

TABLE OF CONTENTS

1. PURPOSE AND NEED	1-1
1.1 INTRODUCTION	1-1
1.2 GENERAL BACKGROUND: LEGISLATION AND POLICY	1-1
1.3 PURPOSE OF THIS DEIS.....	1-2
1.4 SUMMARY OF EVENTS AND DECISIONS PRECEDING THIS DEIS.....	1-4
1.5 PROPOSED ACTION - DECISIONS TO BE MADE	1-8
1.5.1 Need for the Proposal and the Need to Make These Decisions	1-8
1.5.2 What These Decisions Can and Cannot Do	1-9
1.5.3 Scope of the Proposed Action.....	1-10
1.6 REASONABLY FORESEEABLE DEVELOPMENT (RFD) SCENARIO.....	1-12
1.7 FEDERAL MANAGEMENT OF LEASES AND DEVELOPMENT	1-13
1.7.1 Lease Types	1-13
1.7.2 Lease Restrictions	1-14
1.7.3 Staged Decision Process	1-15
1.7.4 Bonding.....	1-17
1.7.5 Rentals and Royalties	1-17
1.7.6 Expiration or Termination of a Lease.....	1-17
1.8 THE ANALYSIS PROCESS	1-18
2. ALTERNATIVES.....	2-1
2.1 INTRODUCTION	2-1
2.2 SCOPING.....	2-1
2.2.1 Scoping Activities	2-1
2.2.2 Scoping Results	2-3
2.3 ISSUE IDENTIFICATION, DEVELOPMENT, AND MANAGEMENT	2-3
2.3.1 Preliminary Issue Areas	2-3
2.3.2 Additional Issues not Considered in Further Detail.....	2-4
2.3.3 Site-Specific Concerns.....	2-4
2.3.4 Issue Management	2-4
2.4 ALTERNATIVES DEFINE THE ISSUES.....	2-14
2.4.1 Initial List of Preliminary Alternatives.....	2-14
2.4.2 Additional Alternatives Identified in Scoping	2-14
2.4.3 Alternatives not Considered in Detail	2-14
2.4.4 Alternatives Considered in Detail	2-16
2.4.5 Comparison of Alternatives	2-27
3. AFFECTED ENVIRONMENT/ENVIRONMENTAL CONSEQUENCES	3.0-1
3.0 INTRODUCTION	3.0-2
3.0.1 Direct Effects	23.0-2
3.0.2 Cumulative Effects.....	3.0-4
3.1 ISSUE 1: BIODIVERSITY	3.1-4

3.1.1	Affected Environment.....	3.1-4
3.1.2	Environmental Effects	3.1-16
3.2	ISSUE 2: CULTURAL RESOURCES.....	3.2-38
3.2.1	Affected Environment.....	3.2-38
3.2.2	Environmental Consequences	3.2-47
3.3	ISSUE 3: TRADITIONAL CULTURAL PROPERTIES.....	3.3-60
3.3.1	Affected Environment.....	3.3-60
3.3.2	Environmental Consequences	3.3-65
3.4	ISSUE 4: VISUAL RESOURCES.....	3.4-74
3.4.1	Affected Environment.....	3.4-74
3.4.2	Environmental Consequences	3.4-86
3.5	ISSUE 5: ECONOMIC RESOURCES.....	3.5-99
3.5.1	Affected Environment.....	3.5-99
3.5.2	Environmental Consequences	3.5-103
3.6	ISSUE 6: SOCIAL RESOURCES	3.6-116
3.6.1	Affected Environment.....	3.6-116
3.6.2	Environmental Consequences	3.6-119
3.7	ISSUE 7A: DISPERSED RECREATION.....	3.7-127
3.7.1	Elements Common to Both Dispersed and Developed Recreation....	3.7-127
3.7.2	Affected Environment.....	3.7-130
3.7.3	Environmental Consequences	3.7-137
3.8	ISSUE 7B: DEVELOPED RECREATION	3.8-151
3.8.1	Affected Environment.....	3.8-151
3.8.2	Environmental Consequences	3.8-154
3.9	ISSUE 8: SOIL RESOURCES	3.9-162
3.9.1	Affected Environment.....	3.9-162
3.9.2	Environmental Consequences	3.9-165
3.10	ISSUE 9: HYDROLOGIC RESOURCES	3.10-173
3.10.1	Affected Environment.....	3.10-173
3.10.2	Environmental Consequences	3.10-177
3.11	3.11 ISSUE 10: NOXIOUS WEEDS.....	3.11-185
3.11.1	Affected Environment.....	3.11-185
3.11.2	Environmental Consequences	3.11-186
3.12	ISSUE 11: AIR QUALITY.....	3.12-188
3.12.1	Affected Environment.....	3.12-188
3.12.2	Environmental Consequences	3.12-200
3.13	ISSUE 12: RILEY ABANDONED URANIUM MINE.....	3.13-217
3.13.1	Affected Environment.....	3.13-217
3.13.2	Environmental Consequences	3.13-220
3.14	ISSUE 12A: ABANDONED URANIUM MINES	3.14-224
3.14.1	Affected Environment.....	3.14-224

3.14.2 Environmental Consequences	3.14-225
3.15 ISSUE 12B: HUMAN HEALTH AND SAFETY	3.15-236
3.15.1 Hazards Associated with Oil and Gas Leasing	3.15-236
3.16 ISSUE 13: NATIONAL NATURAL LANDMARKS.....	3.16-241
3.16.1 Affected Environment.....	3.16-241
3.16.2 Environmental Consequences	3.16-243
3.17 ISSUE 14: RESEARCH NATURAL AREAS.....	3.17-246
3.17.1 Affected Environment.....	3.17-246
3.17.2 Environmental Consequences	3.17-246
3.18 ISSUE 15: PUBLIC ACCESS	3.18-248
3.18.1 Affected Environment.....	3.18-248
3.18.2 Environmental Consequences	3.18-253
4.0 PREPARERS AND CONTRIBUTORS.....	4-1
5.0 REFERENCES.....	5-1
6.0 GLOSSARY	6-1

APPENDIX A—Lease Decision Issuing Process

APPENDIX B—Lease Stipulations and Standard Lease Terms

APPENDIX C—Oil and Gas Exploration, Development, and Production

APPENDIX D—Reasonably Foreseeable Development Scenario

APPENDIX E—Best Management Practices

APPENDIX F—Index

TABLES

Table 2-1.	Issues in Sioux Oil & Gas Leasing EIS.....	2-5
Table 2-2.	Existing Leases in the Project Area.....	2-17
Table 2-3.	Existing and RFD Projected Wells in the Existing Lease Areas.....	2-17
Table 2-4.	Geographically Locatable Existing Lease Stipulations	2-18
Table 2-5.	Custer Forest Plan Oil & Gas Leasing Stipulations Applicable to the Sioux Ranger District within South Dakota.....	2-19
Table 2-6.	Existing and Projected Wells under Alternative 2	2-21
Table 2-7.	Alternative 3 Leasing Stipulations	2-22
Table 2-8.	Non-Mapped Stipulations, Lease Notices, and Conditions of Approval	2-24
Table 2-9.	Existing and Projected Wells under Alternative 3	2-27
Table 2-10.	Summary of Environmental Consequences	2-28
Table 2-11.	Alternative 1 - Acres Under Each Stipulation for Each Land Unit	2-35
Table 2-12.	Alternative 2 - Acres Under Each Stipulation for Each Land Unit	2-35
Table 2-13.	Alternative 3 - Acres Under Each Stipulation for Each Land Unit	2-35
Table 2-14.	Estimated Wells, Acres Disturbed, and Energy Production by Alternative	2-36
Table 3.1-1.	Forest Service Sensitive Species Located in the Project Area	3.1-10
Table 3.1-2.	BLM Sensitive Species Present Within the Project Area	3.1-12
Table 3.1-3.	Habitats for Forest Service Indicator Species in the Project Area.....	3.1-13
Table 3.1-4	Estimates of Effects to Forest Service Sensitive Species.....	3.1-20
Tables 3.1-5a-c.	Alternative 1: Summary of Land Cover Affected.....	3.1-22
Table 3.1-6a-c.	Alternative 2: Summary of Land Cover Affected.....	3.1-26
Table 3.1-7.	Projected Effects of Alternative 2 on FS Sensitive and FS Indicator Species Habitat	3.1-27
Table 3.1-8.	Comparison of Raptor and Grouse Stipulations by Alternative	3.1-30
Table 3.1-9.	Alternative 3: Summary of Land Cover Affected.....	3.1-31
Table 3.1-10.	Projected Effects of Alternative 3 on FS Sensitive and FS Indicator Species Habitat	3.1-32
Table 3.2-1.	Estimated Survey Cover Page of South Dakota Portion of the Sioux Ranger District, Custer National Forest, Based on Data from the South Dakota Archaeological Research Center	3.2-44
Table 3.2-2.	Archaeological Site Types Found in the Project Area, by Unit.....	3.2-45
Table 3.2-3.	NRHP Eligibility Status of Archaeological Sites.....	3.2-45
Table 3.4-1.	Scenic Attractiveness Classes by Unit	3.4-75
Table 3.4-2.	Viewshed Distance Zones by Acre.....	3.4-76
Table 3.4-3.	Existing Scenic Conditions, VQOs, and Compliance Timing Requirements ..	3.4-78
Table 3.4-4.	Management Areas, Acres, and Prescribed VQOs in the North Cave Hills ...	3.4-80
Table 3.4-5.	Management Areas, Acres, and Prescribed VQOs in the South Cave Hills...	3.4-82
Table 3.4-6.	Management Areas, Acres, and Prescribed VQOs in the Slim Buttes.....	3.4-83
Table 3.4-7.	Management Areas, Acres, and Prescribed VQOs in the West Short Pines .	3.4-84
Table 3.4-8.	Management Areas, Acres, and Prescribed VQOs in the East Short Pines ..	3.4-86
Table 3.4-9.	Alternative 2 Projected Wells and Resulting Disturbed Acres.....	3.4-92
Table 3.4-10.	Alternative 3, Projected Wells and Resulting Disturbed Acres.....	3.4-95

Table 3.5-1.	Federal Oil and Gas Production, Value, and Mineral Revenue Disbursements in South Dakota and Harding County, Fiscal Years 1999-2001.....	3.5-103
Table 3.5-2.	Economic Effects of Alternative 1on Harding County – Construction Phase	3.5-106
Table 3.5-3.	Economic Effects of Alternative 1 on Harding County – Production Phase	3.5-108
Table 3.5-4.	Economic Effects of Alternative 2 on Harding County – Construction Phase	3.5-110
Table 3.5-5.	Economic Effects of Alternative 2 on Harding County – Production Phase	3.5-111
Table 3.5-6.	Economic Effects of Alternative 3 on Harding County – Construction Phase	3.5-113
Table 3.5-7.	Economic Effects of Alternative 3 on Harding County – Production Phase	3.5-113
Table 3.6-1.	Estimates of Workers per Well and Construction Timeframe	3.6-119
Table 3.7-1.	Recreation Opportunity Spectrum (ROS) Classes	3.7-129
Table 3.7-2.	Estimated Maximum Allowable Oil and Gas Facilities per Square Mile by ROS Class.....	3.7-129
Table 3.7-3.	Visitor Days of Dispersed Recreation Use	3.7-131
Table 3.7-4.	Management Areas, Acres, and Prescribed Recreation Standards in the North Cave Hills.....	3.7-133
Table 3.7-5.	Management Areas, Acres, and Prescribed Recreation Standards in the South Cave Hills	3.7-134
Table 3.7-6.	Management Areas, Acres, and Prescribed Recreation Standards in the Slim Buttes	3.7-135
Table 3.7-7.	Management Areas, Acres, and Prescribed Recreation Standards in the West Short Pines	3.7-136
Table 3.7-8.	Management Areas, Acres, and Prescribed Recreation Standards in the East Short Pines	3.7-137
Table 3.7-9.	Typical Impacts to Recreation Opportunities from Oil and Gas Activities by ROS Class	3.7-138
Table 3.8-1.	Visitor Days of Developed Recreation Use	3.8-151
Table 3.8-2.	Management Area F, Acres, and Prescribed Recreation Standards in the North Cave Hills.....	3.8-152
Table 3.8-3.	Management Areas, Acres, and Prescribed Recreation Standards in the Slim Buttes	3.8-153
Table 3.9-1.	Criteria for Describing Fragile Soil and Landscape Conditions	3.9-163
Table 3.9-2.	Fragile Soils and Landscapes in the Project Area (acres)	3.9-164
Table 3.9-3.	Area and Type of Land Covered by NSO Stipulation 1 in Management Areas B, D, and E for Alternative 2 (acres).....	3.9-167
Table 3.9-4.	Alternative 2 Soil Resources Disturbance	3.9-168
Table 3.9-5.	Alternative 3 Soil Resources Disturbance	3.9-170
Table 3.9-6.	Difference between Alternative 2 (Stipulation 1 Criteria are applied to Management Areas B, D, and E) and Alternative 3 (Stipulation 1 criteria applied to all NFS land).....	3.9-171

Table 3.10-1. Some Hydrologic Characteristics of Land Units	3.10-175
Table 3.10-2. Beneficial Water Uses in the Project Area.....	3.10-176
Table 3.10-3. Existing Road Effects to Water Resource Features.....	3.10-177
Table 3.10-4. Alternative 1 – Potential Effects on Water Resources	3.10-179
Table 3.10-5. Alternative 2 – RFD Roads, Density, Stream Crossings, and Acres of Wells.....	3.10-181
Table 3.10-6. Alternative 3 – RFD Roads, Density, Stream Crossings, and Acres of Wells.....	3.10-183
Table 3.12-1. Annual Data Summary from Harding County Weather Stations	3.12-189
Table 3.12-2. State Air Emissions Inventory for Calendar Year 2001.....	3.12-190
Table 3.12-3. Source/Emissions Data for Harding County	3.12-190
Table 3.12-4. Ambient Air Quality Standards	3.12-191
Table 3.12-5. Harding County Attainment Status	3.12-192
Table 3.12-6. Examples of AQRVs, Sensitive Receptors, and Factors Potentially Changed by Air Pollution	3.12-197
Table 3.12-7. State-Adopted Regulations and Prohibitory Rules per APCP Article 74:36.....	3.12-198
Table 3.12-8. Categories of Air Quality Effects	3.12-200
Table 3.12-9. Emissions Significance Thresholds	3.12-201
Table 3.12-10. Potential Effects at Existing Lease Sites	3.12-203
Table 3.12-11. Emissions Associated with Oil/Gas Development.....	3.12-204
Table 3.12-12. Development Emissions Estimates.....	3.12-205
Table 3.12-13. Emissions Summary for Alternative 2 Potential Well Development Scenario	3.12-208
Table 3.12-14. Emissions Summary for Alternative 3 Potential Well Development Scenario	3.12-212
Table 3.13-1. Bluff Identification.....	3.13-218
Table 3.13-2. Riley Pass Bluff Waste Types and Volumes.....	3.13-219
Table 3.14-1. Abandoned Mines in North Cave Hills.....	3.14-225
Table 3.14-2. Abandoned Mines in South Cave Hills	3.14-227
Table 3.14-3. Abandoned Mines in Slim Buttes	3.14-228
Table 3.15-1. 40 CFR 192 Standards for Mill Tailings.....	3.15-240
Table 3.16-1. Management Areas in the Slim Buttes Land Unit within or Adjacent to the Castles NNL	3.16-242
Table 3.18-1. Forest Service Traffic Service Levels	3.18-250
Table 3.18-2. Number of Truck and Car Trips per Well.....	3.18-253
Table 3.18-3. Public Access to North Cave Hills under the No Action Alternative	3.18-254
Table 3.18-4. Public Access to the South Cave Hills under the No Action Alternative ...	3.18-255
Table 3.18-5. Miles of Projected Roads, Truck, and Car Trips within each Land Unit under Alternative 2	3.18-258
Table 3.18-6. Public Access to North Cave Hills under Alternative 2	3.18-259
Table 3.18-7. Public Access to the South Cave Hills under Alternative 2	3.18-260
Table 3.18-8. Public Access to Slim Buttes under Alternative 2	3.18-261
Table 3.18-9. Public Access to West Short Pines under Alternative 2.....	3.18-261
Table 3.18-10. Public Access to East Short Pines Unit under Alternative 2	3.18-262

Table 3.18-11. Miles of Projected Roads, Truck, and Car Trips within each Land Unit under Alternative 3	3.18-265
Table 3.18-12. Public Access to North Cave Hills under Alternative 3	3.18-266
Table 3.18-13. Public Access to the South Cave Hills under Alternative 3	3.18-267
Table 3.18-14. Public Access to Slim Buttes under Alternative 3	3.18-267
Table 3.18-15. Public Access to West Short Pines under Alternative 3.....	3.18-268
Table 3.18-16. Public Access to East Short Pines Unit under Alternative 3	3.18-269

FIGURES

Figure 1-1. Location of Portions of the Sioux Ranger District Being Considered for Oil & Gas Leasing	1-3
Figure 1-2. Oil and Gas Leasing Decision Process.....	1-10
Figure 3.4-1. Visual Appearance of Existing Oil and Gas Facilities within North Cave Hills Unit.....	3.4-81
Figure 3.4-3. Typical Character Types within the South Cave Hills Unit.	3.4-82
Figure 3.4-5. Typical Character Types within the Slim Buttes Unit.....	3.4-84
Figure 3.4-8. Visual Character Types within East Short Pines.....	3.4-85

LIST OF MAPS CONTAINED IN MAP PACKET

- Fig 2.01** Alternative 1 Composite Stipulations: North Cave Hills
Fig 2.02 Alternative 1 Composite Stipulations: South Cave Hills
Fig 2.03 Alternative 1 Csu Stipulations: North Cave Hills
Fig 2.04 Alternative 1 Csu Stipulations: South Cave Hills
Fig 2.05 Alternative 1 Nso & TI Stipulations: North Cave Hills
Fig 2.06 Alternative 1 Nso & TI Stipulations: South Cave Hills
Fig 2.07 Alternative 2 Composite Stipulations: North Cave Hills
Fig 2.08 Alternative 2 Composite Stipulations: South Cave Hills
Fig 2.09 Alternative 2 Composite Stipulations: North Slim Buttes
Fig 2.10 Alternative 2 Composite Stipulations: South Slim Buttes
Fig 2.11 Alternative 2 Composite Stipulations: West And East Short Pines
Fig 2.12 Alternative 2 Physical Stipulations: North Cave Hills
Fig 2.13 Alternative 2 Physical Stipulations: South Cave Hills
Fig 2.14 Alternative 2 Physical Stipulations: North Slim Buttes
Fig 2.15 Alternative 2 Physical Stipulations: South Slim Buttes
Fig 2.16 Alternative 2 Physical Stipulations: West And East Short Pines
Fig 2.17 Alternative 2 Biological Stipulations: North Cave Hills
Fig 2.18 Alternative 2 Biological Stipulations: South Cave Hills
Fig 2.19 Alternative 2 Biological Stipulations: North Slim Buttes
Fig 2.20 Alternative 2 Biological Stipulations: South Slim Buttes
Fig 2.21 Alternative 2 Biological Stipulations: West And East Short Pines
Fig 2.22 Alternative 2 Recreation & Special Area Stipulations: North Cave Hills
Fig 2.23 Alternative 2 Recreation & Special Area Stipulations: North Slim Buttes
Fig 2.24 Alternative 2 Recreation & Special Area Stipulations: South Slim Buttes
Fig 2.25 Alternative 3 Composite Stipulations: North Cave Hills
Fig 2.26 Alternative 3 Composite Stipulations: South Cave Hills
Fig 2.27 Alternative 3 Composite Stipulations: North Slim Buttes
Fig 2.28 Alternative 3 Composite Stipulations: South Slim Buttes
Fig 2.29 Alternative 3 Composite Stipulations: West And East Short Pines
Fig 2.30 Alternative 3 Physical Stipulations: North Cave Hills
Fig 2.31 Alternative 3 Physical Stipulations: South Cave Hills
Fig 2.32 Alternative 3 Physical Stipulations: North Slim Buttes
Fig 2.33 Alternative 3 Physical Stipulations: South Slim Buttes
Fig 2.34 Alternative 3 Physical Stipulations: West And East Short Pines
Fig 2.35 Alternative 3 Biological Stipulations: North Cave Hills
Fig 2.36 Alternative 3 Biological Stipulations: South Cave Hills
Fig 2.37 Alternative 3 Biological Stipulations: North Slim Buttes
Fig 2.38 Alternative 3 Biological Stipulations: South Slim Buttes
Fig 2.39 Alternative 3 Biological Stipulations: West And East Short Pines
Fig 2.40 Alternative 3 Recreation & Special Area Stipulations: North Cave Hills
Fig 2.41 Alternative 3 Recreation & Special Area Stipulations: North Slim Buttes

- Fig 2.42** Alternative 3 Recreation & Special Area Stipulations: South Slim Buttes
Fig 3.1.1 Landform Classifications: North Cave Hills
Fig 3.1.2 Landform Classifications: South Cave Hills
Fig 3.1.3 Landform Classifications: North Slim Buttes
Fig 3.1.4 Landform Classifications: South Slim Buttes
Fig 3.1.5 Landform Classifications: West And East Short Pines
Fig 3.4.2 Management Areas: North Cave Hills
Fig 3.4.4 Management Areas: South Cave Hills
Fig 3.4.6 Management Areas: North Slim Buttes
Fig 3.4.7 Management Areas: South Slim Buttes
Fig 3.4.8 Management Areas: West And East Short Pines