

# Contents

Abstract .....	iii
Executive Summary .....	xiv
Abbreviations/Acronyms .....	xix
1.0 Introduction .....	1-1
1.1 Report Contents .....	1-2
1.2 Background .....	1-3
1.2.1 Generic Environmental Impact Statement .....	1-3
1.2.2 License Renewal Evaluation Process .....	1-4
1.3 The Proposed Federal Action .....	1-7
1.4 The Purpose and Need for the Proposed Action .....	1-8
1.5 Compliance and Consultations .....	1-8
1.6 References .....	1-10
2.0 Description of Nuclear Power Plant and Site and Plant Interaction with the Environment .....	2-1
2.1 Plant and Site Description and Proposed Plant Operation During the Renewal Term .....	2-1
2.1.1 External Appearance and Setting .....	2-4
2.1.2 Reactor Systems .....	2-4
2.1.3 Cooling and Auxiliary Water Systems .....	2-6
2.1.4 Radioactive Waste Management Systems and Effluent Control Systems .....	2-8
2.1.4.1 Liquid Waste Processing Systems and Effluent Controls .....	2-10
2.1.4.2 Gaseous Waste Processing Systems and Effluent Controls ....	2-12
2.1.4.3 Solid Waste Processing .....	2-12
2.1.5 Nonradioactive Waste Systems .....	2-14
2.1.6 Plant Operation and Maintenance .....	2-14
2.1.7 Power Transmission System .....	2-15

## Contents

2.2	Plant Interaction with the Environment .....	2-17
2.2.1	Land Use .....	2-17
2.2.2	Water Use .....	2-17
2.2.3	Water Quality .....	2-18
2.2.4	Air Quality .....	2-19
2.2.5	Aquatic Resources .....	2-21
2.2.6	Terrestrial Resources .....	2-22
2.2.7	Radiological Impacts .....	2-27
2.2.8	Socioeconomic Factors .....	2-29
2.2.8.1	Housing .....	2-29
2.2.8.2	Public Services .....	2-32
2.2.8.3	Offsite Land Use .....	2-35
2.2.8.4	Visual Aesthetics and Noise .....	2-36
2.2.8.5	Demography .....	2-37
2.2.8.6	Economy .....	2-42
2.2.9	Historic and Archaeological Resources .....	2-45
2.2.9.1	Cultural Background .....	2-45
2.2.9.2	Historic and Archaeological Resources at the Peach Bottom Site .....	2-46
2.2.10	Related Federal Project Activities and Consultations .....	2-47
2.3	References .....	2-48
3.0	Environmental Impacts of Refurbishment .....	3-1
3.1	References .....	3-4
4.0	Environmental Impacts of Operation .....	4-1
4.1	Cooling System .....	4-2
4.1.1	Water Use Conflicts (Plants With Cooling Ponds or Cooling Towers Using Make-Up Water From a Small River With Low Flow) .....	4-12
4.1.2	Entrainment of Fish and Shellfish in Early Life Stages .....	4-13
4.1.3	Impingement of Fish and Shellfish .....	4-15
4.1.4	Heat Shock .....	4-16
4.1.5	Microbiological Organisms (Public Health) .....	4-17

4.2	Transmission Lines .....	4-19
4.2.1	Electromagnetic Fields—Acute Effects .....	4-22
4.2.2	Electromagnetic Fields—Chronic Effects .....	4-23
4.3	Radiological Impacts of Normal Operations .....	4-24
4.4	Socioeconomic Impacts of Plant Operations During the License Renewal Period .....	4-26
4.4.1	Housing Impacts During Operations .....	4-28
4.4.2	Public Services: Public Utility Impacts During Operations .....	4-30
4.4.3	Offsite Land Use During Operations .....	4-31
4.4.4	Public Services: Transportation Impacts During Operations .....	4-32
4.4.5	Historic and Archaeological Resources .....	4-33
4.4.6	Environmental Justice .....	4-37
4.5	Groundwater Use and Quality .....	4-42
4.5.1	Groundwater Use Conflicts (Plants Using Cooling Towers Withdrawing Makeup Water From a Small River) .....	4-43
4.6	Threatened or Endangered Species .....	4-44
4.6.1	Aquatic Species .....	4-44
4.6.2	Terrestrial Species .....	4-45
4.7	Evaluation of Potential New and Significant Information on Impacts of Operations During the Renewal Term .....	4-46
4.7.1	Evaluation of Potential New and Significant Radiological Impacts on Human Health .....	4-46
4.7.1.1	Summary of Comments .....	4-46
4.7.1.2	Strontium-90 in the Environment .....	4-47
4.7.1.3	Regulatory Basis and Discussion of Risk .....	4-48
4.7.1.4	Effluent Monitoring at Peach Bottom .....	4-49
4.7.1.5	Use of “In-Body” Radionuclide Measurements to Assess Public Risk from Radiological Effluents from Peach Bottom Units 2 and 3 .....	4-50
4.7.1.6	Ability for Strontium-90 to Cause Cancer .....	4-51

## Contents

4.7.1.7	Cause-and-Effect Relationship Between Radiological Releases from Peach Bottom Units 2 and 3 and Increased Incidence in Cancers in the Area .....	4-51
4.7.1.8	Additional Discussion on Cancer .....	4-53
4.7.1.9	Conclusion .....	4-55
4.8	Summary of Impacts of Operations During the Renewal Term .....	4-55
4.9	References .....	4-56
5.0	Environmental Impacts of Postulated Accidents .....	5-1
5.1	Postulated Plant Accidents .....	5-1
5.1.1	Design-Basis Accidents .....	5-2
5.1.2	Severe Accidents .....	5-3
5.2	Severe Accident Mitigation Alternatives .....	5-4
5.2.1	Introduction .....	5-4
5.2.2	Estimate of Risk for Peach Bottom Units 2 and 3 .....	5-5
5.2.2.1	Exelon's Risk Estimates .....	5-5
5.2.2.2	Review of Exelon's Risk Estimates .....	5-8
5.2.3	Potential Design Improvements .....	5-12
5.2.3.1	Process for Identifying Potential Design Improvements .....	5-12
5.2.3.2	Staff Evaluation .....	5-15
5.2.4	Risk-Reduction Potential of Design Improvements .....	5-17
5.2.5	Cost Impacts of Candidate Design Improvements .....	5-18
5.2.6	Cost-Benefit Comparison .....	5-20
5.2.6.1	Exelon Evaluation .....	5-20
5.2.6.2	Staff Evaluation .....	5-23
5.2.7	Conclusions .....	5-25
5.3	References .....	5-26

6.0	Environmental Impacts of the Uranium Fuel Cycle and Solid Waste Management .....	6-1
6.1	The Uranium Fuel Cycle .....	6-2
6.2	References .....	6-9
7.0	Environmental Impacts of Decommissioning .....	7-1
7.1	References .....	7-4
8.0	Environmental Impacts of Alternatives to License Renewal .....	8-1
8.1	No-Action Alternative .....	8-1
8.2	Alternative Energy Sources .....	8-4
8.2.1	Coal-Fired Generation .....	8-6
8.2.1.1	Once-Through Cooling System .....	8-7
8.2.1.2	Closed-Cycle Cooling System .....	8-19
8.2.2	Natural Gas-Fired Generation .....	8-20
8.2.2.1	Once-Through Cooling System .....	8-22
8.2.2.2	Closed-Cycle Cooling System .....	8-30
8.2.3	Nuclear Power Generation .....	8-31
8.2.3.1	Once-Through Cooling System .....	8-31
8.2.3.2	Closed-Cycle Cooling System .....	8-39
8.2.4	Purchased Electrical Power .....	8-40
8.2.5	Other Alternatives .....	8-42
8.2.5.1	Oil-Fired Generation .....	8-42
8.2.5.2	Wind Power .....	8-42
8.2.5.3	Solar Power .....	8-43
8.2.5.4	Hydropower .....	8-43
8.2.5.5	Geothermal Energy .....	8-44
8.2.5.6	Wood Waste .....	8-44
8.2.5.7	Municipal Solid Waste .....	8-45
8.2.5.8	Other Biomass-Derived Fuels .....	8-46
8.2.5.9	Fuel Cells .....	8-46

## Contents

8.2.5.10 Delayed Retirement .....	8-46
8.2.5.11 Utility-Sponsored Conservation .....	8-47
8.2.6 Combination of Alternatives .....	8-49
8.3 Summary of Alternatives Considered .....	8-52
8.4 References .....	8-53
9.0 Summary and Conclusions .....	9-1
9.1 Environmental Impacts of the Proposed Action—License Renewal .....	9-4
9.1.1 Unavoidable Adverse Impacts .....	9-5
9.1.2 Irreversible or Irrecoverable Resource Commitments .....	9-5
9.1.3 Short-Term Use Versus Long-Term Productivity .....	9-6
9.2 Relative Significance of the Environmental Impacts of License Renewal and Alternatives .....	9-6
9.3 Staff Conclusions and Recommendations .....	9-8
9.4 References .....	9-9
Appendix A – Comments Received on the Environmental Review .....	A-1
Appendix B – Contributors to the Supplement .....	B-1
Appendix C – Chronology of NRC Staff Environmental Review Correspondence Related to Exelon Generation Company’s Application for License Renewal of Peach Bottom Atomic Power Station Units 2 and 3 .....	C-1
Appendix D – Organizations Contacted .....	D-1
Appendix E – Exelon Generation Company’s Compliance Status and Consultation Correspondence .....	E-1
Appendix F – GEIS Environmental Issues Not Applicable to Peach Bottom Units 2 and 3 ....	F-1

# Figures

2-1	Location of Peach Bottom Site, 80-km (50-mi) Region .....	2-2
2-2	Location of Peach Bottom Site, 10-km (6-mi) Region .....	2-3
2-3	Peach Bottom Station Layout .....	2-5
2-4	Peach Bottom Transmission Line Map .....	2-16
4-1	Geographic Distribution of Minority Populations (shown in shaded areas) Within 80 Km (50 Mi) of Peach Bottom Site Based On 2000 Census Block Group Data .....	4-39
4-2	Geographic Distribution of Low-Income Populations (shown in shaded areas) Within 80 km (50 mi) of Peach Bottom Site Based On 1990 Census Block Group Data .....	4-40