

TABLES OF CONTENTS

Volume I

	Page
REGIONAL DIRECTOR’S NOTE	iii
COVER SHEET	v
EXECUTIVE SUMMARY	vii
ABBREVIATIONS, ACRONYMS, AND SYMBOLS	xxix
CONVERSION CHART	xxxiii
LIST OF FIGURES (in Volume II)	xxxv
LIST OF TABLES (in Volume II).....	xxxix
1. THE PROPOSED ACTIONS.....	1-3
1.1. Description of the Proposed Actions.....	1-3
1.2. Purpose of and Need for the Proposed Actions.....	1-3
1.3. Regulatory Framework.....	1-4
1.4. Prelease Process	1-18
1.5. Postlease Activities	1-20
1.6. Other OCS-Related Activities.....	1-36
2. ALTERNATIVES INCLUDING A PROPOSED ACTION.....	2-3
2.1. Multisale NEPA Analysis	2-3
2.2. Alternatives, Mitigating Measures, and Issues.....	2-4
2.2.1. Alternatives.....	2-4
2.2.2. Mitigating Measures.....	2-4
2.2.2.1. Proposed Mitigating Measures Analyzed.....	2-4
2.2.2.2. Existing Mitigating Measures.....	2-5
2.2.3. Issues	2-5
2.2.3.1. Issues to be Analyzed	2-5
2.2.3.2. Issues Considered but Not Analyzed	2-7
2.3. Proposed Lease Sales 189 and 197.....	2-8
2.3.1. Alternative A (Preferred Alternative) — A Proposed Action	2-8
2.3.1.1. Description.....	2-8
2.3.1.2. Summary of Impacts.....	2-8
2.3.1.3. Mitigating Measures	2-19
2.3.1.3.1. Military Warning Areas Stipulation — Hold and Save Harmless, Electromagnetic Emissions, and Operational Restrictions (“standard” Eastern GOM military stipulation) ..	2-19
2.3.1.3.2. Evacuation Stipulation for the Eglin Water Test Areas	2-20
2.3.1.3.3. Coordination and Consultation Stipulation for Exploration Activities in the Eglin Water Test Areas	2-21

2.3.2.	Alternative B — No Action	2-22
2.3.2.1.	Description	2-22
2.3.2.2.	Summary of Impacts	2-22
3.	DESCRIPTION OF THE AFFECTED ENVIRONMENT	3-3
3.1.	Physical Environment	3-3
3.1.1.	Air Quality	3-3
3.1.2.	Water Quality	3-4
3.1.2.1.	Coastal Waters	3-5
3.1.2.2.	Marine Waters	3-5
3.2.	Biological Resources	3-7
3.2.1.	Sensitive Coastal Environments	3-7
3.2.1.1.	Coastal Barrier Beaches and Associated Dunes	3-7
3.2.1.2.	Wetlands	3-11
3.2.1.3.	Seagrass Communities	3-16
3.2.2.	Sensitive Offshore Benthic Resources	3-17
3.2.2.1.	Continental Shelf Resources	3-17
3.2.2.1.1.	Live Bottoms (Pinnacle Trend)	3-17
3.2.2.2.	Continental Slope and Deepwater Resources	3-21
3.2.2.2.1.	Chemosynthetic Communities	3-23
3.2.2.2.2.	Nonchemosynthetic Communities	3-27
3.2.3.	Marine Mammals	3-29
3.2.3.1.	Nonendangered and Nonthreatened Species	3-29
3.2.3.2.	Endangered and Threatened Species	3-35
3.2.4.	Sea Turtles	3-40
3.2.5.	Alabama, Choctawhatchee, St. Andrew, and Perdido Key Beach Mice, and Florida Salt Marsh Vole	3-47
3.2.6.	Coastal and Marine Birds	3-51
3.2.6.1.	Nonendangered and Nonthreatened Species	3-51
3.2.6.2.	Endangered and Threatened Species	3-52
3.2.7.	Endangered and Threatened Fish	3-53
3.2.7.1.	Gulf Sturgeon	3-53
3.2.7.2.	Smalltooth Sawfish	3-54
3.2.8.	Fisheries	3-56
3.2.8.1.	Fish Resources	3-56
3.2.8.2.	Essential Fish Habitat	3-63
3.3.	Socioeconomic Activities	3-69
3.3.1.	Commercial Fishing	3-69
3.3.2.	Recreational Fishing	3-74
3.3.3.	Recreational Resources	3-75
3.3.4.	Archaeological Resources	3-76
3.3.4.1.	Historic	3-76
3.3.4.2.	Prehistoric	3-77
3.3.5.	Human Resources and Land Use	3-77
3.3.5.1.	Socioeconomic Analysis Area	3-78
3.3.5.1.1.	Description of the Analysis Area	3-78
3.3.5.1.2.	Land Use	3-78
3.3.5.2.	How OCS Development Has Affected the Analysis Area	3-80
3.3.5.3.	Current Economic Baseline Data	3-84
3.3.5.4.	Demographics	3-85
3.3.5.4.1.	Population	3-85
3.3.5.4.2.	Age	3-85
3.3.5.4.3.	Race and Ethnic Composition	3-86
3.3.5.4.4.	Education	3-86

3.3.5.5.	Economic Factors	3-86
3.3.5.5.1.	Employment	3-87
3.3.5.5.2.	Income and Wealth.....	3-87
3.3.5.5.3.	Business Patterns by Industrial Sector	3-87
3.3.5.6.	Non-OCS-Related Marine Transport.....	3-88
3.3.5.7.	OCS-Related Offshore Infrastructure	3-89
3.3.5.7.1.	Exploration and Production Structures.....	3-89
3.3.5.7.2.	Offshore Transport.....	3-89
3.3.5.8.	OCS-Related Coastal Infrastructure	3-91
3.3.5.8.1.	Service Bases	3-93
3.3.5.8.2.	Navigation Channels	3-96
3.3.5.8.3.	Helicopter Hubs	3-96
3.3.5.8.4.	Construction Facilities.....	3-97
3.3.5.8.5.	Processing Facilities.....	3-101
3.3.5.8.6.	Pipeline Shore Facilities.....	3-105
3.3.5.8.7.	Disposal and Storage Facilities for Offshore Operations	3-105
3.3.5.8.8.	Coastal Pipelines	3-109
3.3.5.9.	State Oil and Gas Activities.....	3-109
3.3.5.9.1.	Leasing and Production.....	3-109
3.3.5.9.2.	Pipeline Infrastructure for Transporting State-Produced Oil and Gas.....	3-111
3.3.5.10.	Environmental Justice.....	3-112
4.	ENVIRONMENTAL AND SOCIOECONOMIC CONSEQUENCES	4-3
4.1.	Impact-Producing Factors and Scenario – Routine Operations	4-3
4.1.1.	Offshore Impact-Producing Factors and Scenario.....	4-3
4.1.1.1.	Resource Estimates and Timetables.....	4-4
4.1.1.1.1.	Proposed Action	4-4
4.1.1.1.2.	Gulfwide OCS Program	4-5
4.1.1.2.	Exploration and Delineation	4-5
4.1.1.2.1.	Seismic Surveying Operations	4-6
4.1.1.2.2.	Exploration and Delineation Drilling Plans	4-8
4.1.1.2.3.	Exploration and Delineation Drilling	4-8
4.1.1.3.	Development and Production.....	4-10
4.1.1.3.1.	Development and Production Plans	4-10
4.1.1.3.2.	Development and Production Drilling	4-12
4.1.1.3.3.	Production Structures	4-12
4.1.1.3.3.1.	Types of Production Structures.....	4-13
4.1.1.3.3.2.	Bottom Area Disturbance	4-13
4.1.1.3.3.3.	Sediment Displacement	4-14
4.1.1.3.4.	Infrastructure Presence	4-14
4.1.1.3.4.1.	Anchoring	4-15
4.1.1.3.4.2.	Space-Use Conflicts.....	4-15
4.1.1.3.4.3.	Aesthetic Interference	4-16
4.1.1.3.4.4.	Bottom Debris.....	4-16
4.1.1.3.5.	Workovers and Abandonments	4-17
4.1.1.4.	Operational Waste Discharged Offshore	4-17
4.1.1.4.1.	Drilling Muds and Cuttings.....	4-18
4.1.1.4.2.	Produced Waters	4-20
4.1.1.4.3.	Well Treatment, Workover, and Completion Fluids.....	4-21
4.1.1.4.4.	Production Solids and Equipment.....	4-21
4.1.1.4.5.	Deck Drainage.....	4-21
4.1.1.4.6.	Treated Domestic and Sanitary Wastes.....	4-22
4.1.1.4.7.	Minor Discharges	4-22

	4.1.1.4.8.	Vessel Operational Wastes.....	4-22
	4.1.1.4.9.	Assumptions About Future OCS Operational Wastes	4-22
4.1.1.5.		Trash and Debris.....	4-23
4.1.1.6.		Air Emissions.....	4-23
4.1.1.7.		Noise	4-23
4.1.1.8.		Offshore Transport.....	4-26
	4.1.1.8.1.	Pipelines	4-26
	4.1.1.8.2.	Service Vessels.....	4-29
	4.1.1.8.3.	Helicopters	4-29
	4.1.1.8.4.	Alternative Transportation Methods of Natural Gas.....	4-30
4.1.1.9.		Hydrogen Sulfide and Sulfurous Petroleum	4-30
	4.1.1.9.1.	Sour Oil, Sour Gas, and Sulfurous Oil in the Gulf of Mexico	4-31
		4.1.1.9.1.1. Occurrence	4-31
		4.1.1.9.1.2. Treatment (Sweetening).....	4-31
		4.1.1.9.1.3. Requirements for Safety Planning and Engineering Standards	4-32
	4.1.1.9.2.	Environmental Fate of H ₂ S.....	4-32
		4.1.1.9.2.1. Atmospheric Release	4-32
		4.1.1.9.2.2. Aquatic Release	4-32
	4.1.1.9.3.	H ₂ S Toxicology	4-33
		4.1.1.9.3.1. Humans	4-33
		4.1.1.9.3.2. Wildlife.....	4-33
		4.1.1.9.3.3. Fish	4-33
4.1.1.10.		New or Unusual Technologies.....	4-33
4.1.1.11.		Decommissioning and Removal Operations.....	4-34
4.1.2.		Coastal Impact-Producing Factors and Scenario	4-36
	4.1.2.1.	Coastal Infrastructure.....	4-37
		4.1.2.1.1. Service Bases	4-37
		4.1.2.1.2. Helicopter Hubs	4-38
		4.1.2.1.3. Construction Facilities.....	4-38
		4.1.2.1.3.1. Platform Fabrication Yards.....	4-38
		4.1.2.1.3.2. Shipyards	4-39
		4.1.2.1.3.3. Pipecoating Facilities and Yards.....	4-39
		4.1.2.1.4. Processing Facilities.....	4-39
		4.1.2.1.4.1. Refineries	4-39
		4.1.2.1.4.2. Gas Processing Plants.....	4-40
		4.1.2.1.5. Terminals.....	4-41
		4.1.2.1.5.1. Pipeline Shore Facilities	4-41
		4.1.2.1.6. Disposal and Storage Facilities for Offshore Operational Wastes	4-41
		4.1.2.1.6.1. Nonhazardous Oil-field Waste Sites	4-41
		4.1.2.1.6.2. Landfills.....	4-42
		4.1.2.1.7. Coastal Pipelines	4-42
		4.1.2.1.8. Navigation Channels	4-43
4.1.2.2.		Discharges and Wastes	4-44
		4.1.2.2.1. Onshore Facility Discharges	4-44
		4.1.2.2.2. Coastal Service-Vessel Discharges	4-44
		4.1.2.2.3. Offshore Wastes Disposed Onshore.....	4-44
		4.1.2.2.4. Beached Trash and Debris.....	4-45
4.1.2.3.		Noise	4-45
4.1.3.		Other Cumulative Activities Scenario	4-46
	4.1.3.1.	State Oil and Gas Activities.....	4-46
		4.1.3.1.1. Leasing and Production.....	4-46
		4.1.3.1.2. Pipeline Infrastructure for Transporting State-Produced Oil and Gas.....	4-46

4.1.3.2.	Other Major Offshore Activities.....	4-46
4.1.3.2.1.	Dredged Material Disposal.....	4-46
4.1.3.2.2.	Nonenergy Minerals Program in the Gulf of Mexico	4-47
4.1.3.2.3.	Marine Transportation.....	4-48
4.1.3.2.4.	Military Activities.....	4-49
4.1.3.3.	Other Major Influencing Factors on Coastal Environments	4-49
4.1.3.3.1.	Submergence of Wetlands.....	4-49
4.1.3.3.2.	River Development and Flood Control Projects	4-50
4.1.3.3.3.	Dredging.....	4-50
4.1.3.4.	Major Sources of Oil Inputs in the Gulf of Mexico.....	4-51
4.1.3.4.1.	Municipal Wastewater Discharges.....	4-51
4.1.3.4.2.	Natural Seepage.....	4-52
4.1.3.4.3.	Spills.....	4-52
4.1.3.4.4.	Mississippi River Runoff	4-52
4.1.3.4.5.	Nonpoint-Source Urban Runoff.....	4-52
4.1.3.4.6.	Industrial Wastewater Discharges.....	4-52
4.1.3.4.7.	Produced Water.....	4-53
4.1.3.4.8.	Other Sources.....	4-53
4.2.	Environmental and Socioeconomic Impacts - Routine Operations.....	4-53
4.2.1.	Alternative A – The Proposed Actions.....	4-53
4.2.1.1.	Impacts on Air Quality	4-53
4.2.1.2.	Impacts on Water Quality	4-57
4.2.1.2.1.	Coastal Waters.....	4-57
4.2.1.2.2.	Marine Waters.....	4-58
4.2.1.3.	Impacts on Sensitive Coastal Environments.....	4-60
4.2.1.3.1.	Coastal Barrier Beaches and Associated Dunes.....	4-60
4.2.1.3.2.	Wetlands.....	4-61
4.2.1.3.3.	Seagrass Communities	4-66
4.2.1.4.	Impacts on Sensitive Offshore Benthic Resources	4-68
4.2.1.4.1.	Continental Shelf.....	4-68
4.2.1.4.1.1.	Live Bottoms (Pinnacle Trend).....	4-68
4.2.1.4.2.	Continental Slope and Deepwater Resources.....	4-69
4.2.1.4.2.1.	Chemosynthetic Communities.....	4-69
4.2.1.4.2.2.	Nonchemosynthetic Communities.....	4-73
4.2.1.5.	Impacts on Marine Mammals	4-75
4.2.1.6.	Impacts on Sea Turtles.....	4-81
4.2.1.7.	Impacts on the Alabama, Choctawhatchee, St. Andrew, and Perdido Key Beach Mice, and Florida Salt Marsh Vole.....	4-85
4.2.1.8.	Impacts on Coastal and Marine Birds.....	4-85
4.2.1.9.	Impacts on Endangered and Threatened Fish	4-89
4.2.1.9.1.	Gulf Sturgeon.....	4-89
4.2.1.9.2.	Smalltooth Sawfish	4-89
4.2.1.10.	Impacts on Fish Resources and Essential Fish Habitat.....	4-90
4.2.1.11.	Impacts on Commercial Fishing.....	4-94
4.2.1.12.	Impacts on Recreational Fishing.....	4-97
4.2.1.13.	Impacts on Recreational Resources.....	4-98
4.2.1.14.	Impacts on Archaeological Resources.....	4-99
4.2.1.14.1.	Historic.....	4-100
4.2.1.14.2.	Prehistoric.....	4-101
4.2.1.15.	Impacts on Human Resources and Land Use	4-102
4.2.1.15.1.	Land Use and Coastal Infrastructure.....	4-102
4.2.1.15.2.	Demographics	4-102
4.2.1.15.3.	Economic Factors.....	4-103
4.2.1.15.4.	Environmental Justice	4-105
4.2.2.	Alternative B – No Action.....	4-107

4.3.	Impact-Producing Factors and Scenario – Accidental Events	4-109
4.3.1.	Oil Spills	4-109
4.3.1.1.	Background	4-109
4.3.1.1.1.	Past Spill Incidents	4-110
4.3.1.1.1.1.	Past Record of OCS Offshore Spills	4-110
4.3.1.1.1.2.	Past Record of OCS Coastal Spills	4-110
4.3.1.1.1.3.	Past Record of All (OCS and non-OCS) Spills	4-111
4.3.1.1.2.	Projections of Spill Incidents	4-112
4.3.1.1.2.1.	Projections of Offshore Spills from OCS Program Operations	4-113
4.3.1.1.2.2.	Projections of Coastal Spills from OCS Program Operations	4-114
4.3.1.1.2.3.	Projections of Offshore Spills from Non-OCS Operations	4-115
4.3.1.1.2.4.	Projections of Coastal Spills from Non-OCS Operations	4-116
4.3.1.1.3.	Characteristics of OCS Oil	4-117
4.3.1.1.4.	Spill Prevention Initiatives	4-117
4.3.1.1.5.	Spill-Response Capabilities	4-118
4.3.1.1.5.1.	Oil-Spill Response Plans	4-118
4.3.1.1.5.2.	Financial Responsibility	4-118
4.3.1.1.5.3.	Offshore Response and Cleanup Technology	4-119
4.3.1.1.5.4.	Onshore Response and Cleanup Technology	4-120
4.3.1.1.5.5.	Shoreline Cleanup Countermeasures	4-121
4.3.1.2.	Risk Characterization for Proposed Action Spills	4-122
4.3.1.2.1.	Frequency, Magnitude, and Source of Spilled Oil from a Proposed Action	4-122
4.3.1.2.1.1.	Mean Estimated Numbers of Offshore Spills from a Proposed Action	4-122
4.3.1.2.1.2.	Most Likely Number of Offshore Spill Events for a Proposed Action	4-123
4.3.1.2.1.3.	Most Likely Number of Coastal Spill Events for a Proposed Action	4-123
4.3.1.2.1.4.	Probability of Spills Occurring as a Result of a Proposed Action	4-123
4.3.1.2.1.5.	Most Likely Sizes of Spills from a Proposed Action	4-124
4.3.1.2.1.6.	Most Likely Source/Cause of Offshore Spills	4-124
4.3.1.2.1.7.	Most Likely Locations of Probable Offshore Spills	4-125
4.3.1.2.1.8.	Most Likely Locations of Probable Coastal Spills	4-125
4.3.1.2.1.9.	Oil Types	4-125
4.3.1.2.1.10.	Estimated Total Volume of Oil from Assumed Spills	4-126
4.3.1.2.2.	Fate of Spilled Oil	4-126
4.3.1.2.2.1.	Persistence	4-127
4.3.1.2.2.2.	Mass Balance of Spilled Oil	4-127
4.3.1.2.2.3.	Short-Term Fate Processes	4-128
4.3.1.2.2.4.	Longer-Term Weathering Processes	4-129
4.3.1.2.2.5.	Likely Response/Cleanup of Spill	4-131

4.3.1.2.3.	Direct Exposure/Contact with Locations Where Sensitive Resources May Occur.....	4-132
4.3.1.2.3.1.	Transport of Slicks by Winds and Currents.....	4-132
4.3.1.2.3.2.	Offshore Surface Area Covered by Spilled Oil/Surface Layer Thickness.....	4-133
4.3.1.2.3.3.	Likelihood of an Offshore Spill Occurring and Contacting Modeled Locations of Environmental Resources.....	4-133
4.3.1.2.3.4.	Length of Shoreline That Could be Exposed to Stranded Oil if an Offshore Spill Occurring as a Result of a Proposed Action were to Contact Land.....	4-134
4.3.2.	Blowouts.....	4-134
4.3.3.	Vessel Collisions.....	4-135
4.3.4.	Chemical and Drilling Fluid Spills.....	4-136
4.4.	Environmental and Socioeconomic Impacts – Accidental Events.....	4-136
4.4.1.	Impacts on Air Quality.....	4-136
4.4.2.	Impacts on Water Quality.....	4-138
4.4.2.1.	Coastal Waters.....	4-138
4.4.2.2.	Marine Waters.....	4-138
4.4.3.	Impacts on Sensitive Coastal Environments.....	4-139
4.4.3.1.	Coastal Barrier Beaches and Associated Dunes.....	4-139
4.4.3.2.	Wetlands.....	4-140
4.4.3.3.	Seagrass Communities.....	4-142
4.4.4.	Impacts on Sensitive Offshore Benthic Resources.....	4-145
4.4.4.1.	Continental Shelf Resources.....	4-145
4.4.4.1.1.	Live Bottoms (Pinnacle Trend).....	4-145
4.4.4.2.	Continental Slope and Deepwater Resources.....	4-145
4.4.4.2.1.	Chemosynthetic Communities.....	4-145
4.4.4.2.2.	Nonchemosynthetic Communities.....	4-147
4.4.5.	Impacts on Marine Mammals.....	4-148
4.4.6.	Impacts on Sea Turtles.....	4-153
4.4.7.	Impacts on the Alabama, Choctawhatchee, St. Andrews, and Perdido Key Beach Mice, and the Florida Salt Marsh Vole.....	4-158
4.4.8.	Impacts on Coastal and Marine Birds.....	4-159
4.4.9.	Impacts on Endangered and Threatened Fish.....	4-161
4.4.9.1.	Gulf Sturgeon.....	4-161
4.4.9.2.	Smalltooth Sawfish.....	4-162
4.4.10.	Impacts on Fish Resources, Essential Fish Habitat, and Commercial Fishing.....	4-163
4.4.11.	Impacts on Recreational Fishing.....	4-167
4.4.12.	Impacts on Recreational Resources.....	4-167
4.4.13.	Impacts on Archaeological Resources.....	4-168
4.4.13.1.	Historic.....	4-168
4.4.13.2.	Prehistoric.....	4-168
4.4.14.	Impacts on Human Resources and Land Use.....	4-169
4.4.14.1.	Land Use and Coastal Infrastructure.....	4-169
4.4.14.2.	Demographics.....	4-169
4.4.14.3.	Economic Factors.....	4-169
4.4.14.4.	Environmental Justice.....	4-171
4.5.	Cumulative Environmental and Socioeconomic Impacts.....	4-172
4.5.1.	Impacts on Air Quality.....	4-172
4.5.2.	Impacts on Water Quality.....	4-175
4.5.2.1.	Coastal Waters.....	4-175
4.5.2.2.	Marine Waters.....	4-176

4.5.3.	Impacts on Sensitive Coastal Environments.....	4-177
4.5.3.1.	Coastal Barrier Beaches and Associated Dunes	4-177
4.5.3.2.	Wetlands	4-182
4.5.3.3.	Seagrass Communities.....	4-188
4.5.4.	Impacts on Sensitive Offshore Benthic Resources	4-191
4.5.4.1.	Continental Shelf Resources	4-191
4.5.4.1.1.	Live Bottoms (Pinnacle Trend).....	4-191
4.5.4.2.	Continental Slope and Deepwater Resources	4-195
4.5.5.	Impacts on Marine Mammals	4-198
4.5.6.	Impacts on Sea Turtles.....	4-205
4.5.7.	Impacts on the Alabama, Choctawhatchee, St. Andrew, and Perdido Key Beach Mice, and Florida Salt Marsh Vole.....	4-211
4.5.8.	Impacts on Coastal and Marine Birds.....	4-212
4.5.9.	Impacts on Endangered and Threatened Fish	4-215
4.5.9.1.	Gulf Sturgeon.....	4-215
4.5.9.2.	Smalltooth Sawfish	4-216
4.5.10.	Impacts on Fish Resources and Essential Fish Habitat.....	4-217
4.5.11.	Impacts on Commercial Fishing.....	4-222
4.5.12.	Impacts on Recreational Fishing.....	4-224
4.5.13.	Impacts on Recreational Resources	4-226
4.5.14.	Impacts on Archaeological Resources	4-227
4.5.14.1.	Historic	4-227
4.5.14.2.	Prehistoric	4-229
4.5.15.	Impacts on Human Resources and Land Use	4-231
4.5.15.1.	Land Use and Coastal Infrastructure.....	4-231
4.5.15.2.	Demographics	4-232
4.5.15.3.	Economic Factors	4-233
4.5.15.4.	Environmental Justice.....	4-234
4.6.	Unavoidable Adverse Impacts of the Proposed Actions	4-237
4.7.	Irreversible and Irrecoverable Commitment of Resources	4-238
4.8.	Relationship Between the Short-term Use of Man’s Environment and the Maintenance and Enhancement of Long-term Productivity.....	4-239
5.	CONSULTATION AND COORDINATION.....	5-3
5.1.	Development of the Proposed Actions.....	5-3
5.2.	Call for Information and Notice of Intent to Prepare an EIS.....	5-3
5.3.	Development of the Draft EIS.....	5-3
5.4.	Distribution of the Draft EIS for Review and Comment.....	5-8
5.5.	Public Hearings	5-9
5.6.	Major Differences Between the Draft and Final EIS’s	5-11
5.7.	Letters of Comment on the Draft EIS and MMS’s Responses.....	5-11
5.7.1.	Comments Noted Letters	5-12
5.7.2.	Comment Letters and MMS Responses.....	5-23
6.	REFERENCES.....	6-3
7.	PREPARERS.....	7-3
8.	GLOSSARY.....	8-3

APPENDIX A. PHYSICAL AND ENVIRONMENTAL SETTINGS.....	A-3
A.1. Geography and Geology.....	A-3
A.2. Physical Oceanography.....	A-6
A.3. Meteorological Conditions.....	A-9
A.4. Existing OCS-Related Infrastructure.....	A-12
APPENDIX B. STATE COASTAL ZONE MANAGEMENT PROGRAMS.....	B-3
APPENDIX C. RECENT PUBLICATIONS OF THE ENVIRONMENTAL STUDIES PROGRAM, GULF OF MEXICO REGION, 1999-2002.....	C-3
APPENDIX D. CONSULTATIONS.....	D-1
Section 7 Consultations.....	D-3
Essential Fish Habitat Consultation.....	D-9
KEYWORD INDEX.....	Keyword-3

Volume II

	Page
LIST OF FIGURES.....	xiii
LIST OF TABLES.....	xvii
FIGURES.....	3
TABLES.....	51
REFERENCES.....	151

ABBREVIATIONS, ACRONYMS, AND SYMBOLS

~	approximately	BOP	blowout preventer
°	degree	B.P.	before present
\$	dollar	BRD	Biological Resources Division (USGS)
>	greater than		
≥	greater than or equal to	C	Celsius
<	less than	CAA	Clean Air Act of 1970
≤	less than or equal to	CAAA	Clean Air Act Amendments of 1990
μg	microgram	Call	Call for Information and Nominations
'	minute	CBRA	Coastal Barrier Resources Act
%	percent	CBRS	Coastal Barrier Resource System
§	section	CCA	Coastal Coordination Act (Texas)
dB re ⁻¹ μPa-m	standard unit for source levels of underwater sound	CCMP	Comprehensive Conservation and Management Plan
2D	two-dimensional	CD	Consistency Determination
3D	three-dimensional	CDP	common-depth-point (seismic survey)
4C	multicomponent (data)	CEI	Coastal Environments, Inc.
4D	four-dimensional	CEQ	Council on Environmental Quality
5-Year Program	<i>Outer Continental Shelf Oil and Gas Leasing Program: 2002-2007</i>	CER	categorical exclusion review
ac	acre	CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
ACAA	Alabama Coastal Area Act	cf.	compare, see
ACAMP	Alabama Coastal Area Management Program	CFDL	Coastal Facilities Designation Line (Texas)
ACP	Area Contingency Plans	CFR	Code of Federal Regulations
ADCP	Acoustic Doppler Current Profiler	Chouest	Edison Chouest Offshore (also ECO)
ADCNR	Alabama Department of Conservation and Natural Resources	CIAP	Coastal Impact Assistance Program
ADEM	Alabama Department of Environmental Management	CIS	corrosion inhibiting substance
AHTS	anchor-handling tug supply vessels	cm	centimeter
AIRS	Aerometric Information Retrieval System	CNG	compressed natural gas
APD	Application for Permit to Drill	CNRA	Coastal Natural Resources Area
API	American Petroleum Institute	CO	carbon monoxide
Area ID	Area Identification	COE	Corps of Engineers (U.S. Army) (also USCOE)
ASLM	Assistant Secretary of the Interior for Land and Minerals	COF	covered offshore facility
atm	atmosphere	CPA	Central Planning Area
AVHRR	Advanced Very High Resolution Radiometer	CSA	Continental Shelf Associates
BAST	best available and safest technology	CWA	Clean Water Act
bbl	barrel	CWPPRA	Coastal Wetlands Protection, Planning & Restoration Act
BBO	billion barrels of oil	CZARA	Coastal Zone Act Reauthorization Amendments of 1990
BOE	barrels of oil equivalent	CZM	Coastal Zone Management
Bcf	billion cubic feet	CZMA	Coastal Zone Management Act
BLM	Bureau of Land Management	CZMP	Coastal Zone Management Program
BO	Biological Opinion	CZPA	Coastal Zone Protection Act of 1996
BOD	biochemical oxygen demand	DEP	Department of Environmental Protection (State of Florida)

DOC	Department of Commerce (U.S.) (also USDOC)	FMP	Fishery Management Plan
DOCD	Development Operations Coordination Document	FONNSI	finding of no new significant impact
DOD	Department of Defense (U.S.) (also USDOD)	FPS	floating production system
DOI	Department of the Interior (U.S.) (also USDOI)	FPSO	floating production, storage, and offloading system
DOT	Department of Transportation (U.S.) (also USDOT)	FR	<i>Federal Register</i>
DOTD	Department of Transportation and Development (Louisiana)	ft	foot
DP	dynamically positioned	FWS	Fish and Wildlife Service (U.S.)
DPV	dynamically positioned vessel	G&G	geological and geophysical
DWOP	Deepwater Operations Plan	gal	gallon
dwt	dead weight tonnage	GEMS	Gulf Ecological Management Site
E&D	exploration and development	GERG	Geochemical and Environmental Research Group
E&P	exploration and production	GIN	Gulf Islands National Seashore
EA	environmental assessment	GIS	geographical information system
ECO	Edison Chouest Offshore (also Chouest)	GIWW	Gulf Intracoastal Waterway
EEZ	Exclusive Economic Zone	GLPC	Greater Lafourche Port Commission
EFH	Essential Fish Habitat	GMAQS	Gulf of Mexico Air Quality Study
e.g.	for example	GMFMC	Gulf of Mexico Fishery Management Council
Eh	oxidation reduction potential	GMP	Gulf of Mexico Program
EIA	Energy Information Administration (USDOE)	GOM	Gulf of Mexico
EIS	environmental impact statement	GPS	global positioning system
EMAP-E	Environmental Monitoring and Assessment Program for Estuaries (USEPA)	GS	Geological Survey (also USGS)
EP	Exploration Plan	GSA	Geological Survey of Alabama
EPA	Eastern Planning Area	GTFP	green turtle fibropapillomatosis
Era	Era Aviation	GulfCet	Gulf Cetaceans
ESA	Endangered Species Act of 1973	H ₂ S	hydrogen sulfide
ESI	Environmental Sensitivity Indices	ha	hectare
ESP	Environmental Studies Program	HAPC	Habitat Areas of Particular Concern
ESPIS	Environmental Studies Program Information System	HCl	hydrochloric acid
et al.	and others	HLV	heavy lifting vessel
et seq.	and the following	HMS	highly migratory species
EWTA	Eglin Water Test Area	hr	hour
FAA	Federal Aviation Administration	Hz	hertz
FAD	fish attracting devices	IADC	International Association of Drilling Contractors
FCF	Fishermen's Contingency Fund	i.e.	that is
FCMP	Florida Coastal Management Program	INTERMAR	International Activities and Marine Minerals Division (MMS)
FDEP	Florida Department of Environmental Protection	IPF	impact-producing factors
FDR	floating drilling rig	IT	incidental take
FERC	Federal Energy Regulatory Commission	ITM	Information Transfer Meetings
FGBNMS	Flower Garden Banks National Marine Sanctuary	kJ	kilojoule
FMC	Fishery Management Council	kg	kilogram
FMG	Florida Middle Ground	km	kilometer
		kn	knots
		l	liter
		LA	Louisiana
		LADNR	Louisiana Department of Natural Resources (also LDNR)
		LA Hwy 1	Louisiana Highway 1

LATEX	Texas-Louisiana Shelf Circulation and Transport Process Program (MMS-funded study)	NEPA	National Environmental Policy Act
LC ₅₀	lethal concentration, 50% mortality	NFEA	National Fishing Enhancement Act
LCE	Loop Current Eddy	NGL	natural-gas liquids
LCRP	Louisiana Coastal Resources Program	NGVD	National Geodetic Vertical Depth
LDNR	Louisiana Department of Natural Resources (also LADNR)	NHPA	National Historic Preservation Act
LNG	liquefied natural gas	NHS	National Highway System
LOOP	Louisiana Offshore Oil Port	NMFS	National Marine Fisheries Service (also known as NOAA Fisheries)
LPG	liquefied petroleum gas	nmi	nautical mile
LSU	Louisiana State University	No.	number
m	meter	NO ₂	nitrogen dioxide
MA	Mississippi Alabama	NO _x	nitrogen oxide
MAFLA	Mississippi, Alabama, and Florida	NOA	Notice of Availability
MARPOL	International Convention for the Prevention of Pollution from Ships	NOAA	National Oceanic and Atmospheric Administration
Mcf	thousand cubic feet	NOAA	the DOC agency also known as NMFS
MCP	Mississippi Coastal Program	NOI	Notice of Intent to Prepare an EIS
MFCMA	Magnuson Fishery Conservation and Management Act of 1976	NORM	naturally occurring radioactive material
mg	milligrams	NOS	National Ocean Service
mi	statute mile	NOSAC	National Offshore Safety Advisory Committee
MRGO	Mississippi River Gulf Outlet	NOW	nonhazardous oil-field waste
Mbbl	thousand barrels	NPDES	National Pollution and Discharge Elimination System
mm	millimeter	NPFC	National Pollution Funds Center
MMbbl	million barrels	NPS	National Park Service
MMC	Marine Mammal Commission	NRC	National Research Council
MMcf	million cubic feet	NRDA	Natural Resource Damage Assessment
MMPA	Marine Mammal Protection Act of 1972	n.sp.	new specie
MMS	Minerals Management Service	NTL	Notice to Lessees and Operators
MPA	Marine Protected Area	NUT	new or unusual technology
mph	miles per hour	NWR	National Wildlife Refuge
MSA	Metropolitan Statistical Area	NWRC	National Wetlands Research Center
MSD	marine sanitation device	O ₂	oxygen
MSRC	Marine Spill Response Corporation	O ₃	ozone
MSL	mean sea level	OBC	ocean bottom cables
MSW	municipal solid waste	OBF	oil-based drilling fluids
Mta	million metric tons annually	OCD	Offshore and Coastal Dispersion
MODU	mobile offshore drilling unit	OCRM	Office of Ocean and Coastal Resource Management
MOU	Memorandum of Understanding	OCS	Outer Continental Shelf
MPPRCA	Marine Plastic Pollution Research and Control Act of 1987	OCSLA	Outer Continental Shelf Lands Act
MPRS	Marine Protection, Research, and Sanctuaries Act of 1972	ODD	Ocean Disposal Database
MTBE	methyl tertiary butyl ether	OPA	Oil Pollution Act of 1990
Mya	Million years ago	OPA 90	Oil Pollution Act of 1990
N.	North	OPEC	Organization for Petroleum Exporting Countries
NAAQS	National Ambient Air Quality Standards	OPEIU	Office of Professional Employees International Union
NACE	National Association of Corrosion Engineers	OSCP	Oil Spill Contingency Plan
NEP	National Estuary Program	OSFR	oil-spill financial responsibility
		OSLTF	Oil Spill Liability Trust Fund
		OSM	Office of Safety Management
		OSRA	Oil Spill Risk Analysis

OSRO	Oil Spill Removal Organization	SWAMP	Sperm Whale Acoustic Monitoring Program
OSRP	oil-spill response plan		
OSV	offshore supply vessels	SWSS	Sperm Whale Seismic Study
P	compressional (wave)	TA&R	Technical Assessment & Research Program (MMS)
P.L.	Public Law		
PAH	polynuclear aromatic hydrocarbon	TAMU	Texas A&M University
PCB	polychlorinated biphenyl	Tcf	trillion cubic feet
pCi	picocuries	TCMP	Texas Coastal Management Plan
PEMEX	Petroleos Mexicanos	TED	turtle excluder device
pH	potential of hydrogen	TIMS	Technical Information Management System (MMS)
PHI	Petroleum Helicopters, Inc.		
PINC	Potential Incident of Noncompliance	TLP	tension leg platform
		TRW	topographic Rossby wave
PM ₁₀	particulate matter smaller than 10 microns	TSS	traffic separation scheme
		TWC	treatment, workover, and completion
PNOS	Proposed Notice of Sale		
POE	Plan of Exploration	TX	Texas
ppb	parts per billion		
ppm	parts per million	U.S.	United States
PSD	Prevention of Significant Deterioration	U.S.C.	United States Code
		USCG	U.S. Coast Guard
psi	pounds per square inch	USCOE	U.S. Army Corps of Engineers (also COE)
PSV	platform supply vessel	USDOC	U.S. Department of Commerce (also DOC)
		USDOD	U.S. Department of Defense (also DOD)
R&D	research and development	USDOJ	U.S. Department of the Interior (also DOI)
RCRA	Resource Conservation and Recovery Act	USDOT	U.S. Department of Transportation (also DOT)
RD	Regional Director	USEPA	U.S. Environmental Protection Agency
RFG	reformulated motor gasoline	USGS	United States Geological Survey (also GS)
ROTAC	Regional Operations Technology Assessment Committee		
ROV	remotely operated vehicle		
RP	Recommended Practice		
RS-FO	Regional Supervisor for Field Operations		
		VK	Viosca Knoll
S.	South	VOC	volatile organic compounds
SAFMC	South Atlantic Fishery Management Councils	vs.	versus
SARA	Superfund Amendments and Reauthorization Act	W.	West
SBF	synthetic-based drilling fluid	WBF	water-based drilling fluids
SEAMAP	Southeastern Area Monitoring and Assessment Program	WPA	Western Planning Area
sec	second		
Secretary	Secretary of the Interior	yr	year
SEIS	supplemental environmental impact statement		
semi	semisubmersible		
SIC	Standard Industrial Classification		
SIP	State implementation program		
SO ₂	sulphur dioxide		
SO _x	sulphur oxide		
SOLAS	Safety of Life at Sea		
sp.	species		
spp.	multiple species		
Stat.	Statute		

CONVERSION CHART

Measurements in this environmental impact statement are given in the International System of Units (SI) except where United States (U.S.) customary units are the accepted standard (for example, altitudes for aircraft). Factors for converting SI units to U.S. customary units are provided in the following table.

To convert from	To	Multiply by
millimeter (mm)	inch (in)	0.03937
centimeter (cm)	inch (in)	0.3937
meter (m)	foot (ft)	3.281
kilometer (km)	mile (mi)	0.6214
meter ² (m ²)	foot ² (ft ²)	10.76
	yard ² (yd ²)	1.196
	acre (ac)	0.0002471
hectare (ha)	acre (ac)	2.47
kilometer ² (km ²)	mile ² (mi ²)	0.3861
meter ³ (m ³)	foot ³ (ft ³)	35.31
	yard ³ (yd ³)	
liter (l)	gallons (gal)	0.2642
degree Celsius (°C)	degree Fahrenheit (°F)	°F = (1.8 x °C) + 32
1 barrel (bbl) = 42 gal = 158.9 l = approximately 0.1428 metric tons		
1 nautical mile (nmi) = 6,076 ft or 1.15 mi		

LIST OF FIGURES (in Volume II)

	Page
Chapter 1	
1-1 Gulf of Mexico Outer Continental Shelf Planning Areas and Locations of Major Cities	3
1-2 Lease Status of the Proposed Lease Sale Area	4
1-3 Exploration and Development Activity in the Proposed Lease Sale Area.....	5
Chapter 2	
2-1 Military Warning Areas in the Gulf of Mexico	6
Chapter 3	
3-1 Status of Ozone Attainment in the Coastal Counties and Parishes of the Central Gulf of Mexico	7
3-2 Breton National Wilderness Area and Other PSD Class I Air Quality Areas in Proximity to the Proposed Lease Sale Area	8
3-3 Estuarine Systems of the Gulf of Mexico	9
3-4 Multibeam Bathymetric Image of "Double Top" and "Alabama Alps" Pinnacle Features Located along the Mississippi/Alabama Shelf.....	10
3-5 Biological Sample and Survey Locations in the Proposed Lease Sale Area	11
3-6 Location of Known Chemosynthetic Communities in the Gulf of Mexico	12
3-7 Geographic Locations along the Gulf of Mexico Relevant to Marine Mammals and Sea Turtles.....	13
3-8 Location of the Only Known Site of the Florida Salt Marsh Vole Habitat.....	14
3-9 Areas Closed to Longline Fishing in the Gulf of Mexico.....	15
3-10 Gulf of Mexico Offshore and Coastal Subareas	16
3-11 Interstates, Airports, and Railways in the Coastal Subareas	17
3-12 Major Ports and Domestic Waterways in the Coastal Subareas	17
3-13 OCS-Related Service Bases in the Coastal Subareas.....	18
3-14 Areas with 50 Percent or Greater Minority Populations.....	19
3-15 Areas with 50 Percent or More Households with Annual Incomes of Less Than \$15,000	19
Chapter 4	
4-1 Deepwater Exploration and Production Structures.....	20
4-2 Generic Well Schematic for a Shallow Exploration Well in the Proposed Lease Sale Area, Composited from Nearby Industry Developments Projects	21
4-3 Existing and Proposed Pipelines Near the Proposed Lease Sale Area.....	22
4-4 Location of Identified Sand Resource Sites Offshore Alabama	23
4-5 Study Area for Synthesis of Hard Mineral Resources on the Florida Panhandle Shelf.....	24
4-6 A Comparison of Spill Frequency and Spill Volume for Past OCS Spills by Size Category (1971-1999).....	25
4-7 Probability of a Particular Number of Offshore Spills $\geq 1,000$ bbl Occurring as a Result of OCS Program Operations Gulfwide during the Years 2003-2042	26
4-8 Probability of a Particular Number of Offshore Spills $\geq 1,000$ bbl Occurring as a Result of OCS Program Operations in the Central Planning Area during the Years 2003-2042.....	27
4-9 Probability of a Particular Number of Offshore Spills $\geq 1,000$ bbl Occurring as a Result of OCS Program Operations in the Western Planning Area during the Years 2003-2042	28
4-10 Study Area Used to Estimate Spill Risk Associated with a Proposed Action	29
4-11 Mass Balance of a Hypothetical Spill of 4,600 bbl of a Likely Lighter Weight Crude Oil Spilled over 12 Hours from an OCS Pipeline Break at DeSoto Canyon Block 884 during Summer Conditions.....	30

4-12	Mass Balance of a Hypothetical Spill of 4,600 bbl of a Likely Heavier Weight Crude Oil Spilled over 12 Hours from an OCS Pipeline Break at DeSoto Canyon Block 225 during Winter Conditions	31
4-13	Mass Balance of a Hypothetical Spill of 4,600 bbl of a Likely Lighter Weight Crude Oil Spilled over 12 Hours from an OCS Pipeline Break at Viosca Knoll Block 948 during Winter Conditions.....	32
4-14	Mass Balance of a Hypothetical Spill of 4,600 bbl of a Likely Heavier Weight Crude Oil Spilled over 12 Hours from an OCS Pipeline Break at Mississippi Canyon Block 952 during Summer Conditions.....	33
4-15	Typical Slick Shape	34
4-16	Oil Weathering at Sea	35
4-17	Relative Importance of Weathering Processes Over Time	35
4-18	Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Gulf States' Shorelines (by County and Parish) within 10 or 30 Days as a Result of a Proposed Action (only counties and parishes with greater than a 0.5% risk of contact within 10 or 30 days are shown).....	36
4-19	Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Gulf States' Offshore Waters or Recreational Beach Areas within 10 or 30 Days as a Result of a Proposed Action	37
4-20	Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting the Surface Waters Overlying and Surrounding Offshore Environmental Features or Reaching Boundary Targets within 10 or 30 Days as a Result of a Proposed Action	38
4-21	Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Marine Mammal Habitats within 10 or 30 Days as a Result of a Proposed Action	39
4-22	Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Manatee Habitats within 10 or 30 Days as a Result of a Proposed Action	40
4-23	Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Known Locations of Gulf Sturgeon within 10 or 30 Days as a Result of a Proposed Action	40
4-24	Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Sea Turtle Habitats within 10 or 30 Days as a Result of a Proposed Action	41
4-25	Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Endangered Beach Mice Habitats within 10 or 30 Days as a Result of a Proposed Action	42
4-26	Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Snowy Plover Habitat within 10 or 30 Days as a Result of a Proposed Action	43
4-27	Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Piping Plover Habitat within 10 or 30 Days as a Result of a Proposed Action	43
4-28	Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Whooping Crane Habitat within 10 or 30 Days as a Result of a Proposed Action	43
4-29	Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Brown Pelican Habitat within 10 or 30 Days as a Result of a Proposed Action	44
4-30	Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Bald Eagle Habitat within 10 or 30 Days as a Result of a Proposed Action	44
4-31	Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Raptor Bird Habitats within 10 or 30 Days as a Result of a Proposed Action	44

4-32 Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Gull, Terns, and Charadriid Allies Habitats within 10 or 30 Days as a Result of a Proposed Action 45

4-33 Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Charadriid Shoreline Bird Habitats within 10 or 30 Days as a Result of a Proposed Action 45

4-34 Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Diving Bird Habitats within 10 or 30 Days as a Result of a Proposed Action 45

4-35 Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Wading Bird Habitats within 10 or 30 Days as a Result of a Proposed Action 46

4-36 Probabilities of Offshore Spills ($\geq 1,000$ bbl) Occurring over the Life of a Proposed Action and Contacting Waterfowl Habitats within 10 or 30 Days as a Result of a Proposed Action 46

Appendix

A-1 Temperature vs. Salinity Based on Data Collected in the Eastern Gulf of Mexico during the Synoptic Gulfwide R/V Hidalgo Cruise 62-H-3, February-March 1962..... 47

LIST OF TABLES (in Volume II)

	Page
Chapter 2	
2-1 Military Contacts (as of August 2002).....	51
Chapter 3	
3-1 National Ambient Air Quality Standards.....	52
3-2 Historical and Current Benthic Sampling Stations in the Proposed Lease Sale Area.....	53
3-3 Known Locations of Significant Chemosynthetic Communities in the Gulf of Mexico	53
3-4 Marine Mammal Taxa of the Northern Gulf of Mexico	54
3-5 Sea Turtle Taxa of the Northern Gulf of Mexico.....	55
3-6 The 21 Most Abundant Families in Ichthyoplankton Samples from Quadrants of the Gulf of Mexico.....	56
3-7 Dominant Taxa taken in Collections from the DeSoto Canyon Area during Nine SEAMAP Spring Survey Cruises in April and May 1986-1993	57
3-8 Dominant Taxa taken in Collections from the DeSoto Canyon Area during Ten SEAMAP Fall Survey Cruises in September 1986-1994	57
3-9 Percent Occurrence and Mean Abundance of Tuna Larvae in Collections from the DeSoto Canyon Area and Gulfwide during SEAMAP Spring and Fall Survey Cruises.....	58
3-10 Percent Occurrence and Mean Abundance of Dolphin and Billfish Larvae in Collections from the DeSoto Canyon Area and Gulfwide during SEAMAP Spring and Fall Survey Cruises	58
3-11 Gulf of Mexico Essential Fish Habitat Assessment (species under Gulf of Mexico Fishery Management Plans in proposed lease sale area).....	59
3-12 Gulf of Mexico Essential Fish Habitat Assessment (highly migratory species managed by NMFS in proposed lease sale area)	60
3-13 Marine Recreational Fishermen and Fishing Trips.....	61
3-14 Historic Shipwrecks within the Proposed Lease Sale Area	61
3-15 Shipwrecks in Alabama State Waters	62
3-16 Onshore Expenditures Allocations by Coastal Subarea.....	63
3-17 Demographic and Employment Baseline Projections for the United States.....	64
3-18 Demographic and Employment Baseline Projections for Texas.....	66
3-19 Demographic and Employment Baseline Projections for Coastal Subarea TX-1.....	68
3-20 Demographic and Employment Baseline Projections for Coastal Subarea TX-2.....	70
3-21 Demographic and Employment Baseline Projections for Louisiana	72
3-22 Demographic and Employment Baseline Projections for Coastal Subarea LA-1.....	74
3-23 Demographic and Employment Baseline Projections for Coastal Subarea LA-2.....	76
3-24 Demographic and Employment Baseline Projections for Coastal Subarea LA-3.....	78
3-25 Demographic and Employment Baseline Projections for Mississippi.....	80
3-26 Demographic and Employment Baseline Projections for Alabama.....	82
3-27 Demographic and Employment Baseline Projections for Coastal Subarea MA-1.....	84
3-28 Demographic and Employment Baseline Projections for Florida.....	86
3-29 Demographic and Employment Baseline Projections for Coastal Subarea FL-1	88
3-30 Demographic and Employment Baseline Projections for Coastal Subarea FL-2	90
3-31 Demographic and Employment Baseline Projections for Coastal Subarea FL-3	92
3-32 Demographic and Employment Baseline Projections for Coastal Subarea FL-4	94
3-33 Depth and Number of Trips (1999) for OCS-Related Waterways.....	96
3-34 Freight Traffic (1999) for OCS-Related Waterways	97
3-35 Typical Gulf of Mexico Vessel Specifications	98
3-36 OCS-Related Service Bases.....	98

3-37	Existing Coastal Infrastructure Related to OCS Program Activities in the Gulf of Mexico by Coastal Subarea	99
------	--	----

Chapter 4

4-1	Projected Oil and Gas Production in the Gulf of Mexico OCS	100
4-2	Offshore Scenario Information Related to a Proposed Action in the Eastern Planning Area	101
4-3	Offshore Scenario Information Related to OCS Program Activities in the Gulf of Mexico for the Years 2003-2042	102
4-4	Offshore Scenario Information Related to OCS Program Activities in the Eastern Planning Area for the Years 2003-2042	103
4-5	Offshore Scenario Information Related to OCS Program Activities in the Central Planning Area for the Years 2003-2042	104
4-6	Offshore Scenario Information Related to OCS Program Activities in the Western Planning Area for the Years 2003-2042	105
4-7	Coastal Infrastructure Related to OCS Program Activities in the Gulf of Mexico for the Years 2003-2042 by Coastal Subarea	106
4-8(a)	Average Volumes of Fluids (muds) and Cuttings Projected for a Typical Shallow Exploration Well or Development Well in the Proposed Lease Sale Area	107
4-8(b)	Average Volumes of Fluids (muds) and Cuttings Projected for a Typical Deep Exploration Well or Development Well in the Proposed Lease Sale Area	107
4-9	Annual Volume of Produced Water Discharged Overboard on the OCS from 1996 to 2000	108
4-10	Average Annual Emission Rates from OCS Infrastructures in the Gulf of Mexico	108
4-11	Average Annual Emission Rates from OCS Infrastructures in the Eastern Planning Area	108
4-12	OCS Louisiana Study Area Pipeline Landloss Trend Summary	109
4-13	2000 Cleanup Totals: People, Pounds, and Miles	109
4-14	Annual Inputs of Petroleum Hydrocarbons to Gulf of Mexico Waters from Various Sources	110
4-15	Projected Annual Oil Spill Occurrence within Coastal and Offshore Waters of the Gulf of Mexico	111
4-16	Projected Total OCS Emissions Related to a Proposed Action by Source	112
4-17	Projected Total OCS Emissions Related to a Proposed Action by Offshore Subarea	112
4-18	Projected Peak-Year OCS Emissions Related to a Proposed Action by Source	113
4-19	Projected Peak-Year OCS Emissions Related to a Proposed Action by Offshore Subarea	113
4-20	Results of Concentration Estimates and the Corresponding Maximum Allowable Increases, Class I Areas	114
4-21	Results of Concentration Estimates and the Corresponding Maximum Allowable Increases, Class II Areas	114
4-22	Population Projected for a Proposed Lease Sale	115
4-23	Population Projected for a Proposed Lease Sale as a Percent of Total Population	116
4-24	Employment (Direct, Indirect, and Induced) Projected for a Proposed Lease Sale	117
4-25	Employment (Direct, Indirect, and Induced) Projected for a Proposed Lease Sale as a Percent of Total Employment	118
4-26	Past OCS Oil Spills, 1985-1999	119
4-27	Offshore Spills $\geq 1,000$ bbl, 1964-2000, from Accidents Associated with OCS Facility Operations	120
4-28	Offshore Spills $\geq 1,000$ bbl, 1964-2000, from Accidents Associated with OCS Pipeline Oil Transport	121
4-29	Offshore Spill Rates Used to Estimate the Future Potential for Spills	122
4-30	Probability of One or More Offshore Spills Occurring and the Number of Assumed Offshore Spills Occurring from a Facility, Pipeline, or Tanker Accident as a Result of the OCS Program (2003-2042)	123
4-31	Number of Assumed Offshore Spills Occurring, the Probability of these Offshore Spills Occurring, and the Assumed Offshore Spill Sizes as a Result of a Proposed Action	124

4-32	Number of Assumed Spills Occurring in Louisiana Coastal Waters from Support Operation Accidents as a Result of a Proposed Action	125
4-33	Probability of a Particular Number of Offshore Spills Occurring from OCS Facility Operations and/or OCS Pipelines as a Result of a Proposed Action	125
4-34	Probability of One or More Offshore Spills $\geq 1,000$ bbl Occurring and Contacting Environmental Resource Habitats, Offshore Features, Beach Areas, or Parish Shorelines within 10 or 30 Days as a Result of a Proposed Action.....	126
4-35	Surface Area Covered and Length of Shoreline Contacted as a Function of Time for a Hypothetical Spill of 4,600 bbl of Neptune Composite Oil Spilled Over 12 Hours from an OCS Pipeline Break in DeSoto Canyon Block 884 during the Summer (represents the minimum volume of oil remaining in a slick as a function of time for EPA conditions)	127
4-36	Surface Area Covered or Length of Shoreline Contacted as a Function of Time for a Hypothetical Spill of 4,600 bbl of Heavy Arabian Crude Spilled Over 12 Hours from an OCS Pipeline Break DeSoto Canyon Block 225 during the Winter (represents the maximum volume of oil remaining in slick as a function of time for EPA conditions).....	127
4-37	Surface Area Covered and Length of Shoreline Contacted as a Function of Time for a Hypothetical Spill of 4,600 bbl of Neptune Composite Oil Spilled Over 12 Hours from an OCS Pipeline Break in Viosca Knoll Block 948 during the Winter (represents the minimum volume of oil remaining in slick as a function of time for CPA conditions)	128
4-38	Surface Area Covered or Length of Shoreline Contacted as a Function of Time for a Hypothetical Spill of 4,600 bbl of Heavy Arabian Crude Spilled Over 12 Hours from an OCS Pipeline Break at Mississippi Canyon Block 952 during the Summer (represents the maximum volume of oil remaining in slick as a function of time for CPA conditions)	128
4-39	Employment Associated with the Cleanup and Remediation of a Scenario Spill	129
4-40	Employment Associated with the Cleanup and Remediation of a Small Spill	129
4-41	Projected Total OCS Emissions Related to the OCS Program in the EPA by Source for the Years 2003-2042.....	130
4-42	Projected Total OCS Emissions Related to the OCS Program in the CPA by Source for the Years 2003-2042.....	131
4-43	Projected Total Emissions Related to the OCS Program in the EPA by Subarea for the Years 2003-2042.....	132
4-44	Projected Total Emissions Related to the OCS Program in the CPA by Subarea for the Years 2003-2042.....	132
4-45	Projected Peak-Year Emissions Related to the OCS Program in the EPA by Source for the Years 2003-2042.....	133
4-46	Projected Peak-Year Emissions Related to the OCS Program in the CPA by Source for the Years 2003-2042.....	134
4-47	Projected Peak-Year Emissions Related to the OCS Program in the EPA by Subarea for the Years 2003-2042.....	135
4-48	Projected Peak-Year Emissions Related to the OCS Program in the CPA by Subarea for the Years 2003-2042.....	135
4-49	Class I Air Quality Area Results of Concentration Estimates from OCS Emissions and Corresponding Maximum Allowable Increases for the Years 2003-2042	136
4-50	Class II Air Quality Areas Results of Concentration Estimates for OCS Emissions and Corresponding Maximum Allowable Increases for the Years 2003-2042	136
4-51	Gulf Ecological Management Site (GEMS) Areas	137
4-52	Recommended Mitigation Techniques Used to Avoid or Reduce Adverse Impact to Wetlands by Pipelines, Canals, Dredging, and Dredged Material Placement	140
4-53	Population Projected for the OCS Program	143
4-54	Population Projected for the OCS Program as a Percent of Total Population	144
4-55	Employment (Direct, Indirect, and Induced) Projected for the OCS Program	145
4-56	Employment (Direct, Indirect, and Induced) Projected for the OCS Program as a Percent of Total Employment.....	146

Appendix

A-1	Watermasses in the Eastern Gulf of Mexico.....	147
A-2	Climatological Data for Selected Gulf Coast Locations.....	147
A-3	Summary of the Most Damaging Hurricanes in the Gulf of Mexico (1900-1999).....	148