22
3.5	Missile Protection .....	3-23
3.5.1	Missile Selection and Description .....	3-23
3.5.2	Structures, Systems, and Components to Be Protected From Externally Generated Missiles .....	3-29
3.5.3	Barrier Design Procedures .....	3-29
3.5.4	References .....	3-29
3.6	Protection Against Dynamic Effects Associated with Postulated Rupture of Piping .....	3-30
3.6.1	Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside of Containment .....	3-30
3.6.2	Determination of Rupture Locations and Dynamic Effects Associated with the Postulated Rupture of Piping .....	3-30
3.6.3	Leak-Before-Break Evaluation Procedures .....	3-31
3.7	Seismic Design .....	3-33
3.7.1	Seismic Design Parameters .....	3-33
3.7.2	Seismic System Analysis .....	3-39
3.7.3	Seismic Subsystem Analysis .....	3-58
3.7.4	Seismic Instrumentation .....	3-60
3.8	Design of Category I Structures .....	3-163
3.8.1	Concrete Containment .....	3-163
3.8.2	Steel Containment .....	3-164
3.8.3	Concrete and Steel Internal Structures of Concrete Containment .....	3-164
3.8.4	Other Seismic Category I Structures .....	3-165
3.8.5	Foundations .....	3-177
3.8.6	References .....	3-186
3.9	Mechanical Systems and Components .....	3-200
3.9.1	Special Topics for Mechanical Components .....	3-200
3.9.2	Dynamic Testing and Analysis of Systems, Components, and Equipment .....	3-202
3.9.3	ASME Code Class 1, 2, and 3 Components, Component Supports, and Core Support Structures .....	3-204
3.9.4	Control Rod Drive System .....	3-207
3.9.5	Reactor Pressure Vessel Internals .....	3-207
3.9.6	Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints .....	3-207
3.10	Seismic and Dynamic Qualification of Mechanical And Electrical Equipment .....	3-218
3.10.1	Seismic Qualification Criteria .....	3-219
3.10.2	Methods and Procedures for Qualifying Mechanical, Electrical and I&C Equipment .....	3-220
3.10.3	Methods and Procedures for Qualifying Supports of Mechanical and Electrical Equipment and Instrumentation .....	3-220
3.10.4	Test and Analysis Results and Experience Database .....	3-220
3.10.5	References .....	3-221
3.11	Environmental Qualification Of Mechanical And Electrical Equipment .....	3-238
3.11.1	Equipment Identification and Environmental Conditions .....	3-238
3.11.2	Qualification Tests and Analysis .....	3-239
3.11.3	Qualification Test Results .....	3-239
3.11.4	Loss of Ventilation .....	3-240
3.11.5	Estimated Chemical and Radiation Environment .....	3-240

3.11.6	Qualification of Mechanical Equipment .....	3-240
3.11.7	References .....	3-240
3.12	ASME Code Class 1, 2, And 3 Piping Systems, Piping Components, And Their Associated Supports .....	3-250
3.12.1	Introduction .....	3-250
3.12.2	Codes and Standards .....	3-250
3.12.3	Piping Analysis Methods .....	3-250
3.12.4	PIPING MODELING TECHNIQUES .....	3-250
3.12.5	Piping Stress Analysis Criteria .....	3-251
3.12.6	Piping Support Design Criteria .....	3-253
3.12.7	References .....	3-253
3.13	Threaded Fasteners (ASME Code Class 1, 2, and 3) .....	3-254
3.13.1	Design Considerations .....	3-254
3.13.2	Inservice Inspection Requirements .....	3-254
3.13.3	References .....	3-254
<b>3A</b>	<b>Criteria for Distribution System Analysis and Support .....</b>	<b>3-1</b>
<b>3B</b>	<b>Dimensional Arrangement Drawings .....</b>	<b>3-1</b>
<b>3C</b>	<b>Reactor Coolant System Structural Analysis Methods .....</b>	<b>3-1</b>
<b>3D</b>	<b>Methodology for Qualifying Safety-Related Electrical and Mechanical Equipment .....</b>	<b>3-1</b>
<b>3E</b>	<b>Design Details and Critical Sections for Safety-Related Category I Structures .....</b>	<b>3-1</b>
3E.1	Nuclear Island Structures .....	3-2
3E.2	Emergency Power Generating Buildings .....	3-3
3E.3	Essential Service Water Buildings .....	3-4
3E.4	{FOREBAY AND UHS MAKEUP WATER INTAKE STRUCTURE .....	3-5
3E.4.1	Structural Description and Geometry .....	3-5
3E.4.2	Material Properties .....	3-5
3E.4.3	Structural Loads and Load Combinations .....	3-6
3E.4.4	Structural Analysis and Design .....	3-6
3E.4.5	Summary of Results .....	3-8
3E.4.6	Conclusions .....	3-8
3E.4.7	References .....	3-8
<b>3F</b>	<b>{SITE RESPONSE ANALYSIS AND SSI ANALYSIS INPUT FOR EPGB, ESWB, AND CBIS .....</b>	<b>3-1</b>
3F.1	FOUNDATION INPUT RESPONSE SPECTRA (FIRS) .....	3-2
3F.1.1	DYNAMIC SOIL PROFILE AND STOCHASTIC SIMULATION .....	3-2
3F.1.2	SITE RESPONSE ANALYSIS .....	3-3
3F.1.3	FIRS ADJUSTMENT .....	3-4
3F.1.4	SSSI EFFECTS AND COMPARISON TO SSE .....	3-5
3F.2	SITE SSE STRAIN-COMPATIBLE SOIL PROPERTY PROFILES .....	3-7
3F.3	SITE SSE "WITHIN" ACCELERATION TIME HISTORIES .....	3-8
3F.4	COMPUTER CODES .....	3-9
3F.4.1	SOIL PROFILE SIMULATION (SPS) PROGRAM .....	3-9
3F.4.2	SHAKE2000 .....	3-9
3F.4.3	P-SHAKE .....	3-9
3F.5	REFERENCES .....	3-11
<b>4.0</b>	<b>Reactor .....</b>	<b>4-1</b>
4.1	Summary Description .....	4-2

4.2	Fuel System Design .....	4-3
4.3	Nuclear Design .....	4-4
4.4	Thermal-Hydraulic Design .....	4-5
4.5	Reactor Materials .....	4-6
4.6	Functional Design of Reactivity Control Systems .....	4-7
<b>5.0</b>	<b>Reactor Coolant System and Connected Systems .....</b>	<b>5-1</b>
5.1	Summary Description .....	5-2
5.2	Integrity of the Reactor Coolant Pressure Boundary .....	5-3
5.2.1	Compliance with Codes and Code Cases .....	5-3
5.2.2	Overpressure Protection .....	5-3
5.2.3	Reactor Coolant Pressure Boundary Materials .....	5-3
5.2.4	Inservice Inspection and Testing of the RCPB .....	5-3
5.2.5	RCPB Leakage Detection .....	5-4
5.2.6	.....	5-4
5.2.7	References .....	5-4
5.3	Reactor Vessel .....	5-5
5.3.1	Reactor Vessel Materials .....	5-5
5.3.2	Pressure-Temperature Limits, Pressurized Thermal Shock, and Charpy Upper-Shelf Energy Data and Analyses .....	5-6
5.3.3	Reactor Vessel Integrity .....	5-6
5.3.4	References .....	5-6
5.4	Component and Subsystem Design .....	5-7
5.4.1	Reactor Coolant Pumps .....	5-7
5.4.2	Steam Generators (PWR) .....	5-7
5.4.3	Reactor Coolant Piping .....	5-8
5.4.4	Not Used in U.S. EPR Design .....	5-9
5.4.5	Not Used in U.S. EPR Design .....	5-9
5.4.6	Not Used in U.S. EPR Design .....	5-9
5.4.7	Residual Heat Removal System .....	5-9
5.4.8	Not Used in U.S. EPR Design .....	5-9
5.4.9	Not Used in U.S. EPR Design .....	5-9
5.4.10	Pressurizer .....	5-9
5.4.11	Pressurizer Relief Tank .....	5-9
5.4.12	Reactor Coolant System High Point Vents .....	5-9
5.4.13	Safety and Relief Valves .....	5-9
5.4.14	Component Supports .....	5-9
5.4.15	References .....	5-9
<b>6.0</b>	<b>Engineered Safety Features .....</b>	<b>6-1</b>
6.1	Engineered Safety Features Materials .....	6-2
6.1.1	Metallic Materials .....	6-2
6.1.2	Organic Materials .....	6-2
6.1.3	References .....	6-4
6.2	Containment Systems .....	6-5
6.2.1	Containment Functional Design .....	6-5
6.2.2	Containment Heat Removal Systems .....	6-5
6.2.3	Secondary Containment Functional Design .....	6-5
6.2.4	Containment Isolation System .....	6-5

6.2.5	Combustible Gas Control in Containment .....	6-5
6.2.6	Containment Leakage Testing .....	6-5
6.2.7	Fracture Prevention of Containment Pressure Vessel .....	6-5
6.2.8	References .....	6-5
6.3	Emergency Core Cooling System .....	6-6
6.3.1	Design Bases .....	6-6
6.3.2	System Design .....	6-6
6.3.3	Performance Evaluation .....	6-7
6.3.4	Tests and Inspections .....	6-7
6.3.5	Instrumentation Requirements .....	6-7
6.3.6	References .....	6-8
6.4	Habitability Systems .....	6-9
6.4.1	Design Basis .....	6-9
6.4.2	System Design .....	6-9
6.4.3	System Operational Procedures .....	6-10
6.4.4	Design Evaluations .....	6-10
6.4.5	Testing and Inspection .....	6-11
6.4.6	Instrumentation Requirements .....	6-11
6.4.7	References .....	6-11
6.5	Fission Product Removal and Control Systems .....	6-12
6.6	Inservice Inspection of Class 2 and 3 Components .....	6-13
6.6.1	Components Subject to Examination .....	6-13
6.6.2	Accessibility .....	6-13
6.6.3	Examination Techniques and Procedures .....	6-13
6.6.4	Inspection Intervals .....	6-13
6.6.5	Examination Categories and Requirements .....	6-13
6.6.6	Evaluation of Examination Results .....	6-14
6.6.7	System Pressure Tests .....	6-14
6.6.8	Augmented ISI to Protect Against Postulated Piping Failures .....	6-14
6.6.9	References .....	6-14
6.7	Main Steamline Isolation Valve Leakage Control System (BWRS) .....	6-15
6.8	Extra Borating System .....	6-16
<b>7.0</b>	<b>Instrumentation and Controls .....</b>	<b>7-1</b>
7.1	Introduction .....	7-2
7.2	Reactor Trip System .....	7-3
7.3	Engineered Safety Features Systems .....	7-4
7.4	Systems Required for Safe Shutdown .....	7-5
7.5	Information Systems Important to Safety .....	7-6
7.5.1	Description .....	7-6
7.5.2	Analysis .....	7-6
7.5.3	References .....	7-7
7.6	Interlock Systems Important to Safety .....	7-9
7.7	Control Systems Not Required For Safety .....	7-10
7.8	Diverse I&C Systems .....	7-11
7.9	Data Communication Systems .....	7-12



<b>8.0</b>	<b>Electric Power .....</b>	<b>8-1</b>
8.1	Introduction .....	8-2
8.1.1	Offsite Power Description .....	8-2
8.1.2	Onsite Power System Description .....	8-2
8.1.3	Safety-Related Loads .....	8-2
8.1.4	Design Bases .....	8-3
8.1.5	References .....	8-3
8.2	Offsite Power System .....	8-9
8.2.1	Description .....	8-9
8.2.2	Analysis .....	8-15
8.2.3	References .....	8-23
8.3	Onsite Power System .....	8-28
8.3.1	Alternating Current Power Systems .....	8-28
8.3.2	DC Power Systems .....	8-32
8.3.3	References .....	8-32
8.4	Station Blackout .....	8-45
8.4.1	Description .....	8-45
8.4.2	Analysis .....	8-45
8.4.3	References .....	8-48
<b>9.0</b>	<b>Auxiliary Systems .....</b>	<b>9-1</b>
9.1	Fuel Storage and Handling .....	9-2
9.1.1	Criticality Safety of New and Spent Fuel Storage and Handling .....	9-2
9.1.2	New and Spent Fuel Storage .....	9-2
9.1.3	Spent Fuel Pool Cooling and Purification System .....	9-2
9.1.4	Fuel Handling System .....	9-2
9.1.5	Overhead Heavy Load Handling System .....	9-2
9.2	Water Systems .....	9-5
9.2.1	Essential Service Water System .....	9-5
9.2.2	Component Cooling Water System .....	9-7
9.2.3	Demineralized Water Distribution System .....	9-7
9.2.4	Potable and Sanitary Water Systems (PSWS) .....	9-7
9.2.5	Ultimate Heat Sink .....	9-12
9.2.6	Condensate Storage Facilities .....	9-20
9.2.7	Seal Water Supply System .....	9-20
9.2.8	Safety Chilled Water System .....	9-20
9.2.9	Raw Water Supply System .....	9-20
9.3	Process Auxiliaries .....	9-33
9.4	Air Conditioning, Heating, Cooling and Ventilation Systems .....	9-34
9.4.1	Main Control Room Air Conditioning System .....	9-34
9.4.2	Fuel Building Ventilation System .....	9-35
9.4.3	Nuclear Auxiliary Building Ventilation System .....	9-35
9.4.4	Turbine Island Ventilation System .....	9-35
9.4.5	Safeguard Building Controlled-Area Ventilation System .....	9-39
9.4.6	Electrical Division of Safeguard Building Ventilation System (SBVSE) .....	9-39
9.4.7	Containment Building Ventilation System .....	9-39
9.4.8	Radioactive Waste Building Ventilation System .....	9-39
9.4.9	Emergency Power Generating Building Ventilation System .....	9-39
9.4.10	Station Blackout Room Ventilation System .....	9-39

9.4.11	Essential Service Water Pump Building Ventilation System .....	9-39
9.4.12	Main Steam and Feedwater Valve Room Ventilation System .....	9-40
9.4.13	Smoke Confinement System .....	9-40
9.4.14	Access Building Ventilation System .....	9-40
9.4.15	{UHS MAKEUP WATER INTAKE STRUCTURE Ventilation System .....	9-40
9.4.16	FIRE PROTECTION BUILDING VENTILATION SYSTEM .....	9-44
9.5	Other Auxiliary Systems .....	9-51
9.5.1	Fire Protection System .....	9-51
9.5.2	Communication System .....	9-60
9.5.3	Lighting System .....	9-62
9.5.4	Diesel Generator Fuel Oil Storage and Transfer System .....	9-62
9.5.5	Diesel Generator Cooling Water System .....	9-62
9.5.6	Diesel Generator Starting Air System .....	9-62
9.5.7	Diesel Generator Lubricating System .....	9-62
9.5.8	Diesel Generator Air Intake and Exhaust System .....	9-62
<b>9A</b>	<b>Fire Protection Analysis .....</b>	<b>9A-1</b>
<b>9B</b>	<b>Fire Protection Analysis - Plant Specific Supplement .....</b>	<b>9B-1</b>
9B.1	Introduction .....	9-2
9B.1.1	Regulatory Bases .....	9-2
9B.1.2	Defense-In-Depth .....	9-3
9B.1.3	Scope .....	9-3
9B.2	Fire Protection Analysis Methodology .....	9-5
9B.2.1	General Design Criteria .....	9-5
9B.2.2	Specific Elements .....	9-5
9B.2.3	Assumptions .....	9-9
9B.3	Fire Area-by-Fire Area Evaluation .....	9-13
9B.3.1	Turbine Building .....	9-13
9B.3.2	Switchgear Building .....	9-15
9B.3.3	Auxiliary Power Transformer Area .....	9-17
9B.3.4	Generator Transformer Area .....	9-19
9B.3.5	{Warehouse Building .....	9-20
9B.3.6	Security Access Facility .....	9-20
9B.3.7	Central Gas Supply Building .....	9-21
9B.3.8	{Grid Systems Control Building .....	9-21
9B.3.9	Fire Protection Building .....	9-22
9B.3.10	{Circulating Water System Cooling Tower Structure .....	9-22
9B.3.11	Circulating Water System Pump Building .....	9-23
9B.3.12	Ultimate Heat Sink Makeup Water Intake Structure .....	9-23
9B.3.13	Circulating Water System Makeup Intake Structure .....	9-25
9B.3.14	Desalinization/Water Treatment Building .....	9-26
9B.4	References .....	9-27
<b>10.0</b>	<b>Steam and Power Conversion System .....</b>	<b>10-1</b>
10.1	Summary Description .....	10-2
10.2	Turbine-Generator .....	10-3
10.2.1	Design Bases .....	10-3
10.2.2	General Description .....	10-3
10.2.3	Turbine Rotor Integrity .....	10-4
10.2.4	Safety Evaluation .....	10-5
10.2.5	References .....	10-5

10.3	Main Steam Supply System .....	10-9
10.3.1	Design Bases .....	10-9
10.3.2	System Description .....	10-9
10.3.3	Safety Evaluation .....	10-9
10.3.4	Inspection and Testing Requirements .....	10-9
10.3.5	Secondary Side Water Chemistry Program .....	10-9
10.3.6	Steam and Feedwater System Materials .....	10-9
10.3.7	References .....	10-11
10.4	Other Features Of Steam And Power Conversion System .....	10-12
10.4.1	Main Condensers .....	10-12
10.4.2	Main Condenser Evacuation System .....	10-12
10.4.3	Turbine Gland Sealing System .....	10-12
10.4.4	Turbine Bypass System .....	10-13
10.4.5	Circulating Water System .....	10-13
10.4.6	Condensate Polishing System .....	10-23
10.4.7	Condensate and Feedwater System .....	10-23
10.4.8	Steam Generator Blowdown System (PWR) .....	10-23
10.4.9	Emergency Feedwater System .....	10-23
<b>11.0</b>	<b>Radioactive Waste Management .....</b>	<b>11-1</b>
11.1	Source Terms .....	11-2
11.2	Liquid Waste Management System .....	11-3
11.2.1	Design Basis .....	11-3
11.2.2	System Description .....	11-3
11.2.3	Radioactive Effluent Releases .....	11-3
11.2.4	Liquid Waste Management System Cost-Benefit Analysis .....	11-6
11.2.5	References .....	11-8
11.3	Gaseous Waste Management Systems .....	11-17
11.3.1	Design Basis .....	11-17
11.3.2	System Description .....	11-17
11.3.3	Radioactive Effluent Releases .....	11-17
11.3.4	Gaseous Waste Management System Cost-Benefit Analysis .....	11-21
11.3.5	References .....	11-22
11.4	Solid Waste Management Systems .....	11-42
11.4.1	Design Basis .....	11-42
11.4.2	System Description .....	11-43
11.4.3	Radioactive Effluent Releases .....	11-43
11.4.4	Solid Waste Management System Cost-Benefit Analysis .....	11-45
11.4.5	Failure Tolerance .....	11-45
11.4.6	Quality Assurance .....	11-45
11.4.7	References .....	11-45
11.5	Process and Effluent Radiological Monitoring and Sampling Systems .....	11-46
11.5.1	Design Basis .....	11-46
11.5.2	System Description .....	11-46
11.5.3	Effluent Monitoring and Sampling .....	11-47
11.5.4	Process Monitoring and Sampling .....	11-47
11.5.5	References .....	11-47

<b>12.0 Radiation Protection .....</b>	<b>12-1</b>
12.1 Ensuring that Occupational Radiation Exposures are As Low As is Reasonably Achievable .....	12-2
12.1.1 Policy Considerations .....	12-2
12.1.2 Design Considerations .....	12-2
12.1.3 Operational Considerations .....	12-2
12.1.4 References .....	12-2
12.2 Radiation Sources .....	12-3
12.2.1 Contained Sources .....	12-3
12.2.2 Airborne Radioactive Material Sources .....	12-4
12.2.3 References .....	12-4
12.3 Radiation Protection Design Features .....	12-5
12.3.1 Facility Design Features .....	12-5
12.3.2 Shielding .....	12-7
12.3.3 Ventilation .....	12-7
12.3.4 Area Radiation and Airborne Radioactivity Monitoring Instrumentation .....	12-7
12.3.5 Dose Assessment .....	12-10
12.3.6 Minimization of Contamination .....	12-18
12.3.7 References .....	12-18
12.4 Dose Assessment .....	12-47
12.5 Operational Radiation Protection Program .....	12-48
12.5.1 References .....	12-48
<b>13.0 Conduct Of Operations .....</b>	<b>13-1</b>
13.1 Organizational Structure of Applicant .....	13-2
13.1.1 Management and Technical Support Organization .....	13-2
13.1.2 Operating Organization .....	13-22
13.1.3 Qualifications of Nuclear Plant Personnel .....	13-34
13.1.4 References .....	13-35
13.2 Training .....	13-48
13.2.1 References .....	13-48
13.3 Emergency Planning .....	13-49
13.4 Operational Program Implementation .....	13-50
13.4.1 References .....	13-50
13.5 Plant Procedures .....	13-56
13.5.1 Administrative Procedures .....	13-56
13.5.2 Operating and Maintenance Procedures .....	13-58
13.5.3 References .....	13-62
13.6 Security .....	13-64
13.6.1 References .....	13-65
13.7 Fitness For Duty .....	13-66
13.7.1 References .....	13-67
13.8 References .....	13-68
<b>14.0 Verification Programs .....</b>	<b>14-1</b>
14.1 Specific Information to be Addressed for the Initial Plant Test Program .....	14-2
14.2 Initial Plant Test Program .....	14-3
14.2.1 Summary of Test Program and Objectives .....	14-3

14.2.2	Organization and Staffing .....	14-3
14.2.3	Test Procedures .....	14-9
14.2.4	Conduct of Test Program .....	14-11
14.2.5	Review, Evaluation, and Approval of Test Results .....	14-11
14.2.6	Test Records .....	14-14
14.2.7	Conformance of Test Programs with Regulatory Guides .....	14-14
14.2.8	Utilization of Reactor Operating and Testing Experience in Development of Initial Test Program .....	14-14
14.2.9	Trial Use of Plant Operating and Emergency Procedures .....	14-14
14.2.10	Initial Fuel Loading and Initial Criticality .....	14-15
14.2.11	Test Program Schedule .....	14-15
14.2.12	Individual Test Descriptions .....	14-16
14.2.13	References .....	14-17
14.2.14	COL Applicant Site-Specific Tests .....	14-17
14.3	Inspections, Tests, Analyses, and Acceptance Criteria .....	14-38
14.3.1	Tier 1, Chapter 1, Introduction .....	14-38
14.3.2	Tier 1, Chapter 2, System Based Design Descriptions and ITAAC .....	14-38
14.3.3	Tier 1, Chapter 3, Non-System Based Design Descriptions and ITAAC .....	14-39
14.3.4	Tier 1, Chapter 4, Interface Requirements .....	14-39
14.3.5	Tier 1, Chapter 5, Site Parameters .....	14-39
14.3.6	Design Acceptance Criteria .....	14-39
14.3.7	References .....	14-40
<b>15.0</b>	<b>Transient and Accident Analysis .....</b>	<b>15-1</b>
15.0	.....	15-1
15.0.1	Radiological Consequence Analysis .....	15-1
15.0.2	Computer Codes Used in Analysis .....	15-1
15.0.3	Radiological Consequences of Design Basis Accidents .....	15-1
15.0.4	PLANT COOLDOWN .....	15-4
15.0.5	Compliance with Section C.I.15, "Transient and Accident Analyses," of Regulatory Guide 1.206 .....	15-4
15.0.6	References .....	15-4
15.1	Increase in Heat Removal by the Secondary System .....	15-7
15.2	Decrease in Heat Removal by the Secondary System .....	15-8
15.3	Decrease in Reactor Coolant System Flow Rate .....	15-9
15.4	Reactivity and Power Distribution Anomalies .....	15-10
15.5	Increase in Reactor Coolant Inventory .....	15-11
15.6	Decrease in Reactor Coolant Inventory Events .....	15-12
15.7	Radioactive Release from a Subsystem or Component .....	15-13
15.8	Anticipated Transients Without Scram .....	15-14
15.9	Boiling Water Reactor Stability .....	15-15
15.10	Spent Fuel Pool Criticality and Boron Dilution Analysis .....	15-16
<b>16.0</b>	<b>TECHNICAL SPECIFICATIONS .....</b>	<b>16-1</b>
<b>17.0</b>	<b>Quality Assurance and Reliability Assurance .....</b>	<b>17-1</b>
17.1	Quality Assurance During Design .....	17-2
17.2	Quality Assurance During the Operations Phase .....	17-3

17.3	Quality Assurance Program Description .....	17-4
17.4	Reliability Assurance Program .....	17-5
17.4.1	Reliability Assurance Program Scope, Stages, and Goals .....	17-5
17.4.2	Reliability Assurance Program Implementation .....	17-5
17.4.3	Organization, Design Control, Procedures and Instructions, Corrective Actions, and Audit Plans .....	17-6
17.4.4	Reliability Assurance Program Information Needed in a COL Application .....	17-6
17.4.5	References .....	17-16
17.5	Quality Assurance Program description .....	17-18
17.5.1	QA Program Responsibilities .....	17-18
17.5.2	SRP Section 17.5 and the QA Program Description .....	17-18
17.5.3	Evaluation of the QAPD Against the SRP and QAPD Submittal Guidance .....	17-18
17.5.4	References .....	17-18
17.6	Description of Applicant's Program for Implementation of 10 CFR 50.65, the Maintenance Rule .....	17-20
17.6.1	Scoping Per 10 CFR 50.65(b) .....	17-20
17.6.2	Monitoring Per 10 CFR 50.65(a) .....	17-20
17.6.3	Periodic Evaluation Per 10 CFR 50.65(a)(3) .....	17-21
17.6.4	Risk Assessment and Management Per 10 CFR 50.65(a)(4) .....	17-21
17.6.5	Maintenance Rule Training and Qualification .....	17-21
17.6.6	Maintenance Rule Program Role in Implementation of Reliability Assurance Program (RAP) in the Operations Phase .....	17-21
17.6.7	MAINTENANCE RULE PROGRAM RELATIONSHIP WITH INDUSTRY OPERATING EXPERIENCE ACTIVITIES .....	17-22
17.6.8	Maintenance Rule Program Implementation .....	17-22
17.6.9	References .....	17-22
17.7	Maintenance Rule Program .....	17-23
<b>18.0</b>	<b>Human Factors Engineering .....</b>	<b>18-1</b>
18.1	Human Factors Engineering Program Management .....	18-2
18.1.1	Human Factors Engineering Program Goals, Assumptions and Constraints, and Scope .....	18-2
18.1.2	Human Factors Engineering and Control Room Design Team Organization .....	18-3
18.1.3	Human Factors Engineering Processes and Procedures .....	18-3
18.1.4	Human Factors Engineering Issues Tracking .....	18-3
18.1.5	Technical Program .....	18-3
18.1.6	References .....	18-3
18.2	Operating Experience Review .....	18-4
18.3	Functional Requirements Analysis and Functional Allocation .....	18-5
18.4	Task Analysis .....	18-6
18.5	Staffing and Qualifications .....	18-7
18.6	Human Reliability Analysis .....	18-8
18.7	Human System Interface Design .....	18-9
18.8	Procedure Development .....	18-12
18.9	Training Program Development .....	18-13
18.10	Verification and Validation .....	18-14
18.11	Design Implementation .....	18-15

18.12 Human Performance Monitoring .....	18-16
18.12.1 Objectives and Scope .....	18-16
18.12.2 Methodology .....	18-17
18.12.3 Results Summary .....	18-19
18.12.4 References .....	18-19
<b>19.0 Probabilistic Risk Assessment and Severe Accident Evaluation .....</b>	<b>19-1</b>
19.1 Probabilistic Risk Assessment .....	19-2
19.1.1 Uses and Application of the PRA .....	19-2
19.1.2 Quality of PRA .....	19-3
19.1.3 Special Design/Operational Features .....	19-5
19.1.4 Safety Insights from the Internal Events PRA for Operations at Power .....	19-5
19.1.5 Safety Insights from the External Events PRA for Operations at Power .....	19-7
19.1.6 Safety Insights from the PRA for Other Modes of Operation .....	19-20
19.1.7 PRA-Related Input to Other Programs and Processes .....	19-20
19.1.8 Conclusions and Findings .....	19-20
19.1.9 References .....	19-20
19.2 Severe Accident Evaluations .....	19-24
19.2.1 Introduction .....	19-24
19.2.2 Severe Accident Prevention .....	19-24
19.2.3 Severe Accident Mitigation .....	19-24
19.2.4 Containment Performance Capability .....	19-24
19.2.5 Accident Management .....	19-24
19.2.6 Consideration of Potential Design Improvements under 10 CFR 50.34(f) .....	19-24
19.2.7 References .....	19-24
19.3 Open, Confirmatory, and COL Action Items Identified as Unresolved .....	19-25

## List of Tables

Table 1.1-1— {Acronyms Used in this Document} .....	1-7
Table 1.6-1— {Reports Referenced} .....	1-25
Table 1.7-1— {I&C Functional and Electrical One Line Diagrams} .....	1-27
Table 1.7-2— {Piping and Instrumentation Diagrams} .....	1-28
Table 1.8-1— FSAR Sections that Demonstrate Conformance to U.S. EPR FSAR Interface Requirements .....	1-31
Table 1.8-2— FSAR Sections that Address COL Items .....	1-32
Table 1.9-1— {Conformance with Regulatory Guides} .....	1-54
Table 2.0-1— {U.S. EPR Site Design Envelope Comparison} .....	2-2
Table 2.1-1— {CCNPP Unit 3 Specific Location} .....	2-18
Table 2.1-2— {Population Within 10 mi (16 km) Radius (2000 – 2060)} .....	2-19
Table 2.1-3— {Population Within 50 mi (80 km) Radius (2000 – 2060)} .....	2-20
Table 2.1-4— {Transient Population Facilities - Population Facilities - Major Employers Within the 10 mi (16 km) Zone} .....	2-21
Table 2.1-5— {Transient Population Facilities - Major Recreational Areas and Attractions Within the 10 mi (16 km) Zone} .....	2-22
Table 2.1-6— {Transient Population Facilities - Marinas Within the 10 mi (16 km) Zone} .....	2-23
Table 2.1-7— {Transient Population Distribution for the 10 mi (16 km) Radius (2000)} .....	2-24
Table 2.1-8— {Commuting Patterns To and From the Calvert County and St. Mary's County Area (2000)} .....	2-25
Table 2.1-9— {Population Within the LPZ (2000 – 2060)} .....	2-26
Table 2.1-10— {Special Facilities – Schools Within the 10 mi (16 km) Zone} .....	2-27
Table 2.1-11— {Special Facilities - Nursing Homes Within the 10 mi (16 km) Zone} .....	2-28
Table 2.2-1— {Description of Facilities, Products, and Materials} .....	2-91
Table 2.2-2— {CCNPP Units 1, 2 and 3 Onsite Chemical Storage} .....	2-92
Table 2.2-3— {Hazardous Chemical Waterway Freight, Port of Baltimore} .....	2-95
Table 2.2-4— {Aircraft Operations - Significant Factors} .....	2-96
Table 2.2-5— {Onsite Chemicals Disposition} .....	2-97
Table 2.2-6— {Hazardous Material, Roadway Transportation, Disposition} .....	2-100
Table 2.2-7— {Hazardous Material, Navigable Waterway Transportation, Disposition} .....	2-102
Table 2.2-8— {Explosion Event Analysis} .....	2-104
Table 2.2-9— {Flammable Vapor Cloud Events (Delayed Ignition) and Vapor Cloud Explosion Analysis} .....	2-106
Table 2.2-10— {Toxic Vapor Cloud Analysis} .....	2-109
Table 2.3-1— {National Ambient Air Quality Standards} .....	2-162
Table 2.3-2— {Total and Average Numbers of Tropical Storms and Hurricanes} .....	2-163
Table 2.3-3— {Monthly Mean Number of Days with Thunderstorms} .....	2-164
Table 2.3-4— {High Winds by Storm Type for Calvert County} .....	2-165
Table 2.3-5— {Hail Events in Calvert County} .....	2-166
Table 2.3-6— {Ice Storm Events Within the General Region of the Site} .....	2-167
Table 2.3-7— {Snow Storm Events within the General Region of the Site} .....	2-173
Table 2.3-8— {Probable Maximum Winter Precipitation (PMWP) Values} .....	2-183
Table 2.3-9— {Design Basis Tornado Characteristics for CCNPP Unit 3} .....	2-184
Table 2.3-10— {CCNPP 33 ft (10 m) Annual JFD} .....	2-185
Table 2.3-11— {CCNPP 197 ft (60 m) Annual JFD} .....	2-193
Table 2.3-12— {CCNPP 33 Feet Wind Direction Persistence Summary for Year 2000} .....	2-202
Table 2.3-13— {CCNPP 33 Feet Wind Direction Persistence Summary for Year 2001} .....	2-204
Table 2.3-14— {CCNPP 33 Feet Wind Direction Persistence Summary for Year 2002} .....	2-206
Table 2.3-15— {CCNPP 33 Feet Wind Direction Persistence Summary for Year 2003} .....	2-208



Table 2.3-16— {CCNPP 33 Feet Wind Direction Persistence Summary for Year 2004} .....	2-210
Table 2.3-17— {CCNPP 33 Feet Wind Direction Persistence Summary for Year 2005} .....	2-212
Table 2.3-18— {CCNPP 33 Feet Average Wind Direction Persistence Summary for Years 2000-2005} ...	2-214
Table 2.3-19— {CCNPP 197 Feet Wind Direction Persistence Summary for Year 2000} .....	2-216
Table 2.3-20— {CCNPP 197 Feet Wind Direction Persistence Summary for Year 2001} .....	2-218
Table 2.3-21— {CCNPP 197 Feet Wind Direction Persistence Summary for Year 2002} .....	2-220
Table 2.3-22— {CCNPP 197 Feet Wind Direction Persistence Summary for Year 2003} .....	2-222
Table 2.3-23— {CCNPP 197 Feet Wind Direction Persistence Summary for Year 2004} .....	2-224
Table 2.3-24— {CCNPP 197 Feet Wind Direction Persistence Summary for Year 2005} .....	2-226
Table 2.3-25— {CCNPP 197 Feet Average Wind Direction Persistence Summary for Years 2000-2005} .....	2-228
Table 2.3-26— {CCNPP Monthly Mean Temperatures (2000-2005)} .....	2-230
Table 2.3-27— {CCNPP Highest Monthly Mean Maximum Temperatures (2000 - 2005)} .....	2-231
Table 2.3-28— {CCNPP Lowest Monthly Mean Minimum Temperatures (2000-2005)} .....	2-232
Table 2.3-29— {CCNPP Monthly Mean Daily Maximum Temperatures (2000-2005)} .....	2-233
Table 2.3-30— {CCNPP Monthly Mean Daily Minimum Temperatures (2000-2005)} .....	2-234
Table 2.3-31— {CCNPP Maximum Hourly Temperatures (2000-2005)} .....	2-235
Table 2.3-32— {CCNPP Minimum Hourly Temperatures (2000-2005)} .....	2-236
Table 2.3-33— {CCNPP Number of Hourly Temperature Values Greater Than or Less Than Indicated Value (2000-2005)} .....	2-237
Table 2.3-34— {Monthly Mean Temperatures (1971-2000) at Sites Around CCNPP} .....	2-238
Table 2.3-35— {Monthly Mean Maximum Temperatures (1971-2000) at Sites Around CCNPP} .....	2-239
Table 2.3-36— {Monthly Mean Minimum Temperatures (1971-2000) at Sites Around CCNPP} .....	2-240
Table 2.3-37— {Monthly Mean Wet Bulb Temperatures (1983-2000) at Sites Around CCNPP} .....	2-241
Table 2.3-38— {Monthly Mean Dew Point Temperatures (1983-2000) at Sites Around CCNPP} .....	2-242
Table 2.3-39— {Number of Days with Maximum Hourly Temperature Value Greater Than or Equal to 90° F at Sites Around CCNPP} .....	2-243
Table 2.3-40— {Number of Days with Maximum Hourly Temperature Value Less Than or Equal to 32° F at Sites Around CCNPP} .....	2-244
Table 2.3-41— {Number of Days with Minimum Hourly Temperature Value Less Than or Equal to 32° F at Sites Around CCNPP} .....	2-245
Table 2.3-42— {Number of Days with Minimum Hourly Temperature Value Less Than or Equal to 0° F at Sites Around CCNPP} .....	2-246
Table 2.3-43— {Monthly Mean Relative Humidity at Sites Around CCNPP} .....	2-247
Table 2.3-44— {CCNPP Monthly and Annual Precipitation (2000-2005)} .....	2-248
Table 2.3-45— {CCNPP Monthly and Annual Percent Frequency of Precipitation Occurrence (2000-2005)} .....	2-249
Table 2.3-46— {CCNPP Hourly Rainfall Rate Distribution (2000-2005)} .....	2-250
Table 2.3-47— {CCNPP Measured Extreme Precipitation Hourly Values (2000-2005)} .....	2-251
Table 2.3-48— {Mean Monthly and Annual Precipitation (1971-2000) At Sites Around CCNPP} .....	2-252
Table 2.3-49— {Mean Monthly and Annual Snowfall (1961-1990)At Sites Around CCNPP} .....	2-253
Table 2.3-50— {Monthly Mean Number of Days with Precipitation (1961-1990) At Sites Around CCNPP} .....	2-254
Table 2.3-51— {Monthly Mean Number of Days with Heavy Fog (1971-2000) At Sites Around CCNPP} .....	2-255
Table 2.3-52— {CCNPP 33 ft (10m) Annual Stability Persistence Summary for Year 2000} .....	2-256
Table 2.3-53— {CCNPP 33 ft (10m) Annual Stability Persistence Summary for Year 2001} .....	2-257
Table 2.3-54— {CCNPP 33 ft (10m) Annual Stability Persistence Summary for Year 2002} .....	2-258
Table 2.3-55— {CCNPP 33 ft (10m) Annual Stability Persistence Summary for Year 2003} .....	2-259
Table 2.3-56— {CCNPP 33 ft (10m) Annual Stability Persistence Summary for Year 2004} .....	2-260
Table 2.3-57— {CCNPP33 ft (10m) Annual Stability Persistence Summary for Year 2005} .....	2-261

Table 2.3-58— {CCNPP 33 ft (10m) Average Annual Stability Persistence Summary for Years 2000-2005} .....	2-262
Table 2.3-59— {CCNPP 197 ft (60m) Annual Stability Persistence Summary for Year 2000} .....	2-263
Table 2.3-60— {CCNPP 197 ft (60m) Annual Stability Persistence Summary for Year 2001} .....	2-264
Table 2.3-61— {CCNPP 197 ft (60m) Annual Stability Persistence Summary for Year 2002} .....	2-265
Table 2.3-62— {CCNPP 197 ft (60m) Annual Stability Persistence Summary for Year 2003} .....	2-266
Table 2.3-63— {CCNPP 197 ft (60m) Annual Stability Persistence Summary for Year 2004} .....	2-267
Table 2.3-64— {CCNPP 197 ft (60m) Annual Stability Persistence Summary for Year 2005} .....	2-268
Table 2.3-65— {CCNPP 197 ft (60m) Average Annual Stability Persistence Summary for Years 2000-2005} .....	2-269
Table 2.3-66— {Monthly and Annual Average Mixing Height Values (m)} .....	2-270
Table 2.3-67— {Monthly and Annual Average Mixing Height Values (m)} .....	2-271
Table 2.3-68— {Temperature Inversion Frequency and Persistence, Year 2000} .....	2-272
Table 2.3-69— {Temperature Inversion Frequency and Persistence, Year 2001} .....	2-273
Table 2.3-70— {Temperature Inversion Frequency and Persistence, Year 2002} .....	2-274
Table 2.3-71— {Temperature Inversion Frequency and Persistence, Year 2003} .....	2-275
Table 2.3-72— {Temperature Inversion Frequency and Persistence, Year 2004} .....	2-276
Table 2.3-73— {Temperature Inversion Frequency and Persistence, Year 2005} .....	2-277
Table 2.3-74— {Tower Instrument Specifications and Accuracies for Meteorological Monitoring Program (Preoperational and Operational)} .....	2-278
Table 2.3-75— {Distances from Meteorological Tower to Nearby Obstructions to Air Flow} .....	2-279
Table 2.3-76— {Site-Specific EAB/LPZ Accident x/Q Values for Ground Level Release} .....	2-280
Table 2.3-77— {Control Room/TSC x/Q Values for Vent Stack Release} .....	2-281
Table 2.3-78— {Control Room/TSC x/Q Values for Main Steam Relief Valve Release} .....	2-282
Table 2.3-79— {Control Room/TSC x/Q Values for Safeguards Building Roof Release (via Safeguards Building Canopies)} .....	2-283
Table 2.3-80— {Control Room/TSC x/Q Values for Equipment Hatch Release} .....	2-284
Table 2.3-81— {Control Room/TSC x/Q Values for Safeguards Building Depressurization Shaft Release} .....	2-285
Table 2.3-82— {50th Percentile x/Q Values} .....	2-286
Table 2.3-83— {AEOLUS3 Design Input} .....	2-287
Table 2.3-84— {ARCON96 Design Inputs} .....	2-288
Table 2.3-85— {Normal Effluent Annual Average, Undecayed, Undepleted x/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Grid Receptors} .....	2-289
Table 2.3-86— {Normal Effluent Annual Average, Undecayed, Undepleted x/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Grid Receptors} .....	2-290
Table 2.3-87— {Normal Effluent Annual Average, Undecayed, Undepleted x/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Special and Additional Receptors} .....	2-291
Table 2.3-88— {Normal Effluent Annual Average, Depleted x/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Grid Receptors} .....	2-292
Table 2.3-89— {Normal Effluent Annual Average, Depleted x/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Grid Receptors 7.5 mi to 50 mi} .....	2-293
Table 2.3-90— {Normal Effluent Annual Average, Depleted x/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Special and Additional Receptors} .....	2-294
Table 2.3-91— {CCNPP Unit 3 Normal Effluent Annual Average, Gamma x/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Grid Receptors} .....	2-295
Table 2.3-92— {CCNPP Unit 3 Normal Effluent Annual Average, Gamma x/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Grid Receptors} .....	2-296
Table 2.3-93— {Normal Effluent Annual Average, Gamma x/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Special and Additional Receptors} .....	2-297

Table 2.3-94— {Normal Effluent Annual Average, D/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Grid Receptors} .....	2-298
Table 2.3-95— {Normal Effluent Annual Average, D/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Grid Receptors} .....	2-299
Table 2.3-96— {Normal Effluent Annual Average, D/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Special and Additional Receptors} .....	2-300
Table 2.3-97— {Specific Locations of Receptors of Interest} .....	2-301
Table 2.3-98— Calvert Cliffs Nuclear Power Station Monthly Mean Temperatures (1987-2006) .....	2-302
Table 2.3-99— Calvert Cliffs Nuclear Power Station Monthly and Annual Precipitation (1992-2006) ....	2-303
Table 2.3-100— Monthly Atmospheric Stability Summary (2000 through 2005) .....	2-304
Table 2.3-101— {CCNPP 33' (10-m) 2000-2006 Annual Joint Frequency Distribution Table} .....	2-305
Table 2.3-102— {CCNPP 197' (60-m) 2000-2006 Annual Joint Frequency Distribution Table} .....	2-313
Table 2.3-103— {100-Year Return Period and Historical Maximum Snowfall Events} .....	2-321
Table 2.3-104— {Highest Daily Snow Depth} .....	2-322
Table 2.3-105— {Tropical Cyclone-Related Extreme Rainfall Events} .....	2-323
Table 2.3-106— Record 1-Day Snowfall Events within 50 mile (80 km) of the Site .....	2-324
Table 2.4-1— {Monthly Streamflow for the Patuxent River at Bowie, MD, USGS Station No. 01594440, Patuxent River near Bowie, MD (1977 through 2005)} .....	2-503
Table 2.4-2— {Mean Daily Streamflow for the Patuxent River at Bowie, MD, USGS Station No. 01594440, Patuxent River near Bowie, MD (1977 through 2005)} .....	2-504
Table 2.4-3— {Maximum Daily Streamflow for the Patuxent River at Bowie, MD, USGS Station No. 01594440, Patuxent River near Bowie, MD (1977 through 2005)} .....	2-505
Table 2.4-4— {Minimum Daily Streamflow for the Patuxent River at Bowie, MD, USGS Station No. 01594440, Patuxent River near Bowie, MD (1977 through 2005)} .....	2-506
Table 2.4-5— {Monthly Streamflow for St. Leonard Creek at St. Leonard, MD, USGS Station No. 01594800, St. Leonard Creek near St. Leonard, MD (1956 through 2003)} .....	2-507
Table 2.4-6— {Mean Daily Streamflow for St. Leonard Creek at St. Leonard, MD, USGS Station No. 01594800, St. Leonard Creek near St. Leonard, MD (1956 through 2003)} .....	2-508
Table 2.4-7— {Maximum Daily Streamflow for St. Leonard Creek at St. Leonard, MD, USGS Station No. 01594800, St. Leonard Creek near St. Leonard, MD (1956 through 2003)} .....	2-509
Table 2.4-8— {Minimum Daily Streamflow for St. Leonard Creek at St. Leonard, MD, USGS Station No. 01594800, St. Leonard Creek Near St. Leonard, MD (1956 through 2003)} .....	2-510
Table 2.4-9— {Estimated Monthly Mean Inflow to the Chesapeake Bay Based on Three Reference Stations (1951 through 2000)} .....	2-511
Table 2.4-10— {Details of Brighton and Rocky Gorge Dams} .....	2-513
Table 2.4-11— {Permitted Surface Water Withdrawals in Calvert County} .....	2-514
Table 2.4-12— {Sub-Basin Drainage Areas} .....	2-515
Table 2.4-13— {HEC-HMS Sub-Basin Site PMP Peak Discharges} .....	2-516
Table 2.4-14— {HEC-RAS PMP Peak Discharges} .....	2-517
Table 2.4-15— {PMP Maximum Water Levels} .....	2-518
Table 2.4-16— {Safety-Related Facility Entrance Elevation Summary} .....	2-519
Table 2.4-17— {Bio-Retention Ditch Dimensions} .....	2-520
Table 2.4-18— {Point (1 mi <sup>2</sup> ) Probable Maximum Precipitation Depths} .....	2-521
Table 2.4-19— {PMP Peak Flow Rates} .....	2-522
Table 2.4-20— {PMF Flow Rates} .....	2-523
Table 2.4-21— {Johns Creek PMF Water Surface Elevations} .....	2-524
Table 2.4-22— {Five Highest Historical Water Levels at Baltimore and Annapolis} .....	2-525
Table 2.4-23— PMH Parameters .....	2-526
Table 2.4-24— {Comparison of Surge Results} .....	2-527
Table 2.4-25— {Historical Tsunamis Arriving at the Shores of the Eastern U.S. and Canada} .....	2-528
Table 2.4-26— {Tsunami Wave Characteristics at the Entrance of the Chesapeake Bay} .....	2-529

Table 2.4-27— {Summary of Numerical Analysis for the Tsunami Propagation} .....	2-530
Table 2.4-28— {Simulated Maximum and Minimum Tsunami Magnitude} .....	2-531
Table 2.4-29— {Estimated Peak Freezing Degree-Days and Ice Thickness from 1946 to 2006} .....	2-532
Table 2.4-30— {Summary of Negative Surges of Major Hurricane Events} .....	2-533
Table 2.4-31— {Summary of Information of the Stations and Range of Data Used} .....	2-534
Table 2.4-32— {Annual Minimum Water Levels at Annapolis Station} .....	2-535
Table 2.4-33— {Annual Minimum Water Level at Solomons Island Station} .....	2-536
Table 2.4-34— {CCNPP Unit 3 Observation Wells Construction Details} .....	2-537
Table 2.4-35— {CCNPP Unit 3 Observation Wells Water Level Elevations} .....	2-540
Table 2.4-36— {CCNPP Unit 3 Observation Wells Used in Hydrologic Evaluation} .....	2-547
Table 2.4-37— {CCNPP Unit 3 Observation Wells – Hydraulic Conductivities from Slug Tests} .....	2-553
Table 2.4-38— {Listing of Maryland Department of the Environment (MDE) Water Appropriations Permits for Calvert County, Maryland} .....	2-555
Table 2.4-39— {Listing of U.S. Environmental Protection Agency (EPA) SDWIS Community, Non- Transient Non-Community, and Transient Non-Community  Water Systems in Calvert County, Maryland} .....	2-598
Table 2.4-40— {Maryland Department of the Environment (MDE) Water Appropriation Permits for the Calvert Cliffs Nuclear Power Plant} .....	2-609
Table 2.4-41— {Calvert Cliffs Nuclear Power Plant – Water Use Report (in gallons), Maryland Department of Environment (MDE) Water Appropriation Permit CA69G010 (05)} .....	2-610
Table 2.4-42— {Calvert County Ground-Water-Level Monitoring Network – Selected Water Level Monitoring Wells} .....	2-611
Table 2.4-43— {Reactor Coolant Storage Tank Radionuclide Inventory} .....	2-612
Table 2.4-44— {Summary of the Radionuclide $K_d$ Values for 20 Soils (mean of two replicates) and Averages (units: ml/g)} .....	2-614
Table 2.4-45— {Progeny Nuclides with Activity Concentrations > 1% of ECLs After Accounting for Advection, Decay, Adsorption, and Dilution} .....	2-616
Table 2.4-46— {Calculated Hydraulic Gradients, Groundwater Velocities, and Travel Times .....	2-617
Table 2.4-47— {Summary of Results for the Transport Analysis Considering Only Advection and Radioactive Decay .....	2-618
Table 2.4-48— {Retardation Factors Calculated Using Site-Specific Distribution Coefficients} .....	2-619
Table 2.4-49— {Summary of Results for the Transport Analysis Considering Advection, Radioactive Decay, and Adsorption} .....	2-620
Table 2.4-50— {Simulated Maximum Tsunami Magnitude at Site for Various Cutoff Depths for Case 1} .....	2-621
Table 2.4-51— {Dimensions of the Contaminant Slug} .....	2-622
Table 2.4-52— {Calculation of Effluent Discharge Rates and Dilution Factors} .....	2-623
Table 2.4-53— {Summary of Results for the Transport Analysis Considering Advection, Radioactive Decay, Adsorption, and Dilution in Surface Water} .....	2-624
Table 2.4-54— {Estimated Longitudinal Dispersivities} .....	2-625
Table 2.4-55— {Summary of Results for the Transport Analysis Considering Advection, Radioactive Decay, Adsorption, and Dilution} .....	2-626
Table 2.4-56— {Sum of Radionuclide Activity Concentration / ECL Ratios for each Pathway} .....	2-627
Table 2.4-57— {Transport Analysis for Pathway to Chesapeake Bay (1)} .....	2-628
Table 2.4-58— {Transport Analysis for Pathway to Branch 2} .....	2-631
Table 2.4-59— {Transport Analysis for Pathway to Branch 1} .....	2-634
Table 2.4-60— {Transport Analysis for Pathway to Branch 3} .....	2-637
Table 2.4-61— {Transport Analysis for Pathway to Johns Creek} .....	2-640
Table 2.4-62— {Transport Analysis for Pathway to Branch 2 through Fill} .....	2-643
Table 2.5-1— {Definitions of Classes Used in the Compilation of Quaternary Faults, Liquefaction Features, and Deformation in the Central and Eastern United States} .....	2-1051

Table 2.5-2— {Earthquakes 1985–2005, Update to the EPRI (NP-4726-A 1988) Seismicity Catalog with Emb $\geq 2.8$ , Within a 35° to 43° N, 71° to 89° W Latitude-Longitude Window, Incorporating the 200 mi (320 km) Radius Site Region} .....	2-1052
Table 2.5-3— {Conversion Between Body-Wave ( $m_b$ ) and Moment (M) Magnitudes} .....	2-1056
Table 2.5-4— {Summary of Bechtel Group Seismic Sources} .....	2-1058
Table 2.5-5— {Summary of Dames & Moore Seismic Sources} .....	2-1059
Table 2.5-6— {Summary of Law Engineering Seismic Sources} .....	2-1061
Table 2.5-7— {Summary of Rondout Seismic Sources} .....	2-1064
Table 2.5-8— {Summary of Weston Seismic Sources} .....	2-1066
Table 2.5-9— {Summary of Woodward-Clyde Seismic Sources} .....	2-1070
Table 2.5-10— {Comparison of EPRI Characterizations of the Central Virginia Seismic Zone} .....	2-1072
Table 2.5-11— {Bollinger (1992) Seismic Source Zone Parameters} .....	2-1073
Table 2.5-12— {Chapman Seismic Source Zone Parameters} .....	2-1074
Table 2.5-13— {Summary of Selected USGS Seismic Sources} .....	2-1075
Table 2.5-14— {Chapman and Talwani (2002) Seismic Source Zone Parameters} .....	2-1076
Table 2.5-15— {Summary of Charleston Seismic Sources Changed in New UCSS Model (Bechtel, 2006)} .....	2-1077
Table 2.5-16— {Geographic Coordinates (Latitude and Longitude) of Corner Points of Updated Charleston Seismic Source (UCSS) Geometries (Bechtel, 2006)} .....	2-1079
Table 2.5-17— {Local Charleston-Area Tectonic Features} .....	2-1080
Table 2.5-18— {Comparison of Post-EPRI NP-6395-D 1989 Magnitude Estimates for the 1886 Charleston Earthquake} .....	2-1081
Table 2.5-19— {Comparison of Talwani and Schaeffer (2001) and UCSS Age Constraints on Charleston-Area Paleoliquefaction Events} .....	2-1082
Table 2.5-20— {Comparison of EPRI-SOG Seismic Hazard Results and Replication Calculated in 2006, for PGA, 10 Hz, and 1 Hz Spectral Velocity} .....	2-1083
Table 2.5-21— {Mean Magnitudes and Distances from Deaggregations} .....	2-1084
Table 2.5-22— {Horizontal and Vertical GMRS Amplitudes and Common V/H Ratios} .....	2-1085
Table 2.5-23— {Calvert Cliffs Site Amplification Factors for $10^{-4}$ and $10^{-5}$ Input Motions and HF and LF Rock Spectra} .....	2-1086
Table 2.5-24— {Values of UHS (Hard Rock Conditions)} .....	2-1087
Table 2.5-25— {Summary Thickness and Termination Elevation} .....	2-1088
Table 2.5-26— {Summary of Field Tests} .....	2-1089
Table 2.5-27— {Summary of As-Conducted Boring Information} .....	2-1090
Table 2.5-28— {Summary of Standard Penetration Test Data} .....	2-1095
Table 2.5-29— {Summary Undisturbed Tube Samples} .....	2-1096
Table 2.5-30— {Summary of Hammer Rod Energy Measurements} .....	2-1105
Table 2.5-31— {Summary As-Conducted CPT Information} .....	2-1106
Table 2.5-32— {Summary of As-Conducted Observation Well Information} .....	2-1108
Table 2.5-33— {In-Situ Hydraulic Conductivity (Slug) Test Results} .....	2-1110
Table 2.5-34— {Summary As-Conducted Test Pit Information} .....	2-1111
Table 2.5-35— {Summary of Field Electrical Resistivity Information} .....	2-1112
Table 2.5-36— {Field Electrical Resistivity} .....	2-1113
Table 2.5-37— {Geophysical Data from CCNPP Units 1 and 2 UFSAR} .....	2-1114
Table 2.5-38— {Pressuremeter Test Results, PM-301} .....	2-1115
Table 2.5-39— {Pressuremeter Test Results, PM-701} .....	2-1117
Table 2.5-40— {Summary of Laboratory Tests and Quantities} .....	2-1118
Table 2.5-41— {Index Properties, Powerblock Area} .....	2-1119
Table 2.5-42— {Index Properties, Intake Area} .....	2-1120
Table 2.5-43— {Summary of Soils Chemical Testing Data} .....	2-1121
Table 2.5-44— {Consolidation Test Results, Powerblock Area} .....	2-1122

Table 2.5-45— {Consolidation Test Results, Intake Area} .....	2-1123
Table 2.5-46— {Shear Strength Laboratory Testing Data, Powerblock Area} .....	2-1124
Table 2.5-47— {Shear Strength Laboratory Testing Data, Intake Area} .....	2-1125
Table 2.5-48— {Modified Proctor Tests on Backfill Samples} .....	2-1126
Table 2.5-49— {RCTS Testing Samples} .....	2-1127
Table 2.5-50— {Low Strain Results for Backfill Samples} .....	2-1128
Table 2.5-51— {USCS Classification and Index Properties} .....	2-1129
Table 2.5-52— {Guidelines for Soil Chemistry Evaluation} .....	2-1130
Table 2.5-53— {Performance Properties under Static Loading} .....	2-1131
Table 2.5-54— {Strength Properties of Soils} .....	2-1132
Table 2.5-55— {Estimation of Elastic Modulus} .....	2-1133
Table 2.5-56— {Basis for Recommendation of $E_{u/r}/E$ Ratio} .....	2-1134
Table 2.5-57— {Elastic Properties Under Static Conditions} .....	2-1135
Table 2.5-58— {Earth Pressure Coefficients} .....	2-1136
Table 2.5-59— {Dynamic Properties for Powerblock Area} .....	2-1137
Table 2.5-60— {Dynamic Properties for Intake Area} .....	2-1138
Table 2.5-61— {Strain Dependant Properties for Powerblock Area} .....	2-1139
Table 2.5-62— {Strain Dependant Properties for Intake Area} .....	2-1140
Table 2.5-63— {Strain Dependant Properties for Backfill} .....	2-1141
Table 2.5-64— {Building Elevation, Depth, Area, and Load} .....	2-1142
Table 2.5-65— {Bearing Capacity} .....	2-1143
Table 2.5-66— {Heave after Excavation} .....	2-1144
Table 2.5-67— {Foundation Loading Sequence} .....	2-1145
Table 2.5-68— {Building Center Point Settlement Estimates} .....	2-1146
Table 2.5-69— {Maximum Tilt at End of Construction} .....	2-1147
Table 2.5-70— {Settlement and Tilt for UHS Facilities} .....	2-1148
Table 2.5-71— {Material Properties for Slope Stability} .....	2-1149
Table 2.5-72— {Computed Factors of Safety for Critical Slip Surface} .....	2-1150
Table 2.5-73— {Building Points with Associated Differential Settlements} .....	2-1151
Table 2.5-74— {Seismic Bearing Capacity Results} .....	2-1153
Table 3.2-1— {Classification Summary for Site-Specific SSCs} .....	3-6
Table 3.7-1— {Site SSE (Horizontal and Vertical) Spectral Accelerations at 5% Damping} .....	3-63
Table 3.7-2— {CCNPP Unit 3 Best Estimate Soil for SSI Analysis of NI Common Basemat Structure} .....	3-64
Table 3.7-3— {CCNPP Unit 3 Lower Bound Soil for SSI Analysis of NI Common Basemat Structure} .....	3-67
Table 3.7-4— {CCNPP Unit 3 Upper Bound Soil for SSI Analysis of NI Common Basemat Structure} .....	3-70
Table 3.7-5— {Frequencies and Mass Participation Factors for Common Basemat Intake Structures with Symmetric Boundary Conditions – Fixed Base Analysis} .....	3-73
Table 3.7-6— {Frequencies and Mass Participation Factors for Common Basemat Intake Structures with Anti-Symmetric Boundary Conditions – Fixed Base Analysis} .....	3-75
Table 3.7-7— {Boundary Conditions for Nodes in Plane of Symmetry of the CBIS Finite Element Model} .....	3-77
Table 3.7-8— {Worst Case Accelerations in Emergency Power Generating Building} .....	3-78
Table 3.7-9— {Worst Case Accelerations in Essential Services Water Building} .....	3-79
Table 3.7-10— {Worst Case Accelerations in Common Basemat Intake Structures} .....	3-80
Table 3.7-11— {Criteria for Seismic Interaction of Site-Specific Non-Seismic Category I Structures with Seismic Category I Structures} .....	3-81
Table 3.8-1— {Static Frictional Parameters} .....	3-189
Table 3.8-2— {Stability Evaluation Results for the CBIS} .....	3-190
Table 3.8-3— {Bearing Capacity Evaluation Results for the CBIS} .....	3-191
Table 3.8-4— {Factors of Safety for NI Common Basemat Structure, EPGB, and ESWB under SSE Loading} .....	3-192

Table 3.8-5— {Observed Chemical Properties of Groundwater} .....	3-193
Table 3.9-1— {Site -Specific Inservice Pump Testing Program Requirements} .....	3-212
Table 3.9-2— {Site-Specific Inservice Valve Testing Program Requirements .....	3-213
Table 3.10-1— {Seismic and Dynamic Qualifications of Mechanical and Electrical Equipment} .....	3-222
Table 3.10-2— Seismic Qualification Implementation Program .....	3-237
Table 3.11-1— {Site-Specific Environmentally Qualified Electrical/I&C Equipment} .....	3-241
Table 3E-1— {Demand and Capacity for In-Plane Shear} .....	3-9
Table 3E-2— {Demand and Capacity for Out-of-Plane Shear} .....	3-10
Table 3E-3— {Demand and Capacity for Combined Moment and Axial Force} .....	3-11
Table 3E-4— {Demand and Capacity for Shear Friction} .....	3-14
Table 3F-1— {Bottom of Foundation Depths and Elevations} .....	3-12
Table 3F-2— {Input Rock Motions and Associated Parameters} .....	3-13
Table 3F-3— {Best Estimate Site SSE Strain-Compatible Profiles for the NI Area} .....	3-14
Table 3F-4— {Lower Bound Site SSE Strain-Compatible Profiles for the NI Area} .....	3-16
Table 3F-5— {Upper Bound Site SSE Strain-Compatible Profiles for the NI Area} .....	3-18
Table 3F-6— {Best Estimate Site SSE Strain-Compatible Profiles for the Intake Area} .....	3-20
Table 3F-7— {Lower Bound Site SSE Strain-Compatible Profiles for the Intake Area} .....	3-22
Table 3F-8— {Upper Bound Site SSE Strain-Compatible Profiles for the Intake Area .....	3-24
Table 7.5-1— {Initial Inventory of Post Accident Monitoring Variables} .....	7-8
Table 8.1-1— {Division 1 Emergency Diesel Generator Nominal Loads} .....	8-4
Table 8.1-2— {Division 2 Emergency Diesel Generator Nominal Loads} .....	8-5
Table 8.1-3— {Division 3 Emergency Diesel Generator Nominal Loads} .....	8-6
Table 8.1-4— {Division 4 Emergency Diesel Generator Nominal Loads} .....	8-7
Table 8.2-1— {BGE Transmission System Circuits Connected to the CCNPP Site} .....	8-25
Table 8.3-1— {CCNPP Unit 3 AC Power System Component Data Nominal Values} .....	8-33
Table 8.3-2— {CCNPP Unit 3 EPSS Switchgear, Load Center, and Motor Control Center Numbering and Nominal Voltage} .....	8-34
Table 8.3-3— {CCNPP Unit 3 Normal Power Supply System Switchgear, and Load Center Numbering and Nominal Voltage} .....	8-35
Table 9.5-1— {Fire Protection Program Compliance with Regulatory Guide 1.189} .....	9-63
Table 9B-1— Predefined Severities for Common Plant Ignition Source Fires .....	9-28
Table 9B-2— {Fire Area Parameters} .....	9-29
Table 10.4-1— {Circulating Water System Cooling Tower Design Specifications} .....	10-24
Table 11.2-1— {LADTAP II Input Parameters used in Maximum Exposed Individual Dose Calculation} .....	11-9
Table 11.2-2— {Detailed Dose Commitment Results By Age Group and Organs Due to Liquid Effluent Releases} .....	11-10
Table 11.2-3— {Dose Commitment Due To Liquid Releases} .....	11-12
Table 11.2-4— {Annual Historical Dose Compliance with 40 CFR 190 for CCNPP Units 1 and 2 <sup>1</sup> } .....	11-13
Table 11.2-5— {40 CFR 190 Annual Site Dose Compliance} .....	11-14
Table 11.2-6— {Input Parameters for the LADTAP II Computer Code used in Liquid Waste Cost- Benefit Analysis} .....	11-15
Table 11.2-7— {Population Doses from Liquid Effluents <sup>1</sup> } .....	11-16
Table 11.3-1— {Locations and Atmospheric Dispersion/Deposition Factors for Gaseous Effluent Maximum Dose Evaluations <sup>(c)</sup> } .....	11-23
Table 11.3-2— {Gaseous Pathway Parameters} .....	11-24
Table 11.3-3— {Gaseous Pathway Consumption Factors for MEI <sup>1</sup> } .....	11-25
Table 11.3-4— {Distance to Nearest Gaseous Dose Receptors <sup>(1)(3)</sup> } .....	11-26
Table 11.3-5— {Detailed Dose Commitment Results By Age Group and Organs Due to Gaseous Effluent Releases} .....	11-27
Table 11.3-6— {Gaseous Pathway Doses for Maximally Exposed Individuals (MEI) <sup>(1)(2)</sup> } .....	11-29

Table 11.3-7— {CCNPP Unit 3 Gaseous Effluent MEI Dose Summary} .....	11-30
Table 11.3-8— {Population Doses from Gaseous Effluents <sup>1</sup> } .....	11-31
Table 11.3-9— {Population within 50 mi of the CCNPP Site for Year 2080 (Projected) <sup>1</sup> } .....	11-32
Table 11.3-10— {Bounding 50-mile Dispersion Factors (sec/m <sup>3</sup> ) for CCNPP Site} .....	11-33
Table 11.3-11— {Cow Milk Production (kg/yr) <sup>1</sup> within 50 miles of CCNPP Site} .....	11-35
Table 11.3-12— {Beef Production (kg/yr) within 50 miles of CCNPP Site} .....	11-36
Table 11.3-13— {Poultry Production (kg/yr) within 50 miles of CCNPP Site} .....	11-37
Table 11.3-14— {Meat (Beef and Poultry) Production (kg/yr) within 50 miles of CCNPP Site} .....	11-38
Table 11.3-15— {Grain Production (kg/yr) within 50 miles of CCNPP Site} .....	11-39
Table 11.3-16— {Leafy Vegetable Production (kg/yr) within 50 miles of CCNPP Site} .....	11-40
Table 11.3-17— {Vegetable (Grain and Leafy) Production (kg/yr) within 50 miles of CCNPP Site} .....	11-41
Table 12.3-1— {Source List for CCNPP Units 1 and 2} .....	12-20
Table 12.3-2— {Historical All-Source Compliance for Offsite General Public} .....	12-21
Table 12.3-3— {Mean Historical ISFSI Exposures by Year} .....	12-22
Table 12.3-4— {Historical ISFSI Net Trend} .....	12-23
Table 12.3-5— {Historical Resin Storage Area TLD Readings for 2001 through 2005} .....	12-24
Table 12.3-6— {Historical Annual Average $\chi/Q$ (sec/m <sup>3</sup> ) In CCNPP Unit 3 Directions} .....	12-25
Table 12.3-7— {Historical Gaseous Releases for 2002 through 2006} .....	12-26
Table 12.3-8— {Historical Liquid Releases 2001 through 2006} .....	12-27
Table 12.3-9— {Projected Dose Rates from all Sources by Construction Zone} .....	12-29
Table 12.3-10— {Projected Construction Worker Census 2010 to 2015} .....	12-30
Table 12.3-11— {Projected Construction Worker Occupancy by Zone} .....	12-31
Table 12.3-12— {FTE for CCNPP Unit 3 Construction Workers} .....	12-32
Table 12.3-13— {Average Dose Rates to CCNPP Unit 3 Construction Workers} .....	12-33
Table 12.3-14— {Projected Collective Dose for Construction Worker by Zone} .....	12-34
Table 13.1-1— {Generic Position/Site Specific Position Cross Reference} .....	13-36
Table 13.1-2— {Minimum Shift Crew Composition} <sup>(5)(6)</sup> .....	13-41
Table 13.1-3— {Consortium General Division of Responsibilities} .....	13-42
Table 13.4-1— {Operational Programs Required by NRC Regulations and Program Implementation} .....	13-51
Table 14.3-1— {Site Specific Analyses (Safety Significant Features)} .....	14-41
Table 14.3-2— {Site Specific SSC ITAAC Screening Summary} .....	14-42
Table 14.3-3— {Interface Requirements Screening Summary} .....	14-44
Table 15.0-1— {CCNPP Unit 3 LPZ Atmospheric Dispersion Factors} .....	15-5
Table 15.0-2— {CCNPP Unit 3 LPZ Radiological Consequences of U.S. EPR Design Basis Accidents} .....	15-6
Table 17.4-1— {Site Specific Systems and Structures Included Within RAP} .....	17-17
Table 18.7-1— {Minimum Inventory of Main Control Room Fixed Alarms, Displays, and Controls} .....	18-10
Table 18.7-2— {Minimum Inventory of Remote Shutdown Station Fixed Alarms, Displays, and Controls} .....	18-11
Table 19.1-1— {Summary of External Events Evaluated for CCNPP Unit 3} .....	19-22



## List of Figures

Figure 1.1-1— {50 mi (80 km) Surrounding Area} .....	1-13
Figure 1.1-2— {10 mi (16 km) Surrounding Area} .....	1-14
Figure 1.1-3— {Site Area Map} .....	1-15
Figure 1.2-1— {CCNPP Unit 3 Nuclear and Turbine Building Island Layout} .....	1-19
Figure 2.1-1— {Site Area Map} .....	2-29
Figure 2.1-2— {50 mi (80 km) Surrounding Area} .....	2-30
Figure 2.1-3— {10 mi (16 km) Surrounding Area} .....	2-31
Figure 2.1-4— {Enlarged Site Map} .....	2-32
Figure 2.1-5— {CCNPP Unit 3 Enlargement} .....	2-33
Figure 2.1-6— {Division of Site Parcels} .....	2-34
Figure 2.1-7— {10 mi (16 km) Radius Map} .....	2-35
Figure 2.1-8— {10 mi (16 km) 2000 Population Distribution} .....	2-36
Figure 2.1-9— {10 m (16 km) 2010 Population Distribution} .....	2-37
Figure 2.1-10— {10 mi (16 km) 2020 Population Distribution} .....	2-38
Figure 2.1-11— {10 mi (16 km) 2030 Population Distribution} .....	2-39
Figure 2.1-12— {10 mi (16 km) 2040 Population Distribution} .....	2-40
Figure 2.1-13— {10 mi (16 km) 2050 Population Distribution} .....	2-41
Figure 2.1-14— {10 mi (16 km) 2060 Population Distribution} .....	2-42
Figure 2.1-15— {50 mi (80 km) Vicinity} .....	2-43
Figure 2.1-16— {50 mi (80 km) 2000 Population Distribution} .....	2-44
Figure 2.1-17— {50 mi (80 km) 2010 Population Distribution} .....	2-45
Figure 2.1-18— {50 mi (80 km) 2020 Population Distribution} .....	2-46
Figure 2.1-19— {50 mi (80 km) 2030 Population Distribution} .....	2-47
Figure 2.1-20— {50 mi (80 km) 2040 Population Distribution} .....	2-48
Figure 2.1-21— {50 mi (80 km) 2050 Population Distribution} .....	2-49
Figure 2.1-22— {50 mi (80 km) 2060 Population Distribution} .....	2-50
Figure 2.1-23— {CCNPP Units 1, 2, and 3 Low Population Zone} .....	2-51
Figure 2.1-24— {10 mi (16 km) 2015 Population Distribution} .....	2-52
Figure 2.1-25— {10 mi (16 km) 2055 Population Distribution} .....	2-53
Figure 2.1-26— {50 mi (80 km) 2015 Population Distribution} .....	2-54
Figure 2.1-27— {50 mi (80 km) 2055 Population Distribution} .....	2-55
Figure 2.1-28— {Population Compared to NRC Siting Criteria} .....	2-56
Figure 2.2-1— {5 mi (8 km) Site Vicinity Map} .....	2-112
Figure 2.2-2— {Airports/Airways Within 10 mi (16 km) of Site} .....	2-113
Figure 2.3-1— {Annual Average Number of Tornadoes, 1950 - 1995} .....	2-325
Figure 2.3-2— {Annual Average Number of Tornadoes, 1950 - 1995} .....	2-326
Figure 2.3-3— {Average Number of Strong-Violent (F2-F5) Tornadoes, 1950 - 1995} .....	2-327
Figure 2.3-4— {Date of Maximum Tornado Threat} .....	2-328
Figure 2.3-5— {5-Year Lightning Flash Density Map} .....	2-329
Figure 2.3-6— {Ozone Concentration for Maryland Counties} .....	2-330
Figure 2.3-7— {CCNPP 33' (10 m) Annual Wind Rose (2000-2005)} .....	2-331
Figure 2.3-8— {CCNPP 197' (60 m) Annual Wind Rose (2000-2005)} .....	2-332
Figure 2.3-9— {CCNPP 33' (10 m) January Wind Rose (2000-2005)} .....	2-333
Figure 2.3-10— {CCNPP 33' (10 m) February Wind Rose (2000-2005)} .....	2-334
Figure 2.3-11— {CCNPP 33' (10 m) March Wind Rose (2000-2005)} .....	2-335
Figure 2.3-12— {CCNPP 33' (10 m) April Wind Rose (2000-2005)} .....	2-336
Figure 2.3-13— {CCNPP 33' (10 m) May Wind Rose (2000-2005)} .....	2-337
Figure 2.3-14— {CCNPP 33' (10 m) June Wind Rose (2000-2005)} .....	2-338
Figure 2.3-15— {CCNPP 33' (10 m) July Wind Rose (2000-2005)} .....	2-339

Figure 2.3-16— {CCNPP 33' (10 m) August Wind Rose (2000-2005)}	2-340
Figure 2.3-17— {CCNPP 33' (10 m) September Wind Rose (2000-2005)}	2-341
Figure 2.3-18— {CCNPP 33' (10 m) October Wind Rose (2000-2005)}	2-342
Figure 2.3-19— {CCNPP 33' (10 m) November Wind Rose (2000-2005)}	2-343
Figure 2.3-20— {CCNPP 33' (10 m) December Wind Rose (2000-2005)}	2-344
Figure 2.3-21— {CCNPP 197' (60 m) January Wind Rose (2000-2005)}	2-345
Figure 2.3-22— {CCNPP 197' (60 m) February Wind Rose (2000-2005)}	2-346
Figure 2.3-23— {CCNPP 197' (60 m) March Wind Rose (2000-2005)}	2-347
Figure 2.3-24— {CCNPP 197' (60m) April Wind Rose (2000-2005)}	2-348
Figure 2.3-25— {CCNPP 197' (60 m) May Wind Rose (2000-2005)}	2-349
Figure 2.3-26— {CCNPP 197' (60 m) June Wind Rose (2000-2005)}	2-350
Figure 2.3-27— {CCNPP 197' (60 m) July Wind Rose (2000-2005)}	2-351
Figure 2.3-28— {CCNPP 197' (60 m) August Wind Rose (2000-2005)}	2-352
Figure 2.3-29— {CCNPP 197' (60 m) September Wind Rose (2000-2005)}	2-353
Figure 2.3-30— {CCNPP 197' (60 m) October Wind Rose (2000-2005)}	2-354
Figure 2.3-31— {CCNPP 197' (60 m) November Wind Rose (2000-2005)}	2-355
Figure 2.3-32— {CCNPP 197' (60 m) December Wind Rose (2000-2005)}	2-356
Figure 2.3-33— {BWI Annual Wind Rose}	2-357
Figure 2.3-34— {Norfolk Annual Wind Rose}	2-358
Figure 2.3-35— {Richmond Annual Wind Rose}	2-359
Figure 2.3-36— {CCNPP 33' (10 m) Annual Precipitation Wind Rose (2000-2005)}	2-360
Figure 2.3-37— {CCNPP 197' (60 m) Annual Precipitation Wind Rose (2000-2005)}	2-361
Figure 2.3-38— {Monthly Average Mixing Heights}	2-362
Figure 2.3-39— {Topography Within a 1 Mile (1.6 km) Radius of the Site}	2-363
Figure 2.3-40— {Topography Within a 5 Mile (8 km) Radius of the Site}	2-364
Figure 2.3-41— {Topography Within a 50 Mile (80 km) Radius of the Site}	2-365
Figure 2.3-42— {Maximum Terrain Heights 0-50 Miles Downwind of CCNPP Site by Compass Sector (*)}	2-366
Figure 2.3-43— {CCNPP Unit 3 Control Room Location}	2-367
Figure 2.3-44— {PMWP Values for CCNPP from HMR 53}	2-368
Figure 2.3-45— {Patuxent River NAS Annual Wind Rose (2000 through 2005)}	2-369
Figure 2.3-46— {Patuxent River NAS Wind Speed Class Frequency Distribution (2000 through 2006)}	2-370
Figure 2.4-1— {Site Area Topography and Drainage}	2-647
Figure 2.4-2— {Site Utilization Plot Plan}	2-648
Figure 2.4-3— {Chesapeake Bay Sub-Watershed and CCNPP Unit 3 Site Locations}	2-649
Figure 2.4-4— {Mean, Maximum and Minimum Monthly Streamflows for the Patuxent River at Bowie, MD, USGS Station No. 01594440, Patuxent River Near Bowie, MD (1977-06-01 Through 2005-09-30)}	2-650
Figure 2.4-5— {Sub-Watershed Delineation of the Lower Patuxent River Watershed}	2-651
Figure 2.4-6— {Mean, Max and Min Monthly Streamflows for St. Leonard Creek at St. Leonard, MD, USGS Station No. 01594800, St. Leonard Creek Near St. Leonard, MD (1956-12-01 Through 2003-09-30)}	2-652
Figure 2.4-7— {CCNP UNIT 3 Sub-Basin Drainage Boundaries}	2-653
Figure 2.4-8— {HEC-HMS Hydrologic Diagram}	2-654
Figure 2.4-9— {CCNPP Unit 3 Drainage Ditch Cross Sections}	2-655
Figure 2.4-10— {Site Location}	2-656
Figure 2.4-11— {Johns Creek Watershed}	2-657
Figure 2.4-12— {HEC-HMS Watershed Schematic}	2-658
Figure 2.4-13— {Storage And Inflow & Outflow Hydrographs at Maryland Route 2-4 Culvert}	2-659
Figure 2.4-14— {Sub-Basin 1 Hydrograph}	2-660

Figure 2.4-15— {Sub-Basin 2 Hydrograph} .....	2-661
Figure 2.4-16— {Sub-Basin 3 Hydrograph} .....	2-662
Figure 2.4-17— {Sub-Basin 4 Hydrograph} .....	2-663
Figure 2.4-18— {HEC-RAS Cross Section Locations} .....	2-664
Figure 2.4-19— {Johns Creek PMF Water Surface Profiles} .....	2-665
Figure 2.4-20— {Patuxent River Watershed And Dam Locations} .....	2-666
Figure 2.4-21— {SLOSH Chesapeake Bay Model Grid (SLOSH Basin cp2) and the Location of CCNPP Unit 3} .....	2-667
Figure 2.4-22— {Selected Storm Track and the Envelop of Resulting Surge Elevation in the SLOSH Chesapeake Bay Basin for the PMH} .....	2-668
Figure 2.4-23— {Bottom Profile {SLOSH Model Simulated Time History of Wind Fetch Surge Elevation at the Site (Grid Cell 31, 59) for Cross Wind Effects and Wind Wave Estimation} the Selected PMH Conditions} .....	2-669
Figure 2.4-24— {SLOSH Model Simulated Time History of Wind Speed at the Site (grid cell 31, 59) for the Selected PMH Conditions} .....	2-670
Figure 2.4-25— {Schematic Description of UHS Makeup Water Intake Location and Exposure for Wind Wave Estimation} .....	2-671
Figure 2.4-26— {Schematic Diagram Wave Runup on the UHS Makeup Water Intake Structure (MWIS)} .....	2-672
Figure 2.4-27— {Storm Surge Heights at Different Locations in the Chesapeake Bay During Hurricane Isabel 2003} .....	2-673
Figure 2.4-28— {Map Of Tsunami Source Generators} .....	2-674
Figure 2.4-29— {Staggered Grid for Leap-Frog Scheme} .....	2-675
Figure 2.4-30— {Time Grid Scheme for Assignment of Variables} .....	2-676
Figure 2.4-31— {Spatial Grid Scheme for Assignment of Variables} .....	2-677
Figure 2.4-32— {Computational Domain and Model Bathymetry for Tsunami Simulation in Chesapeake Bay} .....	2-678
Figure 2.4-33— {Water Levels Along Internal Boundary for Case 1, Nonlinear Model} .....	2-679
Figure 2.4-34— {Water Levels Along Internal Boundary Case 2, Nonlinear Model} .....	2-680
Figure 2.4-35— {Water Levels Along Internal Boundary for Case 3, Nonlinear Model} .....	2-681
Figure 2.4-36— {Water Levels Along Internal Boundary for Case 3, Linear Model} .....	2-682
Figure 2.4-37— {Time History Of Tsunami Water Levels Case 1 through 3, Nonlinear Model} .....	2-683
Figure 2.4-38— {Time History Of Tsunami Water Levels At The Site, Case 2}Case 1 through 3 Linear Model} .....	2-684
Figure 2.4-39— {General Site Region} .....	2-685
Figure 2.4-40— {South Chesapeake Bay Ice Analysis- January 28, 2000} .....	2-686
Figure 2.4-41— {South Chesapeake Bay Ice Analysis- February 01, 2004} .....	2-687
Figure 2.4-42— {South Chesapeake Bay Ice Analysis- January 24, 2005} .....	2-688
Figure 2.4-43— {South Chesapeake Bay Ice Analysis- January 26, 2005} .....	2-689
Figure 2.4-44— {EGG Code} .....	2-690
Figure 2.4-45— {EGG Code: Stages Of Ice Development} .....	2-691
Figure 2.4-46— {EGG Code: Predominant Forms Of Ice} .....	2-692
Figure 2.4-47— {Change In The Chesapeake Bay Shoreline Position Near The CCNPP Unit 3 Site Between 1848, 1942 and 1993} .....	2-693
Figure 2.4-48— {Chesapeake Bay Shoreline Erosion Rates Near The CCNPP Unit 3 Site Estimated By Maryland Department Of Natural Resources} .....	2-694
Figure 2.4-49— {UHS Make-Up Intake Structure} .....	2-695
Figure 2.4-50— {Track Of The Probable Maximum Hurricane} .....	2-696
Figure 2.4-51— {CCNPP Unit 3 Site Location} .....	2-697
Figure 2.4-52— {Low Water Level Data Of Annapolis Station And The Curve Fitted By Visual Inspection} .....	2-698

Figure 2.4-53— {Location of CCNPP 200-Mile (320-Km) Radius From the Plant Site} .....	2-699
Figure 2.4-54— {Mid-Atlantic Regional Physiographic Provinces and Hydrostratigraphic Units} .....	2-700
Figure 2.4-55— {Schematic Geologic Cross Section Through the Mid-Atlantic Region} .....	2-701
Figure 2.4-56— {Southern Maryland Schematic Hydrostratigraphic Section} .....	2-702
Figure 2.4-57— {Schematic Cross-Section of Southern Maryland Hydrostratigraphic Units} .....	2-703
Figure 2.4-58— {Potentiometric Surface of the Aquia Aquifer in Southern MD, September 2003} .....	2-704
Figure 2.4-59— {Potentiometric Surface of the Magothy Aquifer in Southern MD, September 2003} .....	2-705
Figure 2.4-60— {Potentiometric Surface of the Upper Patapsco Aquifer in Southern MD, September 2003} .....	2-706
Figure 2.4-61— {Potentiometric Surface of the Lower Patapsco Aquifer in Southern MD, September 2003} .....	2-707
Figure 2.4-62— {CCNPP Site Area Topography and Drainage} .....	2-708
Figure 2.4-63— {Cross-Section and Soil Boring Locations in the Vicinity of CCNPP Unit 3} .....	2-709
Figure 2.4-64— {Cross-Section A-A' Through Proposed Unit 3 Power Block Area} .....	2-710
Figure 2.4-65— {Cross-Section B-B' Through Proposed Unit 3 Power Block Area} .....	2-711
Figure 2.4-66— {Groundwater Observation Wells and Cross-Section Locations in the Vicinity of CCNPP Unit 3} .....	2-712
Figure 2.4-67— {Ground Water Elevations for the Surficial Aquifer, July 2006 Through October 2009} .....	2-713
Figure 2.4-68— {Water Table Elevation Map and Groundwater Flow Direction for the Surficial Aquifer, July 2006} .....	2-714
Figure 2.4-69— {Water Table Elevation Map and Groundwater Flow Direction for the Surficial Aquifer, September 2006} .....	2-715
Figure 2.4-70— {Water Table Elevation Map and Groundwater Flow Direction for the Surficial Aquifer, December 2006} .....	2-716
Figure 2.4-71— {Water Table Elevation Map and Groundwater Flow Direction for the Surficial Aquifer, March 2007} .....	2-717
Figure 2.4-72— {Groundwater Elevations for the Upper Chesapeake Unit, July 2006 Through October 2009} .....	2-718
Figure 2.4-73— {Potentiometric Surface Elevation Map and Groundwater Flow Directions for the Upper Chesapeake Unit, July 2006} .....	2-720
Figure 2.4-74— {Potentiometric Surface Elevation Map and Groundwater Flow Directions for the Upper Chesapeake Unit, Sept 2006} .....	2-721
Figure 2.4-75— {Potentiometric Surface Elevation Map and Groundwater Flow Directions for the Upper Chesapeake Unit, Dec 2006} .....	2-722
Figure 2.4-76— {Potentiometric Surface Elevation Map and Groundwater Flow Directions for the Upper Chesapeake Unit, March 2007} .....	2-723
Figure 2.4-77— {Groundwater Elevations for the Lower Chesapeake Unit, July 2006 Through October 2009} .....	2-724
Figure 2.4-78— {Potentiometric Surface Elevation Map and Groundwater Flow Directions for the Lower Chesapeake Unit, July 2006} .....	2-725
Figure 2.4-79— {Potentiometric Surface Elevation Map and Groundwater Flow Directions for the Lower Chesapeake Unit, Sept 2006} .....	2-726
Figure 2.4-80— {Potentiometric Surface Elevation Map and Groundwater Flow Directions for the Lower Chesapeake Unit, Dec 2006} .....	2-727
Figure 2.4-81— {Potentiometric Surface Elevation Map and Groundwater Flow Directions for the Lower Chesapeake Unit, March 2007} .....	2-728
Figure 2.4-82— {US EPA Region 3 Sole Source Aquifers} .....	2-729
Figure 2.4-83— {Projected Location of Nearest Off-Site Groundwater Well and Community Water Supply System} .....	2-730

Figure 2.4-84— {CCNPP Water Production Wells} .....	2-731
Figure 2.4-85— {The Differences Between the Potentiometric Surfaces of the Aquia Aquifer, September 1982 and September 2003, in Southern Maryland} .....	2-732
Figure 2.4-86— {The Differences Between the Potentiometric Surfaces of the Magothy Aquifer, September 1975 and September 2003, in Southern Maryland} .....	2-733
Figure 2.4-87— {The Differences Between the Potentiometric Surfaces of the Upper Patapsco Aquifer, September 1990 and September 2003, in Southern Maryland} .....	2-734
Figure 2.4-88— {The Differences Between the Potentiometric Surfaces of the Lower Patapsco Aquifer, September 1990 and September 2003, in Southern Maryland} .....	2-735
Figure 2.4-89— {Calvert County Ground-Water-Level Monitoring Network, Location of Selected Water Level Monitoring Wells} .....	2-736
Figure 2.4-90— {Well Hydrograph for Monitoring Well CA Fd 51 Screened in the Piney Point - Nanjemoy Aquifer at Calvert Cliffs State Park} .....	2-737
Figure 2.4-91— {Well Hydrograph for Monitoring Well CA Ed 42 Screened in the Aquia Aquifer at CCNPP} .....	2-738
Figure 2.4-92— {Well Hydrograph for Monitoring Well CA Dc 35 Screened in the Magothy Aquifer at Scientists Cliffs} .....	2-739
Figure 2.4-93— {Well Hydrograph for Monitoring Well CA Db 96 Screened in the Upper Patapsco Aquifer at Prince Frederick} .....	2-740
Figure 2.4-94— {Well Hydrograph for Monitoring Well CA Fd 85 Screened in the Lower Patapsco Aquifer at Chesapeake Ranch Estates} .....	2-741
Figure 2.4-95— {Modeled Post-Construction Depth to the Water Table around the Unit 3 Power Block Area} .....	2-742
Figure 2.4-96— {Modeled Post-Construction Elevation of the Water Table around the Unit 3 Power Block Area} .....	2-743
Figure 2.4-97— {Water Table Elevation Map and Groundwater Flow Direction for the Surficial Aquifer, June 2007} .....	2-744
Figure 2.4-98— {Potentiometric Surface Elevation Map and Groundwater Flow Directions for the Upper Chesapeake Unit, June 2007} .....	2-745
Figure 2.4-99— {Potentiometric Surface Elevation Map and Groundwater Flow Directions for the Lower Chesapeake Unit, June 2007} .....	2-746
Figure 2.4-100— {Conceptual Model of Subsurface Pathways through the Upper Chesapeake Unit To Surface Streams} .....	2-747
Figure 2.4-101— {Plan View of Subsurface Contaminant Pathways} .....	2-748
Figure 2.4-102— {Upper Chesapeake Unit Flow Direction from the Nuclear Auxiliary Building to Branch 2, December 2006} .....	2-749
Figure 2.4-103— {Potentiometric Surface Countours from Groundwater Model of Post-Construction Conditions} .....	2-750
Figure 2.4-104— {Cross Section Showing Pathlines through the Upper Chesapeake Unit in the Post- Construction Groundwater Model} .....	2-751
Figure 2.4-105— {Topography of the Post-Construction Groundwater Flow Model Domain} .....	2-752
Figure 2.4-106— {Proposed Post Construction Observation Well Locations} .....	2-753
Figure 2.4-107— {Cross-Section Showing Pathlines through Engineered Fill in Post-Construction Groundwater Model, for the Simulation Using the Maximum Hydraulic Conductivity of the Fill Material} .....	2-754
Figure 2.4-108— {Pathlines from Nuclear Auxiliary Building Obtained from Groundwater Model of Post-Construction Conditions} .....	2-755
Figure 2.4-109— {Water Table Elevation Map for the Surficial Aquifer, December 2007} .....	2-756
Figure 2.4-110— {Water Table Elevation Map for the Surficial Aquifer, July 2008} .....	2-757
Figure 2.4-111— {Water Table Elevation Map for the Surficial Aquifer, January 2009} .....	2-758
Figure 2.4-112— {Water Table Elevation Map for the Surficial Aquifer, July 2009} .....	2-759

Figure 2.4-113— {Potentiometric Surface Elevation Map for the Upper Chesapeake Unit, December 2007} .....	2-760
Figure 2.4-114— {Potentiometric Surface Elevation Map for the Upper Chesapeake Unit, July 2008} .....	2-761
Figure 2.4-115— {Potentiometric Surface Elevation Map for the Upper Chesapeake Unit, October 2008} .....	2-762
Figure 2.4-116— {Potentiometric Surface Elevation Map for the Upper Chesapeake Unit, April 2009} .....	2-763
Figure 2.4-117— {Potentiometric Surface Elevation Map for the Upper Chesapeake Unit, October 2009} .....	2-764
Figure 2.4-118— {Potentiometric Surface Elevation Map for the Lower Chesapeake Unit, December 2007} .....	2-765
Figure 2.4-119— {Potentiometric Surface Elevation Map for the Lower Chesapeake Unit, April 2008} .....	2-766
Figure 2.4-120— {Potentiometric Surface Elevation Map for the Lower Chesapeake Unit, October 2008} .....	2-767
Figure 2.4-121— {Potentiometric Surface Elevation Map for the Lower Chesapeake Unit, April 2009} .....	2-768
Figure 2.4-122— {Potentiometric Surface Elevation Map for the Lower Chesapeake Unit, October 2009} .....	2-769
Figure 2.4-123— {Chesapeake Bay Digital Elevation Model from NOAA} .....	2-770
Figure 2.4-124— {Comparison of Simulated Water Levels at the Site for Different Grid Sizes for Case 1, Nonlinear Model} .....	2-771
Figure 2.4-125— {Water Levels along Internal Boundary for Case 1, Linear Model} .....	2-772
Figure 2.4-126— {Water Levels along Internal Boundary for Case 2, Linear Model} .....	2-773
Figure 2.4-127— {Contour of Maximum Water Levels for Case 1, Nonlinear Model} .....	2-774
Figure 2.4-128— Contour of Maximum Water Levels for Case 1, Linear Model} .....	2-775
Figure 2.4-129— {Time History of Tsunami Water Levels at Site for Different Cutoff Depths, Case 1, Nonlinear Option} .....	2-776
Figure 2.4-130— {Time History of Tsunami Water Levels at Site for Different Cutoff Depths, Case 1, Linear Option} .....	2-777
Figure 2.5-1— {Map of Physiographic Province} .....	2-1154
Figure 2.5-2— {Site Vicinity Topographic Map 25-Mile (40-Km) Radius} .....	2-1155
Figure 2.5-3— {Site Area Topographic Map 5-Mile (8-Km) Radius} .....	2-1156
Figure 2.5-4— {Site Topographic Map 0.6-Mile (1-Km) Radius} .....	2-1157
Figure 2.5-5— {Regional Geologic Map 200-Mile (320-Km) Radius} .....	2-1158
Figure 2.5-6— {Regional Geologic Map 200-Mile (320-Km) Radius Explanation} .....	2-1159
Figure 2.5-7— {Physiographic Map of Maryland} .....	2-1160
Figure 2.5-8— {Evolution of the Appalachian Orogen} .....	2-1161
Figure 2.5-9— {General Technostratigraphic Terrane Map 200-mile (320 km) Radius (modified from Horton 1991)} .....	2-1162
Figure 2.5-10— {Map of Mesozoic Basins} .....	2-1163
Figure 2.5-11— {Lithologies of Basement Rocks from Coastal Plain Wells} .....	2-1164
Figure 2.5-12— {Tectonic Features of the Mid-Atlantic Passive Margin} .....	2-1165
Figure 2.5-13— {Stratigraphic Cross-Section Through Anne Arundel, Calvert and St. Mary's Counties} .....	2-1166
Figure 2.5-14— {Structure-Contour Map of the Top of the Piney Point-Nanjemoy Aquifer} .....	2-1167
Figure 2.5-15— {Tectonic Age of Crust} .....	2-1168
Figure 2.5-16— {Regional Strip Maps Showing Tectonostratigraphic Divisions and Regional Cross-Section Lines} .....	2-1169

Figure 2.5-17— {Crustal-Scale Cross Section Through the Appalachian Orogen and Coastal Plain}	2-1170
Figure 2.5-18— {Crustal-Scale Cross Section Across the Mid-Atlantic Continental Shelf, Slope and Rise}	2-1171
Figure 2.5-19— {Crustal-Scale Cross Section of the Mid-Atlantic Passive Margin}	2-1172
Figure 2.5-20— {Regional Magnetic Anomaly Map}	2-1173
Figure 2.5-21— {Regional Gravity Anomaly Map}	2-1174
Figure 2.5-22— {Chesapeake Bay Region Magnetic Anomalies with Mesozoic Basins}	2-1175
Figure 2.5-23— {Late Proterozoic and Paleozoic Tectonic Features}	2-1176
Figure 2.5-24— {Seismic Zones and Seismicity in CEUS}	2-1177
Figure 2.5-25— {Map of Tertiary Tectonic Features}	2-1178
Figure 2.5-26— {LiDAR Data for Calvert and St. Mary’s Counties}	2-1179
Figure 2.5-27— {Site Vicinity Geologic Map 25-Mile (40-Km) Radius}	2-1180
Figure 2.5-28— {Site Vicinity Geologic Map 25-Mile (40-Km) Radius Unit Descriptions}	2-1181
Figure 2.5-29— {Map of Seismic Lines (A) and Channels (B)}	2-1182
Figure 2.5-30— {Location Map (A) and Cross Section (B) of Calvert Cliffs, Maryland}	2-1183
Figure 2.5-31— {Potential Quaternary Features in the Site Region}	2-1184
Figure 2.5-32— {Site Area Geologic Map 5-Mile (8-Km) Radius}	2-1185
Figure 2.5-33— {Site Area Geologic Cross Sections A-A’ and B-B’ 5-Mile (8-Km) Radius}	2-1186
Figure 2.5-34— {Site Geologic Map 0.6-mi (1-km) Radius}	2-1187
Figure 2.5-35— {Boring Location Map CCNPP 3 from 2007 Drilling Program}	2-1188
Figure 2.5-36— {CCNPP Site Specific Stratigraphic Column}	2-1189
Figure 2.5-37— {Boring B-301, Caliper, Natural Gamma, Resistivity and SP Logs}	2-1190
Figure 2.5-38— {Boring B-401, Caliper, Natural Gamma, Resistivity and SP Logs}	2-1191
Figure 2.5-39— {Subsurface Profile E-E’}	2-1192
Figure 2.5-40— {Cross Section}	2-1193
Figure 2.5-41— {Geologic Section C-C’}	2-1194
Figure 2.5-42— {Geologic Section D-D’}	2-1195
Figure 2.5-43— {Subsurface Profile E-E’}	2-1196
Figure 2.5-44— {View of Calvert Cliffs Toward the Southwest from the Barge}	2-1197
Figure 2.5-45— {Bechtel Group EPRI Source Zones}	2-1198
Figure 2.5-46— {Dames & Moore EPRI Source Zones}	2-1199
Figure 2.5-47— {Law Engineering EPRI Source Zones}	2-1200
Figure 2.5-48— {Rondout EPRI Source Zones}	2-1201
Figure 2.5-49— {Weston Geophysical EPRI Source Zones}	2-1202
Figure 2.5-50— {Woodward-Clyde Consultants EPRI Source Zones}	2-1203
Figure 2.5-51— {Various EPRI Geometries of the Central Virginia Seismic Zone}	2-1204
Figure 2.5-52— {Seismic Zones and Seismicity in CEUS}	2-1205
Figure 2.5-53— {USGS Model}	2-1206
Figure 2.5-54— {SC DOT Model}	2-1207
Figure 2.5-55— {EPRI (NP-6452-D 1989) EST’s Charleston Map}	2-1208
Figure 2.5-56— {UCSS Map}	2-1209
Figure 2.5-57— {Regional Charleston Tectonic Features}	2-1210
Figure 2.5-58— {Local Charleston Tectonic Features}	2-1211
Figure 2.5-59— {Updated Charleston Seismic Source (UCSS) Logic Tree with Weights for Each Branch Shown in Italics}	2-1212
Figure 2.5-60— {Map of ZRA-S}	2-1213
Figure 2.5-61— {Region Surrounding CCNPP Unit 3 Site Showing Rondout Source 29, A 200 km Square Background, A 400 km Square Background, and Historical Earthquakes}	2-1214

Figure 2.5-62— {Comparison of Seismicity Rate for 200 km Square Background Surrounding CCNPP Unit 3 Site, Using EPRI-SOG Earthquake Catalog and Using Earthquake Catalog Updated Through 2005} .....	2-1215
Figure 2.5-63— {Comparison of Seismicity Rate for 400 km Square Background Surrounding CCNPP Unit 3 Site, Using EPRI-SOG Earthquake Catalog and Using the Earthquake Catalog Updated Through 2005} .....	2-1216
Figure 2.5-64— {Comparison of Seismicity Rate for Rondout Source 29, Using EPRI SOG Earthquake Catalog and Using Earthquake Catalog Updated Through 2005} .....	2-1217
Figure 2.5-65— {Uniform Hazard Spectra for Rock Conditions at Seven Structural Frequencies for which Ground Motion Equations are Available} .....	2-1218
Figure 2.5-66— {Mean $10^{-4}$ Rock Deaggregation for 1 and 2.5Hz} .....	2-1219
Figure 2.5-67— {Mean $10^{-4}$ Rock Deaggregation for 5 and 10 Hz} .....	2-1220
Figure 2.5-68— {Mean $10^{-5}$ Rock Deaggregation for 1 and 2.5 Hz} .....	2-1221
Figure 2.5-69— {Mean $10^{-5}$ Rock Deaggregation for 5 and 10 Hz} .....	2-1222
Figure 2.5-70— { $10^{-4}$ Rock UHS Values and Smooth Spectra Fit to HF and LF Spectral Shapes} .....	2-1223
Figure 2.5-71— { $10^{-5}$ Rock UHS Values and Smooth Spectra Fit to HF and LF Spectral Shapes} .....	2-1224
Figure 2.5-72— {Shear Wave Velocity ( $V_s$ ) and Its Logarithmic Standard Deviation for the Top 140 m} .....	2-1225
Figure 2.5-73— {Shear-Wave Velocity ( $V_s$ ) and Its Logarithmic Standard Deviation, Used for depths from 140 m to 800 m Using Data From Chester and Lexington Park Wells} .....	2-1226
Figure 2.5-74— {Shear-Wave Velocity ( $V_s$ ) vs Depth or Profiles 1 through 10} .....	2-1227
Figure 2.5-75— {Median (Mean of Logarithmic Values) $\pm$ Standard Deviation ( $\sigma$ of Log Values) of Shear Wave Velocity ( $V_s$ ) vs Depth for All 60 Profiles (Thin Solid and Dashed Lines, Compared to Median $V_s$ Profile (red)) .....	2-1228
Figure 2.5-76— { $G/G_{max}$ Curves Representing Uncertainty in Shear Stiffness for Soil Type 2 (Chesapeake Clay/Silt)} .....	2-1229
Figure 2.5-77— {Damping Curves Representing Uncertainty in Shear Stiffness for Soil Type 2 (Chesapeake Clay/Silt)} .....	2-1230
Figure 2.5-78— {Logarithmic Mean Site Amplification Factor and Standard Deviation at the Top of a Soil Column with no Backfill for $10^{-4}$ HF Input Motion} .....	2-1231
Figure 2.5-79— {Maximum Strains vs. Depth for $10^{-4}$ HF Input Motion} .....	2-1232
Figure 2.5-80— {Logarithmic Mean Site Amplification Factor and Standard Deviation at the Top of a Soil Column with no Backfill for $10^{-4}$ LF Input Motion} .....	2-1233
Figure 2.5-81— {Maximum Strains vs. Depth for $10^{-4}$ LF Input Motion} .....	2-1234
Figure 2.5-82— {Logarithmic Mean Site Amplification Factor and Standard Deviation at the Top of a Soil Column with no Backfill for $10^{-5}$ HF Input Motion} .....	2-1235
Figure 2.5-83— {Maximum Strains vs. Depth for $10^{-5}$ HF Input Motion} .....	2-1236
Figure 2.5-84— {Logarithmic Mean Site Amplification Factor and Standard Deviation at the Top of a Soil Column with no Backfill for $10^{-5}$ LF Input Motion} .....	2-1237
Figure 2.5-85— {Maximum Strains vs Depth for $10^{-5}$ LF Input Motion} .....	2-1238
Figure 2.5-86— {HF and LF Spectra and Envelopes for $10^{-4}$ and $10^{-5}$ } .....	2-1239
Figure 2.5-87— {Recommended Horizontal and Vertical GMRS} .....	2-1240
Figure 2.5-88— {V/H Ratios from Several Publications and Recommended V/H Ratios} .....	2-1241
Figure 2.5-89— {Mean Seismic Hazard by Source for Rondout Team, 10 Hz Spectral Acceleration} ...	2-1242
Figure 2.5-90— {Mean $10^{-6}$ Deaggregation Plot for 5 and 10 Hz} .....	2-1243
Figure 2.5-91— {Mean Seismic Hazard by Source for Rondout Team, 10 Hz Spectral Acceleration} ...	2-1244
Figure 2.5-92— {Mean Seismic Hazard by Source for Rondout Team, 1 Hz Spectral Acceleration} ....	2-1245
Figure 2.5-93— {Median Seismic Hazard by Source for Rondout Team, 10 Hz Spectral Acceleration} .....	2-1246
Figure 2.5-94— {Median Seismic Hazard by Source for Rondout Team, 1 Hz Spectral Acceleration} ...	2-1247
Figure 2.5-95— {Mean and Fractile Rock Hazard Curves for PGA} .....	2-1248



Figure 2.5-96— {Mean and Fractile Rock Hazard Curves for 25 Hz} .....	2-1249
Figure 2.5-97— {Mean and Fractile Rock Hazard Curves for 10 Hz} .....	2-1250
Figure 2.5-98— {Mean and Fractile Rock Hazard Curves for 5 Hz} .....	2-1251
Figure 2.5-99— {Mean and Fractile Rock Hazard Curves for 2.5 Hz} .....	2-1252
Figure 2.5-100— {Mean and Fractile Rock Hazard Curves for 1 Hz} .....	2-1253
Figure 2.5-101— {Mean and Fractile Rock Hazard Curves for 0.5 Hz} .....	2-1254
Figure 2.5-102— {CCNPP Unit 3 10 Generic Soil Profiles} .....	2-1255
Figure 2.5-103— {Site Utilization Plan with Boring Locations} .....	2-1256
Figure 2.5-104— {Powerblock Area Profile Locations} .....	2-1257
Figure 2.5-105— {Intake Area Profile Location} .....	2-1258
Figure 2.5-106— {Generalized CCNPP Soil Column} .....	2-1259
Figure 2.5-107— {Subsurface Profile A-A'} .....	2-1260
Figure 2.5-108— {Subsurface Profile B-B'} .....	2-1261
Figure 2.5-109— {Subsurface Profile C-C'} .....	2-1262
Figure 2.5-110— {Subsurface Profile D-D'} .....	2-1263
Figure 2.5-111— {Subsurface Profile E-E'} .....	2-1264
Figure 2.5-112— {Subsurface Profile F-F'} .....	2-1265
Figure 2.5-113— {SPT Data for Powerblock Area} .....	2-1266
Figure 2.5-114— {SPT Data for Intake Area} .....	2-1267
Figure 2.5-115— {CPT Tip Resistance, Powerblock Area} .....	2-1268
Figure 2.5-116— {CPT Tip Resistance, Intake Area} .....	2-1269
Figure 2.5-117— {V <sub>p</sub> Measurements from Suspension P-S Velocity Logging} .....	2-1270
Figure 2.5-118— {V <sub>s</sub> Measurements from Suspension P-S Velocity Logging} .....	2-1271
Figure 2.5-119— {PS Logging Test at Intake Area B-773} .....	2-1272
Figure 2.5-120— {Uphole Seismic Survey Results from CCNPP Units 1 and 2 UFSAR} .....	2-1273
Figure 2.5-121— {Pressuremeter Data} .....	2-1274
Figure 2.5-122— {Moisture Content and Atterberg Limits, Powerblock Area} .....	2-1275
Figure 2.5-123— {Moisture Content and Atterberg Limits, Intake Area} .....	2-1276
Figure 2.5-124— {Plasticity Chart, Powerblock Area} .....	2-1277
Figure 2.5-125— {Plasticity Chart, Intake Area} .....	2-1278
Figure 2.5-126— {RCTS Testing Sample B-437-6, Powerblock Area} .....	2-1279
Figure 2.5-127— {RCTS Testing Sample B-301-10, Powerblock Area} .....	2-1280
Figure 2.5-128— {RCTS Testing Sample B-305-17, Powerblock Area} .....	2-1281
Figure 2.5-129— {RCTS Testing Sample B-404-14, Powerblock Area} .....	2-1282
Figure 2.5-130— {RCTS Testing Sample B-401-31, Powerblock Area} .....	2-1283
Figure 2.5-131— {RCTS Testing Sample B-401-67, Powerblock Area} .....	2-1284
Figure 2.5-132— {RCTS Testing Sample B-401-48, Powerblock Area} .....	2-1285
Figure 2.5-133— {RCTS Testing Sample B-301-78, Powerblock Area} .....	2-1286
Figure 2.5-134— {RCTS Testing Sample B-306-17, Powerblock Area} .....	2-1287
Figure 2.5-135— {RCTS Testing Sample B-409-15, Powerblock Area} .....	2-1288
Figure 2.5-136— {RCTS Testing Sample B-404-22, Powerblock Area} .....	2-1289
Figure 2.5-137— {RCTS Testing Sample B-401-42, Powerblock Area} .....	2-1290
Figure 2.5-138— {RCTS Testing Sample B-409-39, Powerblock Area} .....	2-1291
Figure 2.5-139— {RCTS Testing Sample B-773-2, Intake Area} .....	2-1292
Figure 2.5-140— {RCTS Testing Sample B-773-3, Intake Area} .....	2-1293
Figure 2.5-141— {RCTS Testing Sample B-773-4, Intake Area} .....	2-1294
Figure 2.5-142— {RCTS Testing Sample B-773-5, Intake Area} .....	2-1295
Figure 2.5-143— {RCTS Testing Sample B-773-6, Intake Area} .....	2-1296
Figure 2.5-144— {RCTS Testing Sample B-773-7, Intake Area} .....	2-1297
Figure 2.5-145— {RCTS Testing Sample B-773-9, Intake Area} .....	2-1298
Figure 2.5-146— {RCTS Testing Sample B-773-11, Intake Area} .....	2-1299

Figure 2.5-147— {RCTS Testing Sample B-773-13, Intake Area} .....	2-1300
Figure 2.5-148— {RCTS Testing Sample B-773-15, Intake Area} .....	2-1301
Figure 2.5-149— {RCTS Testing Sample CR6 Blend, Backfill} .....	2-1302
Figure 2.5-150— {RCTS Testing Sample GAB Blend, Backfill} .....	2-1303
Figure 2.5-151— {RCTS Testing Sample CR6 Vulcan Average, Backfill} .....	2-1304
Figure 2.5-152— {Proximity of Chester and Lexington Park Sites to CCNPP} .....	2-1305
Figure 2.5-153— {Shear Wave Velocity Based on Chester (Kent Island) Measurements} .....	2-1306
Figure 2.5-154— {Shear Wave Velocity Based on Lexington Park Measurements} .....	2-1307
Figure 2.5-155— {Smoothed and Averaged $V_s$ Log for Chester and Lexington Park Measurements}	
.....	2-1308
Figure 2.5-156— {Average $V_s$ , Chester, Lexington Park, Maryland and Deep Measurements in Coastal Plain Soils} .....	2-1309
Figure 2.5-157— {Bedrock $V_s$ Log for Chester (Kent Island), Maryland} .....	2-1310
Figure 2.5-158— {Bedrock $V_s$ Log for Lexington Park, Maryland} .....	2-1311
Figure 2.5-159— {Interpretation of Bedrock Velocity Gradient for Chester Measurement} .....	2-1312
Figure 2.5-160— {Excavation Profile AA', Powerblock Area} .....	2-1313
Figure 2.5-161— {Excavation Profile BB', Powerblock Area} .....	2-1314
Figure 2.5-162— {Excavation Profile CC', Powerblock Area} .....	2-1315
Figure 2.5-163— {Excavation Profile DD', Powerblock Area} .....	2-1316
Figure 2.5-164— {Excavation Profile EE', Powerblock Area} .....	2-1317
Figure 2.5-165— {Excavation Profile FF, Intake Area} .....	2-1318
Figure 2.5-166— {Best Estimate Velocity Profiles, In-Situ condition, Powerblock Area} .....	2-1319
Figure 2.5-167— {Best Estimate Velocity Profiles with Fill Placement, Powerblock Area} .....	2-1320
Figure 2.5-168— {Best Estimate Velocity Profiles, In-Situ Condition, Intake Area} .....	2-1321
Figure 2.5-169— {Best Estimate Velocity Profiles with Fill Placement, Intake Area} .....	2-1322
Figure 2.5-170— {Strain Dependant Properties for Powerblock Area} .....	2-1323
Figure 2.5-171— {Strain Dependant Properties for Intake Area} .....	2-1324
Figure 2.5-172— {Strain Dependant Properties for Backfill} .....	2-1325
Figure 2.5-173— {Site Grading Plan} .....	2-1326
Figure 2.5-174— {Elevation Contours of Top of Stratum IIb Cemented Sand} .....	2-1327
Figure 2.5-175— {Topography in Powerblock Area} .....	2-1328
Figure 2.5-176— {FOS against Liquefaction Based on SPT Data, Powerblock} .....	2-1329
Figure 2.5-177— {FOS against Liquefaction Based on SPT Data, Intake Area} .....	2-1330
Figure 2.5-178— {FOS against Liquefaction Based on $V_s$ Data, Powerblock} .....	2-1331
Figure 2.5-179— {FOS against Liquefaction Based on $V_s$ Data, Intake Area} .....	2-1332
Figure 2.5-180— {FOS against liquefaction based on CPT Data, Powerblock Area} .....	2-1333
Figure 2.5-181— {FOS against liquefaction based on CPT Data, Intake Area} .....	2-1334
Figure 2.5-182— {FOS against Liquefaction for Backfill, Powerblock Area} .....	2-1335
Figure 2.5-183— {Building Areas, Loads, and Foundation Elevation} .....	2-1336
Figure 2.5-184— {PLAXIS 3D Subsurface Representation} .....	2-1337
Figure 2.5-185— {Subdivision of ED Model to Account for Variable Surface Topography} .....	2-1338
Figure 2.5-186— {Heave After Excavation} .....	2-1339
Figure 2.5-187— {Building Load Construction Sequence} .....	2-1340
Figure 2.5-188— {Surface Topography Plan and Cross Section} .....	2-1341
Figure 2.5-189— {Contour Plots of Incremental Settlements} .....	2-1342
Figure 2.5-190— {NI Settlement Estimate} .....	2-1343
Figure 2.5-191— {Settlement at Center Point of Safety Related Buildings} .....	2-1344
Figure 2.5-192— {Settlement Tracking Cross Sections} .....	2-1345
Figure 2.5-193— {Foundation Settlement across NI and TB Footprint} .....	2-1346
Figure 2.5-194— {Settlement at Center of Facilities After Adjustment for Topography} .....	2-1347
Figure 2.5-195— {UHS FEM Model} .....	2-1348

Figure 2.5-196— {Earth Pressure Representative Diagrams} .....	2-1349
Figure 2.5-197— {Site Grading Plan with Slope Cross-Sections} .....	2-1350
Figure 2.5-198— {Cross-sections in Powerblock Area} .....	2-1351
Figure 2.5-199— {Cross-sections in Intake Area and Utility Corridor} .....	2-1352
Figure 2.5-200— {Location of Excavation Cross-sections in CCNPP Unit 3} .....	2-1353
Figure 2.5-201— {Excavation Cross-sections in CCNPP Unit 3} .....	2-1354
Figure 2.5-202— {Static and Pseudo-Static Stability Analyses of Slope Section A - Case a} .....	2-1355
Figure 2.5-203— {Static and Pseudo-Static Stability Analyses of Slope Section A - Case b} .....	2-1356
Figure 2.5-204— {Static and Pseudo-Static Stability Analyses of Slope Section B - Case a} .....	2-1357
Figure 2.5-205— {Static and Pseudo-Static Stability Analyses of Slope Section B - Case b} .....	2-1358
Figure 2.5-206— {Static and Pseudo-Static Stability Analyses of Slope Section C} .....	2-1359
Figure 2.5-207— {Static and Pseudo-Static Stability Analyses of Slope Section D} .....	2-1360
Figure 2.5-208— {Static and Pseudo-Static Stability Analyses of Slope Section E} .....	2-1361
Figure 2.5-209— {Static and Pseudo-Static Stability Analyses of Slope Section F (Utility Corridor)} .....	2-1362
Figure 2.5-210— {Static and Pseudo-Static Stability Analyses of Slope Section G (Intake Area)} .....	2-1363
Figure 2.5-211— {Outline of the Appalachian Orogen and its Major Subdivisions along the Eastern North American Continent} .....	2-1364
Figure 2.5-212— {Appalachian Orogen} .....	2-1365
Figure 2.5-213— {Laurentian-Margin Subdivision and other Tectonic Elements of the Southeast of the Blue Mountain Front} .....	2-1366
Figure 2.5-214— {Schematic Map Showing the Relative Positions of Exotic Terranes} .....	2-1367
Figure 2.5-215— {Rifts Formed during the Breakup of Rodinia} .....	2-1368
Figure 2.5-216— {Reconstruction of part of Rodinia at the end of the Neoproterozoic, showing the relative positions of Laurentia, Baltica, and West Gondwana} .....	2-1369
Figure 2.5-217— {Cross section of the carbonate shelf, shelf/slope/basin/transition, and proximal basin (Octorara seaway) during the Middle Ordovician, from Erie (NW) to the present Atlantic coaseline(SE)} .....	2-1370
Figure 2.5-218— {Brandywine Microcontinent} .....	2-1371
Figure 2.5-219— {Catskill clastic wedge Structure and Stratigraphy during the Acadian Orogeny} .....	2-1372
Figure 2.5-220— {Precambrian through Ordovician Regional Stratigraphy} .....	2-1373
Figure 2.5-221— {Legend for Figure 2.5-220 (Precambrian through Ordovician Regional Stratigraphy)} .....	2-1374
Figure 2.5-222— {Silurian through Permian Regional Stratigraphy} .....	2-1375
Figure 2.5-223— {Lower to Middle Mesozoic} .....	2-1376
Figure 2.5-224— {Upper Mesozoic to Cenozoic} .....	2-1377
Figure 2.5-225— {Surficial Geology of the Monmouth Junction Quadrangle, Somerset, Middlesex, and Mercer Counties, New Jersey, Open-File Map OFM 47, Department of Environmental Protection, New Jersey Geological Survey} .....	2-1378
Figure 2.5-226— {Map Legend for Surficial Geology of the Monmouth Junction Quadrangle, Somerset, Middlesex, and Mercer Counties, New Jersey, Open-File Map OFM 47, Department of Environmental Protection, New Jersey Geological Survey} .....	2-1379
Figure 2.5-227— {Ramapo Seismic Zone} .....	2-1380
Figure 2.5-228— {Ramapo Seismicity Cross Section} .....	2-1381
Figure 2.5-229— {Field and Aerial Reconnaissance Map for CCNPP Unit 3} .....	2-1382
Figure 2.5-230— {(A) Generalized Geological Map and (B) Schematic Cross Section of the Northern Chesapeake Bay} .....	2-1383
Figure 2.5-231— {Generalized Top-of-Basement Structure Contour Map of the Northern Chesapeake Bay} .....	2-1384
Figure 2.5-232— {LiDAR Elevation Showing Trace of Pazzaglia's Fault} .....	2-1385

Figure 2.5-233— {Seismic Reflection Line St. M-1 Showing Hillville Fault of Hansen (1978)} .....	2-1386
Figure 2.5-234— {Geologic Map of the Ramapo Fault and Vicinity with Seismicity} .....	2-1387
Figure 2.5-235— {Geologic Map of Kingston Fault} .....	2-1388
Figure 2.5-236— {Explanation of Map Units and Cross Section A- A' for the Geologic Map of the Kingston Fault} .....	2-1389
Figure 2.5-237— {Selection of Shear Modulus and Damping Ratios for Soils Deeper than 400 Feet} .....	2-1390
Figure 2.5-238— {Calculated Maximum Strains Based on Initially Adopted EPRI Curves} .....	2-1391
Figure 2.5-239— {Settlement Monitoring Instrumentation in the Powerblock Area} .....	2-1392
Figure 2.5-240— {Settlement Monitoring Instrumentation at the Intake Area} .....	2-1393
Figure 3.7-1— {CCNPP Unit 3 Site SSE Spectrum (0.15g PGA), 5% damping} .....	3-82
Figure 3.7-2— {CCNPP Unit 3 GMRS (Horizontal) and CCNPP Unit 3 Site SSE Spectrum, 5% damping} .....	3-83
Figure 3.7-3— {CCNPP Unit 3 GMRS (Vertical) and CCNPP Unit 3 Site SSE Spectrum, 5% damping} .....	3-84
Figure 3.7-4— {CCNPP Unit 3 GMRS and EUR (Horizontal) for the Nuclear Island Common Basemat Structures} .....	3-85
Figure 3.7-5— {CCNPP Unit 3 GMRS and EUR CSDRS (Vertical) for the Nuclear Island Common Basemat Structures} .....	3-86
Figure 3.7-6— {CCNPP Unit 3 Site SSE, Site OBE and EUR CSDRS} .....	3-87
Figure 3.7-7— {Comparison of CSDRS, Site SSE and Horizontal RG 1.60 scaled to 0.10 g to Adjusted FIRS for ESWB and EPGB} .....	3-88
Figure 3.7-8— {Comparison of Site SSE and Horizontal RG 1.60 scaled to 0.10 g to Adjusted FIRS for ESWB and EPGB} .....	3-89
Figure 3.7-9— {Comparison of Site SSE and Horizontal RG 1.60 scaled to 0.10 g to Adjusted FIRS for CBIS} .....	3-90
Figure 3.7-10— {Site SSE Spectrum Compatible Acceleration, Velocity, and Displacement Time Histories for Horizontal Component S1} .....	3-91
Figure 3.7-11— {Site SSE Spectrum Compatible Acceleration, Velocity, and Displacement Time Histories for Horizontal Component S2} .....	3-92
Figure 3.7-12— {Site SSE Spectrum Compatible Acceleration, Velocity, and Displacement Time Histories for Vertical Component S3} .....	3-93
Figure 3.7-13— {SSI "Within" Acceleration Time Histories for Input at ESWB Foundation (LB Soil Case) NI Area (22 ft Depth)} .....	3-94
Figure 3.7-14— {SSI "Within" Acceleration Time Histories for Input at ESWB Foundation (BE Soil Case)- NI Area (22 ft Depth)} .....	3-95
Figure 3.7-15— {Safeguard Building 1, Elev. 8.1 m, Y(N-S) Direction, 5% Damping}{SSI "Within" Acceleration Time Histories for Input at ESWB Foundation (UB Soil Case)- NI Area (22 ft Depth)} .....	3-96
Figure 3.7-16— {SSI "Within" Acceleration Time Histories for Input at CBIS Foundation (LB Soil Case)- Intake Area (37.5 ft Depth)} .....	3-97
Figure 3.7-17— {SSI "Within" Acceleration Time Histories for Input at CBIS Foundation (BE Soil Case)- Intake Area (37.5 ft Depth)} .....	3-98
Figure 3.7-18— {SSI "Within" Acceleration Time Histories for Input at CBIS Foundation (UB Soil Case)- Intake Area (37.5 ft Depth)} .....	3-99
Figure 3.7-19— {CCNPP Unit 3 Strain-Compatible Soil Profiles for NI Common Basemat Structures} .....	3-100
Figure 3.7-20— {EPR DC Soil Cases vs. CCNPP Unit 3 Soil Cases for SSI Analysis} .....	3-101
Figure 3.7-21— {CCNPP Unit 3 Strain-Compatible profiles at the NI Area for EPGB and ESWB} .....	3-102
Figure 3.7-22— {CCNPP Unit 3 Strain-Compatible profiles at the Intake Area for CBIS} .....	3-103
Figure 3.7-23— {Isometric View of the Common Basemat Intake Structures} .....	3-104

Figure 3.7-24— {Soil-Structure Interaction (SSI) model for the Common Basemat Intake Structures (Elevations and plant coordinate system refer to CCNPP Unit 3)} .....	3-105
Figure 3.7-25— {Reactor Bldg Internal Structure, Elev. 5.15m, X(E-W) Direction, 5% Damping} .....	3-106
Figure 3.7-26— {Reactor Bldg Internal Structure, Elev. 5.15m, Y(N-S) Direction, 5% Damping} .....	3-107
Figure 3.7-27— {Reactor Bldg Internal Structure, Elev. 5.15m, Z(Vert) Direction, 5% Damping} .....	3-108
Figure 3.7-28— {Reactor Bldg Internal Structure, Elev. 19.5m, X(E-W) Direction, 5% Damping} .....	3-109
Figure 3.7-29— {Reactor Bldg Internal Structure, Elev. 19.5 m, Y(N-S) Direction, 5% Damping} .....	3-110
Figure 3.7-30— {Reactor Bldg Internal Structure, Elev. 19.5 m, Z(Vert) Direction, 5% Damping} .....	3-111
Figure 3.7-31— {Safeguard Building 1, Elev. 8.1m, X(E-W) Direction, 5% Damping} .....	3-112
Figure 3.7-32— {Safeguard Building 1, Elev. 8.1m, Y(N-S) Direction, 5% Damping} .....	3-113
Figure 3.7-33— {Safeguard Building 1, Elev. 8.1m, Z(Vert) Direction, 5% Damping} .....	3-114
Figure 3.7-34— {Safeguard Building 1, Elev. 21.0 m, X(E-W) Direction, 5% Damping} .....	3-115
Figure 3.7-35— {Safeguard Building 1, Elev. 21.0 m, Y(N-S) Direction, 5% Damping} .....	3-116
Figure 3.7-36— {Safeguard Building 1, Elev. 21.0 m, Z(Vert) Direction, 5% Damping} .....	3-117
Figure 3.7-37— {Safeguard Building 2/3, Elev. 8.1m, X(E-W) Direction, 5% Damping} .....	3-118
Figure 3.7-38— {Safegurd Building 2/3, Elev. 8.1m, Y(N-S) Direction, 5% Damping} .....	3-119
Figure 3.7-39— {Safeguard Building 2/3, Elev. 8.1m, Z(Vert) Direction, 5% Damping} .....	3-120
Figure 3.7-40— {Safeguard Building 2/3, Elev. 15.4 m, X(E-W) Direction, 5% Damping} .....	3-121
Figure 3.7-41— {Safeguard Building 2/3, Elev. 15.4 m, Y(N-S) Direction, 5% Damping} .....	3-122
Figure 3.7-42— {Safeguard Building 2/3, Elev. 15.4 m, Z(Vert) Direction, 5% Damping} .....	3-123
Figure 3.7-43— {Safeguard Building 4, Elev. 21.0 m, X(E-W) Direction, 5% Damping} .....	3-124
Figure 3.7-44— {Safeguard Building 4, Elev. 21.0m, Y(N-S) Direction, 5% Damping} .....	3-125
Figure 3.7-45— {Safeguard Building 4, Elev. 21.0m, Z(Vert) Direction, 5% Damping} .....	3-126
Figure 3.7-46— {Containment Building, Elev. 37.6 m, X(E-W) Direction, 5% Damping} .....	3-127
Figure 3.7-47— {Containment Building, Elev. 37.6m, Y(N-S) Direction, 5% Damping} .....	3-128
Figure 3.7-48— {Containment Building, Elev. 37.6 m, Z(Vert) Direction, 5% Damping} .....	3-129
Figure 3.7-49— {Containment Building, Elev. 58.0 m, X(E-W) Direction, 5% Damping} .....	3-130
Figure 3.7-50— {Containment Building, Elev. 58.0 m, Y(N-S) Direction, 5% Damping} .....	3-131
Figure 3.7-51— {Containment Building, Elev. 58.0 m, Z(Vert) Direction, 5% Damping} .....	3-132
Figure 3.7-52— {CCNPP Unit 3 NAB Basemat X(E-W) Direction Spectra (5% Damping)} .....	3-133
Figure 3.7-53— {CCNPP Unit 3 NAB Basemat Y(N-S) Direction Spectra (5% Damping)} .....	3-134
Figure 3.7-54— {CCNPP Unit 3 NAB Basemat Z(Vert) Direction Spectra (5% Damping)} .....	3-135
Figure 3.7-55— {Design Certification NAB Basemat X(E-W) Direction Spectra (5% Damping)} .....	3-136
Figure 3.7-56— {Design Certification NAB Basemat Y(N-S) Direction Spectra (5% Damping)} .....	3-137
Figure 3.7-57— {Design Certification NAB Basemat Z(Vert) Direction Spectra (5% Damping)} .....	3-138
Figure 3.7-58— {CCNPP Unit 3 Radioactive Waste Processing Building Basemat X-Direction Spectra (5% Damping)} .....	3-139
Figure 3.7-59— {CCNPP Unit 3 Radioactive Waste Processing Building Basemat Y-Direction Spectra (5% Damping)} .....	3-140
Figure 3.7-60— {CCNPP Unit 3 Radioactive Waste Processing Building Basemat Z-Direction Spectra (5% Damping)} .....	3-141
Figure 3.7-61— {Design Certification Radioactive Waste Processing Building Basemat X-Direction Spectra (5% Damping)} .....	3-142
Figure 3.7-62— {Design Certification Radioactive Waste Processing Building Basemat Y-Direction Spectra (5% Damping)} .....	3-143
Figure 3.7-63— {Design Certification Radioactive Waste Processing Building Basemat Z-Direction Spectra (5% Damping)} .....	3-144
Figure 3.7-64— {Emergency Power Generating Building (EPGB), Elev. 0.0 ft (0.0 m), X (E-W) Direction ISRS, 5% Damping. Elevations and plant coordinate system refer to U.S EPR FSAR.} .....	3-145

Figure 3.7-65— {Emergency Power Generating Building (EPGB), Elev. 0.0 ft (0.0 m), Y (N-S) Direction ISRS, 5% Damping. Elevations and plant coordinate system refer to U.S EPR FSAR.}	3-146
Figure 3.7-66— {Emergency Power Generating Building (EPGB), Elev. 0.0 ft (0.0 m), Z (Vert) Direction Spectra, 5% Damping. Elevations and plant coordinate system refer to U.S EPR FSAR.}	3-147
Figure 3.7-67— {Essential Service Water Building (ESWB), Elev. 63.0 ft (19.2 m), X (N-S) Direction Spectra, 5% Damping. Elevations and plant coordinate system refer to U.S EPR FSAR.}	3-148
Figure 3.7-68— {Essential Service Water Building (ESWB), Elev. 63.0 ft (19.2 m), Y (E-W) Direction Spectra, 5% Damping. Elevations and plant coordinate system refer to U.S EPR FSAR.}	3-149
Figure 3.7-69— {Essential Service Water Building (ESWB), Elev. 63.0 ft (19.2 m), Z (Vert) Direction Spectra, 5% Damping. Elevations and plant coordinate system refer to U.S EPR FSAR.}	3-150
Figure 3.7-70— {Essential Service Water Building (ESWB), Elev. 14.0 ft (4.3 m), X (N-S) Direction Spectra, 5% Damping. Elevations and plant coordinate system refer to U.S EPR FSAR.}	3-151
Figure 3.7-71— {Essential Service Water Building (ESWB), Elev. 14.0 ft (4.3 m), Y (E-W) Direction Spectra, 5% Damping. Elevations and plant coordinate system refer to U.S EPR FSAR.}	3-152
Figure 3.7-72— {Essential Service Water Building (ESWB), Elev. 14.0 ft (4.3 m), Z (Vert) Direction Spectra, 5% Damping. Elevations and plant coordinate system refer to U.S EPR FSAR.}	3-153
Figure 3.7-73— {ISRS for UHS Makeup Water Intake Structure at location at Elev. -22.5 ft (-6.86 m), North-South Direction. Elevations and plant coordinate system refer to CCNPP Unit 3} .....	3-154
Figure 3.7-74— {ISRS for UHS Makeup Water Intake Structure at Elev. -22.5 ft (-6.86 m), East-West Direction. Elevations and plant coordinate system refer to CCNPP Unit 3.} .....	3-155
Figure 3.7-75— {ISRS for UHS Makeup Water Intake Structure at Elev. -22.5 ft (-6.86 m), Vertical Direction. Elevations and plant coordinate system refer to CCNPP Unit 3} .....	3-156
Figure 3.7-76— {ISRS for Makeup Water Intake Structure at Elev. 11.5 ft (3.5 m), North-South Direction. Elevations and plant coordinate system refer to CCNPP Unit 3.} .....	3-157
Figure 3.7-77— {ISRS for Makeup Water Intake Structure at Elev. 11.5 ft (3.5 m), East-West Direction. Elevations and plant coordinate system refer to CCNPP Unit 3} .....	3-158
Figure 3.7-78— {ISRS for Makeup Water Intake Structure at Elev. 11.5 ft (3.5 m), Vertical Direction. Elevations and plant coordinate system refer to CCNPP Unit 3} .....	3-159
Figure 3.7-79— {ISRS for Makeup Water Intake Structure at Elev. 26.5 ft (8.08 m), North-South Direction. Elevations and plant coordinate system refer to CCNPP Unit 3} .....	3-160
Figure 3.7-80— {ISRS for Makeup Water Intake Structure at Elev. 26.5 ft (8.08 m), East-West Direction. Elevations and plant coordinate system refer to CCNPP Unit 3} .....	3-161
Figure 3.7-81— {ISRS for Makeup Water Intake Structure at Elev. 26.5 ft (8.08 m), Vertical Direction. Elevations and plant coordinate system refer to CCNPP Unit 3} .....	3-162
Figure 3.8-1— {Schematic Site Plan of Seismic Category I Buried Utilities (Electrical Duct Banks)} .....	3-194
Figure 3.8-2— {Schematic Site Plan of Seismic Category I Buried Utilities at the NI (Electrical Duct Banks)} .....	3-195
Figure 3.8-3— {Schematic Site Plan of Seismic Category I Buried Utilities (Underground Piping)} .....	3-196
Figure 3.8-4— {Schematic Site Plan of Seismic Category I Buried Utilities (Underground Piping)} .....	3-197
Figure 3.8-5— {Isometric View of the Basemat Finite Element Mesh (STAAD Pro Static Analysis Model) for the CWS Makeup Water Intake Structure, Forebay and UHS Makeup Water Intake Structure} .....	3-198

Figure 3.8-6— {Conceptual Configuration of Waterproofing Membrane} .....	3-199
Figure 3E-1— {Foundation Plan for the Forebay and UHS Makeup Water Intake Structure @ Elevation -22.5 ft (-6.86 m)} .....	3-15
Figure 3E-2— {Reinforcement for Forebay and UHS Makeup Water Intake Structure Basemat} .....	3-16
Figure 3E-3— {Reinforcement for Forebay and UHS Makeup Water Intake Structure Walls - UHS Makeup Water Intake Structure Side Wall (Section B)} .....	3-17
Figure 3E-4— {Reinforcement for Forebay and UHS Makeup Water Intake Structure Walls - Forebay Long Wall (Section C)} .....	3-18
Figure 3E-5— {Isometric View of the Common Basemat Intake Structures STAAD Pro Model for Static Analyses} .....	3-19
Figure 3F-1— {Low-Strain Shear Wave Velocity Profile at the NI Area} .....	3-26
Figure 3F-2— {Low-Strain Shear Wave Velocity Profile at the Intake Area} .....	3-27
Figure 3F-3— {Log-Standard Deviation for Low-Strain Shear Wave Velocity Profile at the NI Area} .....	3-28
Figure 3F-4— {Log-Standard Deviation for Low-Strain Shear Wave Velocity Profile at the Intake Area} .....	3-29
Figure 3F-5— {Shear Wave Velocity for 60 Simulated Profiles – NI Area (Halfspace at first occurrence of $V_s = 9200$ ft/sec)} .....	3-30
Figure 3F-6— {Shear Wave Velocity for 60 Simulated Profiles – Intake Area (Halfspace at first occurrence of $V_s = 9200$ ft/sec)} .....	3-31
Figure 3F-7— {Fill 1 Shear Modulus Reduction Curves for 60 Simulated Profiles – NI Area} .....	3-32
Figure 3F-8— {Fill 1 Damping Ratio Curves for 60 Simulated Profiles – NI Area} .....	3-33
Figure 3F-9— {5% Damping ARS Amplification Functions at 22 ft Depth – NI Area} .....	3-34
Figure 3F-10— {Log-Mean Strain Profiles - NI Area} .....	3-35
Figure 3F-11— {Log-Mean Strain Profiles - Intake Area} .....	3-36
Figure 3F-12— {5% Damping Horizontal and Vertical FIRS – NI Area} .....	3-37
Figure 3F-13— {5% Damping Horizontal and Vertical FIRS – Intake Area} .....	3-38
Figure 3F-14— {Shear-Wave Velocity Profiles Strain-Compatible with FIRS for the NI Area} .....	3-39
Figure 3F-15— {Damping Profiles Strain-Compatible with FIRS for the NI Area} .....	3-40
Figure 3F-16— {FIRS P-Wave Velocity Profiles for the NI Area} .....	3-41
Figure 3F-17— {Shear-Wave Velocity Profiles Strain-Compatible with FIRS for the Intake Area} .....	3-42
Figure 3F-18— {Damping Profiles Strain-Compatible with FIRS for the Intake Area} .....	3-43
Figure 3F-19— {FIRS P-Wave Velocity Profiles for the Intake Area} .....	3-44
Figure 3F-20— {NEI Check for Horizontal FIRS at 37.5 ft Depth at the Intake Area} .....	3-45
Figure 3F-21— {NEI Check for Vertical FIRS at 37.5 ft Depth at the Intake Area} .....	3-46
Figure 3F-22— {Envelope Horizontal Smooth Adjusted FIRS – EPGB and ESWB (No Adjustment Necessary for FIRS at 22 ft Depth)} .....	3-47
Figure 3F-23— {Envelope Vertical Smooth Adjusted FIRS – EPGB and ESWB (No Adjustment Necessary for FIRS at 22 ft Depth)} .....	3-48
Figure 3F-24— {Envelope Horizontal Smooth Adjusted FIRS – Intake Area} .....	3-49
Figure 3F-25— {Envelope Vertical Smooth Adjusted FIRS – Intake Area} .....	3-50
Figure 3F-26— {SSSI Effect 5% Damping ARS Amplification Functions for EPGB and ESWB} .....	3-51
Figure 3F-27— {Site SSE Comparison with Adjusted FIRS (including NI SSSI Effects) and RG 1.60 – EPGB and ESWB} .....	3-52
Figure 3F-28— {Site SSE Comparison with Adjusted FIRS and RG 1.60 – Intake Area} .....	3-53
Figure 3F-29— {Shear Wave Velocity Profiles Strain-Compatible with Site SSE for the NI Area} .....	3-54
Figure 3F-30— {Damping Profiles Strain-Compatible with Site SSE for the NI Area} .....	3-55
Figure 3F-31— {Site SSE P-Wave Velocity Profiles for the NI Area} .....	3-56
Figure 3F-32— {Shear Wave Velocity Profiles Strain-Compatible with Site SSE for the Intake Area} .....	3-57
Figure 3F-33— {Damping Profiles Strain-Compatible with Site SSE for the Intake Area} .....	3-58

Figure 3F-34— {Site SSE P-Wave Velocity Profiles for the Intake Area} .....	3-59
Figure 3F-35— {SSI "Within" Acceleration Time Histories for Input at ESWB Foundation (LB Soil Case) – NI Area (22 ft Depth) } .....	3-60
Figure 3F-36— {SSI "Within" Acceleration Time Histories for Input at ESWB Foundation (BE Soil Case) – NI Area (22 ft Depth) } .....	3-61
Figure 3F-37— {SSI "Within" Acceleration Time Histories for Input at ESWB Foundation (UB Soil Case) – NI Area (22 ft Depth) } .....	3-62
Figure 3F-38— {SSI "Within" Acceleration Time Histories for Input at CBIS Foundation (LB Soil Case) – Intake Area (37.5 ft Depth)} .....	3-63
Figure 3F-39— {SSI "Within" Acceleration Time Histories for Input at CBIS Foundation (BE Soil Case) – Intake Area (37.5 ft Depth)} .....	3-64
Figure 3F-40— {SSI "Within" Acceleration Time Histories for Input at CBIS Foundation (UB Soil Case) – Intake Area (37.5 ft Depth)} .....	3-65
Figure 3F-41— {5% Damping within ARS at ESWB Foundation Horizontal Direction (S1) – NI Area (22 ft Depth)} .....	3-66
Figure 3F-42— {5% Damping within ARS at ESWB Foundation Horizontal Direction (S2) – NI Area (22 ft Depth)} .....	3-67
Figure 3F-43— {5% Damping within ARS at ESWB Foundation Vertical Direction (S3) – NI Area (22 ft Depth)} .....	3-68
Figure 3F-44— {5% Damping within ARS at CBIS Foundation Horizontal Direction (S1) – Intake Area (37.5 ft Depth)} .....	3-69
Figure 3F-45— {5% Damping within ARS at CBIS Foundation Horizontal Direction (S2) – Intake Area (37.5 ft Depth)} .....	3-70
Figure 3F-46— {5% Damping within ARS at CBIS Foundation Vertical Direction (S3) – Intake Area (37.5 ft Depth)} .....	3-71
Figure 8.1-1— {CCNPP Site 500 kV Circuit Corridors} .....	8-8
Figure 8.2-1— {CCNPP Unit 3 500kV Switchyard and Transmission Line Layout} .....	8-26
Figure 8.2-2— {CCNPP Unit 3 500kV Switchyard Single Line Diagram} .....	8-27
Figure 8.3-1— {CCNPP Unit 3 Emergency Power Supply System Single Line Drawing} .....	8-36
Figure 8.3-2— {CCNPP Unit 3 Normal Power Supply System Single Line Drawing} .....	8-39
Figure 8.3-3— {CCNPP Unit 3 Transformer 30BBT04 Distribution System Single Line Drawing} .....	8-44
Figure 9.2-1— {Potable Water System} .....	9-24
Figure 9.2-2— {Sanitary Waste Water System} .....	9-25
Figure 9.2-3— {Normal Makeup, Emergency Makeup, Blowdown & Chemical Treatment} .....	9-26
Figure 9.2-4— {General Area - UHS Makeup Water and CW Intake Structures} .....	9-27
Figure 9.2-5— {UHS Makeup Water Intake Structure - Plan View} .....	9-28
Figure 9.2-6— {UHS Makeup Water Intake Structure - Section View} .....	9-29
Figure 9.2-7— {Raw Water and Desalinated Water Supply} .....	9-30
Figure 9.2-8— {UHS Makeup Water Intake Structure - Section View} .....	9-31
Figure 9.2-9— {UHS Makeup Water System} .....	9-32
Figure 9.4-1— Turbine Building Ventilation System .....	9-49
Figure 9.4-2— {UHS Makeup Water Intake Structure Ventilation System } .....	9-50
Figure 9.5-1— {CCNPP Unit 3 Fire Water Distribution System – Cooling Tower Loop} .....	9-71
Figure 9.5-2— {CCNPP Unit 3 Fire Water Distribution System – Intake Structure Loop} .....	9-72
Figure 9.5-3— {CCNPP Unit 3 UHS Makeup Water Intake Structure} .....	9-73
Figure 9B-1— {CCNPP Unit 3 Fire Barrier Location, Turbine Building Plan at Elevation (-)23 Feet} .....	9-48
Figure 9B-2— {CCNPP Unit 3 Fire Barrier Location, Turbine Building Plan at Elevation +/- 0 Feet} .....	9-49
Figure 9B-3— {CCNPP Unit 3 Fire Barrier Location, Turbine Building Plan at Elevation +38 Feet} .....	9-50
Figure 9B-4— {CCNPP Unit 3 Fire Barrier Location, Turbine Building Plan at Elevation +65 Feet} .....	9-51
Figure 9B-5— {CCNPP Unit 3 Fire Barrier Location, Turbine Building Plan at Elevation (-)43 Feet} .....	9-52



Figure 9B-6— {CCNPP Unit 3 Fire Barrier Location, Turbine Building Roof Plan} .....	9-53
Figure 9B-7— {CCNPP Unit 3 Fire Barrier Location, Turbine Building Section A-A} .....	9-54
Figure 9B-8— {CCNPP Unit 3 Fire Barrier Location, Turbine Building Section B-B} .....	9-55
Figure 9B-9— {CCNPP Unit 3 Fire Barrier Location, Turbine Building Section C-C} .....	9-56
Figure 9B-10— {CCNPP Unit 3 Fire Barrier Location, SWGR/SBO Buildings Plan View at Elevation (-)13'-0"} .....	9-57
Figure 9B-11— {CCNPP Unit 3 Fire Barrier Location, SWGR/SBO/AUX BLR Buildings Plan View at Elevation 0'-0"} .....	9-58
Figure 9B-12— {CCNPP Unit 3 Fire Barrier Location, SWGR/SBO/AUX BLR Buildings Plan View at Elevation 13'-0"} .....	9-59
Figure 9B-13— {CCNPP Unit 3 Fire Barrier Location, SWGR/SBO/AUX BLR Buildings Plan View at Elevation 24'-6"} .....	9-60
Figure 9B-14— {CCNPP Unit 3 Fire Barrier Location, SWGR/SBO/AUX BLR Buildings, Plan View Section A-A} .....	9-61
Figure 9B-15— {CCNPP Unit 3 Fire Barrier Location, Transformer Area Plan View at Elevation 0'-0" } .....	9-62
Figure 9B-16— {CCNPP Unit 3 Fire Barrier Location, Warehouse Building Plan View at Elevation 85'-0"} .....	9-63
Figure 9B-17— {CCNPP Unit 3 Fire Barrier Location, Security Access Facility Plan View at Elevation 85'-0"} .....	9-64
Figure 9B-18— {CCNPP Unit 3 Fire Barrier Location, Central Gas Supply Building Plan View at Elevation 85'0"} .....	9-65
Figure 9B-19— {CCNPP Unit 3 Fire Barrier Location, Grid Systems Control Building Plan View at Elevation 85'0"} .....	9-66
Figure 9B-20— {CCNPP Unit 3 Fire Barrier Location, Fire Protection Building Plan View at Elevation 85'0"} .....	9-67
Figure 9B-21— {CCNPP Unit 3 Fire Barrier Location, Cooling Tower Structure, Plan View and Section A-A} .....	9-68
Figure 9B-22— {CCNPP Unit 3 Fire Barrier Location, Circulating Water Pump Building, Plan View and Section A-A} .....	9-69
Figure 9B-23— {CCNPP Unit 3 Fire Barrier Location, UHS Makeup Water Intake Structure, Plan View and Section A-A} .....	9-70
Figure 9B-24— {CCNPP Unit 3 Fire Barrier Location, CW Makeup Intake Structure, Plan View and Section A-A} .....	9-71
Figure 9B-25— {CCNPP Unit 3 Fire Barrier Location, Desalinization / Water Treatment Building Plan View at Elevation 100'0"} .....	9-72
Figure 10.2-1— {CCNPP Unit 3 Turbine Control System Schematic Diagram} .....	10-6
Figure 10.2-2— {CCNPP Unit 3 Turbine Control System Logic Diagram} .....	10-7
Figure 10.2-2— {CCNPP Unit 3 Turbine Control System Logic Diagram} .....	10-8
Figure 10.4-1— {Circulating Water System P & ID (Circulating Water Pump Building)} .....	10-25
Figure 10.4-2— {Circulating Water System P & ID (Turbine Building)} .....	10-26
Figure 10.4-3— {Circulating Water System Makeup System P&ID} .....	10-27
Figure 10.4-4— {Circulating Water System Makeup Pump Intake Structure (Plan View)} .....	10-28
Figure 10.4-5— {Circulating Water System Makeup Pump Intake Structure (Section View)} .....	10-29
Figure 10.4-6— {Circulating Water System Blowdown Flowpath} .....	10-30
Figure 10.4-7— {Circulating Water System Plant Discharge} .....	10-31
Figure 12.3-1— {Site Layout of CCNPP Units 1, 2, and 3} .....	12-35
Figure 12.3-2— {Sources on CCNPP Units 1 and 2 (Part 1 and 2)} .....	12-36
Figure 12.3-3— {Sources on CCNPP Units 1 and 2 (Part 2 of 2)} .....	12-37
Figure 12.3-4— {Historical ISFSI 2005 TLD Doses Versus Distance} .....	12-38
Figure 12.3-5— {Resin Area and ISFSI Historical TLD Readings} .....	12-39

Figure 12.3-6— {Resin Area Dose Rate for 2005} .....	12-40
Figure 12.3-7— {Dose Rate Estimated in 2015} .....	12-41
Figure 12.3-8— {Bounding Annual Average X/Q in CCNPP Unit 3 Direction} .....	12-43
Figure 12.3-9— {SFSI TLD Locations} .....	12-44
Figure 12.3-10— {Annual Gamma Net ISFSI Dose Rate} .....	12-45
Figure 12.3-11— {Resin Area TLD Locations} .....	12-46
Figure 13.1-1— {UniStar Ownership and Technical Support} .....	13-43
Figure 13.1-2— {Project Delivery Organization} .....	13-44
Figure 13.1-3— {UNE Corporate Organization} .....	13-45
Figure 13.1-4— {UniStar Nuclear Operating Services, LLC Site Organization} .....	13-46
Figure 13.1-5— {Hiring and Training Schedule for Plant Staff} .....	13-47