I. INTRODUCTION ........................................................................................................ 1-1

II. DESCRIPTION OF PROPOSED ACTION .................................................................... 2-1

III. MAJOR CONCLUSIONS ON THE APPLICATION OF THE STATE ENVIRONMENTAL QUALITY REVIEW ACT TO THE OIL, GAS AND SOLUTION MINING LAW ............... 3-1

A. Introduction .................................................................................................................. 3-1

B. SEQR Requirements .................................................................................................... 3-2

C. Proposed SEQR Determinations ................................................................................... 3-5

D. Future SEQR Compliance ............................................................................................ 3-5

   Table 3.1 Proposed SEQR Determination ........................................................................ 3-5a

E. Parameters for Future SEQR Reviews ........................................................................ 3-6

   1. Project ....................................................................................................................... 3-7

      Figure 3.1 - Intrastate Pipeline Jurisdiction ................................................................ 3-8a

   2. Size of Project .......................................................................................................... 3-8

   3. Lead Agency ............................................................................................................. 3-8

F. Summary of Impacts ..................................................................................................... 3-9

   1. Cumulative Impacts .................................................................................................. 3-9

      Table 3.2 Resource Impact Summary ........................................................................... 3-9a

   2. Secondary Impacts .................................................................................................... 3-10

   3. Long Term Impacts .................................................................................................. 3-11

IV. HISTORY OF OIL, GAS AND SOLUTION SALT PRODUCTION IN NEW YORK STATE

A. Introduction .................................................................................................................. 4-1

B. Oil and Gas History ..................................................................................................... 4-1
1. Natural Seeps 4-1
2. Early Wells 4-1
3. Oil and Gas Production Trends
   Figure 4.1 Annual Production of Crude Oil in NYS 4-2a
   Figure 4.2 Annual Production of Natural Gas in NYS 4-2b
4. Underground Gas Storage Fields 4-3
C. Solution Salt Mining History 4-3
   1. Early Methods of Salt Extraction 4-3
   2. Establishment of Permanent Salt Production Industry in New York State
      Figure 4.3 Solution Salt Mining Operations in NYS 4-5a
      Figure 4.4 Annual Production of Salt in NYS 4-5b
D. Historic Environmental Problems 4-5
E. New York's Oil, Gas and Solution Mining Legislative History 4-7
   1. Early History 4-7
   2. 1981, 1984 and 1987 Revisions to the Oil, Gas and Solution Mining Law 4-9
   3. Regulations Implementing the Oil, Gas and Solution Mining Law 4-11
V. NEW YORK STATE GEOLOGY AND ITS RELATIONSHIP TO OIL, GAS AND SALT PRODUCTION
A. Geologic Provinces in New York State 5-1
   1. Adirondacks and Hudson Highlands: Igneous and Metamorphic Terrains 5-1
   2. Western and Central New York: Paleozoic Sedimentary Rocks 5-2
B. Geologic Factors Which Determine the Existence of Oil, Gas and Salt in Sedimentary Rocks 5-3
   1. Factors Which Affect Productibility 5-5
   2. Economic Factors Affecting Productibility 5-6
C. Producing Formations 5-9
1. Cambrian Period 5-9
   Figure 5.1 Stratigraphic Section Southwestern New York 5-9a

2. Ordovician Period 5-12
   Figure 5.2 Ordovician Bedrock in New York State 5-12a

3. Silurian Period 5-15
   Figure 5.3 Silurian Bedrock in New York State 5-15a

4. Devonian Period 5-20
   Figure 5.4 Devonian Bedrock in New York State 5-20a
   a. Oriskany Sandstone Formation 5-25
   b. Onondaga Limestone Formation 5-26
   c. Tully Limestone Formation 5-27
   d. Devonian Black Shale Production 5-27
   e. Upper Devonian Oil Producing Sands 5-29

D. Other Areas of Oil and Gas Interest 5-30
   1. "Bass Island" Trend 5-30
      Figure 5.5 "Bass Island" Trend Oil and Gas Fields 5-31a
   2. Eastern Overthrust 5-32
      Figure 5.6 The Eastern Overthrust Belt in New York State 5-32a

E. Geothermal Resources 5-34

VI. ENVIRONMENTAL RESOURCES 6-1
   A. Introduction 6-1
   B. Waterways/Waterbodies 6-2
   C. Drinking Water Supplies 6-3
      Figure 6.1 Ground Water Aquifers and Their Uses 6-3a
      Figure 6.2 Ground Water Aquifers in New York State 6-4a
   D. Public Lands 6-6
   E. Coastal Areas 6-7
   F. Wetlands 6-8
   G. Floodplains 6-9
H. Soils
   Figure 6.3 The Lime Content of New York State Soils 6-10
   Figure 6.4 General Soil Limitations of New York State 6-10a & 6-10b

I. Agricultural Lands
   Figure 6.5 The Fourteen Agricultural Regions of NYS 6-11

J. Intensive Timber Production Areas 6-13

K. Significant Habitats 6-14

L. Areas of Historic, Architectural, Archeological and Cultural Significance 6-16

M. Clean Air 6-16

N. Visual Resources 6-17

VII. NYS OIL, GAS AND SOLUTION MINING PROGRAM
   A. Introduction 7-1
      1. Administrative Procedures 7-2
         a. Permit Conditions 7-2
         b. Inspections 7-3
         c. Reporting Requirements 7-3
         d. Enforcement 7-3
      B. Drilling Permit Applications and the Review Process 7-4
         1. Preliminary Procedures 7-4
         2. Permit Application 7-5
         3. Application Processing 7-7
      C. Phases of Well Development 7-8

VIII. SITING OF OIL AND GAS WELLS
   A. Introduction 8-1
B. Well Spacing

Figure 8.1 Drilling Site Layout

1. Statewide Spacing

C. Siting Regulations and Policies

D. Public Safety and Well Siting

1. Public Safety/Other Well Site Facilities

2. Noise, Visual and Air Quality Impacts
   a. Temporary Noise, Visual and Air Quality Impacts
   b. Longer-Term Noise and Visual Impacts

   Figure 8.2 Typical Gas Production Well Site
   c. Visual Resources of Statewide Significance
   d. Summary of Noise and Visual Impacts

E. Water Quality

1. Surface Waters

2. Springs

3. Municipal Water Supplies
   a. Surface Municipal Water Supplies
   b. Municipal Water Wells
   c. Primary and Principal Aquifers

4. Public (Community and Non-Community) Supplies

5. Private Wells

F. Agriculture

1. Drainage Systems

2. Bisection of Fields

3. Site Restoration
   8.3 Restored Site of Blowout and Production Record Holder

4. Water Supply
5. Lease Terms 8-27
6. DEC Permit Conditions 8-28

G. Stream Disturbance 8-28
1. Streambanks 8-29
2. Gathering Lines 8-30
3. Culverts and Sills 8-31
4. Fill and Filter Fabric 8-31
5. General 8-32
6. Aquatic Habitat 8-32

H. Erosion and Sedimentation 8-32
1. Wells and Drinking Water Reservoirs 8-33
2. Other Wells 8-34

I. Historic/Archeologic 8-35
1. Historic Sites 8-35
2. Archeological Sites 8-36
   Figure 8.4 Archeological Sites in Southwestern New York 8-36a
   Figure 8.5 Archeologic Review Process 8-37a

J. Significant Habitats 8-37
1. Heronries 8-38
2. Deer Wintering Areas 8-38
3. Uncommon, Rare and Endangered Plants 8-39

K. Floodplains 8-39
1. Mud or Reserve Pits 8-40
2. Brine and Oil Tanks 8-41
3. Other Tanks 8-42
4. Brush Debris 8-43
5. Erosion/Topsoil 8-44
6. Bulk Supplies 8-44
7. Accidents 8-44

L. Freshwater Wetlands 8-44

Table 8.1 Freshwater Wetland Classification 8-46a
1. Interruption of Natural Drainage 8-46
2. Flooding 8-47
3. Erosion and Sedimentation 8-47
4. Brush Disposal 8-48
5. General Permit Conditions 8-49
6. Creation of Replacement Wetland 8-50
   Figure 8.6 Wetland Permit Conditions and Mitigation 8-50a
   Pond
   Figure 8.7 Gas Well in Class I Wetland 8-50b
7. Increased Access 8-51
8. Pit Location 8-52

M. State Lands 8-53
1. State Lands Permits 8-53
2. State Park Lands 8-54

N. Coastal Zone 8-54
1. Local Plans 8-56
2. Significant Coastal Fish and Wildlife Habitats 8-56

O. "Critical Environmental Area" 8-57

IX DRILLING PHASE: DRILLING, CASING AND COMPLETION OPERATIONS 9-1

A. Introduction 9-2
1. Drilling Rigs 9-2
2. Drilling Fluids 9-2
   Figure 9.1 Truck Mounted Rotary Drilling Rig 9-2a
   Figure 9.2 Cable Tool Rig 9-2b
3. Casing and Cementing 9-3
4. Drilling Safety Considerations 9-4

B. Conductor Casing 9-8

C. Surface Casing 9-10
   Figure 9.3 Primary Cementing Procedures 9-10a
   1. Recent Revisions 9-13
   2. Further Revisions 9-13

D. Well Control 9-18
   1. Blowout Preventers 9-18
      Figure 9.4 Blowout Prevention Equipment 9-19a

E. Production Casing 9-22
   1. Annular Pressure 9-23
   2. Completion and Testing 9-24

F. Stimulation 9-25
   1. Water-Gel Fracs 9-26
   2. Foam Fracs 9-27
   3. Flowback 9-28

G. Completion Reports and Well Logs 9-29

H. Waste Handling and Disposal 9-31
   1. On Site Waste Handling 9-31
   2. Pit Construction 9-31
   3. Pit Liners 9-32
      Table 9.1 Pit Liner Specifications 9-33a
   4. Pitless Drilling 9-34
   5. Tanks 9-35
   6. Waste Fluids 9-36
      a. Brine or Freshwater Drilling Fluid 9-36
      b. Drilling Mud 9-36
c. Completion Fluid 9-36
d. Acid 9-37
e. Frac Fluid 9-37
f. Formation Water/Production Fluid 9-37
g. Precipitation 9-38

7. Environmental Impacts 9-38
   a. Chlorides 9-39
   b. Surfactants 9-40
c. Gelling Agents 9-41
d. Heavy Metals and Other Drilling Pit Components 9-41
   Table 9.2 Quality Standards and Guidelines for Other Commonly Found Inorganic Chemicals 9-41a

8. Waste Disposal 9-44

X. WELL COMPLETION AND PRODUCTION PRACTICES
   A. Introduction 10-1
   B. Production 10-1
      1. Gas Well Production 10-2
         Figure 10.1 Standard Producing Gas Well 10-2a
         a. Potential Environmental Impacts of Gas Production 10-3
      2. Oil Well Production 10-7
         Figure 10.2 Sucker Rod Pumping System 10-7a
         a. Potential Environmental Problems of Oil Production 10-7
      3. Production Reports and Conservation of Resources 10-12

XI. PLUGGING AND ABANDONMENT OF OIL AND GAS WELLS
   A. Introduction 11-1
   B. Plugging Regulations 11-2
1. Old Plugging Regulations

2. Existing Plugging Regulations

3. Summary of Existing Plugging Requirements
   Figure 11.1 Schematic of Existing New York Well Plugging Requirements

C. Mudding the Hole

D. Plugging Methods

E. Additional Plugging Requirements
   1. Site Reclamation
      Figure 11.2 Well Site After Proper Reclamation
   2. Potential Delays in Plugging and Abandonment
      a. Shut-in
      b. Temporary Abandonment
      c. Detection of Illegal Delays in Plugging
   3. Compliance
      a. Temporary Abandonment
      b. Shut-in Wells

F. Suggested Future Plugging Regulations
   1. Old Oil Field Abandonment Requirements
      a. Production Zone Plugging Requirements
      b. Injection Zone Plugging Requirements
      c. Abandonment Fluid Requirements
      d. Uncemented Surface Casing Plugging Requirements
      e. Plugging Requirements for Uncemented Surface Casing Recovery Failure
      f. Cemented Surface Casing Plugging Requirements
   2. Gas Well Plugging Requirements
1. General Abandonment Requirements

2. Hole Fluid

3. Oil and Gas Zone Plugs
   a. Oil Wells
   b. Gas Wells

4. Injection Zone Plugs

5. Other Oil and Gas Zones
   a. Zones in Open Hole
   b. Zones Behind Uncemented Casing

6. Junk-in-the-Hole

7. Surface Casing Shoe Plugs
   a. Uncemented Casing
   b. Cemented Casing

8. Casing Recovery
   a. Surface Casing - Partial Recovery
b. Surface Casing - No Recovery

c. Production Casing with Cemented Surface Pipe

d. Production Casing with Uncemented Surface Casing

9. Surface Plugs

H. Summary of Environmental Impacts of Plugging and Abandonment Operations

Figure 11.3 Plugged Oil Well with an Open Hole Completion and Tacked Surface Casing: All Casing Recovered

Figure 11.4 Plugged Oil Well with an Open Hole Completion and Tacked Surface Casing: Part of the Surface Casing Left in the Hole

Figure 11.5 Plugged Oil Well with an Open Hole Completion and Partially or Totally Uncemented Surface Casing: All Surface Casing Left in Hole

Figure 11.6 Plugged Injection Well with an Open Hole Completion and Tacked Surface Casing: Unable to Recover Surface Casing or Squeeze

Figure 11.7 Plugged Injection Well with an Open Hole Completion and Tacked Surface Casing: Part of the Surface Casing Left in the Hole

Figure 11.8 Plugged Gas Well with a Lost Circulation Zone and Partially Cemented Production Casing: Combination Stub Plug and Surface Casing Shoe Plug

Figure 11.9 Plugged Dual Completion Well with the Production Casing Recovered Far Below the Shoe of the Surface Casing: Surface Casing Cemented to the Surface

Figure 11.10 Plugged Gas Well with Partially Cemented Production Casing: All Casing Left in the Hole

Figure 11.11 Plugged Gas Well with Junk-in-the-Hole

Figure 11.12 Dry Hole Gas Well with Brackish Water and Upper Non-Commercial Gas Zone
XII. OLD OIL FIELD WATERFLOOD OPERATIONS AND ENHANCED OIL RECOVERY POTENTIAL

A. Introduction
B. Definitions
C. Waterflooding
   1. General
      Figure 12.1 Enhanced Recovery Flood Patterns
   2. Waterflooding in New York
      Figure 12.2 Waterflooded Fields in New York State
         a. Historical Waterflood Operations
            Figure 12.3 Waterflooding
         b. Current Waterflood Operations
         c. Injection Operations
            Figure 12.4 Sample Step Rate Test
   3. Plugging and Abandonment
D. Gas Injection and Immissible Displacement
   1. General
   2. New York's Gas Injection Operations
E. Chemical Recovery Methods
   1. Polymer Flooding
      Table 12.1 Screening Criteria for EOR Candidates
   2. Surfactant Flooding
   3. Alkaline Flooding
   4. New York's Chemical Drive Projects
F. Miscible Displacement Methods
   1. High Pressure Gas Injection
   2. Miscible Hydrocarbon Displacement
   3. New York's Miscible Drive Projects
G. Thermal Recovery Methods
   xiii
I. Salt Completion Operations
   Figure 13.4 Schematic of Typical Solution Salt Mining Well
   Figure 13.5 Notching of Solution Mining Wells

J. Salt Production Operations

K. Controlling the Shape of the Salt Cavity During Production
   Figure 13.6 Schematic Illustrating How Subsidence, Sinkholes, and Mudboils May Occur
   Figure 13.7 Subsidence Monument Used by Texas Brine Corporation

L. Metering of Solution Mining Production

M. Methane Gas

N. Brine Disposal
   Figure 13.8 Cargill Salt Brine Wastewater Disposal Wells

O. Monitoring Wells

P. Earthquakes

Q. Temporary Abandonments and Shut-ins

R. Permanent Plugging and Abandonment

XIV. UNDERGROUND STORAGE

A. Introduction
   Figure 14.1 Natural Gas Supply and Demand Curve
   Figure 14.2 Location Map NYS Underground Storage Reservoirs

B. Storage Site Selection and Formation Evaluation
   1. Depleted Gas Reservoirs
      Figure 14.3 Cross Section of a Natural Gas Storage Reservoir
   2. Solution Mined Salt Cavities
      Figure 14.4 Cross Section of a Salt Cavity
   3. Conventionally Mined Storage Caverns
      Figure 14.5 Cross Section of a Mined Storage Cavern

C. Applying for an Underground Storage Permit

D. Construction of the Storage Site and Access Roads
E. Drilling of a Mined Cavern Main Shaft and Auxiliary Wells 14-14
F. Excavation of a Mined Storage Cavern 14-16
1. On-Site Disposal of Mined Material 14-16
2. Off-Site Disposal of Mined Material 14-17
G. Drilling of Storage Wells 14-19
H. Installation and Operation of Compressor Stations 14-21
I. Operation of the Storage Facility 14-23
1. Depleted Gas Reservoirs 14-23
   a. Reservoir Pressure 14-23
   b. Segments of a Gas Storage Reservoir
      Figure 14.6 Segments of a Gas Storage Reservoir 14-24a
   c. Operation of a Gas Storage Reservoir 14-25
2. Mined Caverns and Abandoned Salt Cavities 14-30
3. Regulation of Storage Operations 14-31
J. Abandonment of Underground Storage Facilities 14-33
   1. Well Abandonment 14-34
   2. Site Restoration 14-34
   3. Reservoir Abandonment 14-35
   4. Underground Storage Abandonment Permit 14-36

XV. INTERAGENCY COORDINATION: BRINE DISPOSAL, UNDERGROUND INJECTION AND OIL SPILL RESPONSE
A. Introduction 15-1
B. Local Government 15-1
   Table 15.1 Oil, Gas and Solution Mining, and Brine Disposal Interagency Coordination 15-1a
C. Complaint Response 15-2
   Table 15.2 New York State Laws and Regulations Related to Oil, Gas and Solution Mining 15-3a
Table 15.3 Brine Chemical Characteristics from New York Producing Zones (Using Chemical Analyses Graded Fair or Better Quality) 15-8a

Table 15.4 Brine Chemical Characteristics From New York Producing Zones (Using All Acceptable Chemical Analyses) 15-8b

1. Water Supply Problems 15-3
2. Oil and Gas Well Drilling and Production 15-6
3. Pipelines 15-6

D. Brine Disposal 15-6
1. Road Spreading 15-7

Table 15.5 Chemical Characteristics of Commercial Road Salt, Shallow Oil Brine and Deep Gas Brine 15-8c

Figure 15.1 New York State Towns and Counties that Accept Brine for Road Spreading 15-9a

2. Discharges to Surface Waters 15-11
3. Underground Injection 15-13

E. Federal Underground Injection Control Program 15-15
1. Primacy under UIC 15-16
2. UIC Program Requirements 15-18
   a. Procedural Requirements 15-18
   b. Technical Requirements 15-20
3. UIC Coordination 15-23

F. Oil Spill Response 15-24
1. New York State Responsibilities 15-24
2. Federal Responsibilities 15-26

XVI. SUMMARY OF ADVERSE ENVIRONMENTAL IMPACTS RESULTING FROM OIL, GAS, SOLUTION MINING AND GAS STORAGE OPERATIONS

A. Introduction 16-1
B. Standard Oil and Gas Operations

1. Adverse Land Impacts
   a. Siting Impacts
   b. Operational Impacts
   c. Fluid Handling Impacts

2. Adverse Impacts on Other Environmental Resources
   a. Agriculture
   b. Significant Habitats
   c. Floodplains
   d. Freshwater Wetlands
   e. Coastal Lands
   f. State Lands
   g. Air Quality
   h. Social and Cultural Resources
   i. Historic and Archeologic Resources
   j. Flora and Fauna

3. Adverse Impacts on Surface Waters
   a. Siting Impacts
   b. Operational Impacts
   c. Fluid Handling Impacts

4. Adverse Impacts on Groundwater
   a. Siting Impacts
   b. Operational Impacts
   c. Fluid Handling Impacts

5. Plugging and Abandonment Impacts

C. Enhanced Oil Recovery Impacts
1. Siting and Operational Impacts
2. Surface and Groundwater Impacts

D. Solution Mining Impacts
1. Siting and Operational Impacts
2. Surface and Groundwater Impacts

E. Underground Gas Storage
1. Siting and Operational Impacts
2. Surface and Groundwater Impacts
3. Socio-Economic Impacts

F. Conclusion

XVII. SUMMARY OF MITIGATION MEASURES

A. Administrative Review Process
1. Existing Mitigation
2. Proposed Mitigation

B. Siting of Wells
1. Existing Mitigation
2. Proposed Mitigation

C. Drilling Phase: Drilling, Casing and Completion Operations
1. Existing Mitigation
2. Proposed Mitigation

D. Well Completion and Production Practices
1. Existing Mitigation
2. Proposed Mitigation

E. Plugging and Abandonment of Oil and Gas Wells
1. Existing Mitigation

Page
16-20
16-21
16-22
16-23
16-24
16-24
16-26
16-26
16-27
17-1
17-1
17-3
17-3
17-6
17-8
17-8
17-13
17-15
17-16
17-16
17-17
17-17
xix
<table>
<thead>
<tr>
<th>2. Proposed Mitigation</th>
<th>17-18</th>
</tr>
</thead>
<tbody>
<tr>
<td>F. Enhanced Oil Recovery Operations</td>
<td>17-23</td>
</tr>
<tr>
<td>1. Existing Mitigation</td>
<td>17-23</td>
</tr>
<tr>
<td>2. Proposed Mitigation</td>
<td>17-25</td>
</tr>
<tr>
<td>G. Solution Salt Mining</td>
<td>17-26</td>
</tr>
<tr>
<td>1. Existing Mitigation</td>
<td>17-26</td>
</tr>
<tr>
<td>2. Proposed Mitigation</td>
<td>17-27</td>
</tr>
<tr>
<td>H. Underground Storage</td>
<td>17-29</td>
</tr>
<tr>
<td>1. Existing Mitigation</td>
<td>17-29</td>
</tr>
<tr>
<td>2. Proposed Mitigation</td>
<td>17-30</td>
</tr>
<tr>
<td>I. Summary</td>
<td>17-32</td>
</tr>
</tbody>
</table>

XVIII. ECONOMICS

<table>
<thead>
<tr>
<th>A. Introduction</th>
<th>18-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Historical Benefits to State</td>
<td>18-2</td>
</tr>
<tr>
<td>B. New York Production and Market Value</td>
<td>18-3</td>
</tr>
<tr>
<td>1. Production</td>
<td>18-3</td>
</tr>
<tr>
<td>2. Market Value</td>
<td>18-4</td>
</tr>
<tr>
<td>Figure 18.1 Market Value of Oil and Gas Production</td>
<td>18-4a</td>
</tr>
<tr>
<td>C. Leasing Process and Revenues</td>
<td>18-5</td>
</tr>
<tr>
<td>1. Leasing Private Lands</td>
<td>18-5</td>
</tr>
<tr>
<td>2. Private Leasing Revenues</td>
<td>18-6</td>
</tr>
<tr>
<td>3. Leasing Process for Public Lands</td>
<td>18-6</td>
</tr>
<tr>
<td>4. Current State Land Leasing</td>
<td>18-7</td>
</tr>
<tr>
<td>Figure 18.2 Oil and Gas Leasing Revenues From State Lands</td>
<td>18-7a</td>
</tr>
<tr>
<td>5. Lake Erie Leasing</td>
<td>18-8</td>
</tr>
<tr>
<td>6. Oil and Gas Revenues</td>
<td>18-8</td>
</tr>
</tbody>
</table>
a. Local Property Tax Revenues  
Figure 18.3 Oil and Gas Property Tax Revenues  

b. Permit and Fee Revenues  
Figure 18.4 Oil Production in New York State versus Price  

Figure 18.5 Gas Production in New York State versus Price  

D. Related Economic Benefits  

1. The Value of Investment  
2. Secondary Benefits of Oil and Gas Operations  
   a. Free Gas to Landowners  
   b. End User Savings  
   c. Access Roads  
3. Gas Storage Benefits  

E. Impacts of Low Oil and Gas Prices in New York  
Table 18.1 New York State Oil and Gas Statistics  

F. Economic Impacts on New York Exploration  

G. Impacts of Environmental Regulations on the Oil and Gas Industry  

H. Summary  

XIX. UNAVOIDABLE ADVERSE IMPACTS  

A. Oil and Gas Drilling and Development  
B. Enhanced Oil Recovery  
C. Solution Salt Mining  
D. Underground Gas Storage  
E. Geothermal  
F. Stratigraphic
G. Brine Disposal

XX. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

A. Oil and Gas Drilling Development 20-1
B. Enhanced Oil Recovery 20-1
C. Solution Salt Mining 20-1
D. Underground Gas Storage 20-2
E. Geothermal 20-2
F. Stratigraphic Test Wells 20-2
G. Brine Disposal Wells 20-2

XXI. ALTERNATIVE ACTIONS

A. Prohibition of Resource Development 21-1
   Table 21.1 Alternate Energy Sources and Associated Adverse Impacts 21-2
B. Removal of Regulation 21-3
C. Maintenance of Status Quo Versus Revision of Existing Regulations 21-5

GLOSSARY 1-14p.

REFERENCES 1-16p.
## APPENDIX 1 - Underground Storage - Applying for a Certificate of Public Convenience and Necessity Under Section 7 of the Natural Gas Act 1-8p.

## APPENDIX 2 - Freedom of Information Law (FOIL) 1-4p.

## APPENDIX 3 - Movement of Contaminants in Aquifers 1-9p.

## APPENDIX 4 - Mineral Ownership and Leasing Summary 1-11p.

## APPENDIX 5 - Oil, Gas, Solution Mining, Gas Storage, Brine Disposal, Stratigraphic, and Geothermal Well Drilling Environmental Assessment Form 1-9p.

## APPENDIX 6 - Gathering Lines 1-7p.

## APPENDIX 7 - Brine Disposal Well Permitting Guidelines 1-7p.

## APPENDIX 8 - Forms Used in the Oil, Gas and Solution Mining Program 1-7p.