

---

**COVE POINT EXPANSION PROJECT**  
**FINAL EIS**  
**TABLE OF CONTENTS**

<b>EXECUTIVE SUMMARY .....</b>	<b>ES-1</b>
PROJECT IMPACTS .....	ES-3
ALTERNATIVES CONSIDERED .....	ES-11
PUBLIC INVOLVEMENT .....	ES-13
MAJOR CONCLUSIONS .....	ES-15
<b>TABLE OF CONTENTS .....</b>	<b>i</b>
<b>LIST OF APPENDICES .....</b>	<b>vi</b>
<b>LIST OF FIGURES .....</b>	<b>vi</b>
<b>LIST OF TABLES .....</b>	<b>vii</b>
<b>ACRONYMS AND ABBREVIATIONS.....</b>	<b>x</b>
1.0   INTRODUCTION .....	1-1
1.1   PROJECT PURPOSE AND NEED.....	1-2
1.1.1   Projected Domestic Supplies and Demand for Natural Gas .....	1-2
1.1.2   Potential of LNG Imports .....	1-3
1.2   PURPOSE AND SCOPE OF THE EIS .....	1-3
1.3   PERMITS, APPROVALS, AND REGULATORY REQUIREMENTS.....	1-4
1.4   PUBLIC REVIEW AND COMMENT.....	1-11
2.0   DESCRIPTION OF THE PROPOSED ACTION .....	2-1
2.1   PROPOSED FACILITIES.....	2-1
2.1.1   LNG Terminal Expansion.....	2-2
2.1.1.1   LNG Ships .....	2-6
2.1.2   Pipeline Facilities.....	2-10
2.1.3   Other Aboveground Facilities.....	2-13
2.1.4   Proposed Facilities with Limited or No Further Review in This EIS....	2-14
2.2   LAND REQUIREMENTS.....	2-15
2.2.1   Cove Point LNG Terminal Expansion .....	2-15
2.2.2   Pipeline Facilities.....	2-16
2.2.3   Other Aboveground Facilities.....	2-20
2.3   CONSTRUCTION PROCEDURES.....	2-20
2.3.1   Cove Point LNG Terminal Expansion Facilities .....	2-20
2.3.2   Pipeline Facilities.....	2-21
2.3.2.1   General Pipeline Construction Procedures .....	2-21
2.3.2.2   Special Pipeline Construction Techniques.....	2-24
2.3.2.3   Other Aboveground Facility Construction Procedures.....	2-27
2.4   CONSTRUCTION SCHEDULE.....	2-27

---

2.5	ENVIRONMENTAL COMPLIANCE AND MONITORING .....	2-28
2.6	OPERATION AND MAINTENANCE.....	2-29
2.6.1	Cove Point LNG Terminal Expansion Facilities .....	2-29
2.6.2	Pipeline and Associated Aboveground Facilities .....	2-30
2.7	SAFETY CONTROLS .....	2-31
2.7.1	Cove Point LNG Terminal Facilities .....	2-31
2.7.2	Pipeline and Associated Aboveground Facilities .....	2-32
2.8	FUTURE PLANS AND ABANDONMENT .....	2-33
2.9	NONJURISDICTIONAL FACILITIES .....	2-33
3.0	ALTERNATIVES.....	3-1
3.1	NO ACTION OR POSTPONED ACTION ALTERNATIVE .....	3-2
3.2	SYSTEM ALTERNATIVES.....	3-4
3.2.1	LNG Import Point System Alternatives.....	3-5
3.2.1.1	Other Existing LNG Import Terminals.....	3-5
3.2.1.2	Recently Approved LNG Import Terminals .....	3-9
3.2.1.3	Other Planned or Proposed LNG Projects .....	3-10
3.2.2	LNG Delivery Alternative .....	3-11
3.2.3	Other Pipeline Company System Alternatives .....	3-12
3.3	ALTERNATIVE PROJECT FACILITIES ON DOMINION'S SYSTEM .....	3-13
3.3.1	TL-532—Mid-Point Compression Alternative.....	3-13
3.3.2	TL-532—Downstream Looping Alternative .....	3-15
3.3.3	Start Point Compression Alternative .....	3-17
3.3.4	TL-522 Pipeline Replacement Alternative .....	3-20
3.3.5	Alternative Configuration of Cove Point Terminal Expansion Facilities .....	3-21
3.4	PIPELINE ALTERNATIVES .....	3-22
3.4.1	Pipeline Route Alternatives .....	3-22
3.4.1.1	TL-532 Pipeline Route Alternatives .....	3-22
3.4.1.2	PL-1 EXT2 Pipeline Route Alternatives.....	3-32
3.4.2	Pipeline Route Variations .....	3-34
3.4.2.1	TL-532 Pipeline Variations.....	3-35
3.4.2.2	PL-1 EXT2 Pipeline Variations .....	3-39
3.4.3	Alternative Sites for New Aboveground Facilities .....	3-43
4.0	ENVIRONMENTAL ANALYSIS .....	4-1
4.1	GEOLOGIC RESOURCES .....	4-2
4.1.1	Geologic Setting.....	4-2
4.1.1.1	Existing Environment .....	4-2
4.1.1.2	Environmental Consequences .....	4-4
4.1.2	Mineral Resources .....	4-5
4.1.2.1	Existing Environment .....	4-5
4.1.2.2	Environmental Consequences .....	4-6
4.1.3	Geologic Hazards.....	4-7
4.1.3.1	Existing Environment .....	4-7
4.1.3.2	Environmental Consequences .....	4-11
4.1.4	Paleontological Resources .....	4-13
4.2	SOILS .....	4-13

---

4.2.1	Existing Environment .....	4-13
4.2.2	Environmental Consequences.....	4-15
4.2.2.1	General Construction and Operational Impact .....	4-15
4.2.2.2	Site-Specific Impact and Mitigation .....	4-16
4.3	WATER RESOURCES .....	4-19
4.3.1	Groundwater .....	4-19
4.3.1.1	Existing Environment .....	4-19
4.3.1.2	Environmental Consequences.....	4-25
4.3.2	Surface Water.....	4-27
4.3.2.1	Existing Environment .....	4-27
4.3.2.2	Environmental Consequences.....	4-32
4.4	VEGETATION .....	4-41
4.4.1	Existing Environment .....	4-41
4.4.2	Environmental Consequences.....	4-44
4.4.3	Site-Specific Impact.....	4-45
4.5	WETLANDS.....	4-47
4.5.1	Existing Environment .....	4-47
4.5.2	Environmental Consequences.....	4-49
4.5.2.1	General Construction and Operational Impact .....	4-49
4.5.2.2	Wetland Construction and Mitigation Procedures .....	4-50
4.5.2.3	Site Specific Impact .....	4-51
4.6	FISH AND WILDLIFE .....	4-53
4.6.1	Fisheries Resources.....	4-53
4.6.1.1	Existing Environment .....	4-53
4.6.1.2	Environmental Consequences.....	4-57
4.6.2	WILDLIFE RESOURCES.....	4-62
4.6.2.1	Existing Environment .....	4-62
4.6.2.2	Environmental Consequences.....	4-64
4.7	THREATENED, ENDANGERED, AND OTHER SPECIAL STATUS SPECIES .....	4-66
4.7.1	Federally Listed or Proposed Threatened and Endangered Species .....	4-66
4.7.2	Conclusions and Recommendations, Federally Listed Species.....	4-72
4.7.3	Other Special Status Species.....	4-73
4.8	LAND USE, RECREATION, AND VISUAL RESOURCES .....	4-77
4.8.1	Land Use .....	4-77
4.8.1.1	Existing Environment .....	4-77
4.8.1.2	Environmental Consequences .....	4-81
4.8.2	Existing Residences and Planned Future Developments .....	4-90
4.8.2.1	Existing Environment .....	4-90
4.8.3	Recreation and Special Interest Areas .....	4-94
4.8.3.1	Existing Environment .....	4-94
4.8.3.2	Environmental Consequences .....	4-96
4.8.4	Visual Resources.....	4-97
4.8.4.1	Existing Environment .....	4-97
4.8.4.2	Environment Consequences .....	4-99
4.8.5	Hazardous Waste Sites.....	4-100

---

4.8.6	Coastal Zone Management .....	4-100
4.9	SOCIOECONOMICS .....	4-101
4.9.1	Population .....	4-102
4.9.2	Economy and Employment.....	4-104
4.9.3	Housing.....	4-108
4.9.4	Public Services.....	4-110
4.9.5	Property Values.....	4-110
4.9.6	Transportation .....	4-111
4.10	CULTURAL RESOURCES .....	4-115
4.10.1	Existing Environment .....	4-115
4.10.1.1	Cultural Resource Surveys.....	4-115
4.10.2	Environmental Consequences.....	4-123
4.10.2.1	Impact and Mitigation.....	4-123
4.10.2.2	Compliance with NHPA .....	4-123
4.11	AIR QUALITY AND NOISE .....	4-124
4.11.1	Air Quality .....	4-124
4.11.1.1	Existing Environment .....	4-129
4.11.1.2	Environmental Consequences.....	4-131
4.11.2	Noise .....	4-138
4.11.2.1	Existing Environment .....	4-138
4.11.2.2	Environmental Consequences.....	4-146
4.12	RELIABILITY AND SAFETY .....	4-153
4.12.1	LNG Hazards .....	4-154
4.12.2	Cryogenic Design and Technical Review.....	4-155
4.12.3	Storage and Retention Systems.....	4-160
4.12.4	Siting Requirements – Thermal and Dispersion Exclusion Zones .....	4-164
4.12.5	Marine Safety.....	4-171
4.12.5.1	Chesapeake Bay .....	4-177
4.12.5.2	Requirements for LNG Ship Operations.....	4-177
4.12.5.3	Environmental Impacts Associated with Coast Guard Actions .....	4-182
4.12.5.4	LNG Ship Safety.....	4-190
4.12.6	Terrorism and Security Issues.....	4-197
4.12.7	Pipeline Reliability and Safety.....	4-199
4.13	CUMULATIVE IMPACTS.....	4-208
4.13.1	Other Existing and Proposed Projects.....	4-208
4.13.2	Land Resources and Use .....	4-210
4.13.3	Water Resources .....	4-213
4.13.4	Wetlands .....	4-213
4.13.5	Air Quality .....	4-213
4.13.6	Conclusions about Cumulative Impacts.....	4-215
5.0	CONCLUSIONS AND RECOMMENDATIONS .....	5-1
5.1	SUMMARY OF THE STAFF'S ENVIRONMENTAL ANALYSIS.....	5-1
5.1.1	Geology.....	5-1
5.1.2	Soils.....	5-2
5.1.3	Water Resources .....	5-2

---

5.1.4	Wetlands .....	5-3
5.1.5	Vegetation .....	5-3
5.1.6	Wildlife .....	5-3
5.1.7	Endangered and Threatened Species .....	5-4
5.1.8	Land Use, Recreation, and Visual Resources .....	5-4
5.1.9	Socioeconomics .....	5-6
5.1.10	Cultural Resources .....	5-6
5.1.11	Air Quality and Noise .....	5-6
5.1.12	Reliability and Safety.....	5-7
5.1.13	Alternatives.....	5-9
5.2	FERC STAFF'S RECOMMENDED MITIGATION.....	5-11
6.0	COMMENTS ON DRAFT EIS AND RESPONSES .....	6-1

---

## LIST OF APPENDICES

APPENDIX A	EIS DISTRIBUTION LIST
APPENDIX B	FACILITY LOCATION MAPS
APPENDIX C	ALTERNATIVES MAPS
APPENDIX D	GEOLOGY AND MINERAL RESOURCE TABLES
APPENDIX E	SOILS TABLES
APPENDIX F	GROUNDWATER AND SURFACE WATER TABLES
APPENDIX G	WETLANDS TABLES AND FIGURES
APPENDIX H	DRAFT GENERAL CONFORMITY EVALUATION
APPENDIX I	REFERENCES AND CONTACTS
APPENDIX J	LIST OF PREPARERS
APPENDIX K	CORRESPONDENCE RELATED TO CAPE ALTERNATIVES
APPENDIX L	CORRESPONDENCE RELATED TO U.S. COAST GUARD
APPENDIX M	SUBJECT INDEX

## LIST OF FIGURES

Figure 2.1-1	General Facilities Location Map.....	2-3
Figure 2.1-2	General Plot Plan of Proposed Cove Point LNG Terminal Expansion	
	Facilities.....	2-4
Figure 2.2-1	TL-532 Pipeline Existing Right-of-Way .....	2-17
Figure 2.2-2	TL-532 Pipeline New Right-of-Way .....	2-18
Figure 2.2-3	PL-1 EXT2 Pipeline Existing Right-of-Way.....	2-19
Figure 2.3-1	Typical Pipeline Construction Sequence .....	2-22
Figure 4.11-1	Cove Point LNG Terminal Expansion Noise Sensitive Area .....	4-140
Figure 4.11-2	Proposed Perulack Compressor Station Noise Sensitive Area .....	4-141
Figure 4.11-3	Proposed Centre Relay Compressor Station Noise Sensitive Area .....	4-143
Figure 4.11-4	Mockingbird Hill Compressor Station Upgrade Noise Sensitive Area .....	4-144
Figure 4.11-5	Wolf Run Compressor Station Expansion Noise Sensitive Area .....	4-145
Figure H-1	Examples of Single Containment Tanks.....	4-162
Figure H-3	Examples of Double Containment Tanks .....	4-163
Figure H-4	Examples of Full Containment Tanks.....	4-165
Figure 4.12-1	Existing and Proposed LNG Shipping Route .....	4-183
Figure 4.12-2	Potentially Sensitive Resources Along the LNG Transit Route .....	4-186

---

## LIST OF TABLES

TABLE 1.1-1	Cove Point Expansion Project Firm Service Quantities .....	1-2
TABLE 1.3-1	Environmental Permits and Agency Reviews for the Cove Point	
TABLE 1.4-1	Expansion Project .....	1-8
TABLE 2.1-1	Issues Identified and Comments Received During the Public	
TABLE 2.1.1-1	Scoping Process for the Cove Point Expansion Project.....	1-12
TABLE 2.1.2-1	Cove Point Expansion Project Proposed LNG Terminal Expansion	
TABLE 2.1.4-1	and Other Aboveground Facilities.....	2-2
TABLE 2.2-1	Typical LNG Ship Characteristics.....	2-10
TABLE 2.3.2.2-1	Cove Point Expansion Project Proposed Pipeline Facilities.....	2-11
TABLE 2.7.1-1	Proposed Facilities With Limited Review in This EIS .....	2-15
TABLE 3.3.1-1	Land Requirements for Cove Point Expansion Project Proposed	
TABLE 3.3.1-2	Facilities.....	2-16
TABLE 3.3.2-1	Proposed HDD Crossings .....	2-26
TABLE 3.3.3-1	Federal Siting and Design Requirements for LNG Facilities .....	2-31
TABLE 3.3.3-2	Comparison of TL-532—Mid-Point Compression Alternative to	
TABLE 3.4.1.1-1	the Proposed Project .....	3-13
TABLE 3.4.1.1-2	Estimated Annual Emissions for Operation of New and Added	
TABLE 3.4.1.1-3	Compression Required for TL-532—Mid-Point Compression	
TABLE 3.4.1.1-4	Alternative.....	3-14
TABLE 3.4.1.2-1	Comparison of TL-532—Downstream Looping Alternative to the	
TABLE 3.4.1.2-2	Proposed Project .....	3-16
TABLE 3.4.2-1	Comparison of PL-1 EXT2—Start Point Compression Alternative	
TABLE 3.4.2.1-1	to the Proposed Project .....	3-17
TABLE 3.4.2.1-2	Estimated Annual Emissions for Operation of Compressor Stations	
TABLE 3.4.2.1-3	Required for PL-1 EXT2—Start Point Compression Alternative	
TABLE 3.4.2.1-4	and Centre Relay Compressor Station .....	3-18
TABLE 3.4.2.1-5	Comparison of Highway 2/4 (West Side) and BGE Powerline	
TABLE 3.4.2.1-6	Alternative with Proposed TL-532 Pipeline Route.....	3-24
TABLE 3.4.2.1-7	Comparison of Calvert Cliffs Power Plant Alternative with	
TABLE 3.4.2.1-8	Proposed TL-532 Pipeline Route.....	3-28
TABLE 3.4.2.1-9	Comparison of White Sands Alternative with Proposed TL-532	
TABLE 3.4.2.1-10	Pipeline Route.....	3-30
TABLE 3.4.2.1-11	Comparison of Patuxent River Alternative with Proposed TL-532	
TABLE 3.4.2.1-12	Pipeline Route.....	3-31
TABLE 3.4.2.1-13	Comparison of Tuscarora State Forest Alternative with	
TABLE 3.4.2.1-14	Corresponding Segment of Proposed PL-1 EXT2 Pipeline.....	3-32
TABLE 3.4.2.1-15	Comparison of Rothrock State Forest Alternative with	
TABLE 3.4.2.1-16	Corresponding Segment of Proposed PL-1 EXT2 Pipeline.....	3-33
TABLE 3.4.2.1-17	Minor Route Variations Incorporated into the Proposed Route of	
TABLE 3.4.2.1-18	the TL-532 Pipeline as a Result of Landowner Negotiations .....	3-35
TABLE 3.4.2.1-19	Comparison of the Hunter’s Ridge Variation with the	
TABLE 3.4.2.1-20	Corresponding Segment of Proposed TL-532 Pipeline .....	3-36
TABLE 3.4.2.1-21	Comparison of the Hunting Creek Variation with the	
TABLE 3.4.2.1-22	Corresponding Segment of Proposed TL-532 Pipeline .....	3-37

---

TABLE 3.4.2.1-3	Comparison of the Zekiah Swamp Variation with the Corresponding Segment of Proposed TL-532 Pipeline .....	3-38
TABLE 3.4.2.1-4	Comparison of the Mattawoman Creek Variation with the Corresponding Segment of Proposed TL-532 Pipeline .....	3-39
TABLE 3.4.2.2-1	Comparison of the Perulack Variation with the Corresponding Segment of Proposed PL-1 EXT2 Pipeline .....	3-40
TABLE 3.4.2.2-2	Comparison of the Route 64 Variation with the Corresponding Segment of Proposed PL-1 EXT2 Pipeline .....	3-41
TABLE 3.4.2.2-3	Comparison of the Beech Creek Variation with the Corresponding Segment of Proposed PL-1 EXT2 Pipeline .....	3-42
TABLE 3.4.2.2-4	Comparison of the West Branch Susquehanna River Variation with the Corresponding Segment of Proposed PL-1 EXT2 Pipeline.....	3-42
TABLE 3.4.2.2-5	Comparison of the Leidy Variation with the Corresponding Segment of Proposed PL-1 EXT2 Pipeline .....	3-43
TABLE 4.1-1	Physiographic Provinces of Project Facilities.....	4-2
TABLE 4.1.2.1-1	Mineral Resources Crossed or in the Vicinity of Proposed Facilities .....	4-6
TABLE 4.1.3.1-1	Potential Cave and Karst Areas Crossed by the PL-1 EXT2 Pipeline .....	4-10
TABLE 4.2.1-1	Major Soil Limitations Crossed by Proposed Pipelines .....	4-14
TABLE 4.3.2.2-1	Hydrostatic Test Water Sources for Proposed Facilities .....	4-38
TABLE 4.4.1-1	Vegetation Types Affected by the Cove Point Expansion Project .....	4-42
TABLE 4.5.2.3-1	Wetlands Affected by the Cove Point Expansion Project .....	4-51
TABLE 4.6.1.1-1	Recreational and Commercially Important Fish Species Known to Occur in the Project Area.....	4-54
TABLE 4.7.1-1	Results of Bat Surveys Along the PL1-EXT2 Pipeline .....	4-68
TABLE 4.7.3-1	Other Special Status Species that Potentially Occur in the Vicinity of the Cove Point Expansion Project .....	4-73
TABLE 4.8.1.1-1	Land Use Types Crossed (by County) by Cove Point Expansion Project Pipelines.....	4-78
TABLE 4.8.1.2-1	Acreage Affected by Construction and Operation of Proposed Cove Point Expansion Project .....	4-85
TABLE 4.8.2.1-1	Residences Within or Within 50 Feet of the Proposed Construction Work Areas for the Cove Point Expansion Project .....	4-91
TABLE 4.8.3.2-1	Public Land and Other Designated Recreation, Scenic, or Special Use Areas Affected by Proposed Facilities .....	4-96
TABLE 4.9.1-1	Existing Socioeconomic Conditions in the Project Area.....	4-103
TABLE 4.9.1-2	Construction Time and Expected Workforce Associated with the Proposed Cove Point Expansion Project Facilities .....	4-104
TABLE 4.9.2-1	Local Economy and Workforce Composition (number of jobs) .....	4-106
TABLE 4.9.3-1	Housing and Property Values in Project Area .....	4-109
TABLE 4.9.7-1	Population Composition in Project Area (Percent).....	4-114
TABLE 4.11.1.1-1	Ambient Pollutant Background Levels ( $\mu\text{g}/\text{m}^3$ ) at the Cove Point LNG Terminal.....	4-130
TABLE 4.11.1.1-2	Ambient Pollutant Background Levels ( $\mu\text{g}/\text{m}^3$ ) at the Perulack and Centre Relay Compressor Stations .....	4-130

---

TABLE 4.11.1.1-3	Ambient Pollutant Background Levels ( $\mu\text{g}/\text{m}^3$ ) at the Wolf Run and Mockingbird Hill Compressor Stations .....	4-131
TABLE 4.11.1.2-1	Construction Emissions for VOCs, CO and NOx.....	4-132
TABLE 4.11.1.2-2	Year-By-Year Estimate of Construction Emissions for VOCs, CO and NOx .....	4-132
TABLE 4.11.1.2-3	Estimated Annual Emissions for Operation of Proposed LNG Terminal Equipment .....	4-133
TABLE 4.11.1.2-4	Estimated Annual Marine Emissions (tpy) .....	4-134
TABLE 4.11.1.2-5	Marine Emission Impacts .....	4-134
TABLE 4.11.1.2-6	Estimated Annual Emissions for Operation of Proposed Perulack Compressor Station.....	4-135
TABLE 4.11.1.2-7	Estimated Annual Emissions for Operation of Proposed Centre Relay Compressor Station.....	4-135
TABLE 4.11.1.2-8	Estimated Annual Emissions for Operation of the Proposed Mockingbird Hill Compressor Station Upgrade.....	4-136
TABLE 4.11.1.2-9	Estimated Annual Emissions for Operation of Proposed Quinlin Compressor Station Upgrade .....	4-137
TABLE 4.11.1.2-10	Estimated Annual Emissions for Operation of Proposed Wolf Run Compressor Station.....	4-138
TABLE 4.11.2-1	Noise-Sensitive Areas Most Affected by the Cove Point Expansion Project .....	4-139
TABLE 4.11.2.2-1	Predicted Noise Impacts due to Horizontal Directional Drilling Operations .....	4-147
TABLE 4.11.2.2-2	Noise Impacts at the Nearest Noise-Sensitive Areas from the Proposed Cove Point Expansion Project.....	4-149
TABLE 4.12.4-1	Impoundment Areas.....	4-168
TABLE 4.12.4-2	Thermal Exclusion Zones .....	4-169
TABLE 4.12.5.3-1	Major Shoreline Features Along the Cove Point LNG Transit Route .....	4-184
TABLE 4.12.5.4-1	Minimum Striking Speed to Penetrate LNG Cargo Tanks .....	4-192
TABLE 4.12.5.4-2	LNG Spills on Water .....	4-196
TABLE 4.12.7-1	DOT Class Locations By Milepost .....	4-201
TABLE 4.12.7-2	Natural Gas Service Incidents by Cause .....	4-204
TABLE 4.12.7-3	Outside Forces Incidents by Cause (1970-1984) .....	4-205
TABLE 4.12.7-4	External Corrosion by Level of Control (1970-1984) .....	4-205
TABLE 4.12.7-5	Annual Average Fatalities - Natural Gas Transmission and Gathering Systems .....	4-206
TABLE 4.12.7-6	Nationwide Accidental Deaths .....	4-207
TABLE 4.13.1.1	Summary of Cumulative Impacts of the Cove Point Expansion Project and Other Past, Present, and Future Projects.....	4-211