

Bray

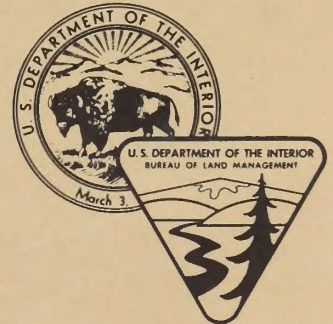
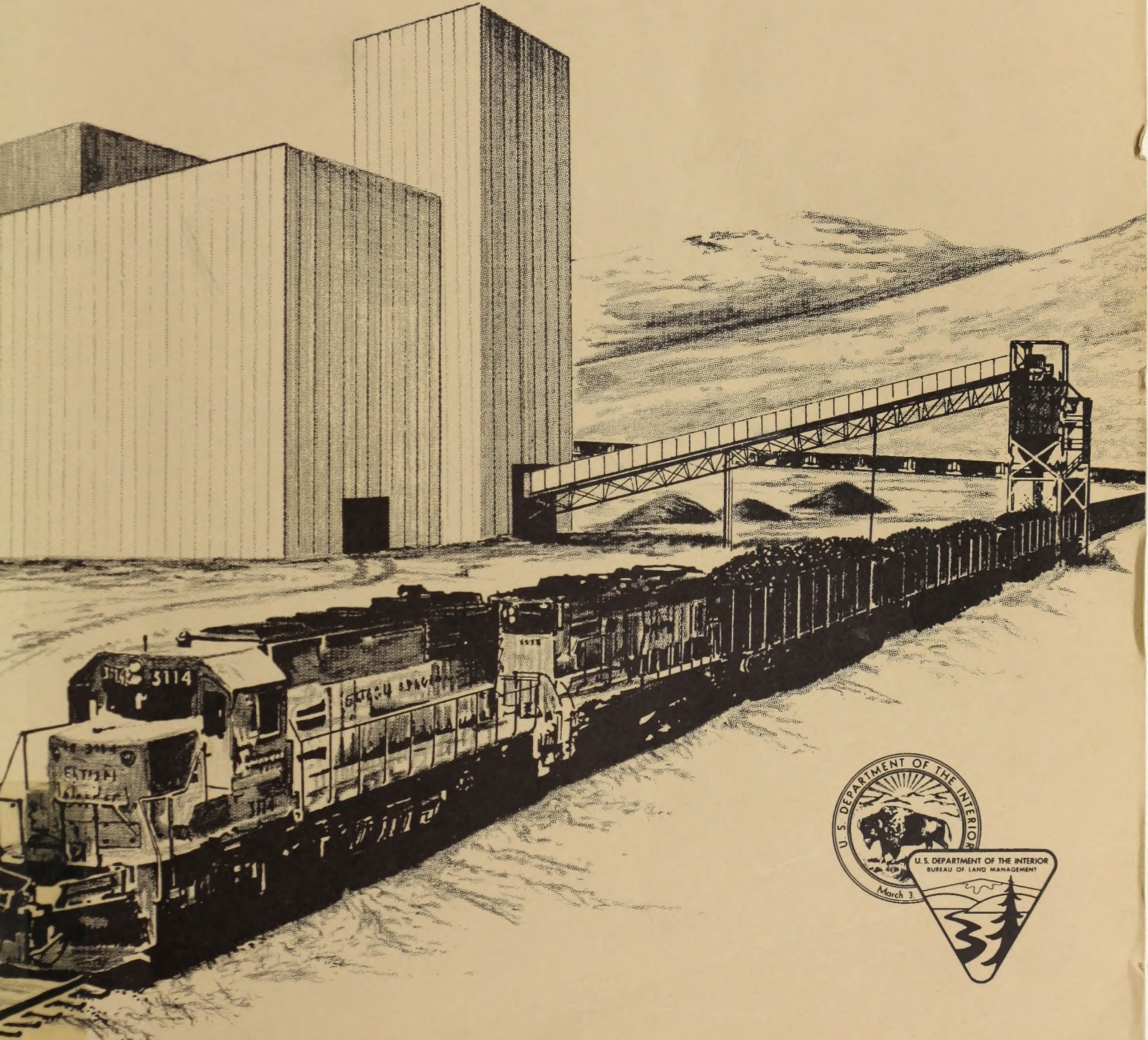
BLM LIBRARY



88045872

UINTA-SOUTHWESTERN UTAH FINAL ENVIRONMENTAL IMPACT STATEMENT COAL

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT



BLM LIBRARY
RS 150A BLDG. 50
DENVER FEDERAL CENTER
P.O. BOX 25047
DENVER, CO 80225

ID88045872

TD
195
.C5
U58
198
C.2

FINAL

UINTA-SOUTHWESTERN UTAH

REGIONAL COAL

ENVIRONMENTAL IMPACT STATEMENT

Prepared by
THE DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

BLM LIBRARY
RS 150A BLDG. 50
DENVER FEDERAL CENTER
P.O. BOX 25047
DENVER, CO 80225

Ed Hartey

ACTING DIRECTOR BUREAU OF LAND MANAGEMENT

1914

WEST VIRGINIA UNIVERSITY

DEPARTMENT OF CHEMISTRY

RECEIVED

DEPT. OF CHEMISTRY
PO BOX 1000
MORGANTOWN WV 26506

Uinta-Southwestern Utah Coal Region
Environmental Impact Statement

() Draft

(X) Final

Lead Agency

U.S. Department of the Interior, Bureau of Land Management

Cooperating Agencies

U.S. Department of Agriculture
Forest Service

U.S. Department of the Interior
Geological Survey
Fish and Wildlife Service

Abstract

This statement assesses the environmental consequences of five alternative levels of coal development, including development of the Hollberg Preference Right Lease Application (PRLA) area and an exchange of Utah Power and Light Company (UP&L) PRLA lands for coal leases on the Wasatch Plateau. The alternatives range from leasing 11 tracts (561.8 million tons) to leasing three tracts (153.7 million tons), and also includes the no action alternative. Alternative Two, the high level scenario (465.2 million tons) involving the leasing of seven tracts on the Wasatch Plateau for underground mining only, is the preferred alternative. The statement assesses impacts that would occur in Carbon, Emery, Sanpete, and Sevier Counties as a result of proposed coal leasing and development, and impacts from the UP&L exchange on the Kaiparowits Plateau in Garfield and Kane Counties.

The Draft EIS was filed with EPA October 8, 1980 and public hearings on the Draft were held in Escalante, Castle Dale, Price, and Salt Lake City. Comments were received from Federal, State, and local government agencies, the coal industry, and private citizens. The comment period ended December 9, 1980. This Final EIS incorporates the responses and text revisions resulting from comments received on the Draft.

Comments on the Draft were requested from the following: (see Attachment)

For further information regarding this statement or proposed alternative actions contact:

Mr. Ron Bolander
Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111
Telephone 524-4257 (FTS 588-4257)

Date by Which Comments on the Final Statement Must be Received: **APR 6 1981**

Attachment

Comments on the Draft Environmental Impact Statement were requested from the following agencies, interest groups, and individuals (an asterisk denotes comments were received).

Federal Agencies

Department of Agriculture

- *Forest Service
- *Soil Conservation Service

Department of the Interior

- Bureau of Land Management
- *Geological Survey
- *Heritage Conservation and Recreation Service
- *National Park Service
- Office of the Solicitor (Regional Office)
- *Office of Surface Mining
- *U.S. Fish and Wildlife Service
- *Water and Power Resources Service

Federal Highway Administration

Small Business Administration

Office of Technological Assessment

*Environmental Protection Agency

Local Agencies

Six County Association of Governments

Utah Association of Governments

*Southeastern Utah Association of Governments

Uintah Basin Association of Governments

Five County Association of Governments

Kane County Commission

*Garfield County Commission

Carbon County Commission

*Emery County Commission

Sevier County Commission

Sanpete County Commission

Other Organizations and Individuals

Numerous organizations and individuals expressing interest in the coal leasing program for the region have been sent copies of the DEIS, including Utah's congressional delegation, coal and other energy companies, universities and colleges, and local and statewide organizations.

State Agencies

State of Colorado

Governor

Clearinghouse

Department of Natural Resources

State of Utah

*Governor

Clearinghouse

State Planning Coordinator

*Div. of Environmental

Health Services

*Bureau of Air Quality

Dept. of Natural Resources

Utah Energy Office

Div. of Water Resources

Div. of State Lands and

Forestry

Div. of Oil, Gas, and Mining

*Div. of Wildlife Resources

Div. of Transportation

State Archives and Records

Service

Div. of Parks and Recreation

*Div. of State History

Major Special Interest Groups

National Resources Defense Council

*Friends of the Earth

Public Lands Council

The Wilderness Society

Independent Petroleum Assoc. of America

Utah Mining Association

*Sierra Club

Farmers Home Administration

American Right-of-Way Association

Utah Geological Association

League of Women Voters of Utah

Western Colorado Resources Council

Four Corners Geological Society

Public Lands Institute

Utah Water Users Association

American Fisheries Society

Utah Geological and Mineralogical Society

Wasatch Front Regional Council

Environmental Defense Fund

Environmental Policy Institute

Defenders of Wildlife

The Wildlife Society

TABLE OF CONTENTS

<p>SUMMARY</p> <p>INTRODUCTION S-1</p> <p>ALTERNATIVES S-1</p> <p>ALTERNATIVE ONE, MAXIMUM LEVEL (561.8 MILLION TONS)..... S-1</p> <p>ALTERNATIVE TWO, (PREFERRED ALTERNATIVE) HIGH LEVEL (465.2 MILLION TONS)..... S-1</p> <p>ALTERNATIVE THREE, MID LEVEL (335.3 MILLION TONS)..... S-2</p> <p>ALTERNATIVE FOUR, LOW LEVEL (153.7 MILLION TONS)..... S-2</p> <p>ALTERNATIVE FIVE, NO ACTION S-2</p> <p>HOLLBERG PRLA..... S-2</p> <p>ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ALTERNATIVE ACTIONS S-2</p> <p>ALTERNATIVE ONE..... S-2</p> <p>ALTERNATIVE TWO S-3</p> <p>ALTERNATIVE THREE S-4</p> <p>ALTERNATIVE FOUR S-5</p> <p>UTAH POWER AND LIGHT EXCHANGE S-5</p>	<p>UNRESOLVED ISSUES S-6</p> <p>IDENTIFICATION OF THE PREFERRED ALTERNATIVE S-7</p> <p>CHAPTER 1 PURPOSE AND NEED</p> <p>INTRODUCTION 1</p> <p>COAL LEASING PROGRAM..... 1</p> <p>PURPOSE AND NEED FOR LEASING 1</p> <p>THE NEED FOR LEASING IN THE REGION..... 1</p> <p>PLANNING PROCESS FOR THE COAL LEASE PROGRAM 2</p> <p> SUMMARY 2</p> <p> UINTA-SOUTHWESTERN UTAH COAL REGION..... 2</p> <p>SCOPING..... 10</p> <p>ALTERNATIVES 10</p> <p>PREFERENCE RIGHT LEASE APPLICATIONS..... 12</p> <p>INTERRELATIONSHIPS..... 12</p> <p> TRANSPORTATION..... 12</p> <p> ENERGY INDUSTRY DEVELOPMENTS 12</p> <p> STATE AND LOCAL LAND USE PLANS, PROGRAMS AND CONTROLS..... 12</p> <p>UTAH POWER AND LIGHT EXCHANGE..... 13</p> <p>PURPOSE AND NEED..... 13</p> <p>LAND USE PLANNING PROCESS..... 13</p> <p>SCOPING..... 13</p>
--	---

TABLE OF CONTENTS

ALTERNATIVES	13
INTERRELATIONSHIPS	13
TRANSPORTATION	13
COAL DEVELOPMENT ON THE KAIPAROWITS PLATEAU	15
LOCAL LAND USE PLANS AND CONTROLS	15

CHAPTER 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

INTRODUCTION	17
--------------------	----

FEDERAL COAL LEASING PRO- GRAM	17
---	----

INDIVIDUAL TRACT DEVELOPMENT	17
TUCKER CANYON TRACT	17
MILLER CREEK TRACT	21
GORDON CREEK TRACT	21
SLAUGHTERHOUSE CANYON TRACT	26
MEETINGHOUSE CANYON TRACT	26
RILDA CANYON TRACT	26
COTTONWOOD TRACT	32
NORTH HORN MOUNTAIN TRACT	32
EMERY NORTH TRACT	38
EMERY CENTRAL TRACT	44
EMERY SOUTH TRACT	44
HOLLBERG PRLA	49

DESCRIPTION OF THE ALTERNA- TIVES	49
--	----

ALTERNATIVE ONE	49
-----------------------	----

ALTERNATIVE TWO (PREFERRED ALTERNATIVE)	55
---	----

ALTERNATIVE THREE	55
-------------------------	----

ALTERNATIVE FOUR	58
------------------------	----

ALTERNATIVE FIVE	58
------------------------	----

COMPARATIVE ANALYSIS MATRIX	58
-----------------------------------	----

REQUIRED AUTHORIZATIONS	58
-------------------------------	----

MITIGATING MEASURES	65
---------------------------	----

SURFACE MINE RECLAMATION	67
--------------------------------	----

UTAH POWER & LIGHT EXCHANGE	67
-----------------------------------	----

INTRODUCTION	67
--------------------	----

DESCRIPTION OF THE ALTERNATIVES	71
ALTERNATIVE ONE	71
ALTERNATIVE TWO	71

CHAPTER 3 DESCRIPTION OF THE ENVIRONMENT

INTRODUCTION	75
--------------------	----

WASATCH PLATEAU	75
-----------------------	----

CLIMATE, AIR QUALITY	75
----------------------------	----

CLIMATE	75
---------------	----

AIR QUALITY	75
-------------------	----

SOILS	78
-------------	----

WASATCH PLATEAU COAL FIELD	78
----------------------------------	----

EMERY COAL FIELD	78
------------------------	----

WATER RESOURCES	81
-----------------------	----

SURFACE WATER	81
---------------------	----

WATER QUALITY	81
---------------------	----

TRACE ELEMENTS	86
----------------------	----

TABLE OF CONTENTS

<p>GROUND WATER 86</p> <p>WATER RIGHTS 86</p> <p>CONSUMPTIVE USES OF WATER 86</p> <p>GEOLOGY, TOPOGRAPHY, PALE- ONTOLOGY, MINERAL RE- SOURCES 89</p> <p>WASATCH PLATEAU COAL FIELD 89</p> <p>EMERY COAL FIELD 91</p> <p>VEGETATION 91</p> <p>VEGETATION TYPES 91</p> <p>THREATENED OR ENDANGERED PLANTS 95</p> <p>RECLAMATION POTENTIAL 95</p> <p>WILDLIFE 96</p> <p>THREATENED AND ENDANGERED SPECIES 100</p> <p>FISHERIES 100</p> <p>THREATENED OR ENDANGERED FISHES 103</p> <p>LAND USE 103</p> <p>SOCIOECONOMICS 104</p> <p>ECONOMIC AND DEMOGRAPHIC CONDITIONS 104</p> <p>INFRASTRUCTURE CONDITIONS 107</p> <p>SOCIAL CONDITIONS 107</p>	<p>TRANSPORTATION 111</p> <p>CULTURAL RESOURCES 114</p> <p>SPECIAL DESIGNATION AREAS 116</p> <p>VISUAL RESOURCES 116</p> <p>RECREATION 119</p> <p>KAIPAROWITS PLATEAU 119</p> <p>INTRODUCTION 119</p> <p>CLIMATE AND AIR QUALITY 121</p> <p>SOILS 121</p> <p>DEEP PLATEAU SOILS ASSOCIATION 121</p> <p>SHALLOW PLATEAU SOILS ASSOCIATION 121</p> <p>SHALLOW SOIL-ROCK OUTCROP ASSOCIATION 121</p> <p>SANDY SOILS ASSOCIATION 122</p> <p>BADLAND-ROCKLAND ASSOCIATION 122</p> <p>WATER RESOURCES 122</p> <p>GEOLOGY, TOPOGRAPHY, PALE- ONTOLOGY, MINERAL RE- SOURCES 123</p> <p>VEGETATION 123</p> <p>VEGETATION TYPES 123</p> <p>THREATENED OR ENDANGERED PLANTS 125</p>
--	---

TABLE OF CONTENTS

<p>WILDLIFE 125</p> <p>LAND USE 126</p> <p>SOCIOECONOMICS 126</p> <p>TRANSPORTATION 128</p> <p>CULTURAL RESOURCES 128</p> <p>SPECIAL DESIGNATION AREAS 129</p> <p>VISUAL RESOURCES 129</p> <p>RECREATION 129</p> <p>CHAPTER 4 ENVIRONMENTAL CONSEQUENCES</p> <p>INTRODUCTION 133</p> <p>ANALYSIS ASSUMPTIONS AND GUIDELINES 133</p> <p>FEDERAL COAL LEASING PROGRAM 134</p> <p>ALTERNATIVE ONE 134</p> <p style="padding-left: 20px;">AIR QUALITY 134</p> <p style="padding-left: 20px;">SOILS 141</p> <p style="padding-left: 20px;">WATER RESOURCES 142</p> <p style="padding-left: 20px;">GEOLOGY, TOPOGRAPHY, PALEONTOLOGY, MINERAL RESOURCES 145</p> <p style="padding-left: 20px;">VEGETATION 146</p> <p style="padding-left: 20px;">WILDLIFE 148</p> <p style="padding-left: 20px;">LAND USE 152</p> <p style="padding-left: 20px;">SOCIOECONOMICS 156</p> <p style="padding-left: 20px;">TRANSPORTATION 164</p> <p style="padding-left: 20px;">CULTURAL RESOURCES 169</p> <p style="padding-left: 20px;">SPECIAL DESIGNATION AREAS 169</p> <p style="padding-left: 20px;">VISUAL RESOURCES 169</p> <p style="padding-left: 20px;">RECREATION 170</p> <p style="padding-left: 20px;">UNAVOIDABLE ADVERSE IMPACTS 171</p>	<p>THE RELATIONSHIP BETWEEN THE SHORT-TERM USE OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY 173</p> <p>IRRETRIEVABLE OR IRREVERSIBLE COMMITMENT OF RESOURCES 173</p> <p>HOLLBERG PRLA 174</p> <p style="padding-left: 20px;">AIR QUALITY 174</p> <p style="padding-left: 20px;">SOILS 174</p> <p style="padding-left: 20px;">WATER RESOURCES 175</p> <p style="padding-left: 20px;">GEOLOGY, TOPOGRAPHY, PALEONTOLOGY, MINERAL RESOURCES 175</p> <p style="padding-left: 20px;">VEGETATION 176</p> <p style="padding-left: 20px;">WILDLIFE 176</p> <p style="padding-left: 20px;">LAND USE 176</p> <p style="padding-left: 20px;">SOCIOECONOMICS 176</p> <p style="padding-left: 20px;">TRANSPORTATION 177</p> <p style="padding-left: 20px;">CULTURAL RESOURCES 177</p> <p style="padding-left: 20px;">SPECIAL DESIGNATION AREAS 177</p> <p style="padding-left: 20px;">VISUAL RESOURCES 177</p> <p style="padding-left: 20px;">RECREATION 177</p> <p style="padding-left: 20px;">UNAVOIDABLE ADVERSE IMPACTS 178</p> <p style="padding-left: 20px;">THE RELATIONSHIP BETWEEN THE SHORT-TERM USE OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY 178</p> <p style="padding-left: 20px;">IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES 178</p> <p>ALTERNATIVE TWO (PREFERRED ALTERNATIVE) 178</p> <p style="padding-left: 20px;">INTRODUCTION 178</p> <p style="padding-left: 20px;">AIR QUALITY 178</p> <p style="padding-left: 20px;">SOILS 179</p> <p style="padding-left: 20px;">WATER RESOURCES 179</p> <p style="padding-left: 20px;">GEOLOGY, TOPOGRAPHY, PALEONTOLOGY, MINERAL RESOURCES 179</p> <p style="padding-left: 20px;">VEGETATION 180</p> <p style="padding-left: 20px;">WILDLIFE 180</p> <p style="padding-left: 20px;">LAND USE 182</p> <p style="padding-left: 20px;">SOCIOECONOMICS 182</p> <p style="padding-left: 20px;">TRANSPORTATION 192</p> <p style="padding-left: 20px;">CULTURAL RESOURCES 196</p> <p style="padding-left: 20px;">SPECIAL DESIGNATION AREAS 196</p> <p style="padding-left: 20px;">VISUAL RESOURCES 196</p> <p style="padding-left: 20px;">RECREATION 196</p> <p style="padding-left: 20px;">UNAVOIDABLE ADVERSE IMPACTS 198</p> <p style="padding-left: 20px;">THE RELATIONSHIP BETWEEN THE SHORT-TERM USE OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY 198</p> <p style="padding-left: 20px;">IRRETRIEVABLE OR IRREVERSIBLE COMMITMENT OF RESOURCES 199</p> <p>ALTERNATIVE THREE 199</p> <p style="padding-left: 20px;">INTRODUCTION 199</p> <p style="padding-left: 20px;">AIR QUALITY 199</p> <p style="padding-left: 20px;">SOILS 200</p> <p style="padding-left: 20px;">WATER RESOURCES 200</p> <p style="padding-left: 20px;">GEOLOGY, TOPOGRAPHY, PALEONTOLOGY, MINERAL RESOURCES 200</p> <p style="padding-left: 20px;">VEGETATION 200</p> <p style="padding-left: 20px;">WILDLIFE 201</p> <p style="padding-left: 20px;">LAND USE 204</p>
--	--

TABLE OF CONTENTS

<p>SOCIOECONOMICS 204</p> <p>TRANSPORTATION 212</p> <p>CULTURAL RESOURCES 214</p> <p>SPECIAL DESIGNATION AREAS 214</p> <p>VISUAL RESOURCES 214</p> <p>RECREATION 217</p> <p>UNAVOIDABLE ADVERSE IMPACTS 217</p> <p>THE RELATIONSHIP BETWEEN THE SHORT-TERM USE OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY 219</p> <p>IRRETRIEVABLE OR IRREVERSIBLE COMMITMENT OF RESOURCES 219</p> <p>ALTERNATIVE FOUR 219</p> <p> INTRODUCTION 219</p> <p> AIR QUALITY 219</p> <p> SOILS 220</p> <p> WATER RESOURCES 220</p> <p> GEOLOGY, TOPOGRAPHY, PALEONTOLOGY, MINERAL RESOURCES 220</p> <p> VEGETATION 220</p> <p> WILDLIFE 221</p> <p> LAND USE 221</p> <p> SOCIOECONOMICS 226</p> <p> TRANSPORTATION 232</p> <p> CULTURAL RESOURCES 232</p> <p> SPECIAL DESIGNATION AREAS 232</p> <p> VISUAL RESOURCES 236</p> <p> RECREATION 236</p> <p> UNAVOIDABLE ADVERSE IMPACTS 236</p> <p> THE RELATIONSHIP BETWEEN THE SHORT-TERM USE OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY 238</p> <p> IRRETRIEVABLE OR IRREVERSIBLE COMMITMENT OF RESOURCES 238</p> <p>ALTERNATIVE FIVE 238</p> <p> INTRODUCTION 238</p> <p> AIR QUALITY 238</p> <p> SOILS 239</p> <p> WATER RESOURCES 239</p> <p> GEOLOGY, TOPOGRAPHY, PALEONTOLOGY, MINERAL RESOURCES 239</p> <p> VEGETATION 240</p> <p> WILDLIFE 240</p> <p> LAND USE 240</p> <p> SOCIOECONOMICS 240</p> <p> TRANSPORTATION 242</p> <p> CULTURAL RESOURCES 242</p> <p> SPECIAL DESIGNATION AREAS 242</p> <p> VISUAL RESOURCES 242</p> <p> RECREATION 245</p>	<p>ALTERNATIVE TWO (NO ACTION ON EXCHANGE AND DEVELOPMENT OF PRLAS ON THE KAI-PAROWITS PLATEAU BY UP&L) 246</p> <p> AIR QUALITY 246</p> <p> SOILS 246</p> <p> WATER RESOURCES 246</p> <p> GEOLOGY, TOPOGRAPHY, PALEONTOLOGY, MINERAL RESOURCES 248</p> <p> VEGETATION 248</p> <p> WILDLIFE 248</p> <p> LAND USE 250</p> <p> SOCIOECONOMICS 251</p> <p> TRANSPORTATION 253</p> <p> CULTURAL RESOURCES 253</p> <p> SPECIAL DESIGNATION AREAS 253</p> <p> VISUAL RESOURCES 253</p> <p> RECREATION 256</p> <p> UNAVOIDABLE ADVERSE IMPACTS 256</p> <p> THE RELATIONSHIP BETWEEN THE SHORT-TERM USE OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY 258</p> <p> IRRETRIEVABLE OR IRREVERSIBLE COMMITMENT OF RESOURCES 258</p>
<h2 style="margin: 0;">CHAPTER 5 SUMMARY OF INDIVIDUAL TRACTS</h2>	
<p>PROPOSED UTAH POWER AND LIGHT EXCHANGE 245</p> <p> INTRODUCTION 245</p> <p> ALTERNATIVE ONE (FULL EXCHANGE OF THE PRLAs) 245</p>	<p>INTRODUCTION 259</p> <p>TUCKER CANYON 259</p> <p>MILLER CREEK 259</p> <p>GORDON CREEK 259</p> <p>SLAUGHTERHOUSE CANYON 259</p> <p>MEETINGHOUSE CANYON 260</p> <p>RILDA CANYON 260</p> <p>COTTONWOOD 260</p> <p>NORTH HORN MOUNTAIN 261</p> <p>EMERY NORTH 261</p> <p>EMERY CENTRAL 262</p> <p>EMERY SOUTH 262</p>

	PAGES		PAGES
COMMENT LETTERS AND RESPONSES	54	POTENTIAL FOR SPECIAL DESIGNATION IN GARFIELD COUNTY	2
PUBLIC HEARINGS COMMENTS AND RESPONSES	36	APPENDIX 7 AIR QUALITY MODELING	10
APPENDIX 1 UINTA- SOUTHWESTERN UTAH REGIONAL COAL SUGGESTED LEASING TARGET	14	APPENDIX 8 BIOLOGICAL OPINION, U.S. FISH AND WILDLIFE SERVICE	6
APPENDIX 2 AGREEMENT, UTAH POWER & LIGHT CO, DEPARTMENT OF THE INTERIOR, FOREST SERVICE	12	APPENDIX 9 PHEASANT POPULATION ESTIMATE FORMULA	1
APPENDIX 3 MAJOR PLANT COMMUNITIES AND TYPICAL SPECIES OCCURRING IN CENTRAL UTAH	2	APPENDIX 10 NET ENERGY ANALYSIS	23
APPENDIX 4 AREAS WITH POTENTIAL FOR SPECIAL DESIGNATION	1	LIST OF PREPARERS	1
APPENDIX 5 OBJECTIVES OF VISUAL RESOURCE MANAGEMENT CLASSIFICATIONS	1	GLOSSARY	2
APPENDIX 6 AREAS WITH		ABBREVIATIONS	1
		REFERENCES CITED	4
		INDEX	4

SUMMARY

INTRODUCTION

The Uinta-Southwestern Utah Coal Region is one of 12 coal production regions established by the U.S. Department of the Interior as part of a new Federal coal management program. The National Energy Plan announced by President Carter in April 1977 proposed greater use of the Nation's coal resources to offset reliance on imported oil and declining domestic oil resources. Renewed leasing of Federal coal is expected to facilitate production and use of coal to meet national energy requirements.

In response to the President's directive, the Secretary of the Interior established a Regional Coal Team for the Uinta-Southwestern Utah Coal Region and adopted a preliminary leasing target of 322 million tons of Federal coal for lease in mid-1981. The Secretary's leasing target decision considered production goals established by the Department of Energy (DOE). These goals reflect DOE's forecast of low, medium, and high levels of coal demand. Scoping meetings with the public, industry, and affected State and Federal agencies also influenced the Secretary's decision. The coal lands selected for leasing have undergone a land use planning process that identified areas suitable for further consideration for coal leasing and development.

This Uinta-Southwestern Utah Coal Region includes 17 counties in Utah and seven counties in Colorado. The area includes all the known commercially minable coal in Utah and 32 percent of that found in Colorado. The leasing proposed in this statement includes only areas in the Wasatch Plateau and Emery Coal Fields for which land use planning had been updated to determine suitability for leasing. These lands are entirely within Carbon, Emery, Sevier, and Sanpete Counties in central Utah.

In accordance with the National Environmental Policy Act of 1969 (as amended), the final regulations of the Council on Environmental Quality, and the DOI Coal Management Program the coal target and proposed coal leasing were presented to the public. Scoping meetings were held December 1979 and February 1980 in Price, Escalante, Richfield, and Salt Lake City, Utah. Participants at these meetings aided BLM in identifying the following as primary concerns in analyzing the proposed coal leasing program: socio-economics, hydrology, wildlife, land use, aesthetic values, cultural resources, and transportation. No alternative actions were suggested by the public at scoping meetings.

ALTERNATIVES

Five alternatives were recommended by the Regional Coal Team for consideration in the EIS. These alternatives range from leasing 11 tracts to leasing 3 tracts, and the mandatory No Action. In addition, the proposed development of the Hollberg Preference Right Lease Application (PRLA) is included as part of all alternatives.

A proposed exchange of PRLAs covering Federal coal on the Kaiparowits Plateau in Garfield and Kane Counties for Federal coal in the Wasatch Plateau coal field is also analyzed in this statement. The PRLAs were submitted by Utah Power and Light Company (UP&L) and would be exchanged for coal lands of equal value on the Wasatch Plateau. The lease areas proposed for exchange on the Wasatch Plateau are included in the lease tracts discussed in the leasing alternatives. The alternatives identified are:

ALTERNATIVE ONE, MAXIMUM LEVEL (561.8 MILLION TONS)

Alternative One considers leasing 11 tracts and represents the maximum level of coal leasing for the region. One tract (Emery Central) would be surface mined, nine tracts (Tucker Canyon, Miller Creek, Gordon Creek, Meetinghouse Canyon, Rilda Canyon, Cottonwood Canyon, North Horn Mountain, Slaughterhouse Canyon, and Emery South) would be underground mined, and one tract (Emery North) would be a combination surface and underground mine. The Hollberg PRLA is also considered in this Alternative and would be underground mined. The tracts, totaling 37,906 acres, include 561.8 million tons of in-place Federal coal; however, only 256.2 million tons would be recovered.

ALTERNATIVE TWO (PREFERRED ALTERNATIVE), HIGH LEVEL (465.2 MILLION TONS)

Alternative Two considers leasing seven tracts. The tracts are Tucker Canyon, Miller Creek, Gordon Creek, Rilda Canyon, Meetinghouse Canyon, Cottonwood Canyon, and North Horn Mountain. All tracts would be mined using underground methods. The Hollberg PRLA is also considered in this Alter-

SUMMARY

native. The tracts, totaling 31,588 acres, include 465.2 million tons of in-place Federal coal; however, only 186.1 million tons would be recovered.

ALTERNATIVE THREE, MID LEVEL (335.3 MILLION TONS)

Alternative Three was structured primarily to consider those tracts which have been identified for the proposed UP&L exchange. They are: Meetinghouse Canyon, Cottonwood Canyon, and North Horn Mountain. These tracts would not be offered for competitive sale until they have been eliminated from consideration for exchange. All three tracts would be mined using underground methods. The Hollberg PRLA is also considered in this Alternative. The tracts, totaling 24,507 acres, include 335.3 million tons of in-place Federal coal; however, only 134.1 million tons would be recovered.

ALTERNATIVE FOUR, LOW LEVEL (153.7 MILLION TONS)

Alternative Four considers leasing three tracts, Gordon Creek, Meetinghouse Canyon, and Cottonwood Canyon. All three tracts would be mined using underground methods. The Hollberg PRLA is also considered in this Alternative. The tracts, totaling 7,744 acres, include 153.7 million tons of in-place Federal coal; however, only 61.5 million tons would be recovered.

ALTERNATIVE FIVE, NO ACTION

Alternative Five is the No Action Alternative. If implemented, this Alternative would result in no new leasing of Federal coal in 1981. However, the Hollberg PRLA could still be processed.

HOLLBERG PRLA

The Hollberg PRLA could be developed under any of the above alternatives. The 3,036-acre tract would be mined by underground methods. It contains 39.3 million tons of in-place Federal coal, but only 19.5 million tons would be recovered.

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ALTERNATIVE ACTIONS

As specified in the National Environmental Policy Act of 1969, the five alternatives were evaluated to determine their environmental impacts. The results are summarized below.

ALTERNATIVE ONE

The increased population associated with mining development would result in a long-term decrease in air quality in the region; however, except for locally high levels of TSP associated with surface mining and unpaved haul roads, NAAQS would not be exceeded.

Soil and vegetation productivity on 953 acres would be lost for the life of the mines. The 2,720 acres disturbed by surface mining would be progressively reclaimed and a maximum of 279 acres of unreclaimed lands per year would result from stripmining. A long-term increase in vegetation productivity on the Emery tracts (2,720 acres) would probably occur due to reclamation. The 441 acres occupied by housing development would not be reclaimed. An unquantified amount of soil would be lost from disturbed areas on the Wasatch Plateau prior to reclamation. Soil loss on the Emery coal field would be 1 ton per acre annually on disturbed sites.

The mining of 256.2 million tons of coal in the region would result in 305.6 million tons of coal becoming unrecoverable by present technology.

Change in aquifers and distribution of surface water due to subsidence could occur in the area of underground mining. The extent of this change is not known. The consumptive use of water in the region would increase by 1,075 acre-feet by the year 2000. Increased sewage effluent (974 acre-feet annually) would add 397 tons of salts per year to tributaries of the Colorado River. This would increase salinity at Imperial Dam by 0.09 mg/L in 2000.

Wildlife including 69 deer, 20 elk, and 8 moose annually would be displaced due to occupation or disturbance of habitat. Highway mortality of deer would increase by 68 deer per year. Elk migration in the Rock Canyon-Killpack Canyon area could be restricted by mine portal development. Conversion of 299 acres of irrigated cropland to housing devel-

SUMMARY

opment or retired because of change of water use would displace 209 pheasants.

Conversion of irrigated cropland to urban use and retirement of irrigated land to provide water for community needs would result in a permanent loss of 270 acres of agricultural land in the region. Crop production on 29 acres retired to provide water for mining and 110 acres of irrigated cropland disturbed by surface mining on the Emery North tract would be lost until mining ceases and reclamation occurs. Stripmining on the Emery tracts would result in a loss of 4,060 AUMs over the life of the mines. The increased traffic in Huntington Canyon would conflict with livestock movement on and off the Plateau.

Population in the region would increase 7,931 by the year 2000, and housing needs would increase by 2,403 units. The additional income (\$107.3 million annually) and buying power generated would increase the local rate of inflation. The effects of this inflation would be felt most acutely by persons living on fixed incomes and those with lower-paying employment such as trade and service workers. The increase of 3,109 jobs in the mining and construction industries, together with their relatively high wage scales, would make it more difficult for employers in lower-paying industries and government to hire and retain qualified employees.

Capital and operating expenditure requirements of local counties, school districts, and municipalities would rise as a result of the need to expand public services and facilities. The increased population in the region would require an additional 1,922 pupil spaces, 97 teachers, 8 doctors, and 15 police officers. There would be at least a temporary deterioration in the quality of services, causing inconvenience and dissatisfaction among those affected. Several communities, particularly Emery but also Castle Dale, Ferron, and Orangeville, would experience some loss of their present small-town atmosphere and cultural homogeneity.

Mine-related traffic would add 3,350 vehicles per day to highways in the region. Increased traffic on U-10 would result in increased maintenance cost and a doubling of traffic accidents. Traffic accidents in the region would increase by 72 accidents annually. A 23-percent increase of truck traffic on Highways 31 and 29 in canyons west of Huntington and Orangeville would conflict with recreation and other traffic in those canyons. Coal haul traffic from the Tucker Canyon tract would result in 30 to 40 trucks daily passing through Scofield. This type of traffic increase would raise the noise level and traffic hazard for residents and visitors. Commuter and truck traffic associated with coal mine development in the region would result in the consumption of 1.6 million gallons of petroleum per year.

Inadvertent loss of cultural resources could occur, and sites that are salvaged would lose context for further study. Losses through illegal collection or vandalism would increase. The 13-percent increase in local demand for recreational opportunities resulting from population increases could result in overutilization and crowding of existing recreation developments and reduced hunter and fisherman success. The proposed development on the Emery North and Central tracts would conflict with wilderness suitability of a roadless area undergoing review.

The landscape modifications that would result from mining and associated development would modify the visual quality of those areas. The modification would be adverse only where it would exceed VRM objectives in the Emery North, Emery Central, and Tucker Canyon tracts. Surface mining on the Emery North and Emery Central tracts would be visible from Highway U-10 and the town of Emery. Development and operation of the Tucker Canyon tract would be visible to subdivision residents and recreationists at Scofield Reservoir.

ALTERNATIVE TWO

In localized areas, high particulate concentrations could occur near unpaved haul and access roads. This would result in a short-term degradation of air quality; however, NAAQS would not be exceeded if BACT was applied.

Soil and vegetation productivity on 834 acres would be lost for the life of the mines. Housing development associated with coal production in the region would occupy 362 acres resulting in a permanent loss of soil and vegetation productivity on those acres. The remaining 472 acres would be reclaimed. Soil loss from development on the Wasatch Plateau is expected to be low.

About 186.1 million tons of coal would be mined, and the 279.1 million tons left in the ground would be unrecoverable by present technology.

Changes in aquifers and surface distribution of water due to subsidence could occur on 31,588 acres; the extent of this impact is unknown. The consumptive use of water in the region would increase by 867 acre-feet annually; sewage effluent discharge would increase by 795 acre-feet annually, and would increase the annual discharge of salt into Colorado River tributaries by 331 tons. This would increase the salinity level at Imperial Dam by 0.07 mg/L in 2000.

The loss of wildlife including 53 deer annually due to highway mortality and a 36-percent increase in illegal killing would be unavoidable. Elk use of a

SUMMARY

winter migration route off North Horn Mountain would be restricted for 40 years by development of portal facilities in Killpack or Rock Canyons. Surface disturbance would reduce the carrying capacity of the region by 60 deer annually for the life of the mines. Also, seven moose and 18 elk would be displaced from their habitat for the life of the mines. Conversion of irrigated cropland would displace 157 pheasants permanently.

Conversion of irrigated cropland for urban use and retirement of irrigated land to provide water for community and mining would result in a permanent loss of 221 acres of irrigated cropland in the region. Crop production on an additional 20 acres retired from change of water use to industrial would be lost for the life of the mines. About 472 acres of grazing land would be occupied for the life of the mines. The number of AUMs that would be lost is not known. Some conflict between mining traffic and livestock movement in Huntington Canyon would occur.

Coal development proposed in this alternative would cause a worsening of the local inflation rate, which would be particularly detrimental to persons living on low or fixed incomes. Income in the region would increase by \$88.9 million by 2000. The increase of 2,645 jobs would cause competition for labor, with the relatively high wages paid in mining and construction making it difficult for other sectors to hire and retain qualified employees. Demand for infrastructure components and services would require increased capital and operating outlays by local governments. Space for 1,562 additional pupils would be required, and an additional 75 teachers would be needed. Also five additional doctors and 13 police officers would be needed in the region. The population increase of 6,516 would result in some loss of small-town atmosphere and cultural homogeneity in the affected communities, particularly Castle Dale, Ferron, and Orangeville.

Increased traffic (2,890 vehicles per day in the region) would cause crowding on highways U-10 and U-29, and conflicts with recreational traffic on roads on the Wasatch Plateau. Coal haulage through Scofield (30 to 40 trucks daily) would increase noise and traffic hazards for residents and visitors. The increase in traffic would result in an increase of about 49 traffic accidents annually. Haulage of coal to existing loadouts, commuting from local communities, and services to the mines from Price would result in the consumption of 1.33 million gallons of petroleum per year.

Inadvertent loss of cultural resources could occur, and sites that are salvaged would lose context for further study. Losses through illegal collection or vandalism would increase. The local

demand for recreation opportunities would increase by about 10 percent.

Landscape modification resulting from mining and associated development would be adverse on the Tucker Canyon tract where it would exceed VRM objectives. Development on that tract would be visible to nearby subdivision residents and recreationists on Scofield Reservoir.

ALTERNATIVE THREE

Some local short-term degradation of air quality would result from traffic on unpaved haul and access roads, but NAAQS would not be exceeded if BACT was applied.

Soil and vegetation productivity on 472 acres would be lost for the life of the mines. Housing development associated with coal production in the region would permanently occupy 247 acres resulting in a permanent loss of soil and vegetation productivity on those lands. Soil losses are expected to be low.

About 134.1 million tons of coal would be mined, and approximately 201.2 million tons of coal would be made unrecoverable as a result of proposed mining.

Changes in aquifers and points of surface discharge due to potential subsidence on 24,507 acres could occur; however, the extent is not known. The consumptive use of water would increase by 612 acre-feet annually, and discharge of sewage effluent would increase 560 acre-feet per year. This discharge would add 207 tons of salt annually to Colorado River tributaries, and increase the salinity level at Imperial Dam by 0.04 mg/L in 2000.

Loss of wildlife habitat, including habitat for 103 pheasants, on irrigated cropland, and disturbance of wildlife due to mining activities would occur. Surface disturbance caused by mining would result in the loss of 28 deer and 8 elk in the region and deer highway mortality would increase by 20 deer annually.

Conversion of cropland for urban use and retirement of irrigated land to provide water for community and mining use would result in the loss of 170 acres of irrigated cropland in the region. Of this amount, the 156 acres of irrigated croplands committed to community use or retired from change of irrigation water to culinary use would be permanently lost and crop production on those lands would be lost. About 225 acres of grazing land on the Wasatch Plateau would be occupied by mining facilities.

SUMMARY

Development of coal as proposed in this Alternative would result in a worsening of the local inflation rate, which would be particularly detrimental to persons living on low or fixed incomes. Income in the region would increase \$58.2 million annually by 2000. Competition for employees for 1,862 new mining related jobs, with relatively high wages paid in mining and construction would make it difficult for other sectors to hire and retain qualified employees. The demand for services and infrastructure components would require increased capital and operating outlays by local governments. Space for 1,129 additional students would be needed, and 55 new teachers would be required. Four additional doctors and eight police officers would also be needed. The population increase of 4,444 would require an additional 1,347 housing units and would result in some loss of small-town atmosphere and cultural homogeneity in the affected communities, particularly Castle Dale, Ferron, and Orangeville.

Mine related traffic in the region would add 1,900 vehicles per day to roads. Moderate increases in traffic on U-10 would cause overcrowding, increased traffic accidents (29 annually) and conflicts with recreation traffic. Haulage of coal to existing loadouts, commuting from local communities, and services to the mines from Price would result in the consumption of 0.75 million gallons of petroleum fuels per year.

Some inadvertent loss of cultural resources could occur and vandalism and illegal artifact collecting would increase due to the increased population. The local demand for recreation opportunities would increase by 7 percent. Overutilization at some sites would cause user dissatisfaction.

ALTERNATIVE FOUR

Local and short-term degradation of air quality would occur near access roads associated with the proposed mines, but NAAQS would not be exceeded if BACT was applied.

Soil, vegetation, and wildlife productivity on 297 acres would be lost for the life of the mines. On lands committed to urbanization and not reclaimed (127 acres), the loss would be permanent.

About 61.5 million tons of coal would be mined and the 92.2 million tons of coal left in the ground would be unrecoverable by present technology.

Changes in aquifers and points of surface water discharge due to potential subsidence of 7,744 acres could occur; however the extent is not known. Consumptive use of water would increase by 312 acre-feet annually, and sewage effluent discharge would increase 288 acre-feet. The in-

creased salt load to tributaries of the Colorado River would be 117 tons annually. This would increase salinity at Imperial Dam by 0.03 mg/L in 2000.

Surface disturbance associated with mining would decrease big game population by 22 deer and four elk annually and road construction affecting riparian habitat would displace four moose. Increased traffic would cause deer highway mortality to increase by 22 deer annually.

The conversion of cropland for urban use (64 acres) and the retirement of irrigated lands to provide water for mining and community use (23 acres) would result in loss of crop production on 87 acres. Mining related traffic in Huntington Canyon would conflict with livestock movement in the canyon.

The population increase associated with this alternative would cause a worsening of the local inflation rate, which would be particularly detrimental to persons living on low or fixed incomes. Income in the region would increase by \$30.6 million annually by 2000. The addition of 949 new jobs and competition for labor, with the relatively high wages paid in mining and construction, would make it difficult for other sectors to hire and retain qualified employees. Increased capital and operating layouts by local governments would be necessary to provide services for the increased population. Space for 520 additional students, and an increase of 25 teachers would be required. Also two new doctors and five police officers would be needed in the region. Increased population of 2,282 would require 691 new housing units, and would result in some loss of cultural homogeneity in the affected communities, particularly Castle Dale, Ferron, and Orangeville.

Traffic in the region would increase by 1,200 vehicles per day. There would be moderate increases in traffic (100 to 200 vpd) along U-10 from Castle Dale northward, with somewhat greater increase on the Gordon Creek road. Vehicle accidents would increase by 25 accidents annually. Haulage of coal to existing loadouts, commuting from local communities, and services to the mines from Price would result in the consumption of about 0.9 million gallons of petroleum fuels per year.

Vandalism and illegal artifact collecting would increase as a result of the increased population in the area. Local recreation demand would increase by 4 percent.

UTAH POWER AND LIGHT EXCHANGE

UP&L acquired rights to prospecting permits (PRLAs) on 18,325.2 acres of Federal land on the

SUMMARY

Kaiparowits Plateau in 1971. In 1976, UP&L filed suit demanding the processing of the PRLAs and issuance of leases. They dropped the suit when Congress authorized an exchange of the PRLAs for coal leases on the Wasatch Plateau. If the exchange does not develop, UP&L could demand processing of the PRLAs. Two alternatives were developed to consider impacts from the proposed exchange.

Alternative One considers approval of the exchange. The Department of Interior would issue to UP&L a coal lease or group of leases in the Wasatch Plateau area in exchange for relinquishment of all or a portion of the PRLAs held by UP&L on the Kaiparowits Plateau. The leases identified for selection by UP&L are the Meetinghouse Canyon, Cottonwood, and North Horn Mountain tracts. Leasing and coal development on these three tracts is analyzed as Alternative Three of the coal leasing program previously discussed.

Alternative Two is the No Action Alternative. No exchange would be made and the PRLAs would be processed in accordance with regulations detailed in 43 CFR 3430. Meetinghouse Canyon, Cottonwood, and North Horn Mountain tracts would be available for competitive leasing.

A plan for development of the PRLAs has been prepared and submitted by UP&L (UP&L, 1979). According to this plan, four separate mines would be developed at about 2 year intervals. At full production, 18 million tons of coal would be mined annually. Of the 1.287 billion tons of in-place coal, 512 million tons would be recovered.

Environmental Consequences

The loss of soil and vegetation production on 951 acres would be unavoidable for the life of the mines. About 270 acres would be reclaimed, but the loss of production on 681 acres would be permanent due to construction of housing and roads.

Mining of 512 million tons of coal on the PRLAs would result in 775 million tons of coal becoming unrecoverable by present technology.

Changes in aquifers due to mining and subsidence could occur; however, the extent is not known. Consumptive use of water in the area would increase by 1,434 acre-feet annually.

The 176 acres of irrigated cropland converted for community development in Garfield County would result in loss of pasture, hay, and small grains production. An additional 134 acres of irrigated land would be retired to meet water requirements of the

growing communities. Grazing capacity of 200 AUMs per year would be lost.

Population in Garfield County would increase 400 percent by the year 2000. Local communities would experience erosions of their small-town, rural way of life and community homogeneity. Local inflation rates would increase. Jobs and community infrastructure would improve; however, wage competition from the mining and construction sectors would bid up labor costs, making it difficult for local employers to hire and retain qualified workers.

Increased car and truck traffic associated with coal production would increase fuel consumption by 4.5 million gallons per year.

Inadvertent destruction or disturbance of undetected cultural resources and losses through illegal collection or vandalism would occur.

Local demand for dispersed and developed recreation opportunities would increase by approximately 160 percent resulting in over-utilization and crowding of existing recreation facilities and reduced hunter and fisherman success. Development would conflict with wilderness suitability of three areas undergoing wilderness review.

UNRESOLVED ISSUES

Certain issues having direct bearing on implementation of the alternatives have not been resolved. Further analysis and action by appropriate parties and agencies are required in order to resolve the following issues:

1. The leasing target of 322 million tons for the region is subject to change based on the Nation's energy needs. An annual shortfall of 5.5 million tons of coal could occur by 1990, based on 1979 projections by the Department of Energy unless new Federal leasing is initiated. A set of preliminary production goals issued by DOE in late 1980 indicate a substantially higher forecast demand for Utah coal. Based on these new goals, the Secretary could revise the Federal leasing target prior to his final decision on a lease sale.

2. Markets for coal were not identified; therefore, additional analysis of coal transportation systems and interrelated projects would be needed.

3. Tract boundaries are still subject to change based on additional exploratory drilling and subsequent surveys.

SUMMARY

4. The determination of recoverable coal reserves on the tracts is subject to revision based on the ongoing drilling program of GS.

5. Coal values for the UP&L exchange have not been agreed upon; therefore the amount of lands and type of exchange have not yet been decided. The BLM has received the GS evaluation of the coal values and is currently reviewing the evaluation and the procedures involved in the exchange agreement. A decision on the exchange has not been made at this time.

6. Cultural resource inventories of affected areas would also be required as provided for in the coal programmatic Memorandum of Agreement between the President's Advisory Council on Historic Preservation, Office of Surface Mining, and BLM. Full compliance with procedures outlined in 36 CFR, Part 800 Protection of Historic and Cultural Properties must also be completed.

IDENTIFICATION OF THE PREFERRED ALTERNATIVE

Alternative Two, the high level scenario (465.2 million tons) involving the leasing of seven tracts on the Wasatch Plateau for underground mining only, is the preferred alternative.

CHAPTER 1

PURPOSE AND NEED

INTRODUCTION

The Uinta-Southwestern Utah Coal Region is one of 12 coal production regions established by the United States Department of the Interior (DOI) in association with a new Federal coal management program which was initiated in June 1979 (BLM, 1979). This environmental impact statement (EIS) analyzes alternative levels of coal leasing in the region beginning in mid-1981. The R. J. Hollberg Preference Right Lease Application (PRLA) and a proposed Utah Power and Light Company (UP&L) coal lease exchange are also considered.

COAL LEASING PROGRAM

Purpose and Need for Leasing

An integral feature of the new coal leasing program is the offering of Federal coal for lease beginning in 1981. A National Energy Plan announced by President Carter in April 1977 calls for significantly greater use of the nation's abundant coal resources to help offset reliance on imported oil and declining domestic oil and gas resources. Renewed leasing of Federal coal coupled with more active management of existing Federal coal leases is expected to facilitate production and use of coal to meet national energy requirements. The overall coal leasing program is described in the Federal Coal Management Program Final Environmental Statement (BLM, 1979).

The Need for Leasing in the Region

In April 1980, the Secretary of the Interior adopted a preliminary leasing target of 322 million tons of in-place Federal coal for the Uinta-Southwestern Utah Coal Region. The target was established after analyzing potential production from planned and existing coal mines in the region, extensive public hearings, and consultation with State and local officials and the Departments of Energy and Justice. The target would aid DOI in directing its effort to satisfy anticipated coal demand in the region and

assure that Federal coal plays a major role in meeting the country's energy needs.

Factors used in determining the 322-million ton leasing target included the Intermountain Power Project (IPP) and projected production from existing mines. These factors combined with others described in Appendix 1 are expected to result in an anticipated annual coal production deficit of approximately 5.5 million tons by 1990. (See Appendix 1 for details on how the target and anticipated shortfall were determined.) The leasing target selected by the Secretary in April 1980 was designed to lease sufficient coal to cover this 5.5 million tons per year deficit and thus represents the Federal share of production that would satisfy projected 1990 demand. A final leasing target decision will be made by the Secretary that will include more recent DOE production goals for this region, which have increased significantly in the past year.

As of September 30, 1979 there were 201 Federal leases in the State of Utah totaling 7,720.28 million tons of in-place reserves. Of this amount, 267.25 million tons are considered recoverable by surface methods and 2,977.62 million tons are recoverable by underground methods. For the entire Uinta-Southwestern Utah Coal Region, the figures are 262 leases totaling 9,714.71 million tons of in-place reserves, of which 279.58 million tons would be recovered by surface methods and 3,759.35 million tons by underground methods (DOI, 1980).

Concern has been expressed by the Southeastern Utah Association of Local Governments regarding development of the coal production baseline to be used in this EIS. Recognizing that other estimates exist which project different population figures, it was decided to adopt the mid-level baseline analyzed in the Central Utah Coal Development Environmental Statement prepared in 1979 by Geological Survey. Thus annual production rate of 24 million tons by 1990 was projected for only the Four-County area in which the proposed leasing in 1981 and 1982 is located. Projection of 24 million tons production by 1990 as a baseline is based on certain assumptions which may or may not prove valid over time as conditions change.

PURPOSE AND NEED

Planning Process for the Coal Lease Program

The following discussion summarizes the overall Federal Coal Leasing Program. It is followed by a discussion of events specific to the Uinta-Southwestern Utah Coal Region which have led to the preparation of this EIS.

SUMMARY

Federal coal would be leased based on the Federal land use planning process which considers input from State, industry and public sectors. Amounts leased would be based on regional production goals provided by the Department of Energy (DOE).

Bureau of Land Management (BLM) and Forest Service (FS) land use planning documents are the sources relied upon in the initial process of identifying areas suitable for further consideration for coal leasing. Criteria used to designate these lands are found in Section 522 of the Surface Mining Control and Reclamation Act of 1977 (SMCRA) and further detailed in 43 CFR 3461 (Regulations Pertaining to Coal Management, Federally Owned Coal: Federal Lands Review-Unsuitability for Mining).

After completion of land use planning, BLM issues a call for industry expressions of interest in coal leasing for those areas in the region found suitable for further consideration. A Regional Coal Team (RCT) is formed to overview the leasing process and make recommendations to the Director of BLM regarding leasing actions and regional leasing targets. A series of meetings are held, which are open to the public, to consider each of the following steps in the process. The expressions of industry interest and other geologic and mining information are used by the Geological Survey (GS) to delineate specific tracts for potential leasing. GS prepares tract summary reports which indicate annual production potential, expected mining methods, employment requirements, tract size, and other salient data. This information is used to prepare a site-specific environmental analysis for each tract. The RCT then ranks the tracts based on coal economics, environmental impacts, and socioeconomic impacts. The RCT also formulates preliminary alternatives consisting of different combinations of tracts to make up varying levels of production. After a preliminary cumulative analysis is prepared, the RCT reviews the analysis and may modify its previous decision concerning ranking and tract combinations for alternatives. An EIS is then

prepared which analyzes the environmental impacts of the alternatives selected.

UINTA-SOUTHWESTERN UTAH COAL REGION

The Uinta-Southwestern Utah Coal Region is comprised of 17 counties in Utah and seven counties in Colorado (Figure 1-1). Several major coal fields are located in the region which cumulatively include all known commercially minable coal in Utah (Doelling, 1972) and 32 percent of the known commercially minable coal in Colorado (Landis, 1959).

The region is an active coal producing area. As of 1980, there were 39 producing leases in the region, 27 of which were in Utah. Nearly 9 million tons were produced that year (DOI, 1980). The coal from these leases is being taken out of 21 mines in the region which have Federal coal leases. Fourteen of the mines are in Utah and seven are located in Colorado. Ten mines in Utah and nine in Colorado have mining plans awaiting approval.

This EIS covers only lands for which land use planning has been sufficiently updated to consider the unsuitability criteria identified in SMCRA and 43 CFR 3461. These lands are entirely located within a four-county area in central Utah (Carbon, Emery, Sevier, Sanpete) and include public lands administered by FS and BLM as well as private lands overlying Federal coal (Figures 1-2 and 1-3). The Wasatch Plateau and Emery coal fields, which encompass the Wasatch Plateau and Emery Known Recoverable Coal Resource Areas (KRCRA), are located in the area of consideration. Land use planning efforts in the Colorado portion of the region were not completed in time for consideration of leasing in this EIS.

BLM-administered lands in the area are located in the Moab District San Rafael Planning Area and Wattis Planning Unit. Land Use Plans were supplemented in July 1979 to consider the coal unsuitability criteria. The documents are available for review at the BLM District Office in Moab, Utah. FS lands in the area of concern are located in the Manti-LaSal National Forest Ferron-Price Planning Unit. In May 1979, the Ferron-Price Land Management Plan and EIS were completed and are available for review at the Forest Supervisors Office in Price, Utah.

BLM issued a call for industry expressions of interest on August 23, 1979. An RCT under the chairmanship of the BLM State Director from Nevada was established on November 20, 1979. Team members include Utah and Colorado BLM State Di-

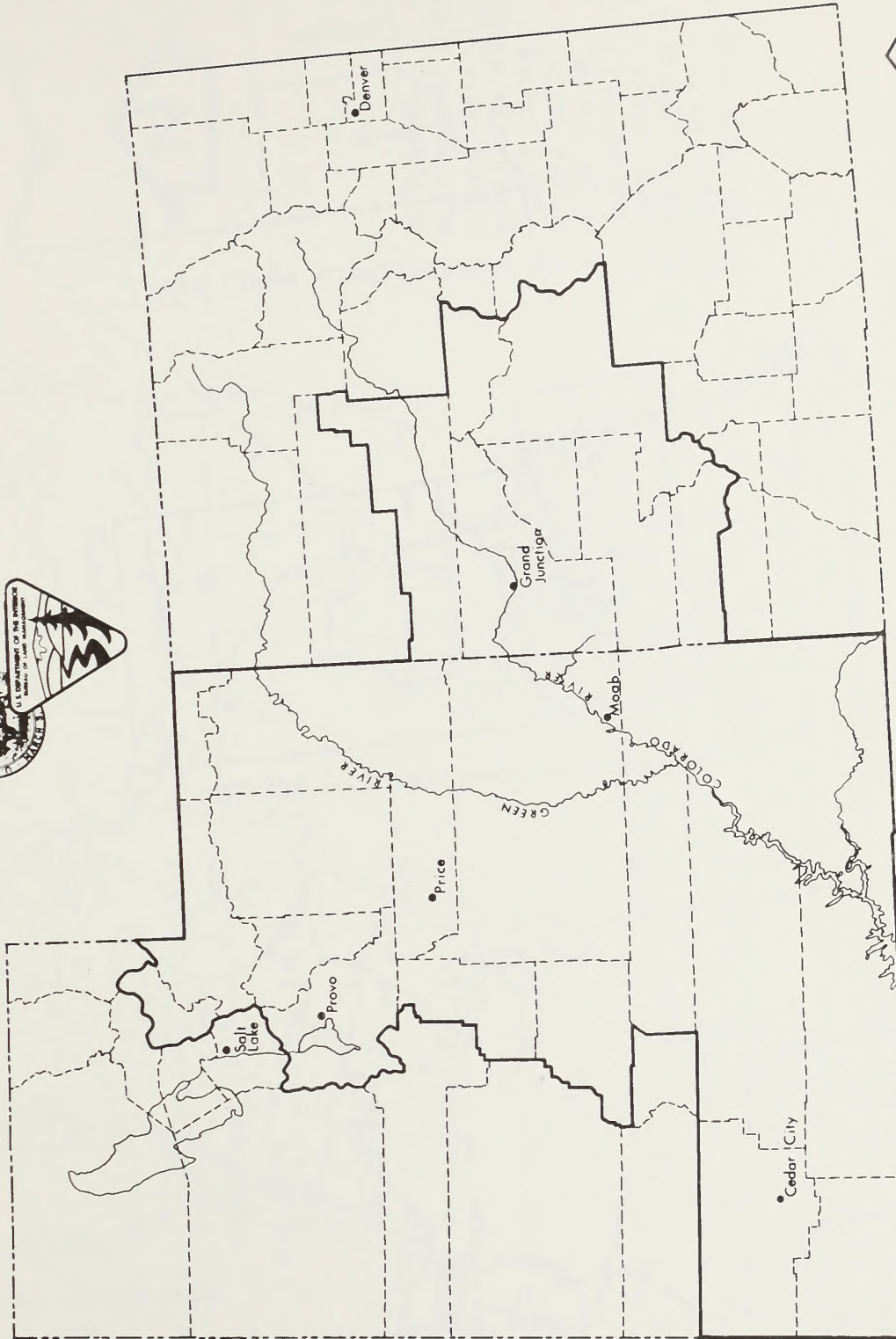
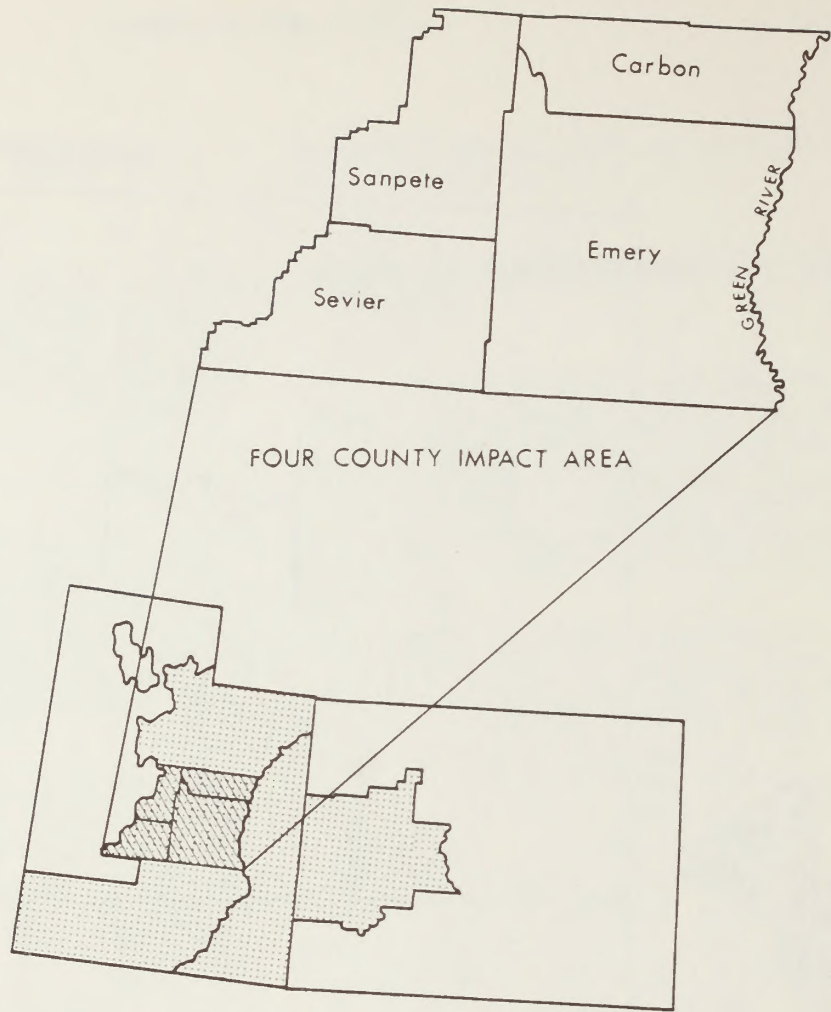


FIGURE 1-1

UINTA-SOUTHWESTERN UTAH COAL REGION

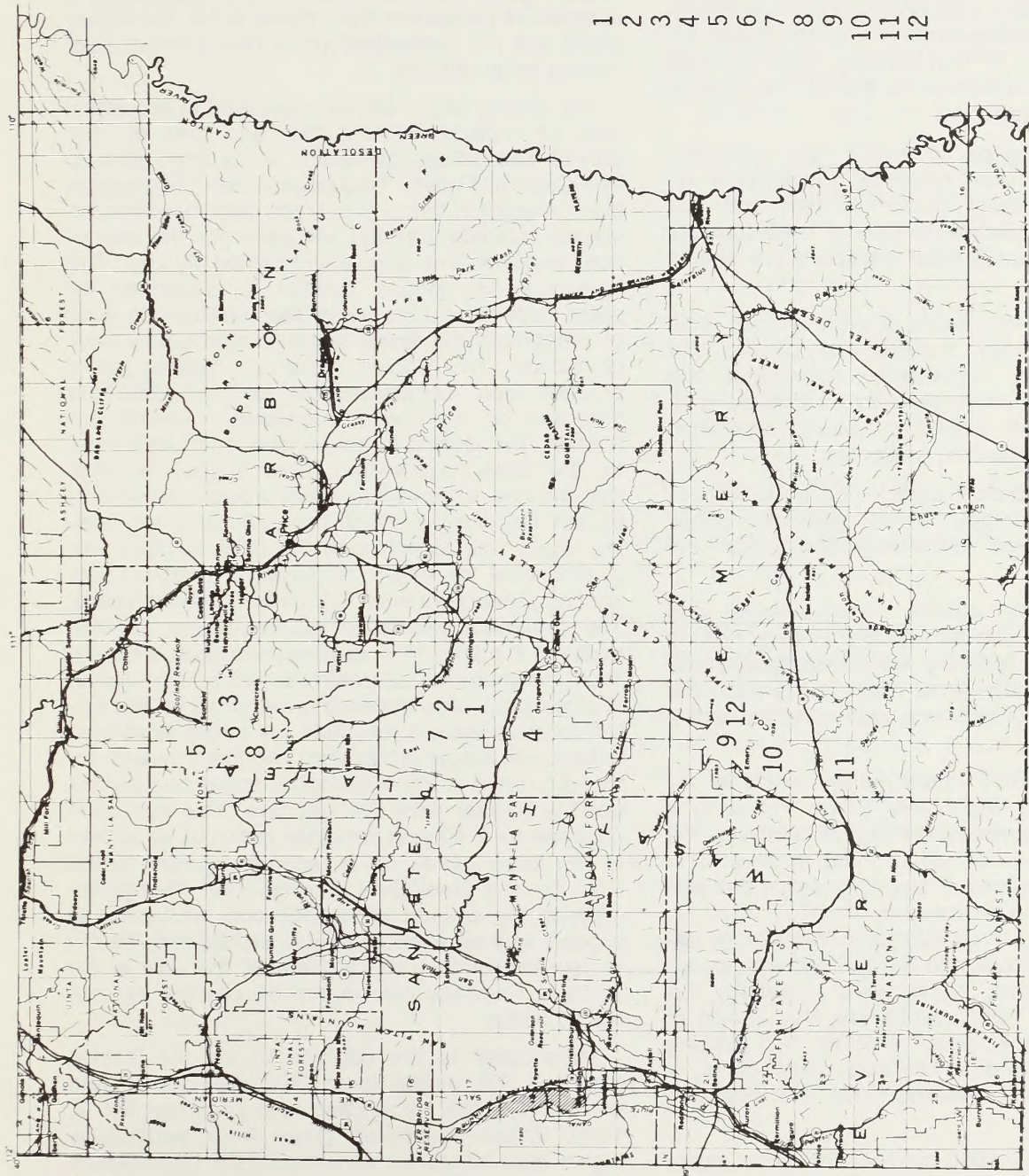


UINTA-SOUTHWESTERN UTAH COAL REGION



FIGURE 1-2
FOUR-COUNTY IMPACT AREA

BLM 1980



- 1 COTTONWOOD
- 2 MEETINGHOUSE CANYON
- 3 GORDON CREEK
- 4 NORTH HORN MOUNTAIN
- 5 TUCKER CANYON
- 6 MILLER CREEK
- 7 RILDA CANYON
- 8 SLAUGHTERHOUSE CANYON
- 9 EMERY NORTH
- 10 EMERY CENTRAL
- 11 EMERY SOUTH
- 12 HOLLBERG PRLA

FIGURE 1-3
FOUR-COUNTY IMPACT AREA
TRACT LOCATIONS

(GS, 1979)

PURPOSE AND NEED

rectors and representatives of the State Governors of Utah and Colorado. The Office of Surface Mining (OSM), FS, GS, and NPS are represented on the team by ex-officio members. Using the industry expressions of interest and other geologic information, GS delineated 13 tracts for potential leasing. Due to data and time constraints, site specific analyses were prepared for only eight tracts. Pursuant to 43 CFR 3420.4-4, the tracts were ranked high, medium, and low for leasing desirability by the RCT during a meeting on February 5 and 6, 1980. The basis for ranking was coal economics, environmental impacts, and socioeconomic impacts. Table 1-1 shows the results of that ranking. The following subfactors were considered by the RCT in ranking the tracts for leasing:

1. Coal economics: production rate, estimated mine life, total coal reserves, recoverable reserves, coal quality (sulfur content and Btu value), surface ownership, type of mine (surface versus underground), coal transportation needs, and coal access;
2. Impacts on the natural environment: air quality, soils, hydrology, surface and underground water resources, vegetation, endangered and threatened species, reclamation potential, wildlife, cultural and historical values, recreation values, visual resources, and noise;
3. Socio-economic impact: effect on local population, infrastructure, social services, public safety, culture and well being, and agriculture; and
4. Unsuitability criteria: rights-of-ways and easements; land use for scientific studies, historic lands and sites, federally listed endangered and threatened species, eagle nests, state residents fish and wildlife, floodplains, and municipal watersheds.

Minutes of all RCT meetings are available for review at the BLM Utah State Office. Following a review of the preliminary cumulative analysis, the RCT at its meeting on April 3, 1980 reviewed and revised the alternatives. A final cumulative analysis was completed and reviewed by the RCT June 17, 1980. At that time, three additional tracts were delineated for consideration in the EIS and site specific analyses prepared. These were ranked by the RCT on July 30, 1980; results are also shown in Table 1-1. A final acceptance of all tract ranking and selection of alternatives was made during a July 30, 1980 RCT meeting. This EIS analyzes those alternatives.

On December 16, 1980 the RCT met once again. During this meeting modifications in tract boundaries and in-place coal figures were suggested by GS and accepted by the RCT. Those modifications

are reflected in Chapter 2, Alternatives Including the Proposed Action. Tracts modified were Slaughterhouse Canyon, Miller Creek, Gordon Creek and Emery North. The RCT also recommended preliminary lease sale dates of July 30, 1981 and February 4, 1982. The Utah State Director concurred with this recommendation.

The leasing target for the Uinta-Southwestern Utah Coal Region is based upon the difference between the Department of Energy's (DOE) coal production goals and the Department of the Interior's estimate of production from mines within the region which are not dependent upon new Federal coal leasing for production.

The leasing target can be expressed in two ways: tons of in-place Federal coal and tons of new annual production facilitated by Federal leasing. The Code of Federal Regulations calls for expressing the target in terms of in-place coal; however, revisions currently planned will allow for the use of both in-place and annual production figures. The numerical calculations needed to determine in-place Federal coal are being deemphasized in favor of presenting the lease target in terms of annual production. This should make the leasing target process more understandable and will keep the emphasis on any needed increases in annual production. The leasing target announced in April 1980 for the Uinta-Southwestern Utah Region assumed that the new competitive leases would achieve production beginning in 1990. The 322-million-ton leasing target was based upon the DOE medium production goal for 1990. The target in terms of new annual production was 5.5 million tons annually. The preferred alternative would provide approximately 4.5 million tons of new production annually. Thus the preferred alternative's 466 million tons of in-place coal, while exceeding the target of 322 million tons in-place, is less than the target expressed in terms of annual production. The major reason for this difference is that the original target calculations used a 30-year mine life estimate. This has been changed to a 40-year mine life estimate as shown in the DEIS based on a recommendation to the RCT by the Geological Survey. This change increases the amount of in-place coal necessary to support a given level of annual production. Also, it is now known that 100 percent of the coal in the tracts is Federally owned, not 82 percent as estimated earlier.

Subsequent to the decision to set the leasing target at 322 million tons, DOE issued new (but preliminary) coal production goals on August 7, 1980. These preliminary goals were significantly higher than the earlier versions for the Uinta-Southwestern Utah Region. The medium level goal was raised to 58.7 million tons annually for 1990. One reason for this change was that the earlier goal of

TABLE 1-1

RANKING OF COAL TRACTS IN THE UINTA-SOUTHWESTERN UTAH REGION

Tract	Summary Ranking	Rationale
North Horn Mountain	High	High quality coal, near potential market, larger tract is ideal LMU, underground mining, minable from one location in Rock Canyon, impact expected in several communities of Emery County, some potential impacts to wildlife, no regional water aquifer impacted, and no perennial streams.
Meetinghouse Canyon	High	High quality coal (12,800 Btu) developable from existing operation, underground mining, deep coal, existing market available, minimal additional environmental impact anticipated because of existing facilities, smaller tract, and minor socioeconomic impact.
Cottonwood	High	High quality coal with good mining height, underground mining, existing potential market, some potential impact to groundwater hydrology, potential development from existing operation or small independent operation. Minor socioeconomic impact.
Gordon Creek	Medium-High	High quality underground minable coal near rail transportation. Could be mined from existing operations or independent new development, minor socioeconomic impact anticipated in Carbon County areas, some faulting will impact production and cause greater cost of production. Two small streams originating on the tract could be dewatered for short sections. Some potential impact to wildlife.
Emery North	Medium-Low	Lower quality coal than in Wasatch Plateau, underground and surface minable coal. Rail transportation planned but not developed, marginal area to rehabilitate. Some potential disruption to hydrology and floodplain, near National Register site.

(Continued)

TABLE 1-1 (Continued)

Tract	Summary Ranking	Rationale
Emery Central	Medium-Low	Lower quality coal than Wasatch Plateau, surface minable coal, rail planned but not developed, long truck haul, potential for visual impact from I-70, near T&E plant species that have been identified, marginal area to rehabilitate.
Emery South	Medium	Good quality coal (12,300 Btu, 0.8 percent sulfur), good thickness (9 feet), relatively long truck haulage to rail, underground or potentially surface mining, candidate T&E plant species exists on tract, impacts can be avoided by underground mining, rehabilitation potential may be limited, small reserve that fits in best with existing holdings. No communities in near vicinity.
Slaughterhouse Canyon	Low	Small demonstrated reserve base of 5.55 million tons in two seams. Underground mining would occur, however, recovery would only average 31 percent as otherwise minable coal would be left in place to protect escarpments and support shallow overburden. Nearby riparian areas are critical moose winter range. The area is also habitat for big game, bear, and mountain lion. A 3-inch natural gas pipeline crosses the tract and would require protection from surface disturbance or subsidence.
Tucker Canyon	High	High quality low sulfur coal, small reserve but fits in well with fee land, relatively near rail transportation, underground mining likely from operation proposed on fee land, high interest for SBA tract, adjacent existing summer cabin development and visible from Scofield Reservoir.
Miller Creek	Medium-High	High quality underground coal, near rail transportation, potential development from existing operations, potential minor socioeconomic impact, faulting will impact production and cause greater cost of production. Potential impact on big-game habitat.

TABLE 1-1 (Concluded)

Tract	Summary Ranking	Rationale
Rilda Canyon	Medium-High	High quality coal, underground mining, surrounded by leased land, minable from existing holdings, high competitive interest, potential impact on North Emery Water Users Association culinary water, some wildlife impact, tributary to Huntington Canyon which is a scenic and outdoor recreation area. Probable transportation by truck on narrow canyon roads.

PURPOSE AND NEED

17.3 had been based upon the amount of Utah coal reserves listed by the Bureau of Mines that the State of Utah believes were overly conservative. When DOE updated the goals in 1980, new, much higher reserve figures for Utah were used. This largely contributed to the increase in the goals for Utah and thus for the region as a whole.

The 1979 DOE goal of 17.3 million tons could easily be met by production from existing mines in central Utah alone. Consequently, there was little reason to anticipate that any significant Southern Utah coal production would be needed, since that area remains substantially undeveloped at this time. The calculation leading to the leasing target of 322 million tons applied only to the central Utah area since that is where the proposed leasing in this lease sale round would take place and where the impacts would be concentrated. Since neither production nor leasing was expected from southern Utah it was essentially left out of the analysis except for the Kaiparowits Plateau PRLAs involved in the UP&L exchange. No leasing was contemplated in the Colorado portion of the region so this area was also disaggregated and treated separately.

As a result of the issuance of the new DOE goals, a complete review of the leasing target will be presented to the Secretary following completion of the FEIS. The large upward change in the DOE goals will likely mean that not all of the increase in projected demand can be met from development of the proposed leases in central Utah alone. A demand of such magnitude would stimulate production from southern Utah and west-central Colorado as well, a factor that will be considered in recommending a final leasing target for a Secretarial decision. However, since no new leasing is currently proposed for these other areas at this time and since they are outside the impact study area, this possibility is not extensively discussed in this EIS. Any additional leasing in these areas would be subject to further environmental assessment.

Scoping

Government agencies and the public participated in the scoping process through meetings, open houses, correspondence, etc. by providing information, making suggestions, and raising questions concerning the various issues involved.

A notice of intent to prepare the Uinta-Southwestern Utah Coal Region EIS and hold scoping meetings for the EIS was published in the *Federal Register* on November 19, 1979. Six public scoping meetings were held to identify the potential signifi-

cant issues and alternatives to be addressed in the EIS. Four of these scoping meetings were held concurrently with formal coal leasing target hearings. Dates, locations and attendees of the meeting are shown in Table 1-2.

No suggestions for alternatives were offered by the public during the scoping process, however, the following issues were identified:

1. Socioeconomics. Loss of economic growth possibilities in Garfield and Kane Counties resulting from a possible UP&L exchange of PRLAs in that area for coal located on the Wasatch Plateau, "spillover" effects of increased mining activity in Sanpete County, and continued growth and development in Carbon and Emery Counties.
2. Hydrology. Possible impacts to aquifers, surface water, and water quality.
3. Wildlife. Disruption of migration routes and possible loss of habitat.
4. Land Use. Congestion in narrow canyons where mine sites would be located that may disrupt livestock movement and wildlife migration. Conflicts between coal mining and other mineral resource development such as oil and gas.
5. Visual Resources. Visual impacts resulting from possible surface mining in the Emery coal field and Slaughterhouse Canyon.
6. Cultural Resources. Nearly 60 archaeological sites have been identified in the vicinity of and some actually on the two proposed Emery tracts which are proposed for surface mining. Included is the Rochester-Muddy petroglyphs, a National Register property, which was excluded from the Emery North tract but would still remain adjacent to an intensive mining area.
7. Geology. Effects of possible subsidence, resulting from underground mining.
8. Vegetation. Recent surveys have revealed the presence of one candidate threatened plant species on the Emery South tract.
9. Transportation. Traffic congestion on roads, highways, and communities.

Alternatives

Five alternatives were recommended by the RCT for consideration in the EIS. These alternatives range from leasing 11 tracts to no new leasing of Federal coal. In addition to the delineated tracts, possible development of the Hollberg PRLA will also be considered. The alternatives are presented in detail in Chapter 2.

TABLE 1-2

SCOPING MEETINGS

Date	Location	Individuals or Agencies Attending
October 24-25, 1979	Price, Utah	Federal agencies
December 3, 1979	Escalante, Utah	Public (general, industry), State and county agencies Federal agencies
December 4, 1979	Richfield, Utah	Public (general), county agencies, Federal agencies
December 5, 1979	Price, Utah	Public (general, industry), State and county agencies Federal agencies
December 6, 1979	Salt Lake City, Utah	Public (general, industry), State and county agencies Federal agencies
February 13, 1980	Salt Lake City, Utah	State and Federal agencies

PURPOSE AND NEED

The Secretary of the Interior's decision on a course of action is not limited solely to the alternatives presented in the EIS. He may, through the use of his discretionary authority, select additional alternatives that are intermediate in magnitude to those analyzed. These intermediate alternatives could be developed through changes in the proposed level of leasing, changes in the tract combinations, changes in the lease sale schedule, or modification of the leasing target. These alternatives could be developed in response to expressed preferences of the Governors of Utah and Colorado, the analysis in the EIS, recommendations of the RCT, public input, and coordination with other Federal agencies. Finally, at least one tract would be offered for lease only to small business.

Preference Right Lease Applications

There are 30 PRLAs, including the Hollberg, in the region. Twenty-five are located in Utah, five in Colorado. Cumulatively they total 93,777 acres and contain an estimated 2.23 billion tons of in-place reserves (DOI, 1980). The holders of these applications are entitled to Federal coal leases if certain requirements are met. The BLM Grand Junction District in Colorado is in the process of finalizing an environmental assessment on the Douchester Colomine Joint Venture PRLAs. There are three applications located some 12 miles north of Fruta, Colorado which total 14,729 acres of public land. The PRLAs contain more than 300 million tons of in-place coal which would be mined by underground methods.

After completion of the environmental assessment, the company will be required to make a final showing concerning the economics of the proposal. If the applicant can demonstrate that commercial quantities of coal have been discovered and all other requirements are met, a preference right lease may be issued.

Environmental assessments have been prepared for the Hollberg and Utah Power and Light PRLAs. The remaining 19 PRLAs will require environmental assessments to be completed. At any rate, DOI is in the process of reviewing all applications and is committed to complete the process by the end of 1984.

The Hollberg PRLA is analyzed in this EIS because sufficient data are available to consider possible environmental implications of development. Also, this is the only PRLA located within the area in a region to which the unsuitability criteria were applied in time for consideration in the EIS. If the

Hollberg PRLA is approved, production will contribute to baseline figures used in subsequent calculations of the Federal coal leasing target.

Interrelationships

TRANSPORTATION

The Denver and Rio Grande Western Railroad Company (D&RGW) has engaged in preliminary engineering studies, land exchange, and right-of-way application for construction of a railroad in Castle Valley from Wellington south to Emery. Feasibility of the railroad is tied to transportation of coal from existing and proposed mines.

ENERGY INDUSTRY DEVELOPMENTS

Expansion of the Hunter powerplant from two 430-MW units to four is pending and would require water, manpower, and socioeconomic investment.

A coal gasification plant in Emery County is proposed by Mountain Fuel Company to convert coal to natural gas and methanol. A preliminary figure of 3.5 million tons per year of coal consumption has been given. About 10,000 acre-feet of water per year would be required and an undisclosed number of skilled workers.

IPP in Millard County will consume 9 million tons of coal per year, which it is anticipated will come from the Wasatch and/or Emery coal fields. IPP gives impetus to construction of the D&RGW railroad in Castle Valley and provides a new market for Carbon and Emery County coal.

STATE AND LOCAL LAND USE PLANS, PROGRAMS AND CONTROLS

The State of Utah has no State land use plan. However, section 17 of the Utah State Code empowers counties within the State to develop zoning ordinances and enforcement procedures. Until recently both Carbon and Emery Counties had zoned both KRCRAs as M and G-1 which permitted mining. Recent amendments have now been developed which provide "critical environmental zones" which restrict mining activities over much of the Wasatch Plateau area located in those counties.

The State Division of Wildlife Resources (UDWR) has undertaken a program to establish viable

PURPOSE AND NEED

moose and antelope herds in the proximity of the coal lease tracts. Critical wildlife habitat is located on or near some of the tracts and potential access routes. Development of the tracts and increased recreation use would interact with wildlife habitat and migration routes.

UTAH POWER AND LIGHT EXCHANGE

Purpose and Need

In October 1978, Congress amended the Mineral Leasing Act of 1920 (30 U.S.C. 201(a)) to authorize the Secretary of the Interior to issue leases for coal on Federal lands in Utah to UP&L in exchange for eight PRLAs held by UP&L on the Kaiparowits Plateau in southern Utah (Public Law 95-554, 92 Stat. 2072). UP&L and DOI agreed on selected coal lands on the Wasatch Plateau for exchange. The Secretary of the Interior has committed, by written agreement with UP&L and the Forest Service, to consider and possibly consummate the exchange by December, 1981. A copy of the agreement is located in Appendix 2.

The purpose of the proposed action, as analyzed in this EIS, is to exchange these PRLAs for coal leases on the Wasatch Plateau in central Utah. The need for the action, as stated by UP&L in the agreement, is to allow acquisition of coal lands from which production can be obtained by 1985 to meet anticipated needs of UP&L's Hunter powerplant Unit No. 4 in Emery County and IPP in Millard County. The exchange would be based on equal values of coal as determined by GS.

Land Use Planning Process

The PRLAs are located on BLM-administered lands in the Cedar City District Escalante Planning Unit (Figure 1-4). Coal mining in the planning unit was considered and the coal unsuitability criteria identified in 43 CFR 3461 (Regulations Pertaining to Coal Management: Federally Owned Coal) were applied. A draft planning document was then prepared and made available for public comment in March 1980 and a final document completed in September 1980. The lands comprising the PRLAs were found to be suitable for further consideration for coal development.

Scoping

The scoping process described previously in this chapter included the proposed exchange. Concern was expressed by the citizens of Escalante, Utah, and the county commissions of Kane and Garfield Counties over the socioeconomic aspects of the proposed exchange. They were specifically concerned about the loss of growth and development possibilities in southern Utah towns (if the exchange took place and PRLAs were not developed). Only brief comments were received regarding other resources. No suggestions for alternatives other than those already under consideration were received from the public or other government agencies.

Alternatives

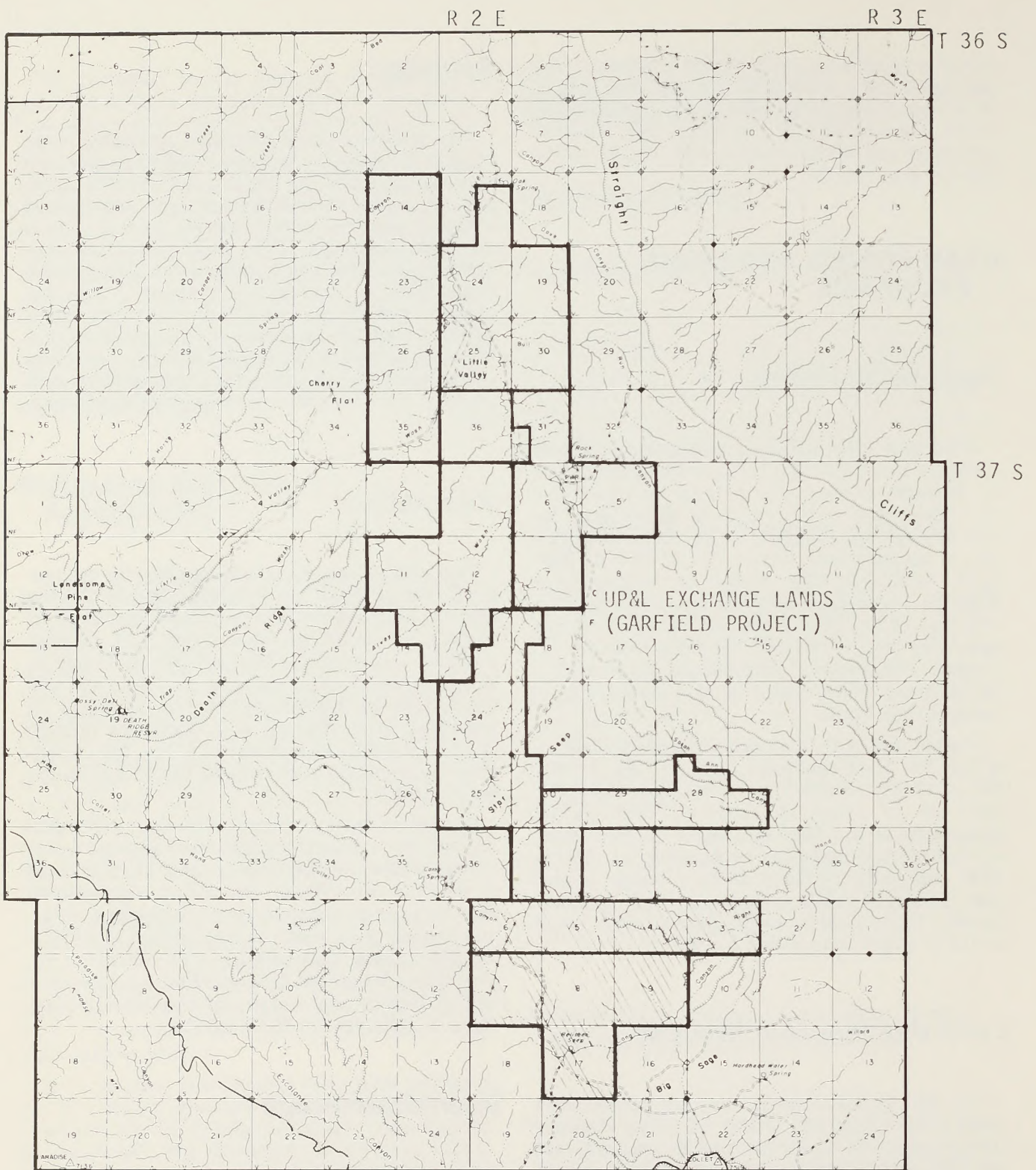
Two alternatives have been identified for this proposal and are described in detail in Chapter 2. They are: (1) approval of the proposed exchange in which UP&L would be granted one, two, or three tracts on the Wasatch Plateau and (2) taking no action, in which no exchange would be made and the PRLAs on the Kaiparowits Plateau would be processed in accordance with regulations detailed in 43 CFR 3420. As a matter of policy, the Department is committed to process all PRLAs by December 1, 1984.

In addition to an outright exchange, a possible scenario for consummation of the exchange would be for UP&L to receive bidding rights of equal value to those in the PRLAs. The bidding rights would then be used to offset bonus bid obligations UP&L may sustain as a result of participation in Federal competitive coal lease sales. A third method of implementing Alternative One would be a combination of exchange of coal leases and coal lease bidding rights as authorized in 43 CFR 3435.1.

Interrelationships

TRANSPORTATION

A major concern regarding the possible development of coal on the Kaiparowits Plateau is coal transportation. BLM contracted with Environmental Research & Technology, Inc., Fort Collins, Colorado, to conduct a study of transportation corridors, methods of transportation, etc. Impacts associated



1/2" EQUALS ONE MILE
 BASE MAP BLM 1978



FIGURE 1-4

UP&L EXCHANGE LANDS (GARFIELD PROJECT)

PURPOSE AND NEED

with the transportation of coal from the Kaiparowits Plateau were studied. The final report was issued on August 1, 1980.

COAL DEVELOPMENT ON THE KAIPAROWITS PLATEAU

Coal in southern Utah is essentially an untapped resource. Currently, no coal is being produced from the coal fields and the small amounts of past production have been confined to limited local markets. However, because the resource is extensive, interest in developing coal on the Kaiparowits Plateau is expected to increase. Two companies have submitted mining plans and are awaiting approval to begin development (GS, 1979).

LOCAL LAND USE PLANS AND CONTROLS

Both Kane and Garfield Counties are revising zoning ordinances and master land use plans. That portion of the PRLAs which is located in Kane County falls in an area now zoned as MU-160 which is a multiple use zone. However, if the proposed revision is accepted mining will be a "conditional use" in this area, meaning that mining and reclamation plans must be filed with the Kane County Planning Commission and County Commissioners for their approval (personal communication, Carrico, Kane Co. Comm., 1980). Garfield County has no ordinances which apply to the PRLA area; however, the County Commission strongly favors some type of coal development.

CHAPTER 2

ALTERNATIVES INCLUDING THE PROPOSED ACTION

INTRODUCTION

Five coal leasing alternatives selected for the Uinta-Southwestern Utah Coal Region and two alternatives for the proposed Utah Power and Light (UP&L) exchange are described in detail in this chapter. Interactions between the coal leasing program and the proposed exchange are identified. Stipulations (mitigating measures) that would be a part of lease issuance, required authorizations for coal leasing, and surface mine reclamation information are also presented. Finally, anticipated environmental impacts of each alternative are summarized in narrative table form. The impacts discussed are those considered to be most significant as determined through the scoping process (40 CFR 1501.7) and environmental analysis (Chapter 4).

FEDERAL COAL LEASING PROGRAM

Each coal leasing alternative is described by identifying specific tracts, in-place resources and recoverable coal reserves, annual production rates, acres proposed for leasing, and identification of surface or underground mining methods. The Hollberg Preference Right Lease Application (PRLA) is considered a part of each alternative because its issuance is not subject to the discretionary authority of the Secretary of the Interior.

Prior to discussion of the various alternatives, narrative summaries are presented for the individual tracts and the Hollberg PRLA which discuss tract locations and size, coal resources, probable mining methods, employment requirements, and probable water needs. Each tract considered in this environmental impact statement (EIS), is a Logical Mining Unit (LMU) as defined by Coal Lease Regulations 43 CFR 3400.5(cc) whether mined independently or in conjunction with adjacent leased or privately owned coal. Three tracts (Emery North, Emery Central, Emery South) are located in the Emery Known Recoverable Coal Resource Area (KRCRA) while the remaining eight tracts (Tucker Canyon, Miller Creek, Gordon Creek, Slaughterhouse Canyon, Rilda Canyon, Meetinghouse Canyon, Cottonwood and North Horn Mountain) are found in the Wasatch Plateau KRCRA. Tract delineation reports and site specific environmental analyses have been completed for all tracts under consideration

detailing probable mine development and anticipated environmental impacts. These reports are available for review at the Utah State Office and Moab District Office of the Bureau of Land Management (BLM) and the Salt Lake Office of the Geological Survey.

At its December 16, 1980 meeting, the RCT recommended that two lease sale dates be considered. The majority of the tracts would be offered for lease July 30, 1981, with a follow-up lease sale date of February 4, 1982. The Utah State Director, BLM, concurred with this recommendation.

Individual Tract Development

TUCKER CANYON TRACT

The Tucker Canyon tract, 161.4 acres in size, is located 2 miles northwest of Scofield, Utah (Figure 2-1). Land surface on the tract is private and the coal is Federally owned. The tract contains an in-place coal resource of 2.15 million tons as shown in Table 2-1 of which 860,000 tons would be recovered at a 40-percent rate. Coal quality on the tract has been determined by a private coal company but the data are not available for public distribution.

Following exploratory drilling, most favorable access to the coal beds would probably be from an area about 0.25 mile south of the tract on privately owned coal land. First production would be from the Upper O'Connor bed followed by development of the Flat Canyon bed. The tract could best be developed in association with adjoining private coal. If the tract were developed separately, the reserves in the Flat Canyon bed would probably not be mined due to the cost of gaining access. The coal is amenable only to underground mining and would probably be mined with continuous miners using room and pillar methods. Annual coal production would be 43,000 tons for the expected 20-year mine life.

Surface facilities would include two portals and plant area consisting of a shop, change house, parking area, and coal storage area. A total of 10 acres would be required. Offsite facilities required would include ventilation facilities, waste disposal area, a 2-mile haulage road, and 2.5 miles of power and telephone lines. These facilities would occupy approximately 24 acres. See Figure 2-2 for a diagram of a possible layout for a surface facility.

TABLE 2-1

COAL QUANTITY: TUCKER CANYON TRACT

	Coal Bed		
	Upper O'Connor	Flat Canyon	Total
Demonstrated Reserve Base (tons)	1,220,000	930,000	2,150,000
Inferred Resource (tons)	0	0	0
Total Estimated In-Place Resource (tons)	1,220,000	930,000	2,150,000
Recoverable Reserves (tons) at 40 Percent	488,000	372,000	860,000
Average Thickness (feet)	4.8	5.6	
Determined by Geological Survey (GS) (1980)			

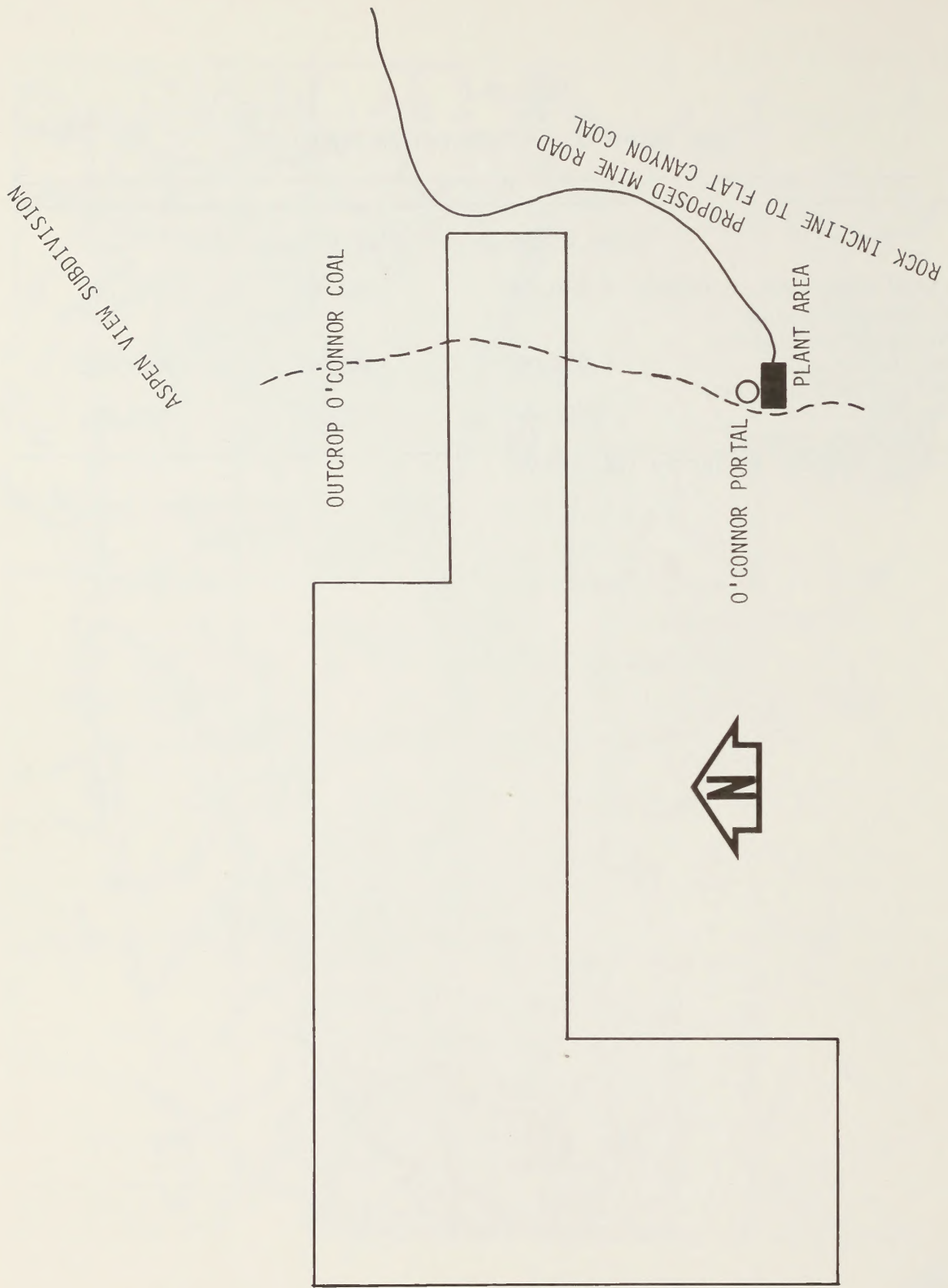


FIGURE 2-2
TUCKER CANYON TRACT SURFACE LAYOUT

The coal would be hauled by truck some 3 to 4 miles from the mine site to a railroad loading area near Scofield. Twenty people would be required for about 2 years for construction activities. The actual mining work force would be about 15 persons. Approximately 0.7 acre-feet of water would be required annually for mine operations and dust suppression. This water would probably be produced by the mine. A potable water source would need to be developed.

MILLER CREEK TRACT

The Miller Creek tract, 2,000 acres in size, is located 4 miles southeast of Scofield and 20 miles northwest of Price, Utah (Figure 2-1). Land surface on the tract is privately owned and all of the coal is Federally owned. The tract contains an estimated in-place coal resource of 43.3 million tons (Table 2-2), of which 17.3 million tons would be recovered at a 40-percent rate. Coal quality is inferred from the Utah No. 2 mine located west of the tract and is shown in Table 2-3.

Mining would be underground, with room and pillar the most likely method, due to extensive faulting expected to be encountered. Production would be 433,000 tons annually for the expected 40-year life of the mine. Access to the reserves could be made through the Swisher Coal Co. operation to the east or from Valley Camp's Utah No. 2 mine to the west, or through a new rock slope portal in Broad Canyon near the southeast corner of the tract (Figure 2-1). Costly fault crossings would be required to gain access to the coal either from existing mines or a new portal in Broad Canyon.

If the tract is mined from one of the adjoining mines no surface disturbance would occur resulting from lease development. Construction of a rock slope portal and other onsite surface facilities in Broad Canyon (Figure 2-1) would result in a surface disturbance of approximately 26 acres. Two miles of new truck haulage road, telephone, and powerlines would also be necessary which would require 34 acres (Figure 2-3).

Approximately 133 permanent employees would be needed to mine the reserves within a 40-year mine life whether the tract was mined separately or as part of an adjoining operation. Mining related activities would require approximately 6.6 acre-feet of water annually. This water would probably be supplied by mine workings. Potable water would also be required if a new portal was constructed. Potential sources of the water have not been determined.

GORDON CREEK TRACT

The Gordon Creek tract, 4,280 acres in size, is located approximately 12 miles west of Helper, Utah (Figure 2-1). Land surface on the tract is privately owned and all of the coal is Federally owned. The tract contains an estimated in-place resource of some 64.9 million tons (Table 2-4) of which 26 million tons would be recovered at a 40-percent rate.

Mining would be underground probably using room and pillar methods with continuous miners. The Hiawatha and Castlegate A seams could be reached through existing mine workings located east of the tract or from a new portal site south of the tract. The Bob Wright seam could only be reached by establishing a new portal in the southeast corner of the tract. If the tract were mined independently of adjacent leases, recoverable resources would be approximately 24.3 million tons (37.5 percent recovery); if mined in conjunction with adjacent existing operations, recoverable reserves would be about 26 million tons (40 percent recovery). The difference in recoverable coal results from State and Federal regulations (30 CFR 211.35a, Utah State Industry Commission Coal Mine General Safety Orders Section 30) which require a 100-foot property boundary if the tract is mined independently. Annual coal production would average 650,000 tons per year with a mine life of 37 years for an independent operation and 40 years if mined in conjunction with adjacent existing operations. Coal quality on the tract was determined by GS and is shown in Table 2-5.

Twenty-five acres of surface disturbance would result from the construction of new surface facilities, portals, and topsoil, waste, and coal storage areas (Figure 2-4). Sixty-five acres of surface disturbance would result from constructing 3 to 4 miles of haul and access roads, and 3 to 4 miles of power and telephone lines.

If the adjacent coal owner (Beaver Creek Coal Company) obtains the tract, the coal would be transported approximately 25 miles on existing roads by truck to the company's wash plant near Wellington, Utah. Independent operators would probably truck the coal to railroad loading facilities in Price (18 miles), Helper (12 miles), or the Castle Gate area (14 miles). Figure 2-4 depicts possible portal sites and new road locations.

About 180 permanent employees would be required for mine operation. If surface facilities were required, an additional 20 to 30 construction employees would be required for 1 to 2 years.

Water requirements to produce the coal would be approximately 10 acre-feet per year. The mine

TABLE 2-2
COAL QUANTITY: MILLER CREEK TRACT

	Coal Bed			Total
	Upper O'Connor	Lower O'Connor	Undetermined ^a	
Demonstrated Reserve Base (tons)	23,200,000	20,100,000	0	43,300,000
Inferred Resource (tons)	0	0	0	0
Total Estimated In-Place Resource (tons)	23,200,000	20,100,000	0	43,300,000
Recoverable Reserves at 40 Percent Average Thickness (feet)	9,280,000 6.9	8,040,000 6.5	0 -	17,320,000 -

Recovery percentage determined by GS (1980)

^aInferred resource not assigned to a specific coal bed

TABLE 2-3
COAL QUALITY: MILLER CREEK TRACT

Coal Bed	Moisture Percent	Ash Percent	Sulfur Percent	Fixed Car- bon Percent	Volatiles Percent	Btu/lb
All	7.46	6.76	0.67	42.26	43.52	12,100

Determined by GS (1980)

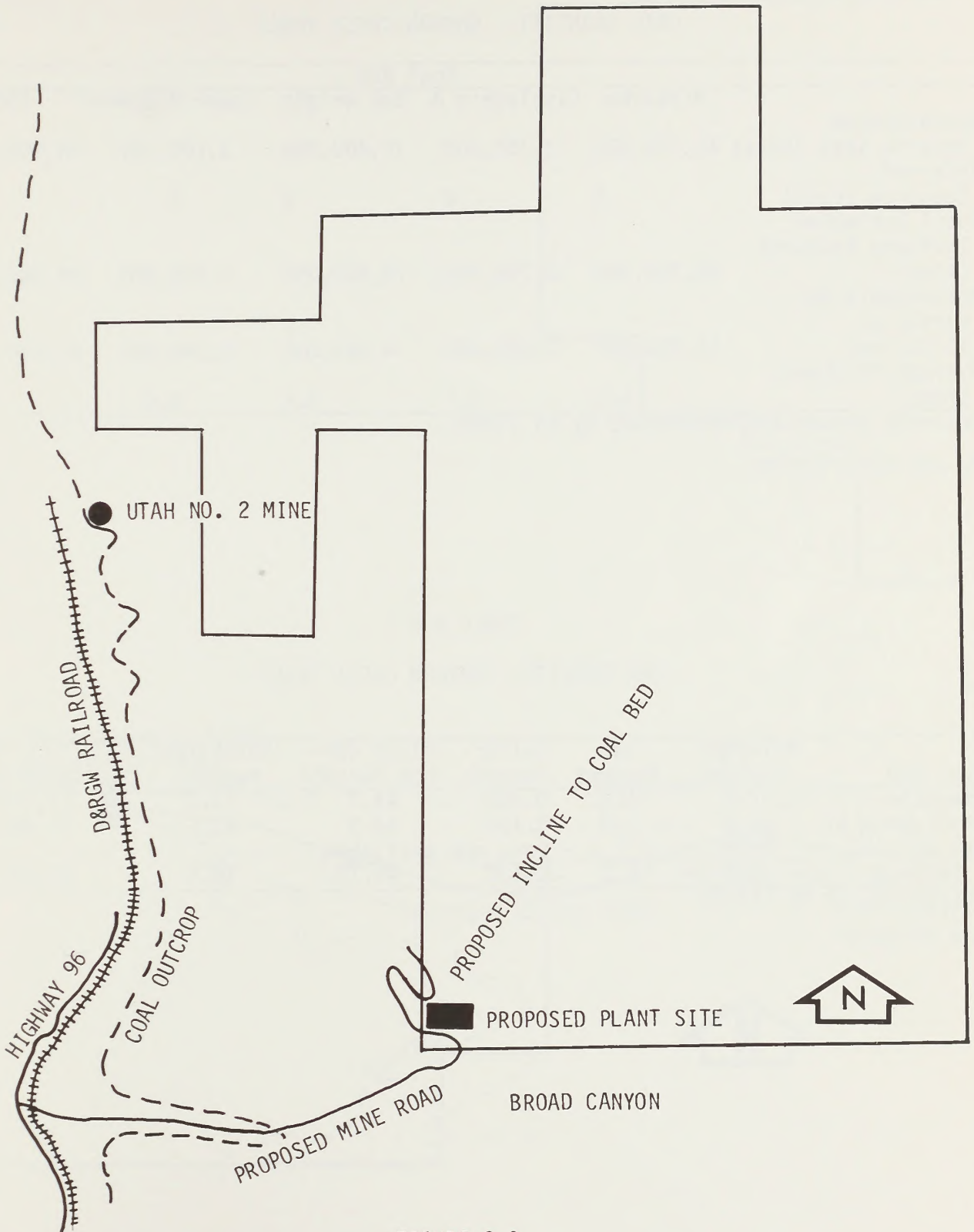


FIGURE 2-3
 MILLER CREEK TRACT SURFACE LAYOUT

TABLE 2-4

COAL QUANTITY: GORDON CREEK TRACT

	Coal Bed				Total
	Hiawatha	Castlegate A	Bob Wright	Lower O'Connor	
Demonstrated Reserve Base (tons)	48,700,000	2,700,000	10,400,000	3,100,000	64,900,000
Inferred Resource (tons)	0	0	0	0	0
Total Estimated In-Place Resource (tons)	48,700,000	2,700,000	10,400,000	3,100,000	64,900,000
Recoverable Reserves at 40 Percent Average Thickness (feet)	19,480,000	1,080,000	4,160,000	1,240,000	25,960,000
	6.3	5.7	6.6	5.0	

Recovery percentage determined by GS (1980)

TABLE 2-5

COAL QUALITY: GORDON CREEK TRACT

Coal Bed	Moisture Percent	Ash Percent	Sulfur Percent	Fixed Carbon Percent	Volatiles Percent	Btu/lb
Hiawatha	7.2	6.5	0.560	44.6	41.3	12,114
Castlegate A	5.4	5.9	0.450	44.9	43.7	12,686
Bob Wright	- - - -	- - - -	- - - -	Data not available	- - - -	- - - -
Average	6.3	6.2	0.505	44.75	42.5	12,400

Determined by GS (1979)

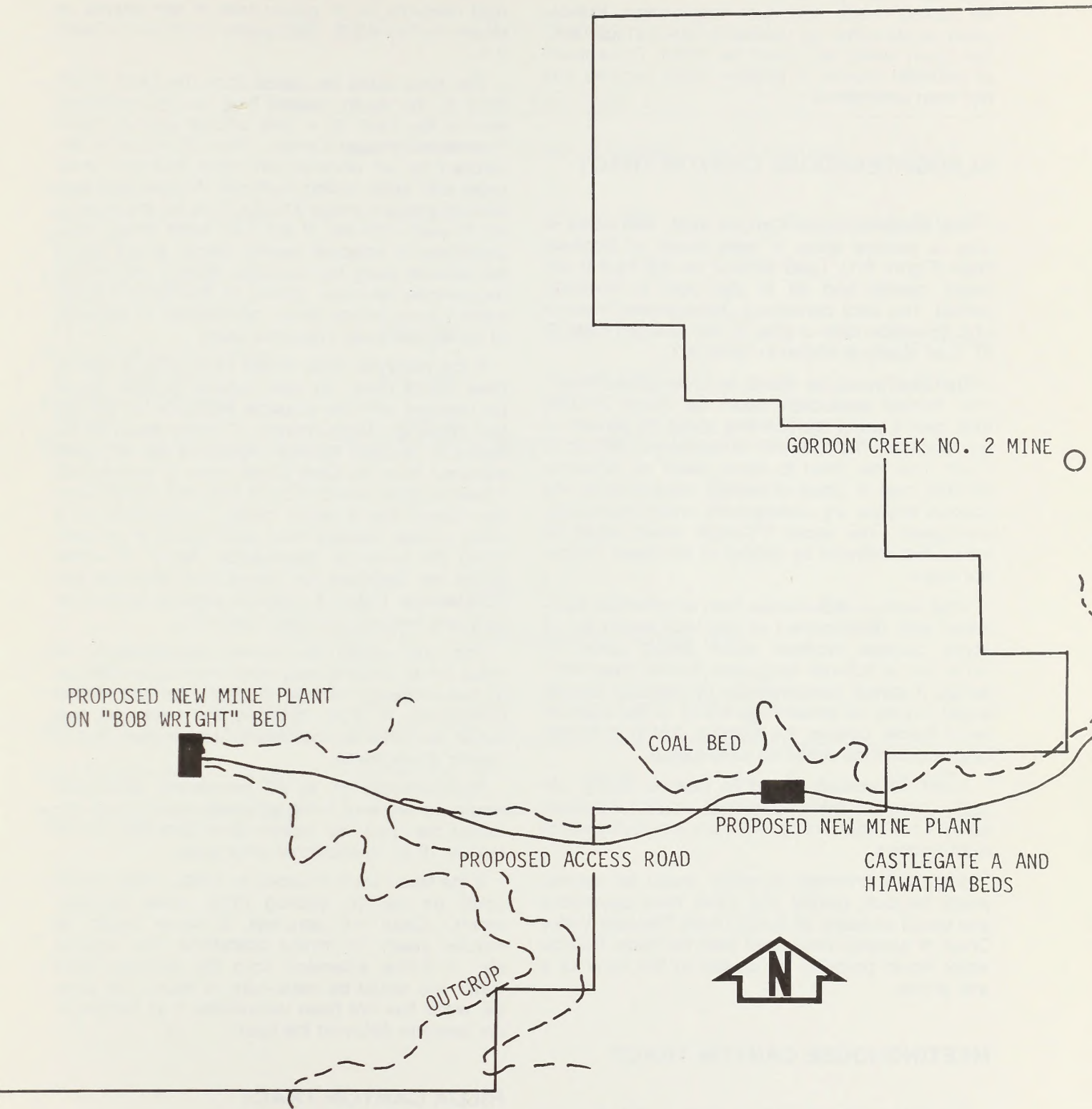


FIGURE 2-4

GORDON CREEK TRACT SURFACE LAYOUT

ALTERNATIVES INCLUDING THE PROPOSED ACTION

workings would probably produce sufficient water for mining needs and dust suppression. Potable water would either be hauled to new surface facilities or an onsite well could be drilled. The amount or potential source of potable water required has not been determined.

SLAUGHTERHOUSE CANYON TRACT

The Slaughterhouse Canyon tract, 440 acres in size, is located some 4 miles south of Scofield, Utah (Figure 2-1). Land surface on the tract is privately owned and all of the coal is Federally owned. The tract contains a demonstrated reserve of 5.55 million tons of coal in two seams (Table 2-6). Coal quality is shown in Table 2-7.

The coal would be mined by underground methods. Annual production would be about 215,000 tons over 8 years representing about 31 percent of the resource. The low ratio of recovered coal would result from the need to leave much of otherwise minable coal in place to protect escarpments and support shallow (by underground mining standards) overburden. The upper O'Connor seam would be mined first followed by mining of the lower O'Connor seam.

Total surface disturbance from all activities associated with development of the tract would be 47 acres. Surface facilities would disturb about 15 acres and a 3.2-mile long mine access road (necessary if mined independently of adjacent leases) would require 32 acres (Figure 2-5). If the adjacent lease holder obtains the tract, a 0.5 to 0.75-mile long access road would be constructed.

About 60 workers would be needed during full-scale operation. Mine operations would be preceded by 1 to 2 years of construction employing about eight workers.

About 3.3 acre-feet of water would be needed yearly for dust control and other mine operations and would probably be hauled from Pleasant Valley Creek or possibly developed from the mine. Potable water would probably be hauled to the mine or a well drilled.

MEETINGHOUSE CANYON TRACT

The Meetinghouse Canyon tract, 1,063.38 acres in size, is located approximately 10 miles northwest of Huntington, Utah (Figure 2-6). The coal is owned by the U.S. Government and the surface is managed by the Forest Service (FS). This is one of three tracts being considered for the proposed

UP&L exchange. The tract contains an in-place coal resource of 31 million tons in two seams as shown in Table 2-8. Coal quality is shown in Table 2-9.

The tract could be mined from the Deer Creek Mine to the south, leased land on the northwest side of the tract, or a coal outcrop area in North Fork Meetinghouse Canyon. The coal would be developed by an underground mine probably using room and pillar mining methods. Annual coal production would average 310,000 tons for the projected 40-year mine life. If the tract were mined independently of adjacent leases, barrier pillars would be required along the boundary thereby diminishing recoverable reserves. Mining of the Blind Canyon seam (upper seam) would be required in advance of mining the lower Hiawatha seam.

If the reserves were mined from UP&L's nearby Deer Creek mine, no new surface facilities would be required with the possible exception of ventilation openings. Approximately 10 acres would be required to support surface facilities if an operation separate from the Deer Creek mine is established. These facilities would include coal and topsoil storage areas, and a waste dump. Construction of 2 miles of new haulage road would result in an additional 20 acres of disturbance. About 10 acres would be disturbed for power and telephone line construction. Figure 2-7 depicts possible surface facility and new access road locations.

The coal would be trucked approximately 10 miles on an existing road down Huntington Canyon to the proposed railroad loadout near the Hunter powerplant. If UP&L obtained the tract, the coal would be used in the nearby Huntington and/or Hunter powerplants.

Approximately 65 to 85 permanent employees would be required if the adjacent lease owner obtained the tract. An independent operation would require 10 to 15 additional employees.

If the lease were obtained by UP&L, water needs could be met by existing UP&L water developments. About 4.8 acre-feet of water would be needed yearly for mining operations, dust control, etc. A 3-mile extension from the existing UP&L water line would be necessary. A source for potable water has not been determined if an independent operator obtained the tract.

RILDA CANYON TRACT

The Rilda Canyon tract, 640 acres in size, is located approximately 12 miles west of Huntington, Utah (Figure 2-6). Land surface (FS) and coal are both Federally owned. The tract contains an esti-

TABLE 2-6

COAL QUANTITY: SLAUGHTERHOUSE CANYON TRACT

	Coal Bed			
	Upper O'Connor	Lower O'Connor	Undetermined	Total
Demonstrated Reserve Base (tons)	1,960,000	3,590,000	0	5,550,000
Inferred Resource (tons)	0	0	0	0
Total Estimated In-Place Resource (tons)	1,960,000	3,590,000	0	5,550,000
Recoverable Reserves at 31 Percent Average Thickness (feet)	466,000	1,250,000	0	1,716,000
	12.5	11.5	-	-

Recovery percentage determined by GS (1980)

TABLE 2-7

COAL QUALITY: SLAUGHTERHOUSE CANYON TRACT

Coal Bed	Moisture Percent	Ash Percent	Sulfur Percent	Fixed Carbon Percent	Volatiles Percent	Btu/lb
Castlegate A	7.54	6.24	0.61	44.91	41.11	12,042

Determined by GS (1979)

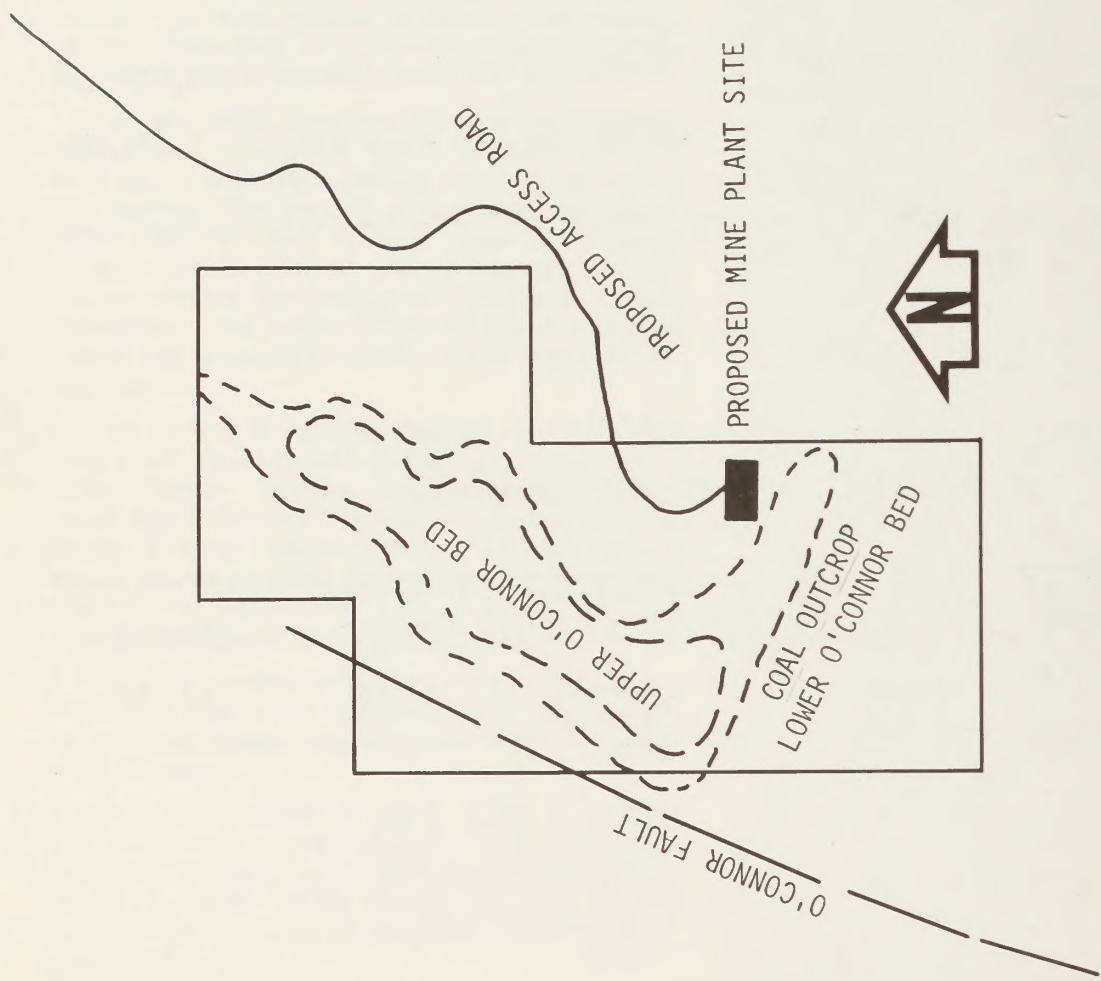
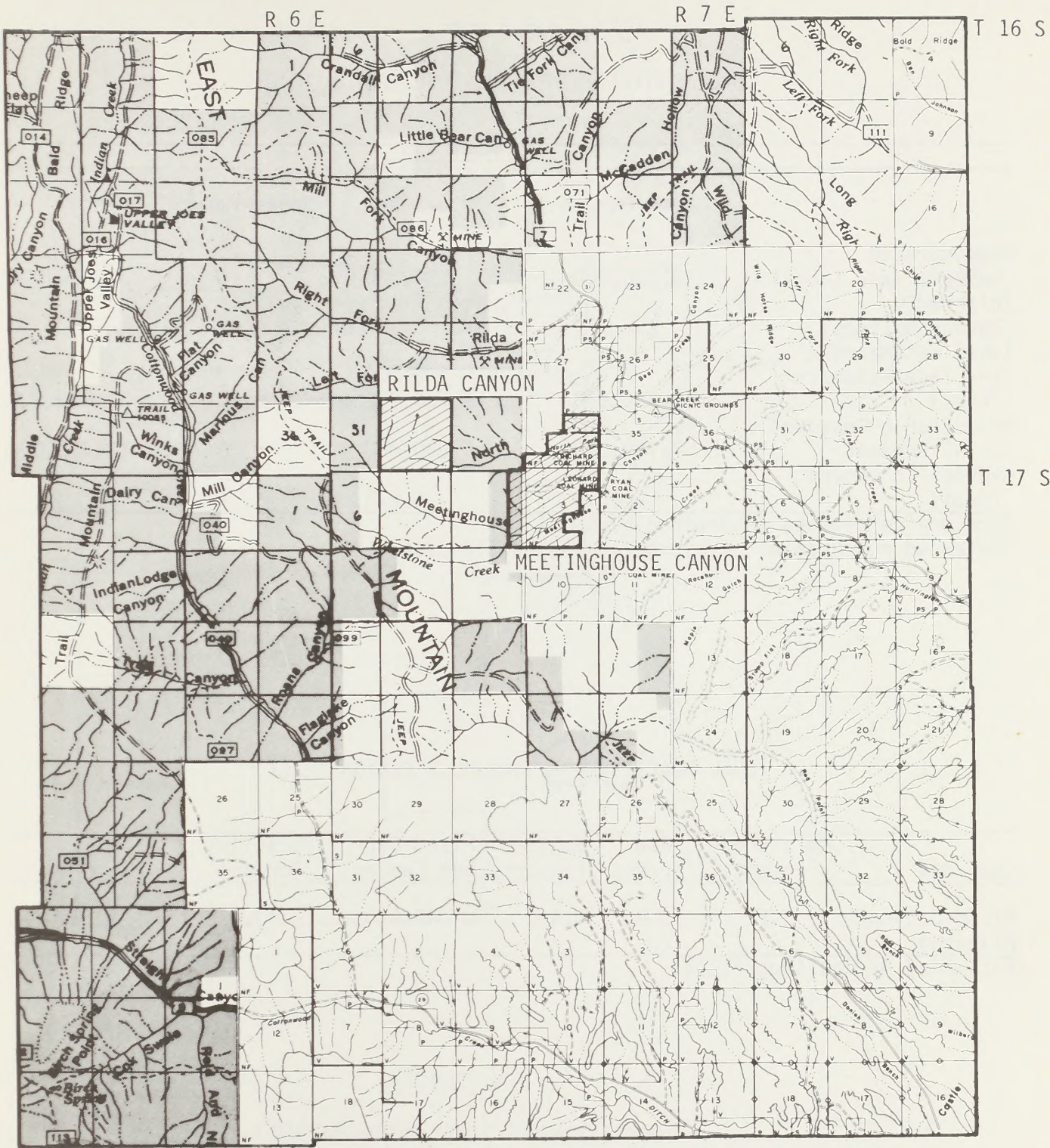


FIGURE 2-5

SLAUGHTERHOUSE CANYON SURFACE LAYOUT



1/2" EQUALS ONE MILE
 BASE MAP BLM 1978



FIGURE 2-6
 MEETINGHOUSE AND RILDA CANYON TRACTS

TABLE 2-8

COAL QUANTITY: MEETINGHOUSE CANYON TRACT

	Coal Bed			Total
	Blind Canyon	Hiawatha	Undetermined ^a	
Demonstrated Reserve Base (tons)	19,300,000	11,700,000	0	31,000,000
Inferred Resource (tons)	0	0	0	0
Total Estimated In-Place Resource (tons)	19,300,000	11,700,000	0	31,000,000
Recoverable Reserves at 40 Percent	7,720,000	4,680,000	0	12,400,000
Average Thickness (feet)	10.8	6.3	-	-

Recovery percentage determined by GS (1980)

^aInferred resource not assigned to a specific coal bed

TABLE 2-9

COAL QUALITY: MEETINGHOUSE CANYON TRACT

Coal Bed	Moisture Percent	Ash Percent	Sulfur Percent	Fixed Carbon Percent	Volatiles Percent	Btu/lb
Blind Canyon/ Hiawatha	3.1	6.0	0.45	47.9	43.4	12,800
Estimated by Doelling (1972)						

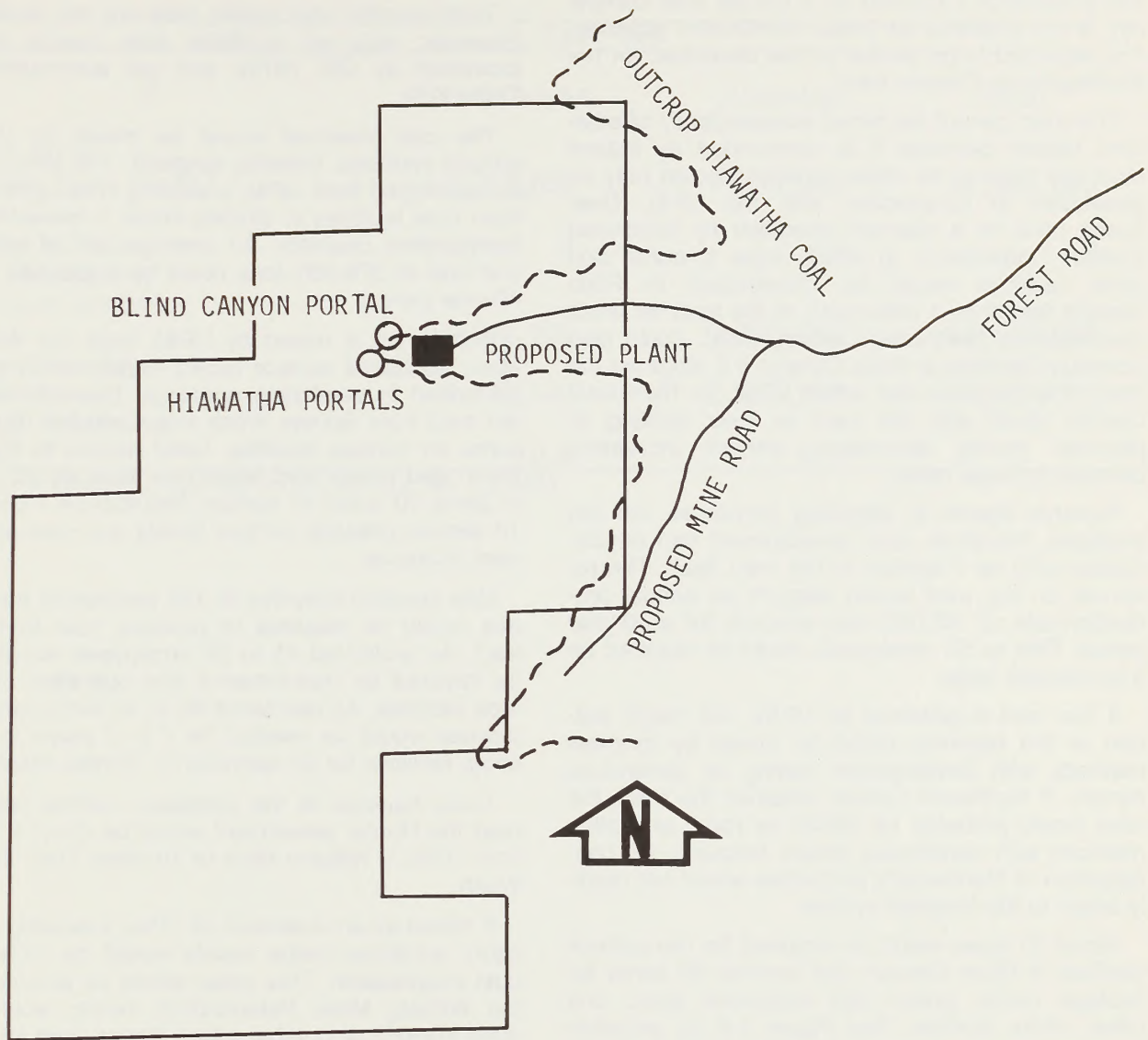


FIGURE 2-7

MEETINGHOUSE TRACT SURFACE LAYOUT

ALTERNATIVES INCLUDING THE PROPOSED ACTION

mated in-place reserve of 19.5 million tons (Table 2-10). Coal quality data have been determined but the information (obtained by a private coal company), is not available for public distribution; however, it is expected to be similar to that described for the Meetinghouse Canyon tract.

The tract cannot be mined independently of adjacent leases because it is surrounded by leased land and there is no other access. It could only be developed in conjunction with the UP&L Deer Creek mine or a planned operation by Northwest Carbon Corporation, in which case a portal and other facilities would be constructed in Rilda Canyon less than 1 mile north of the tract on lands controlled by Northwest Carbon. UP&L could also construct facilities in Rilda Canyon if it obtained the tract. It is possible that either UP&L or Northwest Carbon could add the tract to their existing or planned mining operations without increasing planned tonnage rates.

Reserve figures in adjoining properties are not available, therefore, coal development can be discussed only as it applies to the tract itself. The reserves on the tract would support an annual production rate of 195,000 tons annually for a 40-year period. Fifty to 55 employees would be required on a permanent basis.

If the tract is obtained by UP&L, the major portion of the reserves could be mined by longwall methods with development mining by continuous miners. If Northwest Carbon obtained the tract, the area would probably be mined by room and pillar methods with continuous miners because the configuration of Northwest's properties would not readily adapt to the longwall system.

About 20 acres would be required for the surface facilities in Rilda Canyon and another 43 acres for haulage roads, power and telephone lines, and other offsite facilities. See Figure 2-8 for probable location of new structures.

Water requirements would be about 3.0 acre-feet per year and would probably be available from mine workings. Potable water would need to be developed.

COTTONWOOD TRACT

The Cottonwood tract, 2,400 acres in size, is located approximately 26 miles southeast of Price, Utah (Figure 2-9). Land surface on the tract is owned by the U.S. Government (FS and BLM), as is the coal. This tract is one of three being considered in the proposed UP&L exchange. The tract contains an estimated in-place coal resource of 57.8 million tons in two minable seams (Table 2-

11), of which about 23 million tons would be recovered at a 40-percent rate.

Tract-specific coal quality data are not available. However, data are available from nearby mines (compiled by GS, 1979), and are summarized in Table 2-12.

The coal reserves would be mined by underground methods, possibly longwall. The tract could be developed from UP&L's existing Wilberg Mine or from new facilities in Grimes Wash if mined by an independent operator. An average annual production rate of 578,000 tons could be supported for a 40-year period.

If the tract is mined by UP&L from the Wilberg Mine, additional surface facility requirements would be limited to ventilation openings. Development of the tract from Grimes Wash would require 10 to 15 acres for surface facilities. Road access to Grimes Wash and power and telephone lines would result in some 30 acres of surface disturbance. Figure 2-10 depicts possible surface facility and new access road locations.

One hundred forty-five to 165 permanent employees would be required to produce coal from the tract. An additional 15 to 20 employees would also be required for maintenance and operation of surface facilities. An estimated 30 to 40 temporary employees would be needed for 1 to 2 years to construct facilities for an operation in Grimes Wash.

Truck haulage to the proposed railroad loadout near the Hunter powerplant would be about 8 miles from UP&L's Wilberg Mine or 10 miles from Grimes Wash.

If mined as an extension of UP&L's existing operation, additional water needs would be limited to dust suppression. This water would be provided by the Wilberg Mine. Independent mining would require trucking of potable water. Water used for dust suppression could be produced by the mine or may also be trucked. About 9 acre-feet of water would be required annually if the tract is mined independently of adjacent operators.

NORTH HORN MOUNTAIN TRACT

The North Horn Mountain tract is approximately 21,043 acres in size and located about 4 miles west of Orangeville, Utah (Figure 2-9). Both the surface (FS) and the coal are owned by the U.S. Government. This tract is one of three being considered in the proposed UP&L exchange. The tract contains an estimated in-place coal resource of 246.5 million tons in two minable seams as shown in Table 2-13.

TABLE 2-10

COAL QUANTITY: RILDA CANYON TRACT

	Coal Bed		
	Blind Canyon	Hiawatha	Total
Demonstrated Reserve Base (tons)	12,200,000	7,300,000	19,500,000
Inferred Resource (tons)	0	0	0
Total Estimated In-Place Resource (tons)	12,200,000	7,300,000	19,500,000
Recoverable Reserves at 40 Percent	4,880,000	2,920,000	7,800,000
Average Thickness (feet)	10.6	6.3	
Recovery percentage determined by GS (1980)			

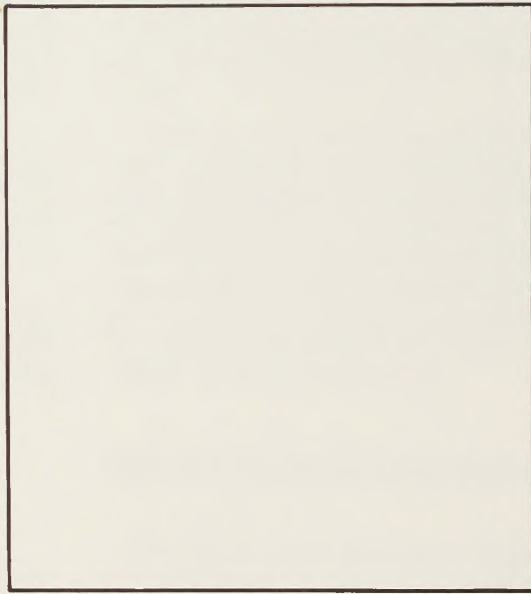
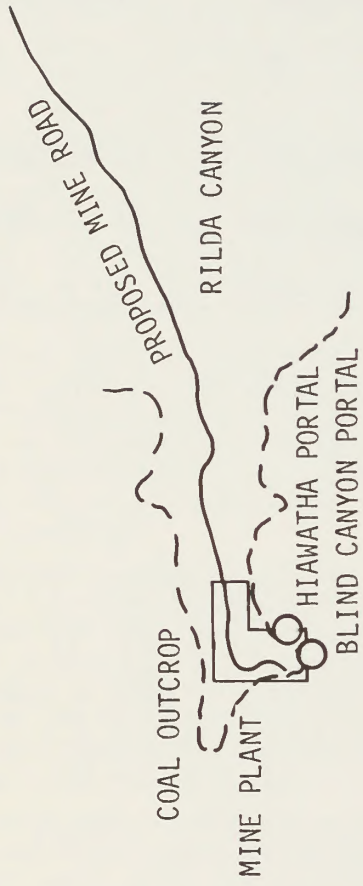


FIGURE 2-8

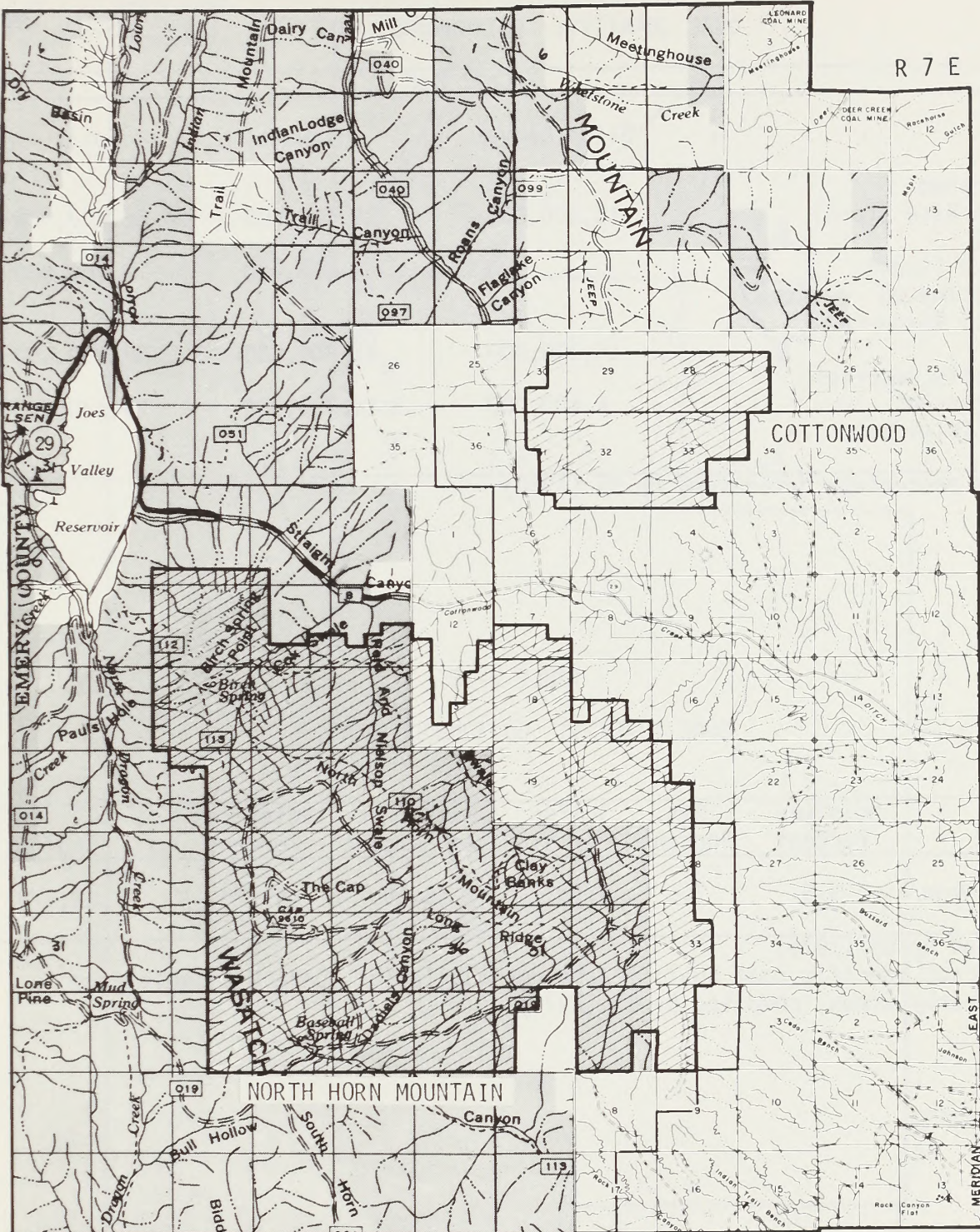
RILDA CANYON TRACT SURFACE LAYOUT

R 6 E

R 7 E

T 17 S

T 18 S



1/2" EQUALS ONE MILE
BASE MAP BLM 1978



FIGURE 2-9

NORTH HORN MOUNTAIN AND COTTONWOOD TRACTS

TABLE 2-11

COAL QUANTITY: COTTONWOOD TRACT

	Coal Bed		
	Blind Canyon	Hiawatha	Total
Demonstrated Reserve Base (tons)	16,000,000	39,400,000	55,400,000
Inferred Resource (tons)	0	2,400,000	2,400,000
Total Estimated In-Place Resource (tons)	16,000,000	41,800,000	57,800,000
Recoverable Reserves at 40 Percent	6,400,000	16,720,000	23,120,000
Average Thickness (feet)	6.3	9.7	

Recovery percentage determined by GS (1980)

TABLE 2-12

COAL QUALITY: COTTONWOOD TRACT

Coal Bed	Moisture Percent	Ash Percent	Sulfur Percent	Fixed Carbon Percent	Volatiles Percent	Btu/lb
Blind Canyon/ Hiawatha	5.5	7.6	0.58	45.68	41.23	12,578

Determined by GS (1979)

Note: Tract specific coal quality data not available. Data available from nearby mines, compiled by GS (1979)

WILBERG MINE

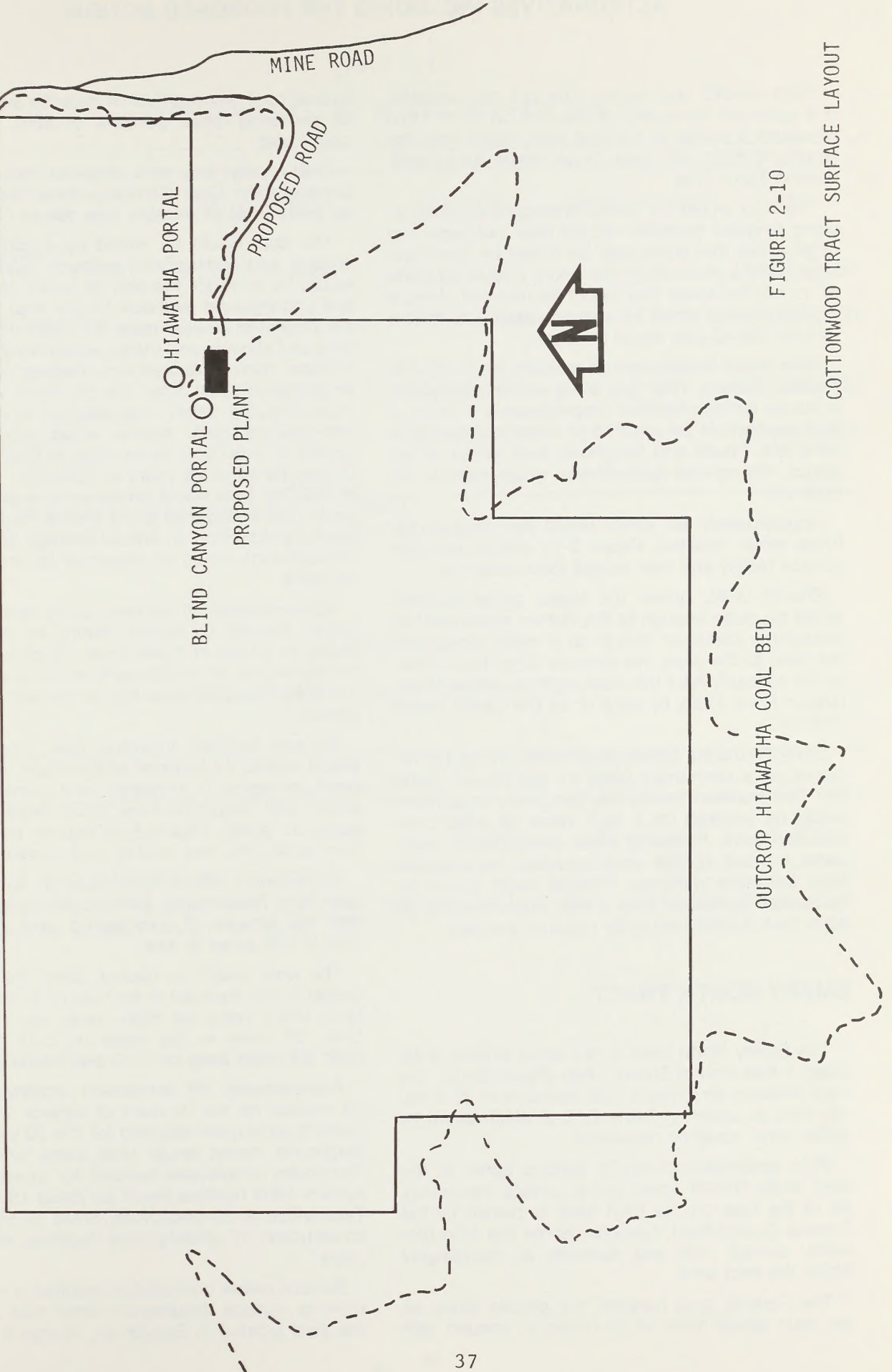


FIGURE 2-10

COTTONWOOD TRACT SURFACE LAYOUT

ALTERNATIVES INCLUDING THE PROPOSED ACTION

Tract-specific coal quality data are not available. It is assumed the quality of the coal on North Horn Mountain is similar to the coal being taken from the nearby Wilberg and Deer Creek Mines as summarized in Table 2-14.

The coal would be mined underground probably using longwall methods except near outcrops and other areas that could only be mined by room and pillar. Mining reserves in the upper bed in advance of mining the lower bed would be required. Annual coal production would be approximately 2.47 million tons for the 40-year life of the mine.

Mine portal facilities would probably be located in Killpack Canyon. Fifty-five acres would be required to house surface facilities. Approximately 6 miles of new road would be required to reach the probable mine site. Power and telephone lines would be required. Appropriate rights-of-way would need to be obtained.

Approximately 90 acres would be required for these offsite facilities. Figure 2-11 depicts possible surface facility and new access road locations.

Should UP&L obtain the lease, portal facilities would be close enough to the Hunter powerplant to consider a conveyor belt (8 to 9 miles long) from the mine to the plant. An operator other than UP&L would probably haul the coal north to either Mohrland or Price, Utah, by truck or by the Castle Valley Railroad.

Seven hundred fifteen employees would be required on a permanent basis for the 40-year mine life. One hundred twenty-five temporary employees would be required for 1 to 2 years for initial construction work. Following initial development work, water for dust control would probably be available from the mine workings. Potable water would be trucked or developed from a well. Approximately 38 acre-feet of water would be required annually.

EMERY NORTH TRACT

The Emery North tract, 2,161 acres in size, is located 1 mile east of Emery, Utah (Figure 2-12). The tract contains an in-place coal resource of 36.2 million tons as shown in Table 2-15 of which about 24 million tons would be recovered.

BLM administers 1,480.75 surface acres of the tract while 680.25 acres are in private ownership. All of the coal on the tract itself is owned by the Federal Government; however, some fee land (privately owned coal and surface) is intermingled within the tract area.

The Federal coal beneath the private lands on the tract would need to be mined in concert with

overall tract development in order to avoid isolating or cornering small portions of land within tract boundaries.

Coal quality data were obtained from the nearby Consolidation Coal Company mine and represent an average of all minable coal seams (Table 2-16).

The coal would be mined by a combination of surface and underground methods. Surface mining would be used for the first 20 years of production and underground methods for the final 20 years of the projected 40-year mine life. Both dragline stripping and shovels and trucks would likely be used in surface mining operations. Underground mining would be initiated from the pit floors when maximum stripping depth was reached in each seam. The exposed coal seams would allow low cost access to fresh coal by as many entries as desired. During the initial 20 years of operation, an average of 549,000 tons would be mined annually. As stripable coal is depleted and a shift is made to underground production, an annual average production of 652,500 tons would be expected for the remaining 20 years.

Approximately 50 surface acres would be disturbed annually by surface mining for 20 years resulting in a total of 1,000 acres. Once underground mining began, an additional 5 acres of surface disturbance would be expected for the second 20-year period.

Surface facilities including coal storage areas would require 78 acres of land surface. Access and haulage roads (1.9 miles), and construction of power and telephone lines would require an additional 31 acres. Figure 2-13 depicts possible surface facility and new access road locations.

Reclamation efforts (discussed in detail in Surface Mine Reclamation Section, this chapter) would limit the amount of unreclaimed land at any one time to 259 acres or less.

The coal could be hauled using the proposed Castle Valley Railroad or be trucked to either Mohrland, Utah, some 49 miles away via U-10, Price, Utah, 60 miles to the north on U-10, or Salina, Utah, 59 miles away on U-10 and Interstate 70.

Approximately 60 permanent employees would be needed for the 20 years of surface mining. Permanent employees required for the 20 years of underground mining would total some 120 persons. Temporary employees needed for construction of surface mine facilities would be about 15 for 1 year. Twenty-five to 30 employees would be required for construction of underground facilities for 1 to 2 years.

Surface owner consultation resulted in two objections to surface disturbance within that portion of the tract located in Section 22, Range 6 E, Town-

TABLE 2-13

COAL QUANTITY: NORTH HORN MOUNTAIN TRACT

	Coal Bed			Total
	Blind Canyon	Hiawatha	Undetermined ^a	
Demonstrated Reserve Base (tons)	122,000,000	67,500,000	0	189,500,000
Inferred Resource (tons)	9,700,000	47,300,000	0	57,000,000
Total Estimated In-Place Resource (tons)	131,700,000	14,800,000	0	246,500,000
Recoverable Reserves at 40 Percent	52,700,000	45,900,000	0	98,600,000
Average Thickness (feet)	10.2	7.8	-	-

Recovery percentage determined by GS (1980)

^aInferred resource not assigned to a specific coal bed

TABLE 2-14

COAL QUALITY: NORTH HORN MOUNTAIN

Coal Bed	Moisture Percent	Ash Percent	Sulfur Percent	Fixed Carbon Percent	Volatiles Percent	Btu/lb
All	5.5	7.6	0.58	45.68	41.23	12,578

Determined by GS (1979)

Note: Tract specific coal quality data not available. Data available from nearby mines, compiled by GS (1979)

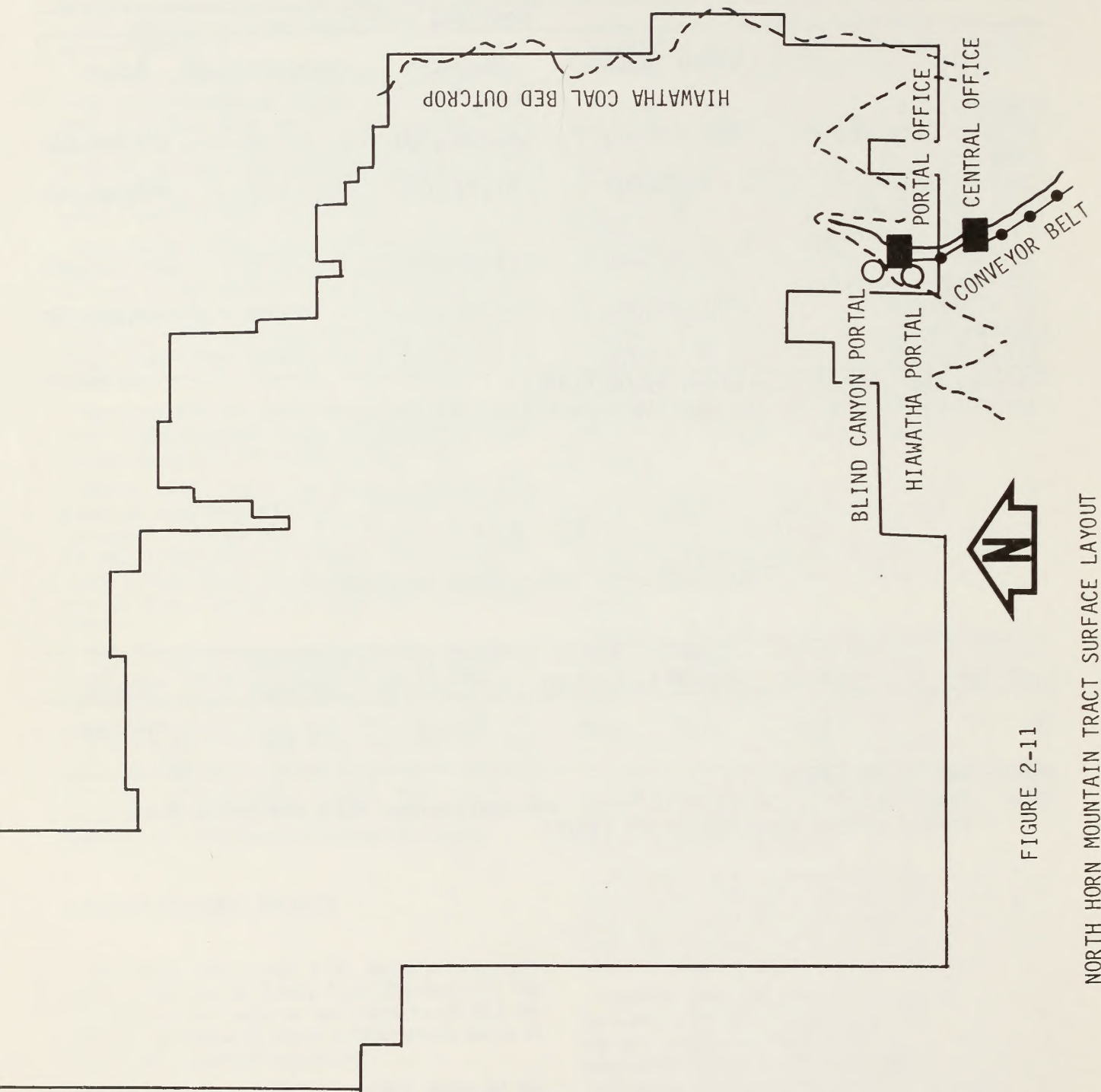
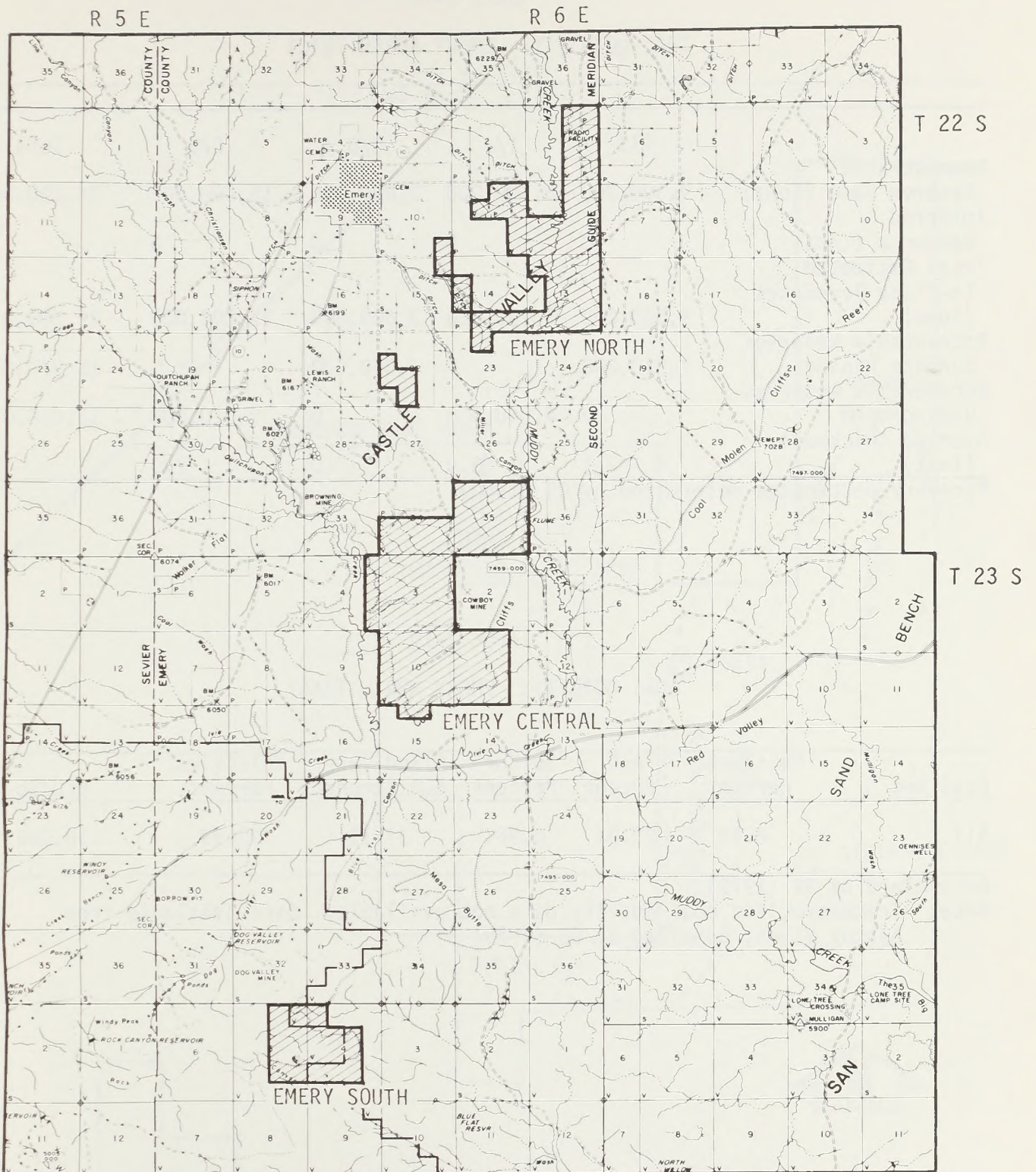


FIGURE 2-11

NORTH HORN MOUNTAIN TRACT SURFACE LAYOUT



1/2" EQUALS ONE MILE
 BASE MAP BLM 1978



FIGURE 2-12

EMERY NORTH, EMERY CENTRAL AND EMERY SOUTH TRACTS

TABLE 2-15

COAL QUANTITY: EMERY NORTH TRACT

	Coal Bed				Total
	I/J	I/J	C/D	C/D	
Demonstrated Reserve Base (tons)	9,300,000	8,100,000	3,600,000	15,200,000	36,200,000
Inferred Resource (tons)	0	0	0	0	0
Total Estimated In-Place Resources (tons)	9,300,000	8,100,000	3,600,000	15,200,000	36,200,000
Recoverable Reserves Surface Mining	7,910,000	0	3,060,000	0	10,970,000
Recoverable Reserves Underground	0	4,540,000	0	8,510,000	13,050,000
Average Thickness (feet)	7.1	13.0	7.0	7.0	

Recovery percentage determined by GS (1980)

TABLE 2-16

COAL QUALITY: EMERY NORTH TRACT

Coal Bed	Moisture Percent	Ash Percent	Sulfur Percent	Fixed Carbon Percent	Volatiles Percent	Btu/lb
All	6.89	22.01	0.96	37.11	33.99	10,056

Determined by GS (1979)

Note: Tract specific coal quality data not available. Data available from nearby mines, compiled by GS (1979)

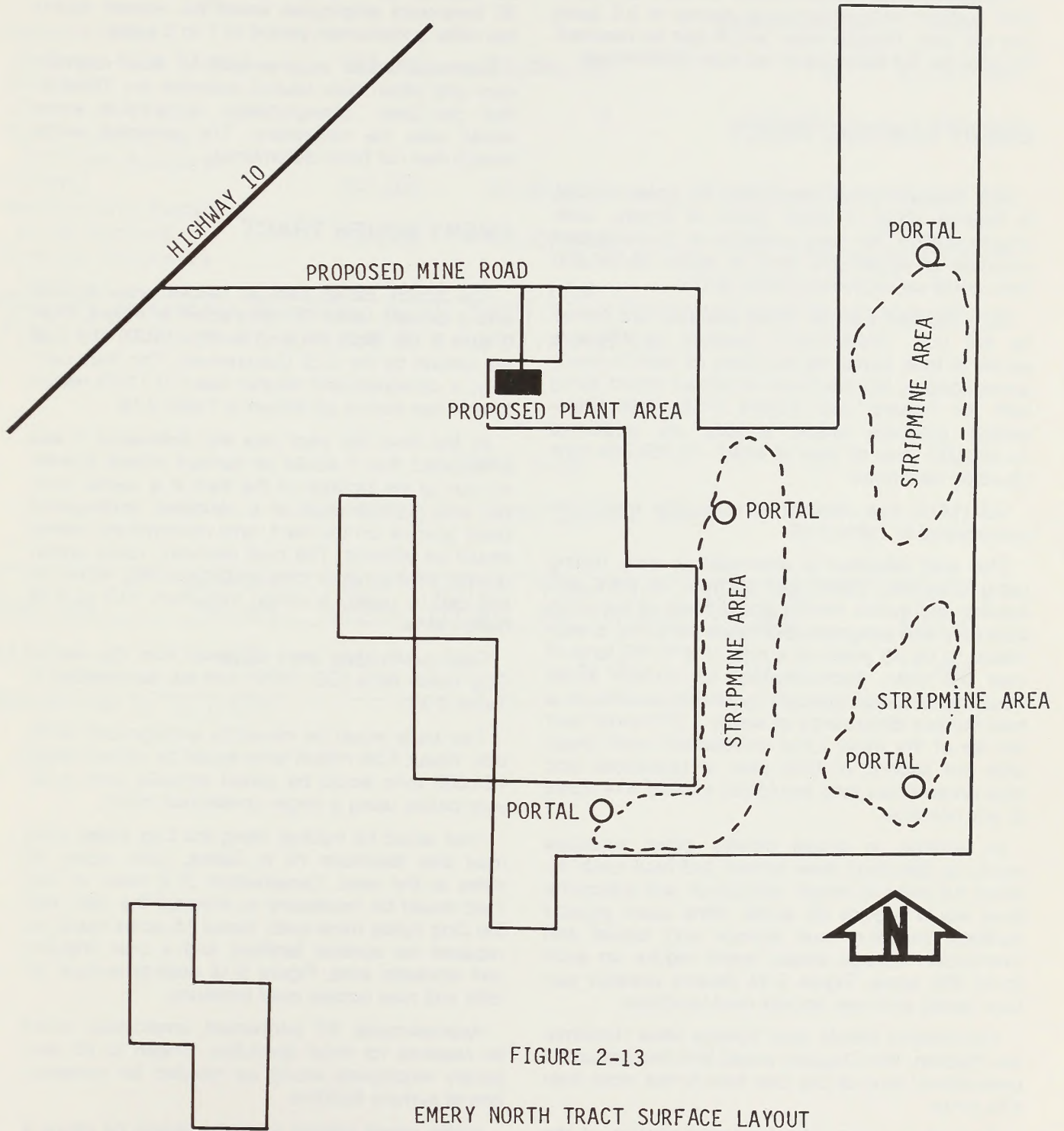


FIGURE 2-13

EMERY NORTH TRACT SURFACE LAYOUT

ALTERNATIVES INCLUDING THE PROPOSED ACTION

ship 22 S. With the possible exception of subsidence, no surface disturbance would be anticipated as this part of the tract would be mined by underground methods.

Estimated water requirements for dust control of both surface and underground mining is 8.5 acre-feet per year. Potable water would also be required. Sources for the water have not been determined.

EMERY CENTRAL TRACT

The Emery Central tract, 2,967.65 acres in size, is located about 4 miles south of Emery, Utah (Figure 2-12). The tract contains an in-place coal resource of 43,367,000 tons of which 39,030,000 tons would be recovered (Table 2-17).

Both the land surface (BLM) and coal are owned by the U.S. Government; however, a 480-acre parcel of land owned by the State of Utah is nearly surrounded by the tract and should be mined along with the Federal coal (Figure 2-12). This State-owned resource would provide an additional 14,200,000 tons of coal of which 12,780,000 tons could be recovered.

GS (1979) has determined coal data which are summarized in Table 2-18.

The coal resource is amenable to strip mining using draglines, trucks and shovels, or front end loaders and trucks. Mining would begin at the north boundary and progress southward. Mine life is estimated to be 40 years at a rate of 975,750 tons of coal per year. Approximately 43 surface acres would be disturbed annually by mining resulting in a total surface disturbance of nearly 1,710 acres over the life of the mine. Land reclamation could begin after the second or third year of operations and total unreclaimed land would not exceed 414 acres at any one time.

In addition to actual mining, other acreages would be disturbed. New access and haul roads totaling 4.8 miles in length and power and telephone lines would require 65 acres. Mine plant support facilities, including coal storage and topsoil and overburden storage areas, would require an additional 220 acres. Figure 2-14 depicts possible surface facility and new access road locations.

Reclamation efforts (see Surface Mine Reclamation Section, this Chapter) would limit the amount of unreclaimed land at any one time to not more than 414 acres.

Four alternatives exist for transportation of the coal to railroad facilities. The Castle Valley Railroad could be used or the coal could be trucked 57 miles south and west to Salina, Utah, over U-10

and Interstate 70 or 63 miles north to Price, Utah, on U-10. The fourth route could be to truck the coal 57 miles north to Mohrland, Utah.

Approximately 100 permanent employees would be required for mine operation. An additional 50 to 60 temporary employees would be needed during the initial construction period of 1 to 2 years.

Estimated water requirements for dust suppression and other mine related activities are 15 acre-feet per year. Transportation of potable water would also be necessary. The potential water source has not been determined.

EMERY SOUTH TRACT

The Emery South tract is 748.49 acres in size and is located some 12 miles south of Emery, Utah (Figure 2-12). Both the land surface (BLM) and coal are owned by the U.S. Government. The tract contains a demonstrated reserve base of 11.53 million tons in two seams as shown in Table 2-19.

At the time this tract was first delineated it was anticipated that it would be surface mined; however, due to the location of the tract in a scenic corridor and the presence of a candidate endangered plant species on the tract, only underground mining would be allowed. The coal recovery, using underground mining rather than surface mining, would be reduced by nearly 5 million tons from 10.3 to 5.36 million tons.

Coal quality data were obtained from the nearby Dog Valley mine (GS, 1979) and are summarized in Table 2-20.

Two beds would be mined by underground methods. About 5.36 million tons would be mined. About 134,000 tons would be mined annually over a 40-year period using a single continuous miner.

Coal would be trucked using the Dog Valley mine road and Interstate 70 to Salina, Utah, some 45 miles to the west. Construction of 2 miles of new road would be necessary to connect the tract with the Dog Valley mine road. About 15 acres would be required for surface facilities and a coal shipping and stockpile area. Figure 2-15 depicts surface facility and new access road locations.

Approximately 37 permanent employees would be required for mine operation. Fifteen to 20 temporary employees would be needed for construction of surface facilities.

Water needs related to mining would be about 2 acre-feet per year and would probably require the drilling of wells on or near the tract. Potable water would be transported to the site.

TABLE 2-17

COAL QUANTITY: EMERY CENTRAL TRACT

	Coal Bed			Total
	I	C	Undetermined ^a	
Demonstrated Reserve Base (tons)	767,000	42,000,000	0	42,767,000
Inferred Resource (tons)	0	0	600,000	600,000
Total Estimated In-Place Resource (tons)	767,000	42,000,000	600,000	43,367,000
Recoverable Reserves at 90 Percent	690,300	37,800,000	540,000	39,030,000
Average Thickness (feet)	5.6	12.4	-	

Recovery percentage determined by GS (1980)

^aInferred resource not assigned to a specific coal bed

TABLE 2-18

COAL QUALITY: EMERY CENTRAL TRACT

Coal Bed	Moisture Percent	Ash Percent	Sulfur Percent	Fixed Carbon Percent	Volatiles Percent	Btu/lb
All	8.0	14.3	0.8	47.9	38.1	11,000

Determined by GS (1979)

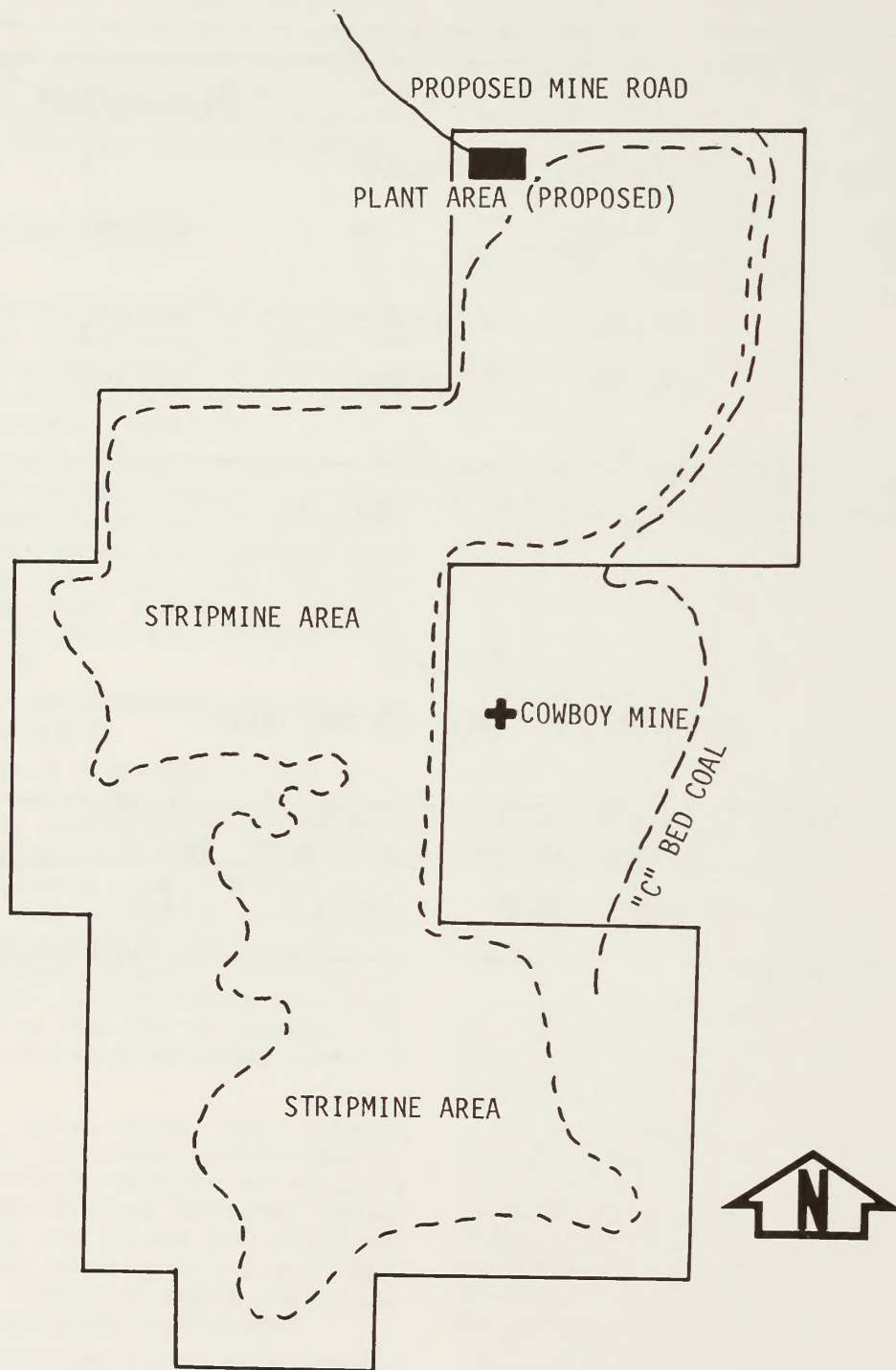


FIGURE 2-14

EMERY CENTRAL TRACT SURFACE LAYOUT

TABLE 2-19

COAL QUANTITY: EMERY SOUTH TRACT

	Coal Bed			Total
	I	A	Undetermined ^a	
Demonstrated Reserve Base (tons)	3,180,000	8,350,000	0	11,530,000
Inferred Resource (tons)	0	0	0	0
Total Estimated In-Place Resource (tons)	3,180,000	8,350,000	0	11,530,000
Recoverable Reserves	1,270,000	4,090,000	0	5,360,000
Average Thickness (feet)	8.7	10.5	-	

Recovery percentage determined by GS (1979)

^aInferred resource not assigned to a specific coal bed

TABLE 2-20

COAL QUALITY: EMERY SOUTH TRACT

Coal Bed	Moisture Percent	Ash Percent	Sulfur Percent	Fixed Carbon Percent	Volatiles Percent	Btu/lb
All	5.6	7.5	0.82	46.1	38.9	12,322

Determined by GS (1979)

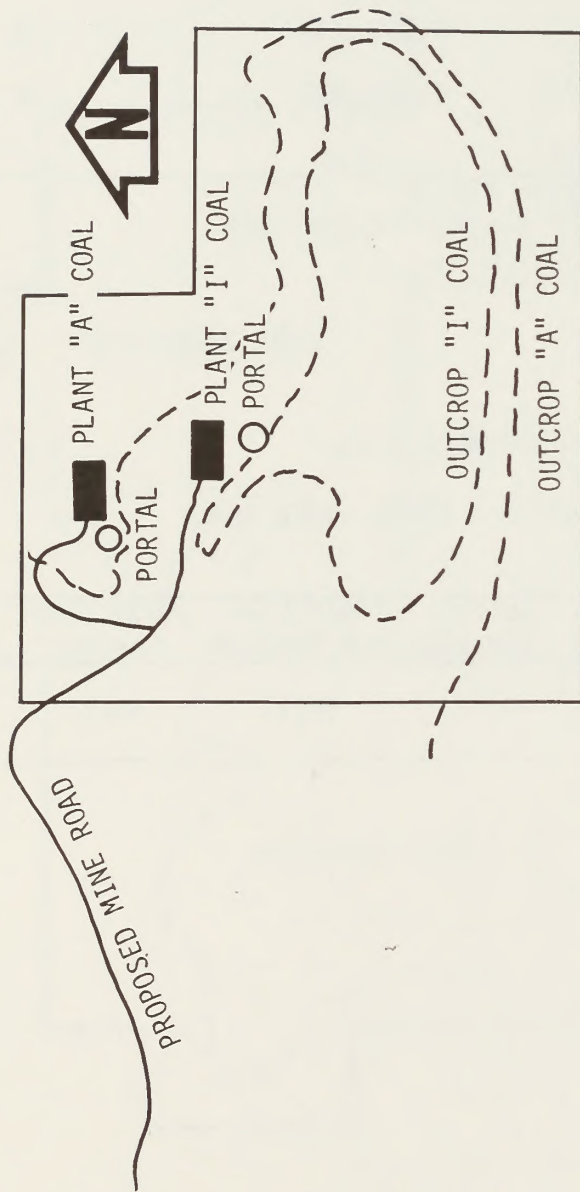


FIGURE 2-15

EMERY SOUTH TRACT SURFACE LAYOUT

ALTERNATIVES INCLUDING THE PROPOSED ACTION

HOLLBERG PRLA

The Hollberg PRLA is 3,035.7 acres in size and located 3 miles east of Emery, Utah (Figure 2-16). All of the coal on the PRLA is owned by the U.S. Government; 2,639.5 surface acres are Federally owned (BLM) while the remaining 396.2 acres are in private ownership. Coal resources on the PRLA are estimated at 39.3 million tons of which 19.5 million tons are recoverable. Emery Energy Corporation proposes to mine an average 490,000 tons of coal annually for 40 years. The coal would be developed by underground methods, probably room and pillar.

Coal quality data were reported by GS (1980) and are summarized in Table 2-21.

Proposed surface facilities would occupy 7 acres in the southwest corner of the PRLA. A powerline (4 miles), 6-inch waterline (4.5 miles), 4-inch culinary waterline (5.5 miles), and a telephone line (4 miles) would be required and would cumulatively occupy 14 acres. A haulage and access road about 5.6 miles long and occupying 56 acres would also be constructed. Appropriate rights-of-way would need to be obtained. Figure 2-17 depicts surface facility and new haulage road locations.

Approximately 75 permanent employees would be required with an additional 15 to 25 construction workers needed for 2 years for mine development.

The coal could be trucked to railroad loading facilities at Mohrland (49 miles), Price (56 miles), Salina (55 miles), or the Castle Valley Railroad could be used.

DESCRIPTION OF THE ALTERNATIVES

ALTERNATIVE ONE

Alternative One considers leasing 11 tracts and represents the maximum level of coal leasing for the region beginning in mid-1981 (Table 2-22). One tract (Emery Central) would be surface mined, nine tracts (Tucker Canyon, Slaughterhouse Canyon, Miller Creek, Gordon Creek, Meetinghouse Canyon, Rilda Canyon, Cottonwood Canyon, North Horn Mountain, and Emery South) would be underground mined, and one tract (Emery North) would be a combination surface and underground mine. The Hollberg PRLA is also considered in this alternative and would be underground mined.

The 11 tracts, totaling 37,906 acres, would be offered for competitive lease and would comprise approximately 561.8 million tons of in-place Federal coal. About 256.2 million tons of the coal would actually be mined. Average annual production from 1987 to 1995 would be approximately 6.55 million tons, declining to about 6.34 million tons per year as the Slaughterhouse Canyon tract, an 8-year operation, would cease production. In 2008, annual production would increase again to 6.61 million tons as increased production from the Emery North tract's underground operations would more than offset production loss as the Tucker Canyon tract is mined out.

A total of 358 construction workers would be required to bring the 11 mines into production. Construction would commence in 1985 and be completed by the end of 1987. Projected mining and coal transportation work forces would be about 1,600 people for the 40-year period beginning in 1987.

Discounting reclamation, surface mining would disturb 372 acres in 1990, 837 acres in 1995, 1,302 acres by 2000, and 2,720 acres by the end of mine life. Approximately 101 acre-feet of water would be required annually for mine use from 1987 until the end of mine life.

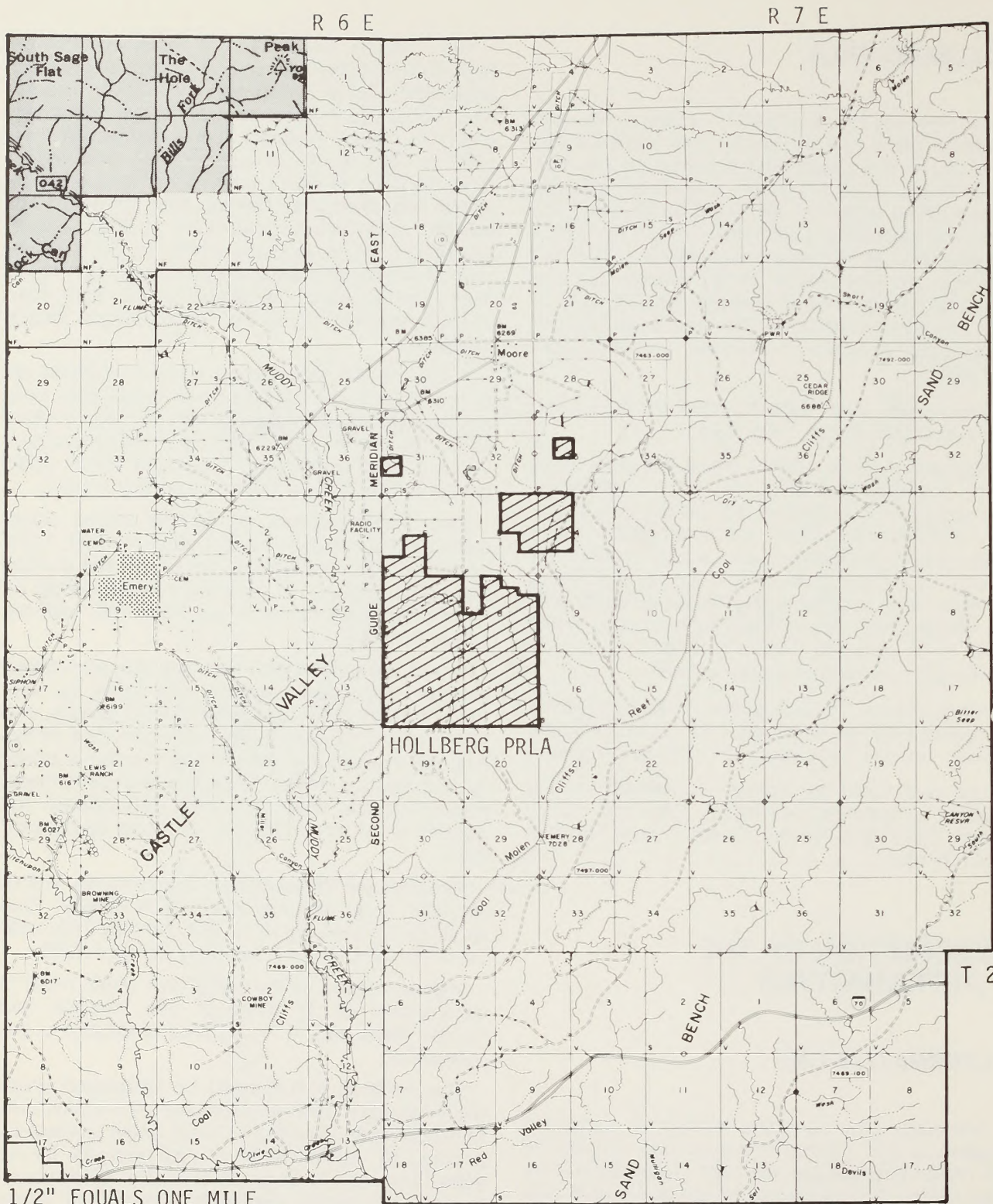
Onsite surface facilities including coal and topsoil storage areas, would occupy 479 acres by 1987 (end of construction and development phase), and 484 acres by the year 2000. Implementation of this alternative would also require construction of offsite developments such as haulage and access roads, and power and telephone lines. Cumulatively, the developments would occupy 469 acres by the year 2000.

Housing and infrastructure requirements directly resulting from implementation of Alternative One would be 59 acres in 1985, 368 acres by 1990, 430 acres by 1995, and 441 acres by the year 2000.

Implementation of this alternative would result in construction of 31 miles of new haulage and access roads and 30 to 40 miles of telephone and powerlines.

The Hollberg PRLA could be developed under this Alternative. With an estimated 19.5 million tons of recoverable reserves, Hollberg would produce an average of 490,000 tons of coal annually for 40 years. The work force would consist of 15 construction and 75 mining personnel. Onsite and offsite facilities would disturb a total of 77 acres, all of which would eventually be reclaimed. Development of the Hollberg PRLA would result in 5.6 miles of new road and 4 miles of powerline construction. Housing requirements would permanently occupy 32 acres.

Alternative One is summarized in Table 2-23.



1/2" EQUALS ONE MILE
 BASE MAP BLM 1978



FIGURE 2-16
 HOLLBERG PRLA

TABLE 2-21

COAL QUALITY: HOLLBERG PRLA

Coal Bed	Moisture Percent	Ash Percent	Sulfur Percent	Fixed Car- bon Percent	Volatiles Percent	Btu/lb
A11	4.0	6.9	1.3	51	38.40	12,000-13,000
GS (1980)						

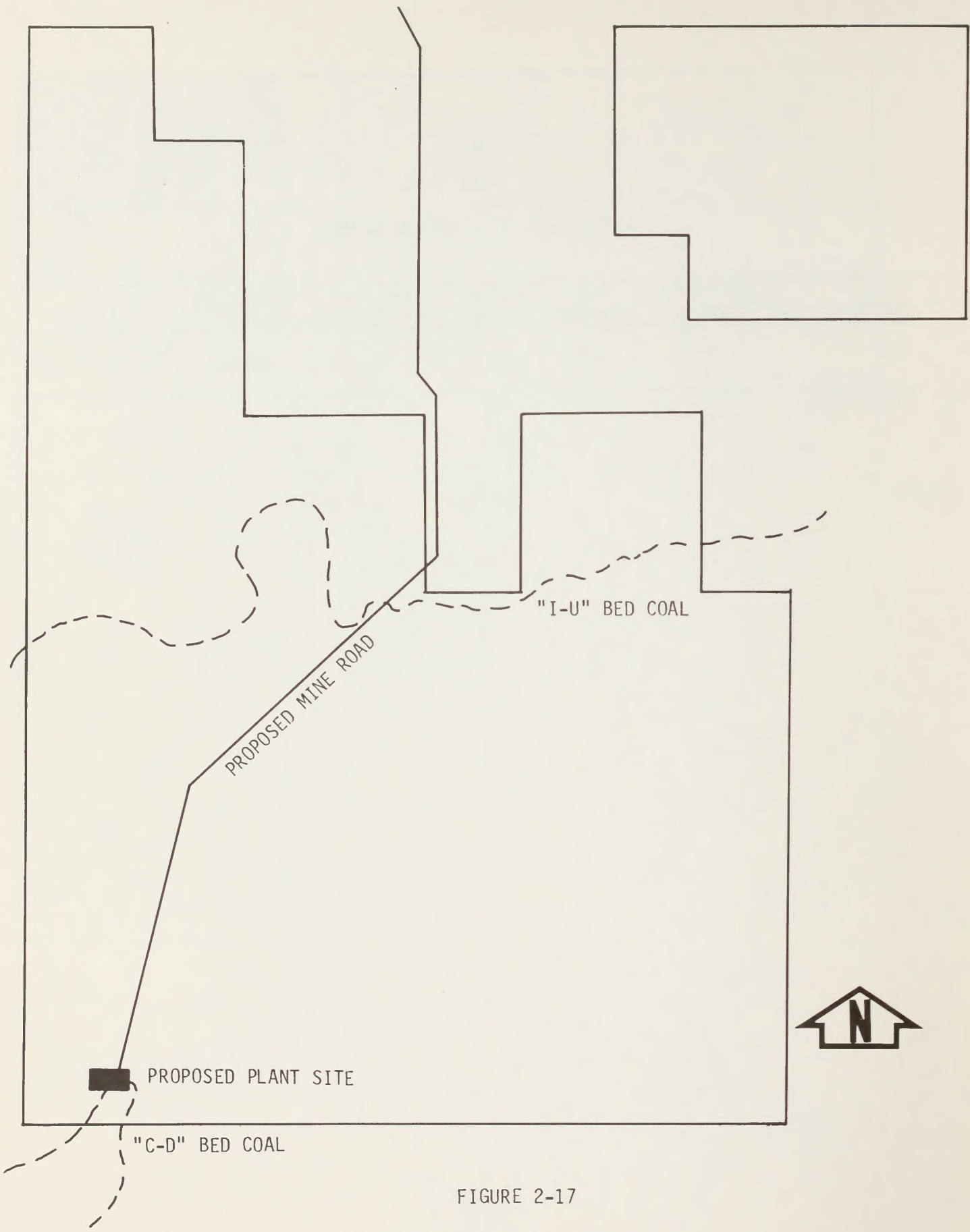


FIGURE 2-17

HOLLBERG PRLA TRACT SURFACE LAYOUT

TABLE 2-22

TRACTS INCLUDED IN THE UINTA-SOUTHWESTERN UTAH REGION EIS ALTERNATIVES

Tract	Alternatives				No Action
	One	Two	Three	Four	
Cottonwood 2,400 acres					
Meetinghouse Canyon 1,063.38 acres					
Gordon Creek 4,280 acres					
North Horn Mountain 21,043 acres					
Tucker Canyon 161.4 acres					
Miller Creek 2,000 acres					
Rilda Canyon 640 acres					
Slaughterhouse Canyon 440 acres					
Emery North 2,161 acres					
Emery Central 2,967.65 acres					
Emery South 748.49 acres					

TABLE 2-23

ALTERNATIVE ONE SUMMARY

	Leasing Only		Leasing with Hollberg PRLA	
Number of Tracts	11		12	
Total Acres:	37,906		40,942	
Total In-Place Coal Resource	561.8 million tons		601.1 million tons	
Total Recoverable Coal Reserves	256.2 million tons		275.7 million tons	
a. Surface Mining	50.0 million tons		50.0 million tons	
b. Underground Mining	206.2 million tons		225.7 million tons	
Average Annual Production:				
	a _{6.55} million tons (1987-1995)		7.04 million tons	
	b _{6.34} million tons (1996-2007)		6.83 million tons	
	6.61 million tons (2008-End of Mine Life)		7.10 million tons	
Water Required for Mining	101.3 acre-feet per year		108.8 acre-feet per year	
Acres Disturbed (Cumulative)		1985	1990	1995
Mining Operations ^c	0 (0)		372 (372)	837 (837)
Onsite Facilities	479 (486)		479 (486)	479 (486)
Offsite Facilities	469 (539)		462 (539)	469 (539)
Housing & Infrastructure	59 (61)		368 (393)	430 (460)
Totals	1,007 (1,086)		1,688 (1,790)	2,215 (2,322)
Employment:		1985-86	a ₁₉₈₇₋₉₅	b ₁₉₉₆₋₂₀₀₇
				2008-End of Mine Life
Construction Workers	358 (383)		-	-
Mining Workers	- (0)		1,605 (1,680)	1,545 (1,620)
Coal Transportation Workers	- (0)		63 (63)	63 (63)
Total Workers	358 (383)		1,668 (1,743)	1,608 (1,683)

a₁₉₈₇₋₉₅ Slaughterhouse Canyon tract would be 8-year operation only

b₁₉₉₆₋₂₀₀₇ Trucker Canyon tract would be a 20-year operation only

c_{2008-End of Mine Life} Numbers in parenthesis in Acres Disturbed and Employment sections are the figures associated with leasing plus development of the Hollberg PRLA. Surface mining operations would continue to disturb 93 acres per year (50 acres, Emery North; 43 acres, Emery Central) until year 2006, when Emery North would cease surface operations. Total disturbance by year 2006 would be 1,860 acres. Emery Central operations would continue to disturb an additional 43 acres per year until 2026 at which time cumulative disturbance from mining operations would total 2,720 acres.

ALTERNATIVE TWO (PREFERRED ALTERNATIVE)

Alternative Two considers leasing seven tracts beginning in mid-1981. The tracts are Tucker Canyon, Miller Creek, Gordon Creek, Rilda Canyon, Meetinghouse Canyon, Cottonwood and North Horn Mountain (Table 2-22). All seven tracts would be mined using underground methods. The Hollberg PRLA is also considered in this Alternative. Development of the PRLA is discussed in Alternative One.

The tracts, totaling 31,588 acres, would be offered for competitive lease and would comprise approximately 465.2 million tons of in-place Federal coal. About 186.1 million tons of the coal would actually be mined. Average annual production from 1987 to 2007 would be approximately 4.67 million tons, declining to about 4.25 million tons per year thereafter as Tucker Canyon, a 20-year operation, would cease production.

A total of 240 construction workers would be required to bring the seven mines into production. Construction would commence in 1985 and be completed by the end of 1987. Projected mining and coal transportation work forces would be 1,348 and 57 personnel respectively.

Approximately 72 acre-feet of water would be required annually from 1987 until the end of mine life.

Onsite surface facilities, including coal and topsoil storage areas, would occupy 156 acres by 1987 (end of construction and development phase). No additional acreage would be required in future years for onsite facilities. Implementation of this Alternative would also require construction of offsite developments such as haulage and access roads, and power and telephone lines. Cumulatively, these developments would occupy 316 acres by 1987. No additional acreage would be required. Housing and infrastructure requirements directly resulting from implementation of Alternative Two would be 43 acres in 1985, 293 acres by 1990, 339 acres by 1995, and 362 acres by the year 2000.

Implementation of this alternative would result in construction of 19.5 miles of new haulage and access roads and 20 to 25 miles of telephone and powerlines. Alternative Two is summarized in Table 2-24. This is the Preferred Alternative because it would allow flexibility in meeting the leasing target. It also offers clearly competitive potential leases as well as tracts that would benefit existing operations. All underground tracts that have high or medium ranking are included in this Alternative.

ALTERNATIVE THREE

Alternative Three was structured to satisfy two basic objectives: (1) to consider those tracts that have been identified for the proposed UP&L exchange, and (2) to lease sufficient tonnages of coal to meet the Federal leasing target of 322 million tons voted by the Regional Coal Team on February 6, 1980, and approved by the Secretary of the Interior on March 28, 1980. The tracts included in this Alternative are: Meetinghouse Canyon, Cottonwood and North Horn Mountain (Table 2-22). These tracts will not be offered for competitive sale until they have been eliminated from consideration for exchange. All three tracts would be mined using underground methods. The Hollberg PRLA is also considered in this Alternative. Development of the PRLA is discussed in Alternative One.

The tracts, totaling 24,507 acres, would be offered for competitive lease and would comprise approximately 335.3 million tons of in-place Federal coal. About 134.1 million tons of the coal would actually be mined at an average annual production rate of 3.35 million tons for 40 years.

A total of 160 construction workers would be required to bring the three mines into production. Construction would commence in 1985 and would be completed by the end of 1987. Projected mining and coal transportation work forces would be 965 and 18 personnel respectively for a total of 983 through end of mine life in 2027.

Approximately 52 acre-feet of water would be required annually for the 40-year life of the mines.

Onsite surface facilities, including coal and topsoil storage areas, would occupy 75 acres by the end of 1987. No additional acreage would be required for onsite facilities. Implementation of this Alternative would also require construction of offsite facilities such as haulage and access roads, power and telephone lines. Cumulatively, these developments would occupy 150 acres by 1987. No additional acreage would be required. Housing and infrastructure requirements directly resulting from implementation of Alternative Three would be 23 acres in 1985, 200 acres by 1990, 235 acres by 1995, and 247 acres by the year 2000.

Implementation of this alternative would result in construction of about 10.2 miles of new haulage and access roads and 11 miles of transmission lines.

Alternative Three is summarized in Table 2-25.

TABLE 2-24

ALTERNATIVE TWO SUMMARY

	Leasing Only		Leasing with Hollberg PRLA	
	7	8	1995	2000
Number of Tracts				
Total Acres:	31,588	34,624		
Total In-Place Coal Resource	465.2 million tons	494.5 million tons		
Total Recoverable Coal Reserves	186.1 million tons	205.6 million tons		
a. Surface Mining	0.0 million tons	0.0 million tons		
b. Underground Mining	186.1 million tons	205.6 million tons		
Average Annual Production:	a 4.67 million tons (1987-2006) 4.25 million tons (2007-End of Mine Life)	5.16 million tons 4.74 million tons		
Water Required for Mining	72.0 acre-feet per year	79.5 acre-feet per year		
Acres Disturbed (Cumulative)	1985	1990	1995	2000
Mining Operations ^b	0 (0)	0 (0)	0 (0)	0 (0)
Onsite Facilities	156 (163)	156 (163)	156 (163)	156 (163)
Offsite Facilities	316 (386)	316 (386)	316 (386)	316 (386)
Housing & Infrastructure	43 (45)	293 (318)	339 (369)	362 (394)
Totals	515 (594)	765 (867)	811 (918)	834 (943)
Employment:	1985-86	a 1987-2007	b 2008-End of Mine Life	
Construction Workers	240 (265)	-	-	-
Mining Workers	- (0)	1,348 (1,423)	1,333 (1,408)	
Coal Transportation Workers	- (0)	57 (57)	55 (55)	
Total Workers	240 (265)	1,405 (1,480)	1,388 (1,463)	

^aTucker Canyon tract would be 20-year operation only

^bNumbers in parenthesis in Acres Disturbed and Employment sections are the figures associated with leasing plus development of the Hollberg PRLA

TABLE 2-25

ALTERNATIVE THREE SUMMARY

	Leasing Only		Leasing with Hollberg PRLA	
	3		4	
Number of Tracts				
Total Acres:	24,507		27,543	
Total In-Place Coal Resource	335.3 million tons		374.6 million tons	
Total Recoverable Coal Reserves	134.1 million tons		153.6 million tons	
a. Surface Mining	0.0 million tons		0.0 million tons	
b. Underground Mining	134.1 million tons		153.6 million tons	
Average Annual Production:	3.35 million tons per year for 40 years		3.84 million tons	
Water Required for Mining	51.7 acre-feet per year		59.2 acre-feet per year	
Acres Disturbed (Cumulative)				
		<u>1985</u>	<u>1990</u>	<u>1995</u>
Mining Operations ^a	0	(0)	0	(0)
Onsite Facilities	75	(82)	75	(82)
Offsite Facilities	150	(220)	150	(220)
Housing & Infrastructure	<u>23</u>	<u>(25)</u>	<u>200</u>	<u>(225)</u>
Totals	248	(327)	425	(527)
Employment:				
		<u>1985-86</u>	<u>b1987-End of Mine Life</u>	
Construction Workers	160	(185)	-	-
Mining Workers	-	(-)	965	(1,040)
Coal Transportation Workers	-	(-)	18	(18)
Total Workers	160	(185)	983	(1,058)

^aNumbers in parenthesis in Acres Disturbed and Employment sections are the figures associated with leasing plus development of the Hollberg PRLA

ALTERNATIVES INCLUDING THE PROPOSED ACTION

ALTERNATIVE FOUR

Alternative Four considers leasing three tracts, Gordon Creek, Meetinghouse Canyon, and Cottonwood in mid-1981 (Table 2-22). All three tracts would be mined using underground methods. The Hollberg PRLA is also considered in this Alternative. Development of the PRLA is discussed in Alternative One.

The tracts totaling 7,744 acres, would be offered for competitive lease and would comprise approximately 153.7 million tons of in-place Federal coal. About 61.5 million tons of the coal would actually be mined at an average annual production rate of approximately 1.54 million tons for 40 years.

A total of 65 construction workers would be required to bring the three mines into production. Construction would commence in 1985 and would be completed by the end of 1987. Projected mining and coal transportation work forces would be 430 and 52 personnel respectively for a total of 493 from 1985 through end of mine life in 2027.

Approximately 24 acre-feet of water would be required annually for the 40-year life of the mines.

Onsite surface facilities, including coal and topsoil storage areas, would occupy 45 acres by the end of 1987. No additional acreage would be required for onsite facilities. Implementation of this Alternative would also require construction of offsite facilities such as haulage and access roads, and power and telephone lines. Cumulatively, these developments would occupy another 125 acres by 1987. No additional acreage would be required. Housing and infrastructure requirements directly resulting from implementation of Alternative Four would be 18 acres in 1985, 101 acres by 1990, 118 acres by 1995, and 127 acres by the year 2000.

Implementation of this Alternative would result in construction of less than 7.7 miles of haulage and access roads and less than 10 miles of transmission lines.

Alternative Four is summarized in Table 2-26.

ALTERNATIVE FIVE

Alternative Five is the No Action Alternative. If implemented, this Alternative would result in no Federal coal from the 11 described tracts being offered for lease in 1981. However, the Hollberg PRLA is considered in this Alternative. Development of the PRLA is discussed in Alternative One.

Even with no additional leasing, the Wasatch Plateau-Emery area will continue to be an active coal

producing area. This anticipated growth and development was analyzed in the Central Utah Coal Development Environmental Statement (ES) prepared in 1979 by Geological Survey. The mid-level annual production rate of 24 million tons by 1990 was considered. Full production from 10 proposed underground mines, for which leases had been issued, added to the 1976 coal production in central Utah, plus a moderate increase in production from existing mines, was taken into account. Anticipated impacts that would result from this increase in coal production were analyzed. The ES is available for review at the BLM Utah State Office and the GS Area Office in Salt Lake City.

The annual production rate considered in the Central Utah EIS is subject to change as additional data are obtained and as local and national trends develop. However, to this point, the production rate planned from existing leases and private mines analyzed for central Utah has not been significantly altered.

Alternative Five is summarized in Table 2-27.

COMPARATIVE ANALYSIS MATRIX

A comparative summary of major impacts for Alternatives One through Four is presented in Table 2-28. Alternative Five is the No Action Alternative, and no new coal leasing is proposed in that alternative. Therefore, there would be no comparative impacts related to Alternatives One through Four. The future environment (projected baseline) without the proposed alternatives is analyzed in Chapter Four, Alternative Five.

REQUIRED AUTHORIZATIONS

The development of Federal coal resources is controlled by numerous laws and regulations imposed by Federal, State and local agencies and authorities. Federal laws of importance include the Federal Coal Leasing Amendments Act of 1976 (FCLAA), the Federal Lands Policy and Management Act of 1976 (FLPMA) and the Surface Mining Control and Reclamation Act of 1977 (SMCRA).

The purpose of FCLAA is to provide a more orderly procedure for the leasing and development of Federally-owned coal than was set forth in its parent document, the Mineral Leasing Act of 1920. FCLAA sets forth major requirements including strictly competitive bidding, the abolishment of preference right leasing, the concept of Logical Mining Units, Diligent Development requirements, Maxi-

TABLE 2-26

ALTERNATIVE FOUR SUMMARY

	Leasing Only		Leasing with Hollberg PRLA	
	3	4	3	4
Number of Tracts				
Total Acres:	7,744	10,780		
Total In-Place Coal Resource	153.7 million tons	193.0 million tons		
Total Recoverable Coal Reserves	61.5 million tons	89.0 million tons		
a. Surface Mining	0.0 million tons	0.0 million tons		
b. Underground Mining	61.5 million tons	89.0 million tons		
Average Annual Production:	1.54 million tons per year for 40 years	2.03 million tons		
Water Required for Mining	23.8 acre-feet per year	31.3 acre-feet per year		
Acres Disturbed (Cumulative)				
	1985	1990	1995	2000
Mining Operations ^a	0 (0)	0 (0)	0 (0)	0 (0)
Onsite Facilities	45 (52)	45 (52)	45 (52)	45 (52)
Offsite Facilities	125 (195)	125 (195)	125 (195)	125 (195)
Housing & Infrastructure	18 (20)	101 (126)	118 (148)	127 (159)
Totals	248 (267)	271 (373)	288 (395)	297 (406)
Employment:				
	1985-86		b)1987-End of Mine Life	
Construction Workers	65 (90)		-	
Mining Workers	- (-)		430 (505)	
Coal Transportation Workers	- (-)		52 (52)	
Total Workers	65 (90)		482 (557)	

^aNumbers in parenthesis in Acres Disturbed and Employment sections are the figures associated with leasing plus development of the Hollberg PRLA

TABLE 2-27

ALTERNATIVE FIVE SUMMARY

	Leasing Only		Leasing with Hollberg PRLA			
	0	1	1985	1990	1995	2000
Number of Tracts	0	1				
Total Acres:	0	3,036				
Total In-Place Coal Resource	0 million tons	39.3 million tons				
Total Recoverable Coal Reserves	0 million tons	19.5 million tons				
a. Surface Mining	0 million tons	0.0 million tons				
b. Underground Mining	0 million tons	19.5 million tons				
Average Annual Production:	0 million tons	0.5 million tons				
Water Required for Mining	0 acre-feet per year	7.5 acre-feet per year				
Acres Disturbed (Cumulative)			1985	1990	1995	2000
Mining Operations ^a	0	(0)	0	(0)	0	(0)
Onsite Facilities	0	(7)	0	(7)	0	(7)
Offsite Facilities	0	(70)	0	(70)	0	(70)
Housing & Infrastructure	0	(2)	0	(25)	0	(32)
Totals	0	(79)	0	(102)	0	(109)
Employment:			1985-86	b1987-End of Mine Life		
Construction Workers	0	(25)	0	0	0	0
Mining Workers	0	(0)	0	0	0	(75)
Coal Transportation Workers	0	(0)	0	0	0	(0)
Total Workers	0	(25)	0	0	0	(75)

^aNumbers in parentheses in Acres Disturbed and Employment sections are the figures associated with leasing plus development of the Hollberg PRLA

TABLE 2-28

COMPARATIVE SUMMARY OF MAJOR IMPACTS

RESOURCE CATEGORY	ALTERNATIVE ONE	ALTERNATIVE TWO	ALTERNATIVE THREE	ALTERNATIVE FOUR
Climate, Air Quality	Annual TSP concentrations in proximity to unpaved haul roads and surface mines would increase by 5 to 50 ug/m ³ resulting in local violations of NAAQS unless BACT is applied.	Annual TSP concentrations in proximity to unpaved haul roads associated with mines would increase by 5 to 50 ug/m ³ resulting in local violations of NAAQS unless BACT is applied.	Annual TSP concentrations in proximity to unpaved haul roads associated with mines would increase by 5 to 50 ug/m ³ resulting in local violations of NAAQS unless BACT is applied.	Annual TSP concentrations in proximity to unpaved haul roads associated with mines would increase by 5 to 10 ug/m ³ resulting in local violations of NAAQS unless BACT is applied.
Soils	Cumulatively, 4,114 acres of surface disturbance would occur by end of mine life. 2,720 acres disturbance would result from surface mining. 3,673 acres would eventually be reclaimed.	Cumulatively, 834 acres of surface disturbance would occur by end of mine life. 472 acres would eventually be reclaimed.	Cumulatively, 472 acres of surface disturbance would occur by end of mine life. 225 acres would eventually be reclaimed.	Cumulatively, 297 acres of surface disturbance would occur by end of mine life. 170 acres would eventually be reclaimed.
Water Resources	Annual consumptive use of water would increase by 1,075 acre-feet in 2000 for the life of the mine and 974 acre-feet thereafter irreversibly lost to municipal use.	Annual consumptive use of water would increase by 867 acre-feet in 2000 for the life of the mine and 795 acre-feet thereafter irreversibly lost to municipal use.	Annual consumptive use of water would increase by 612 acre-feet in 2000 for the life of the mine and 560 acre-feet thereafter irreversibly lost to municipal use.	Annual consumptive use of water would increase by 312 acre-feet in 2000 for the life of the mine and 288 acre-feet thereafter irreversibly lost to municipal use.
Topography, Geology, Paleontology, Mineral Resources	Up to 10 feet of subsidence could occur on portions of 32,776 acres that would be mined by underground methods. Topography would be slightly altered by surface mining. With present technology about 305.6 million tons of coal would not be recovered.	Up to 10 feet of subsidence could occur on portions of 31,588 acres that would be mined by underground methods. Topography would be slightly altered by surface mining. With present technology about 279.1 million tons of coal would not be recovered.	Up to 10 feet of subsidence could occur on portions of 24,507 acres that would be mined by underground methods. With present technology about 201.2 million tons of coal would not be recovered.	Up to 10 feet of subsidence could occur on portions of 7,744 acres that would be mined by underground methods. With present technology about 92.2 million tons of coal would not be recovered.

(Continued)

TABLE 2-28 (Continued)

RESOURCE CATEGORY	ALTERNATIVE ONE	ALTERNATIVE TWO	ALTERNATIVE THREE	ALTERNATIVE FOUR
Vegetation	Vegetation productivity on 441 acres would be permanently lost.	Vegetation productivity on 362 acres would be permanently lost.	Vegetation productivity on 247 acres would be permanently lost.	Vegetation productivity on 127 acres would be permanently lost.
Wildlife	Possible disruption of elk migration off Wasatch Plateau. Loss of critical moose habitat. An increase in highway related deer loss. Increased poaching of game.	Possible disruption of elk migration off Wasatch Plateau. Loss of critical moose habitat. Increased poaching of game.	Possible disruption of elk migration off Wasatch Plateau. Increased poaching of game.	Possible loss of critical moose habitat. Increased poaching of game.
Land Use	About 220 acres of irrigated cropland would be changed to community use. About 197 acres of irrigated cropland would be retired for lack of water. Two percent (4,060) of the grazing AUMs would be lost from four allotments on the Emery tracts.	About 181 acres of irrigated cropland would be changed to community use. About 157 acres of irrigated cropland would be retired for lack of water.	About 124 acres of irrigated cropland would be changed to community use. About 109 acres of irrigated cropland would be retired for lack of water.	About 64 acres of irrigated cropland would be changed to community use. About 55 acres of irrigated cropland would be retired for lack of water.
Socioeconomics	Employment in Carbon and Emery Counties would be increased by 2,721 jobs over the baseline by the year 2000. Annual earnings in Carbon and Emery Counties would be increased by \$88.4 million by the year 2000. Population in the region would increase	Employment in Carbon and Emery Counties would be increased by 2,465 jobs by the year 2000. This would result in an additional 6,073 people living in Carbon and Emery Counties by 2000. Additional employment would bring in an additional \$80.4	Employment in Carbon and Emery Counties would be increased by 1,765 jobs by 2000. This would result in an additional 4,222 people living in Carbon and Emery Counties by 2000. Additional employment would bring in an additional \$54 million in annual	Employment in Carbon and Emery Counties would be increased by 883 jobs by 2000. This would result in an additional 1,415 residents and 730 residents to each county, respectively by 2000. Additional employment would bring in an additional 26.7

(Continued)

TABLE 2-28 Continued

RESOURCE CATEGORY	ALTERNATIVE ONE	ALTERNATIVE TWO	ALTERNATIVE THREE	ALTERNATIVE FOUR
Socioeconomics (Continued)	by 7,931 persons by the year 2000. Emery and Carbon Counties would experience significant infrastructure impacts. The elements most affected would be housing, education facilities, social services, and water and sewer capacities.	million in annual earnings to Carbon and Emery County by 2000. The most significant infrastructure impacts would occur in Emery County where overcrowding in the county schools would take place. Need for additional housing, social services, and water and sewer capacities would be substantially increased.	earnings to Carbon and Emery Counties by 2000. The most significant infrastructure impacts would occur in Emery County and its constituent communities. There would be additional shortages of classroom space in the schools, housing, social services, and water and sewer capacities by 2000.	million in annual earnings to Carbon and Emery Counties. The infrastructure impacts resulting from this alternative would not be severe.
Transportation	An additional 3,350 vehicles per day would be on the roads in the area. Highway 10 from Price to Emery would be especially crowded with associated safety and maintenance problems.	An additional 2,890 vehicles per day would be on the roads in the area. Highway 10 from Price to Castle Dale would be especially crowded with associated safety and maintenance problems.	An additional 1,900 vehicles per day would be on the roads in the area. Highway 10 from Price to Ferron would be most heavily used.	An additional 1,200 vehicles per day would be on the roads in the area.
Cultural Resources	Unidentified sites could be destroyed. Increased vandalism and collecting would occur.	Unidentified sites could be destroyed. Increased vandalism and collecting would occur.	Unidentified sites could be destroyed. Increased vandalism and collecting would occur.	Unidentified sites could be destroyed. Increased vandalism and collecting would occur.
Special Designation Areas	Development in the Emery area would conflict with one roadless unit currently under wilderness review.	No significant impacts would occur.	No significant impacts would occur.	No significant impacts would occur.

(Continued)

TABLE 2-28 Concluded

RESOURCE CATEGORY	ALTERNATIVE ONE	ALTERNATIVE TWO	ALTERNATIVE THREE	ALTERNATIVE FOUR
Visual Resources	Surface mining would dominate existing landscape and would be visible from U-10. Mining on the Tucker Canyon tract would be visible to subdivision residents and recreationists at Scofield Reservoir.	Mining activity on the Tucker Canyon tract would be visible to subdivision residents and recreationists at Scofield Reservoir.	No significant impacts would occur.	No significant impacts would occur.
Recreation	Local demand for recreation in the region would increase by approximately 13 percent. Some developed sites would experience overcrowding and deterioration. Some facilities in towns would be overcrowded. There would be a reduction in hunter and fisherman success. Traffic congestion on recreation roads would occur.	Local demand for recreation in the region would increase by approximately 10 percent. Some developed sites would experience overcrowding and deterioration. Some facilities in towns would be overcrowded. There would be a reduction in hunter and fisherman success. Traffic congestion on recreation roads would occur.	Local demand for recreation in the region would increase by approximately 7 percent. Some developed sites would experience overcrowding and deterioration. Some facilities in towns would be overcrowded. There would be a reduction in hunter and fisherman success. Traffic congestion on recreation roads would occur.	Local demand for recreation in the region would increase by approximately 4 percent. Some developed sites would experience overcrowding and deterioration. Some facilities in towns would be overcrowded. There would be a reduction in hunter and fisherman success. Traffic congestion on recreation roads would occur.

ALTERNATIVES INCLUDING THE PROPOSED ACTION

imum Economic Recovery, and lease acreage restrictions.

FLPMA provides BLM with a statutory framework for land use planning on public lands and requires that BLM use the principles of multiple use and sustained yield, give priority to the protection of areas of critical environmental concern, consider present as well as future uses of public lands, and coordinate planning activities with those of Federal, State and local agencies. Title 5 of FLPMA authorizes BLM to grant required rights-of-way across public lands. Prior to issuance of such rights-of-way, an environmental assessment would be completed.

SMCRA establishes uniform minimum Federal standards for regulating surface mining and reclamation on Federal, State and private lands, and for ensuring adequate protection from environmental impacts of surface mining. This Act also sets forth provisions regarding environmental protection performance standards and designation of areas unsuitable for surface coal mining. The Act established the Office of Surface Mining (OSM) in the Interior Department to enforce the performance standards.

Each lease operator is required to submit a mining and reclamation plan that complies with OSM and GS regulations, which demonstrates that non-coal resources will be protected. This plan must be approved by the Secretary of the Interior following concurrence of GS and the land management agency and prior to beginning mining operations.

Under the mandate of several laws listed in 43 CFR 3400, Geological Survey is authorized to supervise production of coal resource in the lease areas. Included is the responsibility to identify logical mining units, enforce diligent development, maximum economic recovery and conservation of the mineral resource. On all Federal leases, coal operations are under jurisdiction of GS.

State regulations deal with such aspects as water and air pollution, land use, cultural and historic preservation, reclamation, wildlife and aquatic resources, and mine safety practices. The State responsibility for enforcement of these regulations and standards is considerable and is derived either from State legislation or through Federally authorized transfers of enforcement responsibility as provided by applicable Federal law.

Additional information concerning these laws, as well as other applicable Federal and State regulations and interagency relationships can be found in the Final Environmental Statement, Federal Coal Management Program (BLM, 1979).

Local regulations are generally imposed at the county level and involve special use permits, zoning variances, or construction permits where applicable.

MITIGATING MEASURES

In addition to the laws and regulations which govern land management and coal leasing in general, several measures have been identified which would mitigate some anticipated impacts. The following measures would be made a stipulation to any lease issuance. Additional mitigating measures may be required as a result of further analysis and public review.

1. Leasing of those portions of the Emery North and Central tracts and the Hollberg and Utah Power and Light PRLAs, where construction or other disturbance would impair the wilderness suitability of areas under wilderness review, would not be allowed as long as the areas are under wilderness review.

2. Surface construction or underground activity that would result in subsidence would not be allowed within the Muddy Creek 100-year floodplain. However, the floodplain area would be leased for the purpose of allowing possible underground access to other areas of the Emery North tract provided this did not affect the floodplain.

3. The lessee would provide a qualified cultural resource specialist (approved by the land management agency) to intensively survey surface disturbed areas for the presence of cultural resources. All known cultural sites and those located during inventory that are of significant value would be avoided where feasible as provided for in 36 CFR, part 800, "Protection of Historical and Cultural Properties" and the Coal Programmatic Memorandum of Agreement between the President's Advisory Council on Historic Preservation, OSM, BLM, and SHPO. Impacts to all unavoidable sites would be mitigated using data recovery techniques, such as collection and/or excavation. The lessee would be responsible for mitigation. The cultural resource specialist and salvage techniques used would be subject to approval by the surface management agency.

4. The lessee would be required to evaluate the possible effects of blasting or other mining-related activities on the Rochester-Muddy petroglyph site located adjacent to the Emery North tract. In addition, a latex print of this site would be made at the lessee's expense to monitor future vandalism. The lessee on the Emery North

ALTERNATIVES INCLUDING THE PROPOSED ACTION

tract would be required to provide and/or maintain public access across the lease area to the site during all phases of mining and construction operation.

5. The lessee would be required to establish an approved surface subsidence monitoring system to measure the effects of the underground mining activities on the land surface topography, underground and surface hydrology, and vegetation. A satisfactory series of monitoring points shall be established on the lease area. The lessee would also be required to perform a hydrologic study to secure baseline data concerning the surface and subsurface water occurring on or flowing through the tract areas.

6. The lessee on the Rilda Canyon tract would be required to establish a water-monitoring system approved by the Forest Service to measure any effects mining operations may have on the supply and quality of the municipal water system for affected Emery County communities and other springs and flows in the area. The monitoring system would include the periodic measurement and analysis of water quantity and quality.

7. During all phases of the mining operation, travel would be restricted to rights-of-way access roads and existing public roads. Upon completion of the mining operation, new access roads of no future value would be closed when required by the appropriate Federal official.

8. It will be required that vegetation and landform alterations and structures such as roads, silos, portal facilities, water storage facilities, conveyor lines and transmission lines be located, constructed, and/or painted so as to visually blend with the natural surroundings. Vegetation removal will be permitted only when specifically approved by the surface management agency.

9. The location of any mine-related development in Retention (Class II) or Partial Retention (Class III) areas, will be subject to the approval of the surface management agency.

10. After coal mining activities have concluded, rehabilitation must be accomplished to restore the landscape to its former character to the greatest extent possible. Rehabilitation requirements may include terrain alterations to blend better with natural slopes; alteration, concealment, revegetation of cut-and-fill slopes; and removal of construction debris.

11. High voltage powerlines crossing Emery North and Meetinghouse tracts would be protected from the effects of subsidence resulting from underground mining.

12. Mining would not be allowed in the zone of subsidence beneath the communication facility on the Emery North tract.

13. It will be required that all support facilities, equipment, and similar developments be removed from the lease area within 2 years after the final termination of use of such facilities. All disturbed areas and those areas occupied by such facilities are to be rehabilitated in accordance with a reclamation plan approved by OSM.

14. Mining must be done in such a manner that rock escarpments and cliffs would be protected. Tracts involved include those on the Wasatch Plateau and the Emery tracts.

15. Prior to any ground disturbing actions on public lands, the areas are to be surveyed for the presence of threatened or endangered plant species. If such plants are encountered, it will be required that mining operations be conducted to avoid jeopardizing the plants and their habitat, or other appropriate measures will be taken to preserve the plant population.

16. Only underground mining would be permitted on the Emery South tract. No surface occupancy or development would be allowed on those areas inhabited by the candidate endangered plant species *Townsendia aprica*.

17. Where possible, roads would be located at least 0.25 mile from perennial streams to avoid pollution from accidental spills and fugitive dust.

18. Surface occupancy or disturbance of the drainage bottoms, plus a suitable buffer area, would be prohibited on the Tucker Canyon site.

19. The lessee would be required to replace lost surface water sources because of subsidence or make restitution to users as required by the State of Utah (Title 73323), or by the Office of Surface Mining Reclamation and Enforcement Regulations (30 CFR Chapter VII, 779.17 and 816.54), whichever is applicable.

20. The lessees would be required to maintain dust suppression standards as required by local, State, and Federal agencies.

21. The lessee would be required to maintain a mine development and operation of a size that is compatible with the physical environment. The limited area available for mine facilities at the coal outcrop, steep topography, adverse winter weather, and physical limitations on the size and design of the access road, are factors which would determine the ultimate mine size (all Forest Service tracts).

22. If removal of timber is required for clearing of construction sites, etc., such timber would be

ALTERNATIVES INCLUDING THE PROPOSED ACTION

removed in accordance with Federal agency regulations (all Forest Service tracts).

23. Any current land surface improvements on the tract would need to be protected and/or maintained by the lessee. The continuance of current land uses on the tract would be guaranteed for post mining uses by the lessee (all Forest Service tracts).

24. Floodplains would be determined prior to approval of mine plan. The occupation of channels and floodplains would be allowed only if no suitable alternative is available (all Forest Service tracts).

25. Mining would be done in such a manner that escarpments would be protected (all Forest Service tracts).

26. The watershed treatment furrows and trenches on North Horn would be repaired by lessee if effectiveness is disturbed or damaged by effects of mining.

27. Sage grouse habitats and elk winter range on North Horn Mountain would be maintained by assuring responsibility by the lessee for making available future water sources equal to those presently existing.

28. A cattle driveway would be maintained in Rock Canyon.

29. The integrity of the elk migration route or routes from North Horn would be maintained.

30. The lessee would be required to use Best Available Control Technology (BACT) to minimize fugitive particulate emissions from haul and access roads and other mining related activities.

31. The lessee would provide a qualified paleontologist to conduct a literature search and field examination on all areas where surface disturbance would take place. Operators would immediately bring to the attention of the Authorized Officer any paleontological resources that might be altered or destroyed by their operations and would leave such discovery intact until told to proceed by the Authorized Officer. Impacts to known paleontological sites and those located during inventory or excavation would be mitigated using data recovery techniques, such as collection or excavation.

SURFACE MINE RECLAMATION

Mining plans have not been prepared for proposed surface mining operations analyzed in this statement; therefore, it is assumed that a typical

surface mining sequence would occur. Figure 2-18 shows a scenario for a potential surface mining operation. Since the surface mines would disturb and reclaim areas in stages, only part of the potential mining area would be disturbed annually. Table 2-29 and Figure 2-19 illustrate the assumed reclamation schedule and maximum area of unreclaimed land at any one period of time. It is assumed that areas disturbed for underground mines and facilities would remain unreclaimed for the life of the mine.

As shown in Figure 2-20, vegetation would be established on initially disturbed acreage after 3 years. This does not imply that a total return to original vegetation would occur in that time period, but vegetation cover sufficient to retard wind and water erosion of soil would be established. Depending upon the original vegetation type in the area, restoration to original conditions would require a much longer period of time (15 to 20 years or more).

A detailed reclamation plan based on permanent program performance standards for surface mining (30 CFR Chapter VII, Subchapter K) must be submitted and approved by OSM prior to mining activity.

UTAH POWER & LIGHT EXCHANGE

Introduction

UP&L acquired rights to prospecting permits on 18,325.2 acres of Federal land on the Kaiparowits Plateau in 1971. These lands adjoin over 5,000 acres of State of Utah coal leases held by UP&L.

In 1976, UP&L initiated litigation demanding the Department of the Interior process the UP&L PRLAs and issue coal leases. UP&L agreed to dismiss its suit against the Department, however, when Congress authorized a coal lands exchange by amending the Mineral Leasing Act of 1920. An agreement was drawn up between UP&L and Federal agencies on how to proceed with the exchange. If the exchange does not develop, UP&L could reinstate its suit demanding that the PRLAs be processed. The Department would join UP&L in asking the Court for prompt hearing of any new litigation.

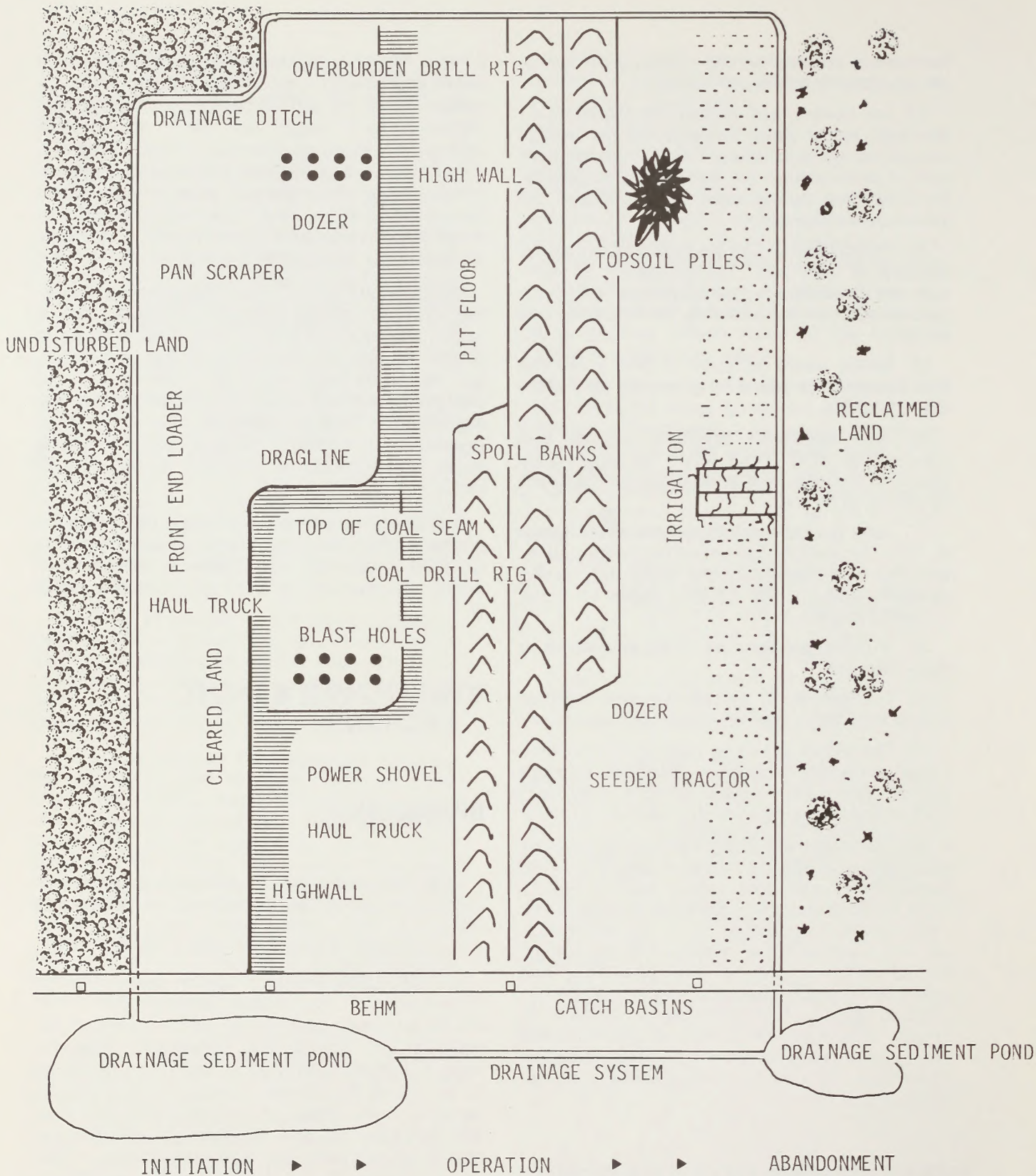


FIGURE 2-18

TIME PHASED SCENARIO OF A POTENTIAL STRIP MINE

TABLE 2-29
RECLAMATION SCHEDULE

Tract	Annual Disturbance ^a	Unreclaimed Mined Lands ^b (Acres Disturbed)	Onsite and Offsite Facilities ^c	Maximum Unreclaimed Lands ^d
Emery North	50	150	109	259
Emery Central	43	129	285	414

^aBeginning in 1987 and continuing for the life of the mine

^bAssumes 3-year period from initial disturbance to establishment of vegetation cover

^cContinues through life of mine

^dMaximum area that would be unreclaimed at any one time

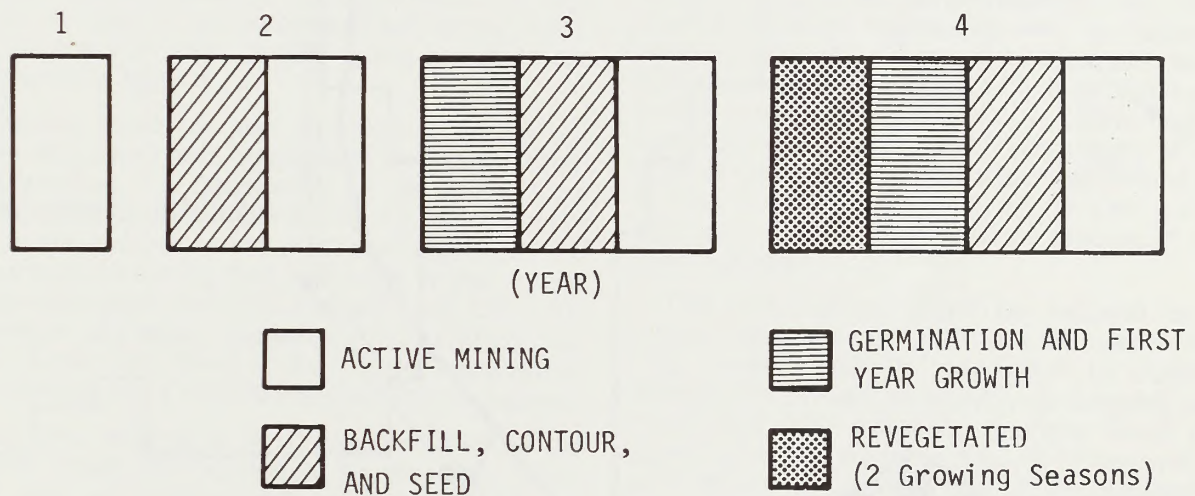


FIGURE 2-19
RECLAMATION SEQUENCE

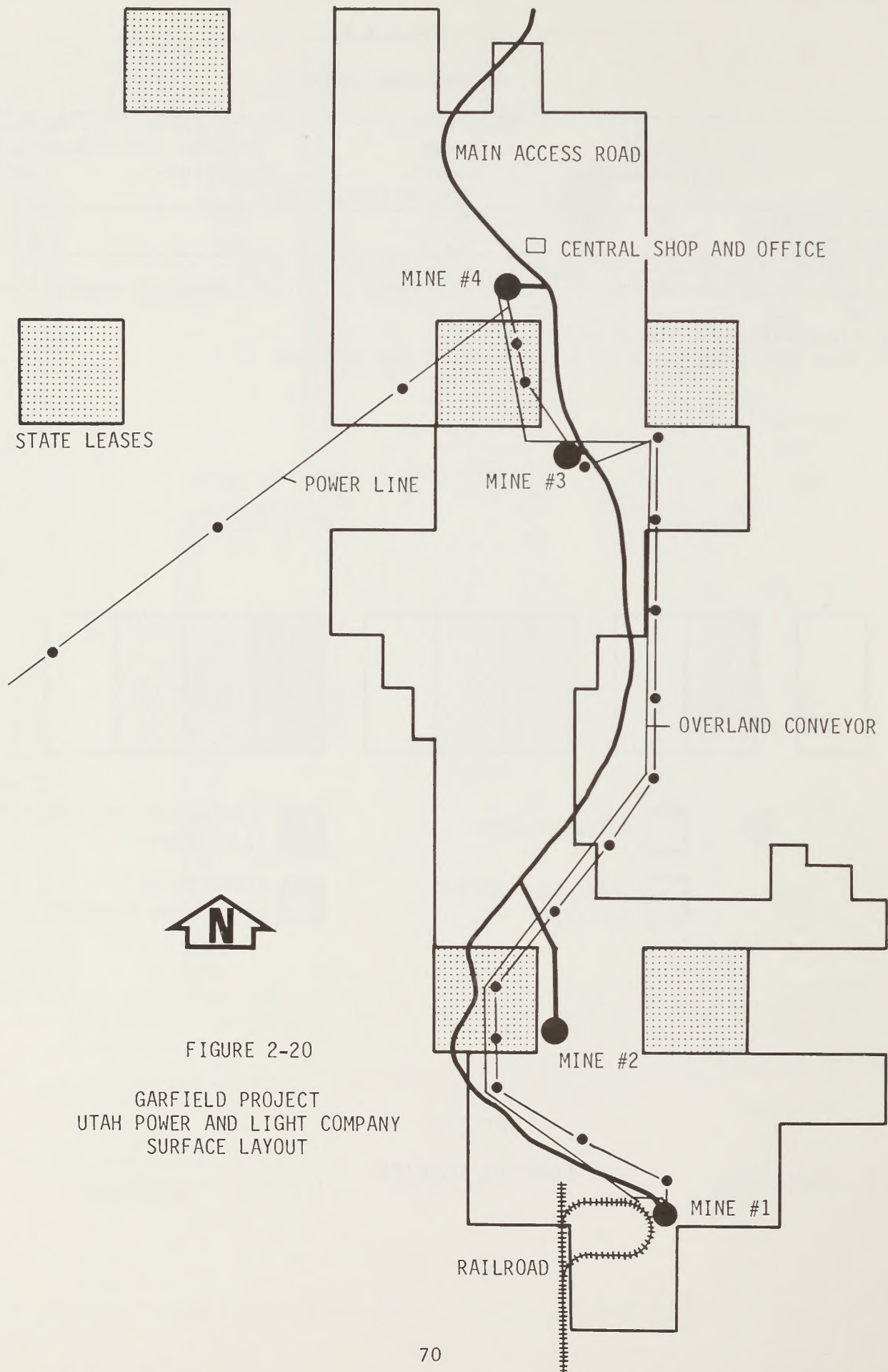


FIGURE 2-20
 GARFIELD PROJECT
 UTAH POWER AND LIGHT COMPANY
 SURFACE LAYOUT

Description of the Alternatives

ALTERNATIVE ONE

Alternative One considers approval of the proposed exchange. The Department of the Interior, in accordance with P.L. 95-554 (92 Stat. 2073) would issue to UP&L a coal lease or group of leases in the Wasatch Plateau area in exchange for relinquishment of all or a portion of the PRLAs held by UP&L on the Kaiparowits Plateau. This exchange would be based on comparative coal values in the two areas. The leases identified for selection by UP&L are the Meetinghouse Canyon, Cottonwood, and North Horn Mountain tracts. Leasing of these three tracts is analyzed as Alternative Three of the coal leasing program previously discussed in this Chapter. The tracts will not be available for competitive lease consideration until a final decision on the exchange is made.

Details concerning the exchange are contained in the agreement signed by the Department, FS, and UP&L. A copy of the agreement and recent correspondence with UP&L regarding the exchange are contained in Appendix 2.

Several details on the exchange have not yet been completed and negotiations are still in process between the Department of the Interior and UP&L. BLM has received the GS final evaluation of the lands involved in the proposed exchange, and is currently reviewing that evaluation. It has not yet been determined how this evaluation will affect the proposed exchange. Therefore, it is not known exactly if one, two, three or none of the tracts would be involved and if the PRLAs would be exchanged.

For this alternative, it is assumed that all the PRLAs would be exchanged for the three tracts and that no development would occur on the PRLAs. Developments on the Meetinghouse, Cottonwood, and North Horn Mountain tracts are also discussed in Alternative Three of the coal leasing program.

There are three possible scenarios for implementation of the exchange as authorized in 43 CFR 3435.1. They are:

1. Outright exchange of the PRLAs for coal leases on the Wasatch Plateau.
2. The issuance of coal lease bidding rights of equal value to the PRLAs. These bidding rights would be used by UP&L as script for bonus bids in Federal competitive coal lease sales.
3. A combination of an exchange and coal lease bidding rights.

A decision regarding the exchange must be made by December 1, 1981, per the agreement.

ALTERNATIVE TWO

Alternative Two is the No Action alternative. No exchange would be made and the PRLAs would be processed in accordance with regulations detailed in 43 CFR 3430. Prior to lease issuance, UP&L would be required to demonstrate commercial quantities of coal on the PRLAs. UP&L would also need to obtain the necessary permits for mine plan approval and be in compliance with all NEPA requirements. Meetinghouse Canyon, Cottonwood, and North Horn Mountain tracts would be available for competitive leasing.

A plan for development of the PRLAs has been prepared and submitted by UP&L (UP&L, 1979). According to this plan, and assuming the Department issues the preference right lease, four separate mines would be developed at about 2-year intervals. Construction would begin in 1985. Full production would be reached by 1997 and would continue through 2027. Figure 2-18 depicts anticipated new development including mine sites, main access roads, powerline, central shops, office, and overland conveyor location. At full production, 18 million tons of coal would be mined annually. Mines No. 2, 3, and 4 would produce 5 million tons each per year and mine number 1 would produce 3 million tons annually.

The coal seams would be reached by rock slopes varying from 2,500 to 4,100 feet in length. The mines would be developed by continuous miners with primary production by longwall panels. Room and pillar extraction methods would be required in some areas. A total of 18 longwall units and 36 continuous miners would be installed on a phased basis to reach desired production. Multiple seam underground mining would be accomplished by sequential seam development and extraction progressing downward from the top seam.

Each of the four mines would have a coal sizing plant at each portal to crush, screen, sample, and deliver coal to the overland belt system. Coal haulage between the mines to the rail loadout and storage facility would be by 60 and 72-inch overland conveyor supported by cable suspension between concrete and steel frames. Most of the coal would then be transported by railroad to the Intermountain Power Project near Lynndyl, Utah, with the remainder used in other UP&L powerplants or marketed elsewhere.

A construction work force of 150 and mine work force of 2,900 (including coal transportation person-

ALTERNATIVES INCLUDING THE PROPOSED ACTION

nel) would be employed. Access to the central office area would be from Escalante, Utah, some 10 miles to the north.

Onsite surface disturbance resulting from construction of portals, administrative and shop facilities, wash houses, parking areas, crushing bins, loadouts, coal storage areas, overland conveyor, etc., would be approximately 270 acres. Offsite surface disturbance resulting from road and transmission line construction would total about 330 acres.

Housing and infrastructure requirements would be 351 acres in Escalante, Tropic, Henrieville, and Cannonville, Utah.

Following completion of mining, 270 acres would be reclaimed. The roads and transmission lines would continue to be used by other companies in the area.

Water would be required underground primarily for dust suppression and equipment cooling. Two possible sources of water were identified: (1) groundwater inflow into the mine from the coal zone strata, and (2) drilling of the Navajo Sandstone aquifer below the coal beds. Annual water needs for mining are estimated at 276 acre-feet (5 gallons of water per ton of coal mined). The amount of potable water required has not been determined.

Development of the PRLAs is summarized in Table 2-30.

TABLE 2-30

DEVELOPMENT SUMMARY: UP&L PRLAS ON KAIPAROWITS PLATEAU

	Annual Tonnage (in millions)			
	1990	1995	2000	2027
Production Schedule				
Mine 1	3.0	3.0	3.0	3.0
Mine 2	2.5	5.0	5.0	5.0
Mine 3	0	5.0	5.0	5.0
Mine 4	0	2.5	5.0	5.0
Total	5.5	15.5	18.0	18.0
Total in-place coal resources	Federal 1,287,000,000			
	State 213,000,000			
Annual Production	18 million tons (years 10 to 40)			
Mine Life	40 years			
Mine Workforce	2,900			
Construction Workforce	150			
Disturbed Acres onsite				
All buildings, portals storage and parking areas, etc.	175 acres			
Conveyors	70 acres (19.1 miles)			
Railroad loadout	25			
Total	270 acres			
Disturbed acres offsite				
Access roads	305 acres			
Transmission lines	25			
Total	330 acres			
Housing and Infrastructure	351 acres			
Total Acres Disturbed	951 acres			
Water required for Mining	276 acre-feet annually			

CHAPTER 3

DESCRIPTION OF THE ENVIRONMENT

INTRODUCTION

This chapter describes the existing environment in the Uinta-Southwestern Utah Coal Region that would be impacted by implementation of any of the five alternatives described for coal leasing or the two alternatives described for the proposed Utah Power and Light exchange. Data are commensurate with the significance of the anticipated impact with less important material summarized, consolidated, or simply referenced.

WASATCH PLATEAU

CLIMATE, AIR QUALITY

Climate

The climate of the region is varied and strongly influenced by topographic features. The area is generally semiarid, characterized by low relative humidity, abundant sunshine, low to moderate precipitation, warm summers, and cold winters. Seasonal and daily variations in temperature can be extreme. Higher elevations are cool and moderately wet, while the lower elevations east of the Wasatch Plateau are drier and either mid-latitude steppe or desert.

The Sierra Nevada and Cascade Ranges, and finally the Wasatch Plateau deplete Pacific Ocean moisture before reaching the lower elevation areas east of the Wasatch Plateau. Annual average precipitation isopleths are presented in Figure 3-1. On the Wasatch Plateau in the area of the proposed tracts, average annual precipitation is 25.0 inches. This precipitation depletes the moisture of the wintertime flow from the west and its general downslope motion across Castle Valley, site of the Emery North, Central and South tracts, and makes winter drier there with about 3 inches of winter precipitation (BLM, EMRIA Report No. 16, 1979).

Precipitation east of the plateau is greatest in summer when moist tropical air masses from the Sea of Cortez or the Gulf of Mexico occasionally move into the region, resulting in thunderstorm activity. Sunshine and warmer temperatures (although only around 70 degrees F), increase evaporation

and transpiration so that most of the summer rain evaporates quickly.

Average annual precipitation around the Emery tracts is less than 10 inches, with extensive areas receiving 6 to 8 inches (BLM, EMRIA Report No. 16, 1979). The town of Emery at 6,220 feet elevation receives 7.55 inches annually on the average. In the area of Castle Valley, the average annual temperature is 46 degrees F. July is the warmest month (average 70 degrees F) and January the coldest (average 20 degrees F). Wide daily temperature ranges (diurnal variation) are caused by relatively strong daytime warming and rapid nighttime cooling. In general, on mountain slopes where air drainage is good there is a smaller diurnal range than in the valley where air is more stagnant. Seasonal variation in mean daily (diurnal) range is greater for valleys than for the mountain slope areas.

At Emery, the frost-free or growing season is a little more than 4 months long (Richardson, 1975). Summer frosts with kill potential are not infrequent. The winter winds may also redistribute the snow leaving many areas bare, which would permit winterkill of new vegetation.

Air Quality

Two sets of ambient air quality standards apply to the region, the National Ambient Air Quality Standard (NAAQS) and the Prevention of Significant Deterioration (PSD) standards.

NAAQS established for protection of human health and public welfare are shown in Table 3-1. Also shown are air pollutants measured during 1978 and 1979 in or near the region. Particulate concentrations exceeded the NAAQS at Price, but much of the particulate concentration in the region consists of suspended soil particles. Sulfur dioxide, nitrogen dioxide, and ozone concentrations were well within the NAAQS. Lead, hydrocarbons, and carbon monoxide have not been monitored in the region, but because these pollutants are emitted primarily from automobiles, concentrations are expected to be low and within the NAAQS.

The sulfur dioxide and nitrogen dioxide concentrations near Castle Dale will increase with the addition of the Hunter Unit 2 coal-fired powerplant and with the addition of units 3 and 4, but concentrations would be within the NAAQS.

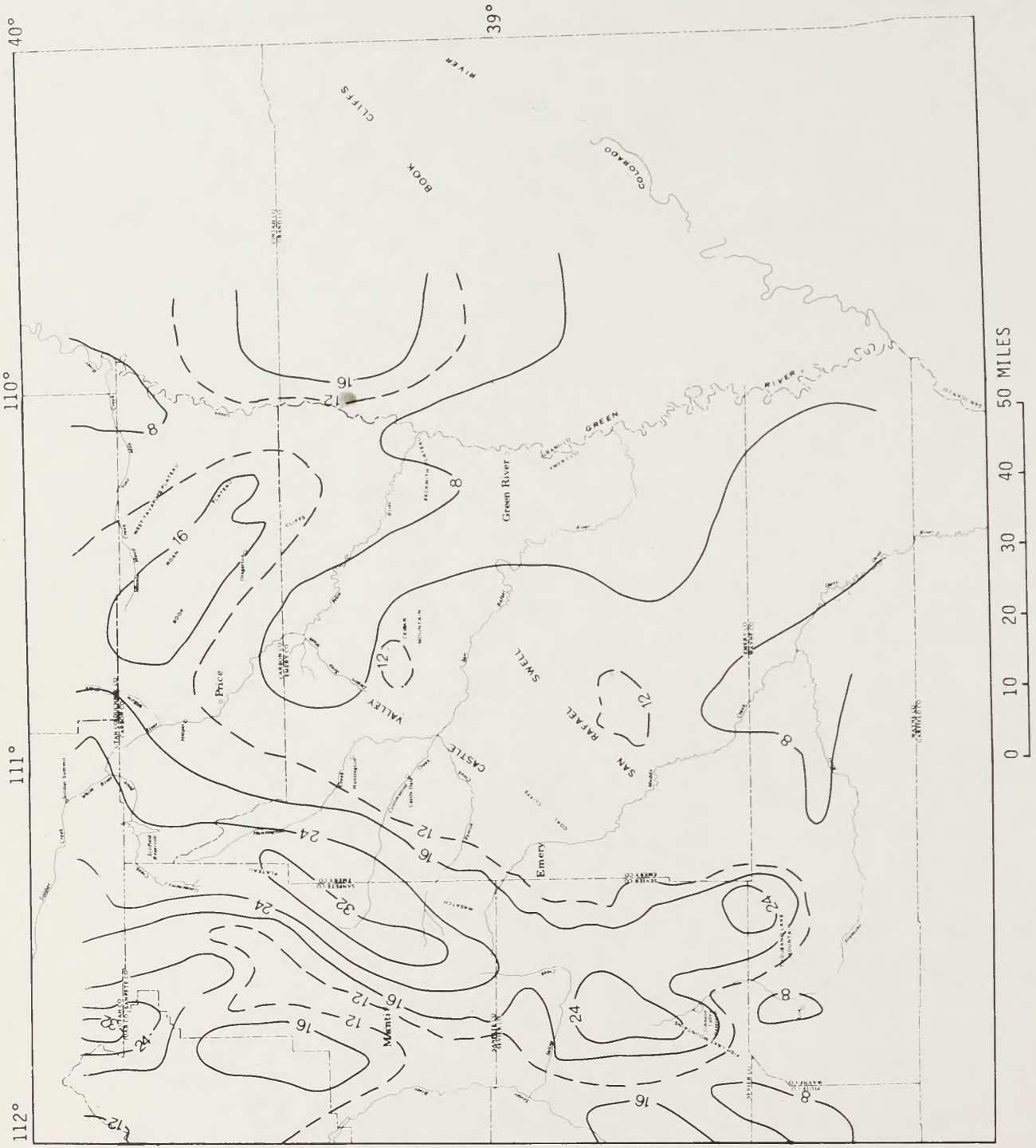


FIGURE 3-1
MEAN ANNUAL PRECIPITATION (IN.) IN CENTRAL UTAH

TABLE 3-1

COMPARISON OF MEASURED POLLUTANT CONCENTRATIONS AND THE NAAQS

Pollutant	Location			NAAQS
	Castle Dale	Price	Huntington	
(Measured in Micrograms per Cubic Meter)				
<u>Total Suspended Particulates</u>				
Annual	a43	b62	c33	60
Maximum 24 Hour	a121	b202	c96	150
<u>Sulfur Dioxide</u>				
Annual	d0-13	d0-13	d0-13	80
Maximum 24 Hour	d53	d53	d27	365
Maximum 3 Hour	d208	d160	d80	1,300
<u>Nitrogen Dioxide</u>				
Annual	d8		e11	100
<u>Ozone</u>				
1 Hour				f134 240
<u>Carbon Monoxide^g</u>				
8 Hour				10,000
1 Hour				40,000
<u>Hydrocarbons^g</u>				
3 Hour				160
<u>Lead^g</u>				
Annual				1.5

^aOctober 1978 - September 1979

^bAugust 1977 - July 1978

^cDecember 1977 - November 1978

^dJanuary 1978 - December 1978

^eOctober 1977 - September 1978

^f1979

^gHas not been measured near the study region

Source TSP, SO₂ and NO₂ data - Utah Bureau of Air Quality
Ozone data - Aerovironment, 1977

DESCRIPTION OF THE ENVIRONMENT

PSD standards were established by the Environmental Protection Agency (EPA) to limit degradation of air quality in areas cleaner than the NAAQS and provide a limitation on the allowable increase in sulfur dioxide and total suspended particulates (TSP) above the existing baseline level. The majority of the region and nearby areas are designated as Class II areas under PSD, which allows moderate, well controlled growth. The Capitol Reef National Park is designated as Class I and is located 25 miles to the south of the proposed Emery surface mine tracts. Class I areas have more stringent limits on increased concentrations of sulfur dioxide and TSP, and are also given protection from visibility degradation. Regulations for visibility protection were promulgated by EPA in November 1980.

The BLM, in coordination with the National Oceanic and Atmospheric Administration (NOAA) and EPA, has been monitoring visibility by photographic and telephotometric methods at Cedar Mountain 30 miles southeast of Price beginning in November 1976. Cramer et al., (1978) summarized baseline visibility data collected in the region including the Cedar Mountain data. The highest measurements cited in the report were measured at Cedar Mountain and indicated the average visual range was 96 miles with a standard deviation of 14 miles. This implies that the probability of exceeding a visual range of 125 miles was only 2 percent.

Additional measurements of visual range have been made by the National Park Service in coordination with the EPA Environmental Monitoring Systems Laboratory beginning in the summer of 1978 at Capitol Reef, Canyonlands, and Bryce Canyon National Parks using multiwavelength telephotometry. Geometric means of the visual range measurements made during the summer, fall, and winter of 1978 and spring of 1979 were 127, 124 and 116 miles at Capitol Reef, Canyonlands, and Bryce Canyon respectively (Malm et al., 1980).

SOILS

Wasatch Plateau Coal Field

Soils data for the Wasatch Plateau were taken from a general soils map of Utah. The information is general in nature and cannot be used for detailed interpretive purposes.

Soils of the Wasatch Plateau represent three soil groups and six soil associations as shown in Table 3-2. Soils are shallow (less than 20 inches) to deep (greater than 40 inches) and range in color from brown to grayish brown. Textures range from loam

to silt loam in the surface layers. Subsoils are primarily loams with a high rock fragment content.

Permeability is slow to rapid. Runoff is medium to slow and sediment production is moderately low. Small inclusions (less than 5 percent) of Rockland and Badland can be found on the Cottonwood Canyon and Meetinghouse Canyon tracts. These areas are dominated by very shallow soils over bedrock.

Soil condition is not a limiting factor for reclamation potential on the Wasatch Plateau. Soils data indicate sufficient topsoil volumes are present for revegetation except on some steep slopes, rocky areas, and escarpments. High salt content of some soils in the area would limit reclamation potential without special treatment.

Emery Coal Field

Soils within the Emery coal field are formed from colluvium and residuum derived from sandstone and shale. Most soils are well drained, calcareous, loamy or coarse loamy in texture, and range from shallow to deep. The dominant landscapes where these soils occur are mesas, benches, steep slopes, and alluvial fans. Finer textured soils occur on floodplains or valley sideslopes where the parent material is residuum weathered from shale. On some sites soils have developed from marine shale and are high in soluble salts; these soils support only salt-tolerant vegetation.

The area is mainly comprised of three closely related soils, Chipeta, Persayo and Castle Valley and by miscellaneous land types. These three soils are shallow, calcareous, and well drained, with the only difference being parent material.

The miscellaneous land types include mixed Alluvial, Rockland Shaley Colluvial, and Badland. Little soil exists in these areas and most are moderately to severely eroded. Included are areas having excessive slopes (50 to 80 percent) where 50 to 70 percent of the surface is covered by stone. Over 97 percent of the Emery South tract is comprised of Rockland and Shaley Colluvial.

The erosion hazard potential is high on the majority of soils which comprise the coal field (Table 3-2).

Reclamation analysis studies conducted within a portion of the Emery Central tract and in an area adjacent to the Emery South tract (BLM, EMRIA Report No. 16, 1979) indicate that the primary soil constraints to revegetation on parts of these sites are inadequate topsoil volumes, poor topsoil quality, and toxic and nutrient-deficient overburden.

TABLE 3-2

SOIL INTERPRETATION SUMMARY WASATCH PLATEAU AND EMERY AREA

Tract	Soil Unit/Group/ Association	Depth in Inches	Erosion Hazard Potential	Reconstruction Potential	Limiting Characteristics
Gordon Creek Slaughterhouse Canyon Meetinghouse Canyon Cottonwood Canyon North Horn Mt. Rilda Canyon Miller Creek Tucker Canyon	1- Arglic Cryoborolls	20-30	-	-	Steep slopes, some areas with unstable soils, some rocky areas.
	A Pachic Cryoborolls				
	Cryic Paleborolls				
	3- Lithic Cryoborolls	10-56	-	-	Steep slopes, shallow soils, cobble soils, rocky areas.
	Mollic Cryoborolls				
	Rock Outcrop				
	61- Typic Fluvaquents	36+	-	-	High salt content, high shrink-swell potentials, clayey soils.
	Typic Salorthids				
	P 63- Typic Torriorthents	10-36	-	-	High salt contents, clayey soils, high erosion potential.
	Lithic Calcorthids				
Lithic Natrargids					
Q 68- Rockland	This is a miscellaneous land type. More than 50% of the area is rock outcrop				
69- Rockland	This is a miscellaneous land type. This area is mainly barren shale and sandstone.				
Badland	The relief is steep to very dissected mountains, plateaus, escarpments and breaks along canyons				
Emery North	Saltair- Saltair				
	Libbings (65%)	40+	High	Poor	Highly Erodible
	Assoc. Libbings (20%)	20-40	High	Poor	Saline, Clayey, Highly Erodible
	Sanpete- Sanpete				
	Minchey 57%	40+	Low to Moderate	Fair	High Rock Fragment Content
	Assoc. Minchey (23%)	40+	Moderate	Fair	
	Chipeta- Chipeta				
	Persayo- (80%)	0-20	High	Poor	Highly Erodible, Shallow
	Badland Persayo	0-20	High	Fair	Clayey, saline, shallow
	Assoc. Badland (13%)	-	-	-	Steep slopes
	Rockland- Rock land				
	shaley (60%)	-	-	-	
	colluvial Shaley coll.				
	land- land	-	-	-	
	Castle Castle Valley				
Valley- Valley (40%)	0-20	Moderate	Poor	Highly Erodible, Shallow	
Kenelworth Kenelworth	20-40	Low	Fair-Poor		

(Continued)

TABLE 3-2 (Concluded)

Tract	Soil Unit/Group/ Association	Depth in Inches ^a	Erosion Hazard Potential ^b	Reconstruction Potential ^c	Limiting Characteristics
Emery Central	Castle Valley	0-20	Moderate	Poor	Steep Slopes, Shallow
	Pallsade	40+	High	Poor	Highly Erodible
	Penoyer	40+	High	Fair	Highly Erodible
	Persayo	0-20	High	Fair	Steep Slopes, Highly Erodible, High Salinity, Shallow
	Ravola	40+	High	Fair	Highly Erodible, High Salinity
Emery South	Mixed alluvial	No Data Available for These Miscellaneous Land Types			
	Rockland				
	Shaley colluvial land				
	Badland				
	Castle Valley	0-20	Moderate	Poor	Steep Slopes, Highly Erodible, Shallow
	Rockland				
	Shaley colluvial land				
	Castle Valley	0-20	Moderate	Poor	Steep Slopes, Shallow
	Chipeta	0-20	High	Poor	Highly Erodible, Shallow
	Minchey	40+	Moderate	Fair	High Rock, Fragment Content
	Pallsade	40+	High	Poor	Highly Erodible
	Penoyer	40+	High	Fair	Highly Erodible
	Rockland				

Sources: Agricultural Experiment Station Bulletin 492, Soils of Utah, by Wilson and other, 1975.

Soil Survey and Interpretations of the Coal Creek Emery Portions of the Price River and Emery County Areas, Carbon and Emery Counties, Utah, USDA, Soil Conservation Service, 1978.

^aTotal depth of soil profile

^bErosion hazard classes or susceptibility of the soil to erosion when no cover is present from BLM 7317.1 and soil profile descriptions

^cEvaluation of a soil as a medium for plant growth based on a soils physical and chemical properties (National Soils Handbook 403.6)

Overburden samples were analyzed both physically and chemically for suitability as a plant growth medium. Several potentially limiting characteristics were identified in some (40 percent) of the samples including nitrogen, potassium, and phosphorous deficiencies, high sodium concentrations, excessive boron and selenium levels, high arsenic and nickel levels, and high pH and salinity levels. The top 40 to 60 feet of deeply weathered and leached overburden can generally be used, with supplemental fertilization, as a topsoil amendment.

WATER RESOURCES

The Emery and Wasatch Plateau coal fields are in the Upper Colorado River Basin in Utah. The principal subbasins are the Price River and San Rafael River, tributaries to the Green River, and the Dirty Devil River which flows into the Colorado. These river basins are shown in Figure 3-2. The geology and topography is such that the surface water divides do not always coincide with the ground water divides. The surface drainage patterns are to the east-southeast, whereas the geologic formations dip 5 to 6 degrees to the northwest (Doelling, 1972) and ground water generally flows in the same direction.

Surface Water

Major perennial streams are the Price River, San Rafael River, Huntington, Cottonwood, Ferron, and Muddy Creeks. Muddy Creek is the only stream that crosses a tract (Emery North). The Muddy Creek 100-year peak flood flow is 4,590 cubic feet per second which is 12 feet higher in the channel than medium flow (Lines, 1980). The floodplain extends for 1.5 miles across the tract. Beaver and Jump Creeks originate on the Gordon Creek tract and drainage from all the tracts eventually enters one of the major perennial streams. No alluvial valley floors have been located in the vicinity of the tracts.

Streamflow data are available for numerous points in or near the study area (Table 3-3). Records show that the minimum flow of many of the streams is zero (GS, 1977). Even the major streams (Price, San Rafael, and Muddy) have been dry in their lower reaches sometime during the period of record.

The Cottonwood tract has one intermittent lake, Snow Lake, and two inventoried springs (Kelly, FS, 1980). The other seven tracts along the Wasatch Plateau have an undetermined number of springs

and seeps that have not been inventoried or enumerated. The tracts in the Emery coal field are essentially dry of springs and seeps. There are natural depressions such as tanks in the ephemeral drainages that collect rain water and hold it until evaporation takes place.

Water Quality

As required by Section 303 of the Federal Water Pollution Control Act Amendments of 1972, P.L. 92-500, the States of the Colorado River Basin have adopted salinity standards for locations on the Colorado River. The adopted standard at Imperial Dam near the Mexico-U.S. border in southern California is 879 milligrams per liter (mg/L). The Colorado River Water Quality Office of Water and Power Resources Service (WPRS) estimates that the cumulative effects of all projects that have been approved to date or for which final environmental impact statements have been completed will increase the flow-weighted average dissolved solids concentration at Imperial Dam to about 1,046 mg/L during the timeframes addressed in this analysis. This is 167 mg/L or 29 percent above the standard adopted by the States (BLM, 1980).

The water quality of principal streams changes markedly between the headwaters and the mouth. The streams show a gradual increase in concentration of dissolved minerals as they flow down the canyons. As the streams leave the mountains and proceed into the valley the total dissolved solids (TDS) concentration picks up ten-fold because the stream crosses the Mancos Shale Formation which is high in salts. The streams go from a fresh water to saline situation. A comparison of TDS between mine effluent and streams is shown in Table 3-4.

In general, the concentration of dissolved solids in surface water ranges from about 200 to 500 mg/L in headwater areas to about 1,000 to 6,000 mg/L in the lower reaches of most streams (GS, 1978). Table 3-5 shows water quality data for principal streams in the area. The concentration of dissolved solids in streams is usually inversely proportional to flow. Thus, the chemical quality of water is usually best during high flow and worst during low flow. Streams within the area of concern contain suspended sediment concentrations ranging from 2 mg/L to 18,500 mg/L, but occasionally have exceeded 200,000 mg/L (GS, 1976).

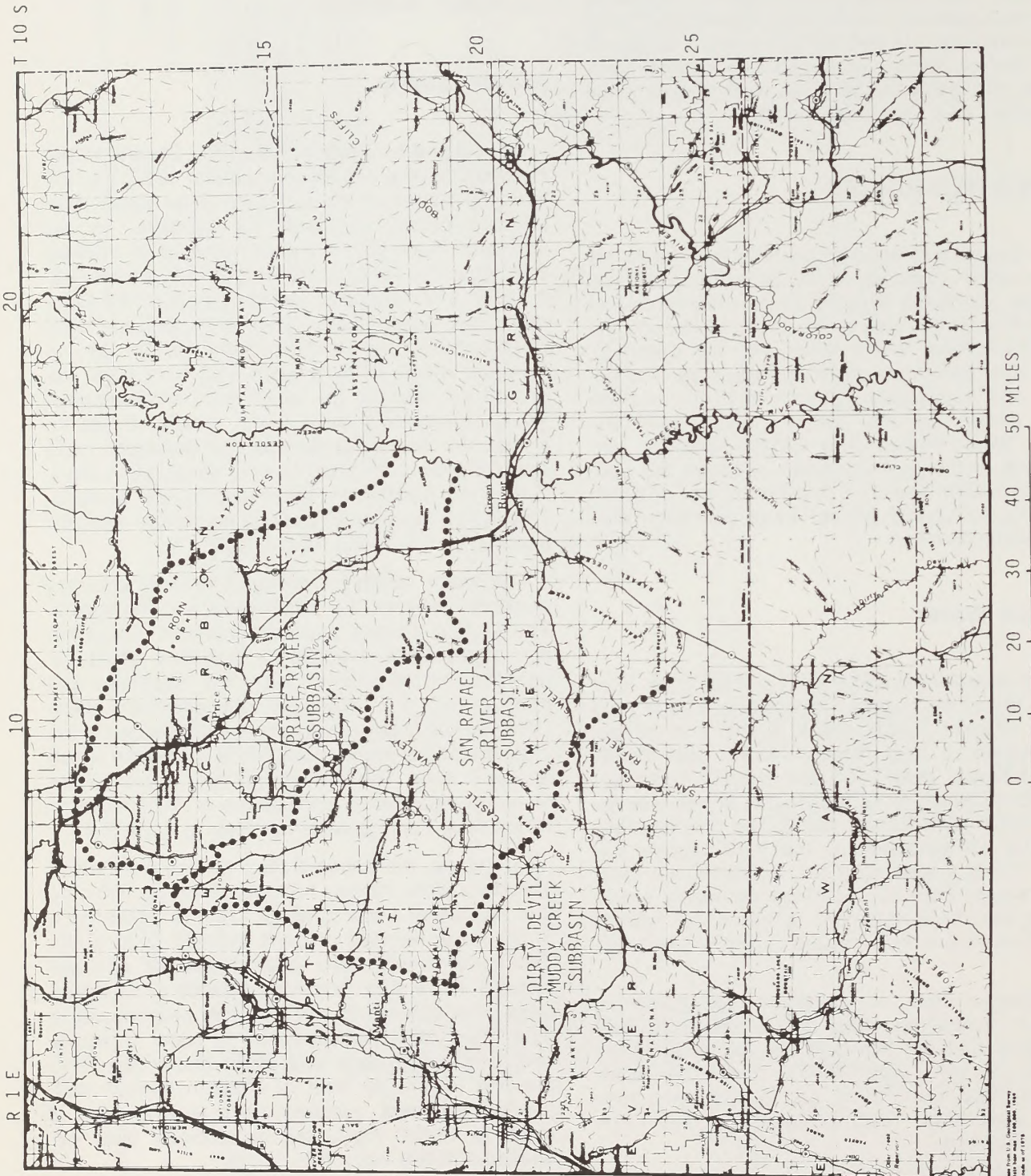


FIGURE 3-2
 MAJOR DRAINAGES FOUR-COUNTRY IMPACT AREA

TABLE 3-3
STREAMFLOW DATA

Station number	Station name	Period of record	Drainage area (sq mi)	Discharge			
				Average (cfs)	(acre-ft per year)	Minimum (cfs)	Maximum (cfs)
<i>Colorado River basin</i>							
3085	Minnie Maud Creek near Myton, UT	1950-55	30	5.05	3,660	0	1,370
		1957-76					
3100	Gooseberry Creek near Scofield, UT	1940-76	16.4	18.4	13,330	0	414
3105	Fish Creek above Reservoir near Scofield, UT	1967-76	65	47.4	34,320	0.6	1,160
3126	White River below Tabbyune Creek near Soldier Summit, UT	1967-76	75	29.8	21,590	1.6	458
3127	Beaver Creek near Soldier Summit, UT	1960-76	26	4.24	3,070	1.2	135
3128	Willow Creek near Castle Gate, UT	1962-76	62	7.60	5,510	0	836
31425	Price River below Miller Creek near Wellington, UT	1972-76	890	--	--	4.8	2,880
31428	Desert Seep Wash near Wellington, UT	1971-76	191	--	--	0.5	1,840
3145	Price River at Woodside, UT	1945-76	1,500	101	73,170	0	8,500
3150	Green River at Green River, UT	1894-99	44,850	6,352	4,602,000	255	68,100
		1904-76					
3180	Huntington Creek near Huntington, UT	1910-17	188	96.7	70,060	2	2,500
		1929-29					
		1930-70					
3245	Cottonwood Creek near Orangeville, UT	1909-20	205	96.8	70,130	1.2	7,220
		1921-27					
		1932-70					
		1975-76					
3265	Ferron Creek near Ferron, UT	1911-23	138	66.8	48,400	1	4,180
		1947-76					
32755	Ferron Creek below Paradise Ranch near Clawson, UT	1975-76	221	--	--	0.8	137
3280	San Rafael River near Castle Dale, UT	1947-64	930	110	79,700	1.3	4,510
		1972-76					
3281	San Rafael River at S. R. Bridge Campground near Castle Dale, UT	1975-76	1,284	--	--	5.0	257
3285	San Rafael River near Green River, UT	1909-18	1,670	152	110,100	0	12,000
		1945-76					
32905	Seven Mile Creek near Fish Lake, UT	1964-76	25	14.9	10,800	2.0	215
3305	Muddy Creek near Emery, UT	1910-13	105	37.5	27,200	0	3,340
		1949-76					
3321	Muddy Creek below Hwy 1-70 near Emery, UT	1973-76	418	15.6	11,300	0.05	2,070
3327	Muddy Creek at Delta Mine near Hanksville, UT	1975-76	841	--	--	0	1,860
3328	Muddy Creek at Mouth, near Hanksville, UT	1975-76	1,552	--	--	0	8,320
<i>Sevier River basin</i>							
20503	Salina Creek near Emery, UT	1963-76	53	17.2	12,460	1.7	519
2060	Salina Creek near Salina, UT	1915-16	290	21.1	15,290	0	1,800
		1919-19					
		1943-55					
		1960-76					

(GS, 1979)

TABLE 3-4

COMPARISON OF DISSOLVED SOLIDS CONCENTRATIONS

Location	Mine	Dissolved-Solids Concentration in Mine Effluent (mg/L)	Stream and Sampling Site	Dissolved-Solids Concentration in Stream Above Mine ^a (mg/L)
(D-13-7)8dac	Utah No. 2	482	Pleasant Valley Creek (Price River tributary) site 09310691	230
(D-16-8)8dda	King No. 2	671	Cedar Creek (Huntington Creek tributary)	^b 671
(D-17-7)27abb	Wilberg	551	Grimes Wash (Cottonwood Creek tributary), site 09324500	141-666
(D-22-4)12bda	Convulsion Canyon	276	Quitcupah Creek (Muddy Creek tributary), site 09331805	421
(D-22-6)29ddd	Emery (Browning)	5,100	Christiansen Wash (Muddy Creek tributary)	(^c)

Source: Extracted from Hydrologic Reconnaissance of the Wasatch Plateau Book Cliffs Coal Field Area, Utah, GS Open File Report 79-988, 1979

^aRanges are for samples collected during 1975-77; single entries are for samples collected concurrently with samples of mine effluent

^bAll flow from mine

^cNo sample collected

TABLE 3-5

WATER QUALITY DATA, GEOLOGICAL SURVEY, 1978 WATER YEAR

Station Number	Station Name ^a	(Constituents in Milligrams Per Liter)										
		TDS	Ca	Mg	Na	K	Cl	So ₄	HCO ₃	SS		
159 09314500	Price River at Woodside	Min.	1290	110	79	190	4	22	640	40	27	
		Max.	4590	330	280	760	13	100	3100	450	4420	
153 09315000	Green River at Green River	Min.	226	33	12	23	1	7.1	69	190	35	
		Max.	761	81	39	120	3.5	38	350	270	13400	
175 09324500	Cottonwood Creek Near Orangeville	Min.	203	38	19	7.9	.5	4.2	21	200	2	
		Max.	369	57	36	42	1.8	21	110	280	452	
179 09327550	Ferron Creek Below Paradise Ranch Near Clawson	Min.	550	78	43	51	2.8	10	230	260	10	
		Max.	5700	340	380	910	13	99	3800	440	466	
183 09328100	San Rafael River at San Rafael Bridge Campground Near Castle Dale	Min.	526	74	35	56	2.5	15	220	240	82	
		Max.	4920	340	280	850	12	75	3200	380	3340	
186 09328500	San Rafael River Near Green River	Min.	1120	110	94	150	5.3	23	620	230	58	
		Max.	3970	490	230	630	16	130	2400	500	4100	
198 09332700	Muddy Creek at Delta Mine Hanksville	Min.	1110	80	36	79	2.1	48	250	160	712	
		Max.	4860	520	180	800	12	660	2600	250	10400	
200 09332800	Muddy Creek at Mouth Near Hanksville	Min.	1630	160	37	150	3.9	130	480	110	8600	
		Max.	5970	550	120	1300	13	1800	2100	190	18500	

TDS = Total dissolved solids; Ca = Calcium; Mg = Magnesium; Na = Sodium; K = Potassium;

Cl = Chloride; SO₄ = Sulfate; HCO₃ = Bicarbonate; SS = Suspended sediment^aLocation of stations shown in Figure 3-2

DESCRIPTION OF THE ENVIRONMENT

Trace Elements

In-stream concentrations of trace elements and heavy metals on the Wasatch Plateau are usually within the maximum limits set by Utah Water Quality Standards. However, in the lower reaches of principal streams concentration of certain elements commonly exceeds recommended limits, see Tables 3-6 and 3-7.

The 208 water quality program being conducted by the Southeastern Utah Association of Governments shows that water from area coal mines contains greater concentrations of arsenic, iron, manganese, and selenium than have been detected in streams. However, the Forest Service (FS) in their monitoring of Grimes Wash, which is the discharge point for the Wilberg Mine, shows that although arsenic, hexivalent chromium, and selenium are occasionally present at the lower limits of detection, the majority of the samples analyzed have shown no detectable concentrations. Iron concentrations are occasionally in excess of State drinking water standards (Rector, 1976).

Ground Water

Geology is the principal factor controlling the occurrence and availability of ground water. Unconsolidated deposits of Quaternary age are the most permeable water-bearing formations in parts of the region; sandstone strata of Jurassic, Cretaceous, and Tertiary age contain the most extensive bedrock aquifers (Price and Arnow, 1974). The geologic formations in the region and their water-bearing properties are shown in Figure 3-3 (GS, 1979).

Two significant aquifer types are found within the coal tract areas. The first is a shallow or perched aquifer which is formed by water being impeded from deeper infiltration by one or more confining layers of material having relatively low permeability. The second aquifer of significance is formed by the Ferron Sandstone member of the Mancos Shale Formation. The Ferron Sandstone aquifer (Figure 3-3) underlays the Wasatch Plateau tracts at depths greater than 500 feet but in Castle Valley around the Emery coal field it is a surface outcrop where some coal mining occurs.

Information on springs within the tract areas is limited; however, Geological Survey (GS) and Utah Power & Light (UP&L) personnel did a water reconnaissance survey of East Mountain Springs in 1979 (UP&L, 1980). This reconnaissance located 102 springs sites which are around and on the Meetinghouse Canyon and Cottonwood tracts.

Depths to ground water range from less than 50 feet to more than 1,000 feet (Price and Waddell, 1973). Groundwater levels are generally less than 50 feet beneath the land surface along alluvial plains of the larger perennial streams (Green, Price, and San Rafael Rivers) and 500 to more than 1,000 feet beneath the land surface on higher plateaus (Price and Waddell, 1973). Local perched ground-water bodies are only a few feet to a few tens of feet below land surface in much of the region. Generally, however, the perched water bodies probably would not sustain large perennial withdrawals from wells.

The chemical quality of ground water ranges widely because of great variations in geology, physiography, and climate. Generally, the best quality is in or near recharge areas or areas with sufficient flow to flush out the poorer quality water. Ground water generally contains less than 500 mg/L of dissolved solids throughout the Wasatch Plateau, 500 to 1,000 mg/L along the fringes of the Plateau and in the Book Cliffs, and 1,000 to 3,000 mg/L in the Emery coal field (Price and Waddell, 1973).

Water Rights

The State Engineer is responsible for the administration of all water rights within the State and for determining whether or not proposed water right applications can be approved in light of existing State statutes and laws. The coal fields lay within Water Right Areas 91, the Price River drainage and 93, Emery County. In essence, there are no unappropriated water rights in areas 91 and 93. Therefore, water would have to be purchased or leased for coal mining operations.

Consumptive Uses of Water

Estimates of the present use of water in the study area are as follows: irrigation, 80 to 90 percent; municipal and industrial, 10 to 15 percent; managed wetlands, 0 to 5 percent.

The quantity of water applied annually to croplands averages 3.6 acre-feet per acre, and consumptive use on croplands averages 1.6 acre-feet per acre according to reports of the Utah Division of Water Resources (1975, 1976).

Large amounts of surface water are diverted annually for irrigation, about 90,000 acre-feet in the Price River Basin, 150,000 acre-feet in the San Rafael Basin, and 25,000 acre-feet in Muddy Creek Basin. Coal-fired electric powerplants (in operation or under construction) will use about 62,000 acre-

TABLE 3-6

TRACE ELEMENT CONCENTRATION IN PRICE RIVER NEAR WOODSIDE

Element	Times Sampled	Exceeded Limits	(mg/L) Highest Reading	(mg/L) Highest Recommended Limits (EPA, 1973)
Cadmium	11	1	0.113	0.03
Copper	7	1	0.035	0.033
Lead	9	2	0.038	0.03
Mercury	6	1	0.60	0.05
Nickel	6	4	0.075	0.01
Silver	6	1	0.004	0.001
Zinc	7	4	0.159	0.005

TABLE 3-7

TRACE ELEMENT CONCENTRATIONS IN THE GREEN RIVER AT GREEN RIVER, UTAH, 1976

Elements	Concentrations (mg/L)	
	Total	Dissolved
Arsenic	0.002-0.015	0-0.033
Cadmium	0-0.010	0-0
Chromium	0-0.096	0-0.010
Cobalt	0.050-0.050	0-0
Copper	0.010-0.110	0.001-0.006
Iron	0.590-32.000	0-0.060
Lead	0.100-0.200	0-0.005
Manganese	0.030-1.000	0-0.020
Mercury	0-0.0001	0-0.0001
Selenium	0.001-0.003	0.001-0.002
Zinc	0-0.150	0-0.080

Source: Unpublished data, Southeastern Utah Association of Governments



Cretaceous sedimentary rocks, upper coal-bearing sequence—Moderate permeability in sandstone and conglomerate, particularly along bedding planes, high permeability where fractured. Potential well yields generally 5 to 50 gal/min in sandstones and fractured conglomerates



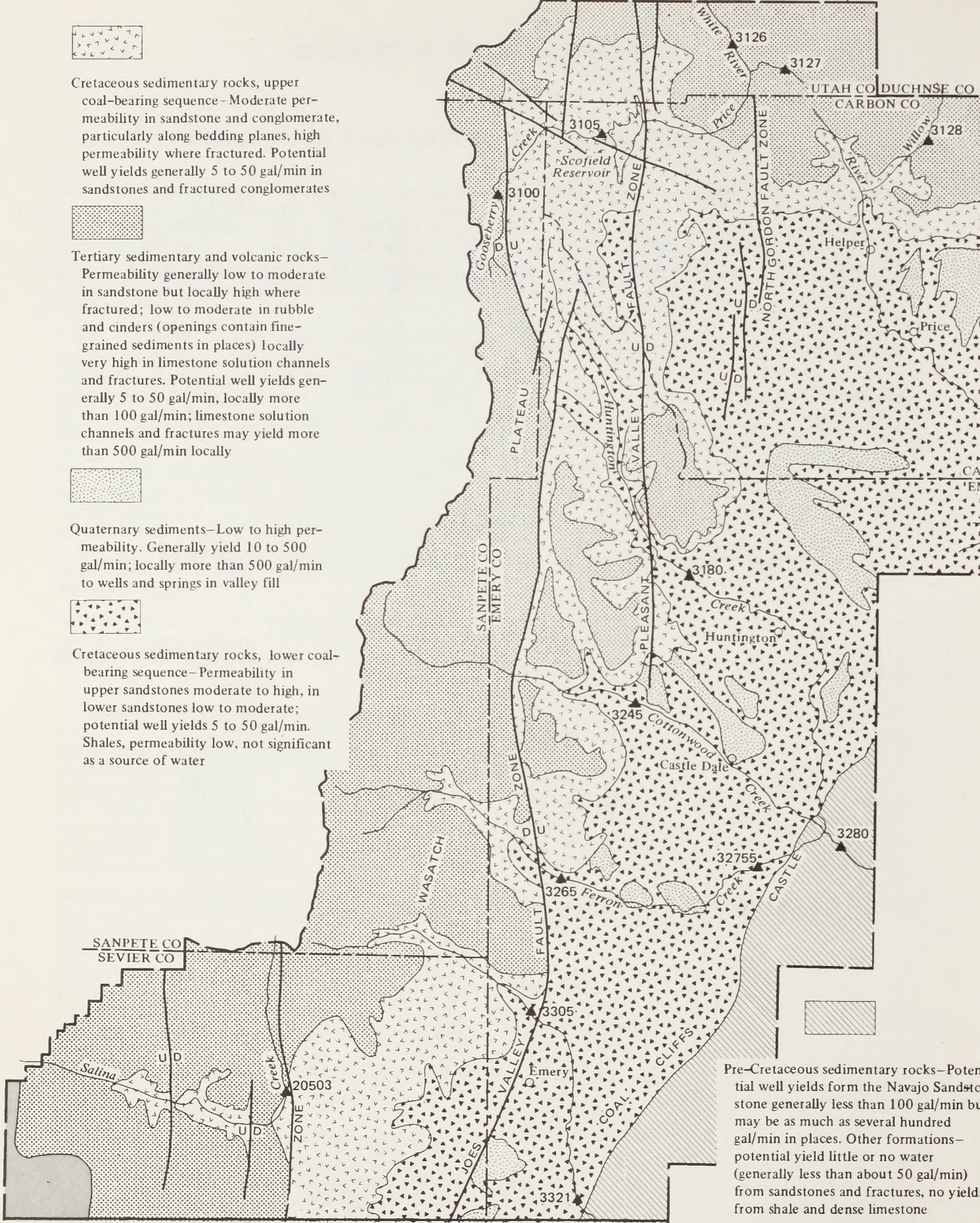
Tertiary sedimentary and volcanic rocks—Permeability generally low to moderate in sandstone but locally high where fractured; low to moderate in rubble and cinders (openings contain fine-grained sediments in places) locally very high in limestone solution channels and fractures. Potential well yields generally 5 to 50 gal/min, locally more than 100 gal/min; limestone solution channels and fractures may yield more than 500 gal/min locally



Quaternary sediments—Low to high permeability. Generally yield 10 to 500 gal/min; locally more than 500 gal/min to wells and springs in valley fill



Cretaceous sedimentary rocks, lower coal-bearing sequence—Permeability in upper sandstones moderate to high, in lower sandstones low to moderate; potential well yields 5 to 50 gal/min. Shales, permeability low, not significant as a source of water



Pre-Cretaceous sedimentary rocks—Potential well yields from the Navajo Sandstone generally less than 100 gal/min but may be as much as several hundred gal/min in places. Other formations—potential yield little or no water (generally less than about 50 gal/min) from sandstones and fractures, no yield from shale and dense limestone

(GS, 1979)

FIGURE 3-3

WATER BEARING PROPERTIES OF GEOLOGIC FORMATIONS

DESCRIPTION OF THE ENVIRONMENT

feet of water annually. Ground water is used for irrigation, livestock, and is the principal source of water for the small communities (total domestic use is about 10,000 acre-feet per year). Water from both wells and springs is utilized, but springs provide the greater quantity (GS, 1979).

Slaughterhouse, Meetinghouse, Cottonwood, and North Horn Mountain tracts are located within watersheds that supply drinking water for small communities. The Straight Canyon watershed supplies municipal water for Orangeville and Castle Dale. A portion of the water supply for Huntington is diverted from Huntington Creek below the Huntington powerplant. The communities of Clear Creek and Scofield are supplied with surface water from Finn Canyon and springs in Boardinghouse Canyon. The North Emery Water Users Association culinary water system located in Rilda Canyon is supplied by springs developed in the Starpoint Sandstone underlying the coal seams which would be mined.

GEOLOGY, TOPOGRAPHY, PALEONTOLOGY, MINERAL RESOURCES

Wasatch Plateau Coal Field

This coal field, in the approximate geographical center of Utah, covers nearly 700,000 acres. It is about 90 miles long, 12 miles wide, and is oriented in a north-south direction (Doelling, 1972). An erosional escarpment delineates the east boundary; the west boundary approximates the drainage divide of the plateau, and the north boundary is delineated by the Price River drainage. The coal field terminates at the Fish Lake Plateau. The Wasatch Plateau coal field is contiguous to the Book Cliff coal field on the northeast, the Emery coal field on the southeast, and the Mt. Pleasant and Salina Canyon coal fields on the west.

The area is one of rugged mountainous topography, mostly ledges and slopes. Deep canyons cut into the plateau from the east. The East Rim is a steep cliff with relief of nearly 1,000 feet. Elevations range from almost 7,000 feet to more than 10,000 feet above sea level. Coal outcrops occur mostly between 7,000 and 8,000 feet.

Sedimentary rock formations outcropping in the coal field are: Flagstaff Limestone, North Horn Formation, Price River Formation, Castlegate Sandstone, Blackhawk Formation, Starpoint Sandstone, and Mancos Shale (Table 3-8). Lithologies consist mainly of interbedded sandstone, shale, and limestone. The various formations are exposed along

the east escarpment of the Wasatch Plateau. The coal beds outcrop in the canyon walls and along the cliffs. Alluvial and colluvial deposits have accumulated along drainage bottoms, benches, and gentle slopes.

The geologic structure of the area is characterized by faulting, extensive regional jointing, and broad gently dipping folds. A notable fault structure is the Joes Valley graben where displacements of 1,500 vertical feet have occurred. Other large faults also occur as do many smaller ones. The North Horn Formation is landslide prone. Steepness of slope and continued wetting from seeps and springs have caused many slides to develop. Most of the slides have stabilized but a few have remained active (FS Ferron-Price Land Management Plan, 1979).

Scientifically significant fossils are expected to occur in the Blackhawk Formation. Some of the plant fossils are used for correlation and paleoenvironmental guides (Parker, 1976). The potential is only moderate for finding molluscs, turtle, crocodile, fish, and dinosaur fossils (personal communication, Robison, 1980). One insect fossil locality is known (personal communication, Jensen, 1978) and is scientifically significant.

Several localities of scientifically significant fossil vertebrates are in the North Horn Formation. Unique dinosaur and other reptilian fossils have been reported by Gilmore (1946). Rare fossilized dinosaur egg shells have been described by Jensen (1966). The mammalian fauna have been described by Gazin (1941) and others. Mammalian fossils of this age are considered significant as they are known only from the Rocky Mountain region of North America and Mongolia. A North American Land Mammal Age (Dragonian) is based on the fossil mammals from the North Horn Formation near North Horn Mountain.

The chance of finding significant fossils in the Mancos Shale, Starpoint Sandstone, Castlegate Sandstone, Price River, and Flagstaff Limestone is small. There has been no comprehensive survey of the region for paleontological resources; however, several unrelated studies have been completed. A literature search was conducted to evaluate research completed in this region and identify as far as possible the known fossils and their association with the various formations in the region. The results of this literature search are compiled in a technical report on file at the BLM Utah State Office.

The coal in the Wasatch Plateau coal field is only recoverable by underground mining methods. Coal beds of commercial interest are found in the lower one third of the Blackhawk Formation. The in-place resource on the tracts totals 470.8 million tons of

TABLE 3-8

GENERALIZED STRATIGRAPHIC COLUMN OF THE EAST-CENTRAL WASATCH PLATEAU

PERIOD	STRATIGRAPHIC UNIT	THICKNESS (feet)	DESCRIPTION	
TERTIARY	Flagstaff Ls.	200-1500	Dark yellow-gray to cream limestone, evenly bedded with minor amounts of sandstone, shale and volcanic ash, ledge former.	
	North Horn Fm.	500-2500	Variogated shales with subordinate sandstone, conglomerate and fresh-water limestone, thickens to north, slope former.	
CRETACEOUS	Price River Fm.	600-1000	Gray to white gritty sandstone interbedded with subordinate shale and conglomerate, ledge and slope former.	
	Castlegate Ss.	150-500	White to gray, coarse-grained often conglomeratic sandstone, cliff former, weathers to shades of brown.	
	Blackhawk Fm. MAJOR COAL SEAMS	700-1000	Yellow to gray, fine-to medium-grained sandstone, interbedded with subordinate gray and carbonaceous shale, several thick coal seams.	
	Star Point Ss.	90-1000	Yellow-gray massive cliff-forming sandstone, often in several tongues separated by Masuk Shale, thickens westward.	
	Marcos Shale	Masuk Shale Mbr.	300-1300	Yellow to blue-gray sandy shale, slope former, thick in north and central plateau area, thins southward.
		Emery Ss. COAL(?)	50-800	Yellow-gray friable sandstone tongue or tongues, cliff former, may contain coal (?) in south part of plateau if mapping is correct, thickens to west and south. Coal may be present in subsurface to west.
		Blue Gate Mbr.	1500-2400	Pale blue-gray, nodular and irregularly bedded marine mudstone and siltstone with several arenaceous beds, weathers into low rolling hills and badlands, thickens northerly.
		Ferron Ss. MAJOR COAL SEAMS	50-950	Alternating yellow-gray sandstone, sandy shale and gray shale with important coal beds of Emery coal field, resistant cliff former, thickens to the south.
		Tununk Sh.	400-650	Blue-gray to black sandy marine slope forming mudstone.
		Dakota Ss. MINOR COAL	0-60	Variable assemblages of yellow-gray sandstone, conglomerate shale and coal. Beds lenticular and discontinuous.

(Doelling, 1972 modified)

DESCRIPTION OF THE ENVIRONMENT

which 187.8 million tons are recoverable. Coal resources are summarized in Table 3-9 and coal quality in Table 3-10.

A number of gas fields have been discovered in the area, three of which (Clear Creek, Gordon Creek, and Flat Canyon) occur within the Wasatch Plateau coal field and two adjacent to it (Joes Valley and Ferron). The gas is being extracted from the Ferron Sandstone. The Slaughterhouse Canyon tract is in the Clear Creek gas field, but no producing wells have been drilled on the tract. None of the remaining tracts occur within a Known Geologic Structure (KGS). Nearly all of the Wasatch Plateau coal field has been leased for oil and gas.

The eight tracts are not expected to contain significant minerals besides oil, gas, and coal.

Emery Coal Field

The Emery coal field is located in Emery and Sevier Counties about 70 miles south of Price, Utah (Figure 3-4). It covers nearly 210 square miles, is 6 miles wide, 35 miles long, and is oriented north-east-southwest. The Coal Cliffs escarpment constitutes the east boundary, the south boundary is along the line where the Coal Cliffs disappear below the Fish Lake Plateau, and the west boundary is the Wasatch Plateau.

Three general landforms dominate the topography of the Emery coal field; the Coal Cliffs make up the eastern portion, Castle Valley extends down through the center, and buttes and knolls make up the western part (Doelling, 1972).

The only rock formation present is the Mancos Shale which is represented by three members: Blue Gate Shale, Ferron Sandstone, and Tununk Shale. Some Quaternary unconsolidated deposits cover the surface of the area (Table 3-8).

The geologic structure of the area consists of gently dipping beds on the west flank of the San Rafael Swell. The Joes Valley-Paradise Fault zone partially marks the west boundary of the coal field. According to Graham (1970), the vertical displacement could be up to 2,000 feet. Several small anticlinal structures are found in the Emery coal field and include the Last Chance Creek Dome and the Rochester Anticline.

Fossils reported in the Ferron Sandstone include plants associated with the coal beds (Cotter, 1976), molluscs (Cobban, 1976), microfossils (Cross, 1976), fish scales, shark teeth, and possibly some reptilian remains (Stokes and Balsley, 1968). The fossil plants associated with the coal could be scientifically significant as well as vertebrate fossils;

however, all of the fossils are expected to occur extensively outside tract boundaries. The Blue Gate Shale and Tununk Shale may be very fossiliferous in places. The fossils are also expected to occur outside the tract boundaries.

The depth to coal in the Emery coal field tracts is shallow enough to allow surface mining methods to be used on most of the area with the exception of a portion of the Emery North tract and the Emery South tract. Adjacent to the Emery North tract is the Hollberg PRLA which would also be mined underground. The minable coal is from the Ferron Sandstone Member of the Mancos Shale Formation. The in-place coal for the three Emery tracts totals 91.1 million tons of which 68.5 million tons are recoverable.

None of the Emery tracts or the Hollberg PRLA are on or adjacent to producing oil and gas fields. However, the entire area is considered by GS as prospectively valuable for oil and gas (personal communication, Kohler, 1980). Most of the area is leased for oil and gas.

VEGETATION

Vegetation varies considerably over the region, ranging from low desert shrubs to conifer stands and mountain meadows. Change in elevation, with associated moisture and temperature changes, is a major factor in the distribution of vegetation types. Topography, aspect, soils, and past land use are also important factors that have affected plant distribution.

Vegetation Types

Eleven major vegetation types are found within the region including: Agricultural, Riparian, Grassland, Desert Shrub, Sagebrush-Grass, Pinyon-Juniper Woodland, Mountain Brush, Ponderosa Pine, Aspen, Conifer-Aspen, and Mountain Meadow. A list of common species found in each vegetation type is in Appendix 3. The distribution of these vegetation types is shown in Figure 3-5.

Dominant vegetation types on the Wasatch Plateau coal field include Sagebrush-Grass, Aspen, and Conifer Aspen. The Riparian type, including cottonwood and willow trees, is found along perennial streams, and Mountain Brush is interspersed with other types. On the Emery coal field the shallow, saline soils and sparse precipitation have resulted in a plant distribution pattern made up of species adapted to this harsh environment. The dominant vegetation types in this area are Desert

TABLE 3-9

COAL RESOURCES

WASATCH PLATEAU COAL FIELD

Tract Name	Area (acres)	Demonstrated Reserve Base (tons X 10 ⁶)	Inferred Resources (tons X 10 ⁶)	Recoverable Reserves (tons X 10 ⁶)	
				Surface	Underground
North Horn Mtn.	21,043.5	189.5	57.0	-	98.6
Cottonwood	2,400.0	55.4	2.4	-	23.1
Meetinghouse Canyon	1,063.4	31.0	-	-	12.4
Slaughterhouse Canyon	440.0	5.6	-	-	1.7
Gordon Creek	4,280.0	64.9	-	-	26.0
Tucker Canyon	161.4	2.2	-	-	0.9
Miller Creek	2,000.0	43.3	-	-	17.3
Rilda Canyon	640.0	19.5	-	-	7.8

EMERY COAL FIELD

Tract Name	Area (acres)	Demonstrated Reserve Base (tons X 10 ⁶)	Inferred Resources (tons X 10 ⁶)	Recoverable Reserves (tons X 10 ⁶)	
				Surface	Underground
Emery North	2,161.0	36.2	-	11.0	13.1
Emery Central	2,967.7	42.8	0.6	39.0	-
Emery South	748.5	11.5	-	-	5.4

TABLE 3-10

COAL QUALITY

Tract	Moisture Percent	Sulfur Percent	Ash Percent	Fixed Car- bon Percent	Volatiles Percent	Btu/ Pound
North Horn	5.5	0.6	7.6	45.7	41.2	12,600
Cottonwood Canyon	5.5	0.6	7.6	45.7	41.2	12,600
Meetinghouse Canyon	3.1	0.5	6.0	47.9	43.4	13,800
Gordon Creek	6.3	0.5	6.2	44.8	42.5	12,400
Slaughterhouse Canyon	7.5	0.6	6.2	44.9	41.1	12,040
Miller Creek	7.5	0.7	6.8	42.3	43.5	12,100
Emery North	6.9	1.0	22.0	37.1	34.0	10,100
Emery Central	8.0	0.8	14.3	47.9	38.1	11,000
Emery South	5.6	0.8	7.5	46.1	38.9	12,300
Hollberg PRLA	4.0	1.3	6.9	51.0	38.4	12,500

The above table is summarized from the Tract Summary Reports prepared by the Geological Survey, 1979 and 1980

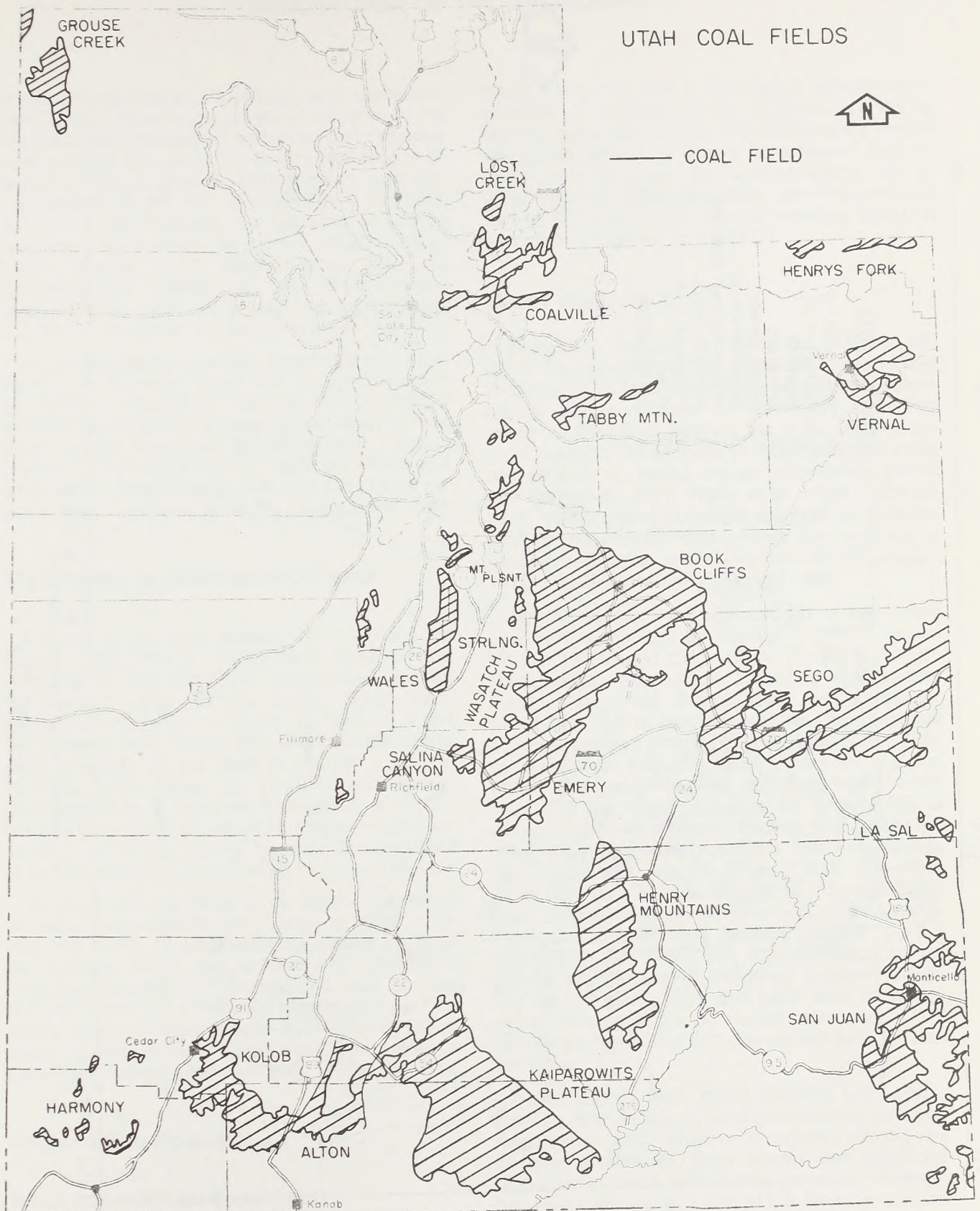
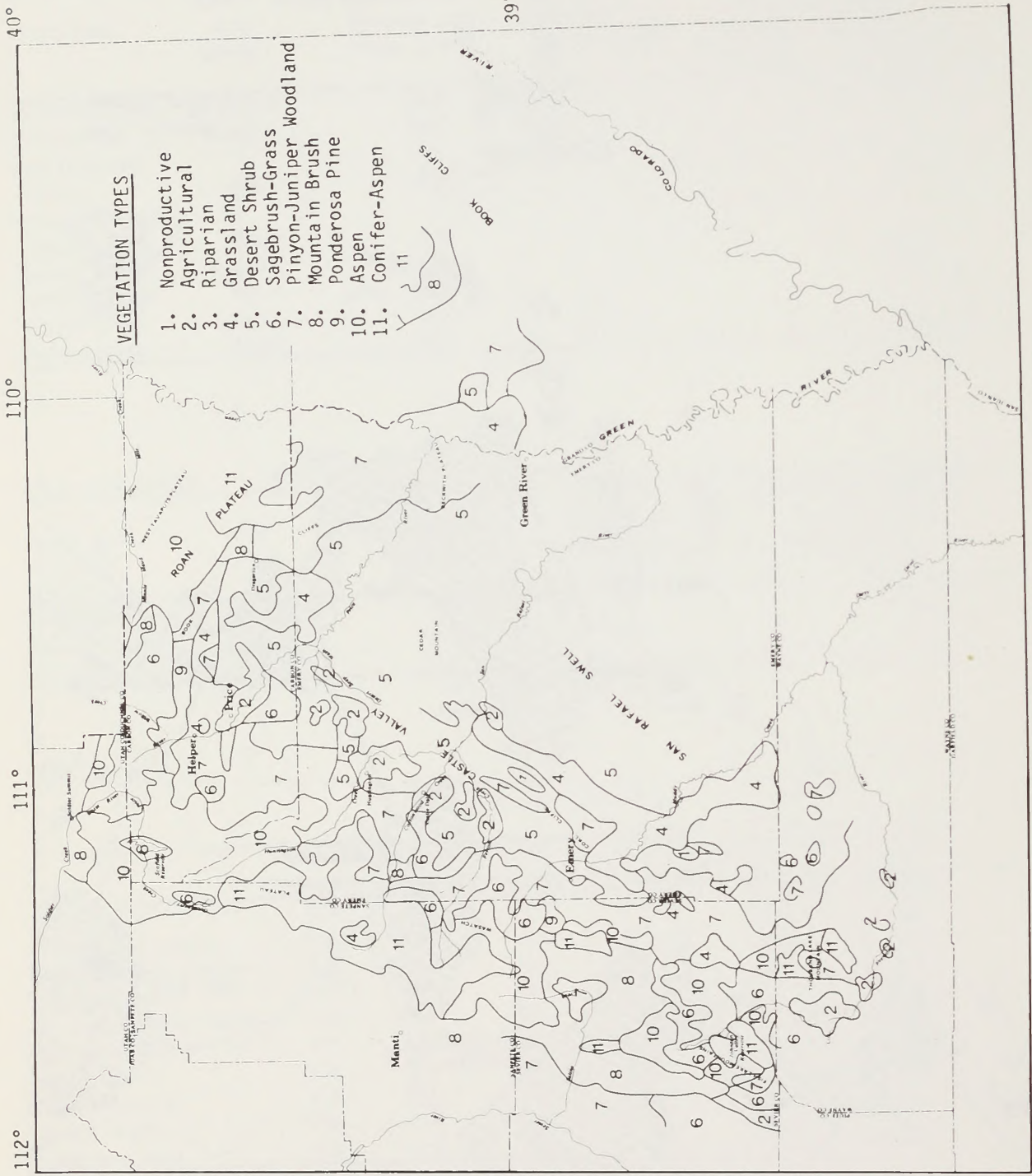


FIGURE 3-4

UTAH COAL FIELDS



(GS, 1979)

0 10 20 30 40 50 MILES

FIGURE 3-5
VEGETATION TYPES

DESCRIPTION OF THE ENVIRONMENT

Shrub, Pinyon-Juniper Woodland, and Grassland. The Riparian type along perennial streams in the area includes greasewood, saltcedar, and saltgrass. A list of plant species in the Emery coal field is included in Energy Minerals Rehabilitation, Inventory and Analysis Report No. 16 (EMRIA No. 16). Studies in this area indicate the following vegetation production in pounds per acre: Pinyon-Juniper 1,000, Riparian 2,000, Desert Shrub 525, and Grassland 245 (EMRIA No. 16). Nonproductive areas such as cliffs, rocky outcrops, talus slopes, and Blue Gate Shale are also present in this area.

Agricultural lands, generally associated with communities in the region, have been reduced by urban development, change of water use, and powerplant development in Emery County. These lands include some natural meadows (pastures) and irrigated cropland. The most common crops are alfalfa and small grains. Approximately 180 acres of private irrigated agricultural land is on the Emery North tract.

Threatened or Endangered Plants

Surveys in the area (Welsh, 1977; Welsh and Neese, 1979; Foster, 1979) have identified the presence of the candidate endangered species *Townsendia aprica* on the Emery South tract. Plants were found on the border of Sections 4 and 5, Township 24S., Range 6E., and adjacent to the west boundary of the tract in Section 5 and 6, Township 24S., Range 6E. The Fish and Wildlife Service defines a candidate threatened or endangered species as one named in a status review announcement in the *Federal Register* and expected to be proposed for official listing in the near future.

No other officially listed or candidate threatened or endangered species are known to exist on or near any of the 11 proposed coal leasing tracts or the Hollberg PRLA discussed in this statement. Proposed threatened or endangered plant species not yet listed or considered candidates (by the above definition) also exist in the region. A list of these species is found in the Final Environmental Statement, Central Utah Coal (GS, 1979).

Reclamation Potential

WASATCH PLATEAU COAL FIELD

The reclamation potential for disturbed areas on the Wasatch Plateau coal field is good. Moisture is adequate with average annual precipitation of 25.0 inches and good spring moisture (average 3.0 inches precipitation in March). Soils are shallow to

deep, loamy-fine, with a rich organic surface layer; however, disturbance on 25 to 33-percent slopes and the presence of rocky inclusions would require special consideration during reclamation. Soil reconstruction potential for revegetation is fair to good (National Soils Handbook), and it is predicted that 50 to 80 percent of seeding attempts would be successful (Hagihara et al., 1972).

EMERY COAL FIELD

Because of the lack of topsoil and nutrient deficient, toxic overburden on some sites, and limited precipitation (6 to 8 inches) the reclamation potential for disturbed areas in the Emery coal field would be limited in parts of the area. Several authors question the success of reclamation on areas of less than 12 inches annual precipitation (Aldon and Springfield, 1975; Bleak et al., 1965; Hagihara et al., 1972). However, recent research on reclamation in arid environments shows that success is possible (Thames, 1977; Vories, 1976; Hodder, 1979; Frischknecht and Ferguson, 1980).

Specific research on reclaimability of the Emery coal field is reported by Hodder in EMRIA Report No. 16 (1979) and 1979 Annual Progress Report, Revegetation Studies on Disturbed Overburden, Emery Coal Field (Frischknecht and Ferguson, 1980). The EMRIA report concludes: "The land use potential appears limited to range land and ... limited agriculture. Evidently these values are reclaimable." The report outlines problems with certain sites and soil types, indicates the unsuitability of some subsoils as a growth medium, and details the need for supplemental irrigation. Followup studies by Frischknecht and Ferguson (1980), present a more optimistic outlook. Except for Mancos Shale soils, container grown plants in soil from the area survived well and made excellent growth. On experimental plots there was little difference in frequency and number of seedlings between topsoil and subsoil areas, but plants were taller on topsoil plots. Herbage yields on topsoil plots were 1,079 pounds per acre, and 610 pounds per acre on subsoil plots.

Fall plantings were more effective than spring planting, and drilling or hand broadcasting and harrowing were most effective. Introduced wheatgrass became established more readily and produced higher early yields than native species. An alfalfa hay mulch applied at a rate of 2.5 tons per acre increased grass production on study plots.

Following fall seeding, if there was insufficient moisture for germination the following spring, supplemental irrigation would be necessary to promote germination and establishment of plants. On

DESCRIPTION OF THE ENVIRONMENT

Mancos Shale areas, drip or sprinkler irrigation would probably be required to establish plants.

In a personal communication with Neil Frischknecht at the Intermountain Forest and Range Experiment Station Shrub Science Laboratory in Provo, Utah, he expressed the opinion that based on research in the Emery coal field, disturbed sites could be restored to the present condition or improved upon. This opinion is based on implementation of the following measures: the proper selection of overburden, supplemental fertilization, hay mulch on some soils, supplemental irrigation where necessary, choice of plant species, and use of container grown plants for transplanting on some sites.

WILDLIFE

A large variety of wildlife characteristic of life zones ranging from Lower Sonoran to Canadian are found in the region. Approximately 90 species of mammals, 270 species of birds, 26 species of reptiles, 9 species of amphibians, and 25 species of fish are found in the region (Dalton et al, 1977). A complete list of wildlife species that may be found in the region has been prepared by UDWR (Dalton et al., 1977). The distribution of game species in relation to elevation and vegetation types is presented in Figure 3-6.

Deer populations currently are low, probably due to past deer harvest practices and recent severe winters. The range could support more deer. Encroachment by energy development and urbanization on critical winter ranges will limit future herd expansion. The locations of deer herd units and distribution of winter ranges are shown in Figure 3-7. The primary leasing areas are located in deer herd units 32, 33, 34, 35, 36, and 45. The ranges within these herd units have the potential to support 31,050 deer (UDWR Files, 1980). In 1979 these units supported a hunter harvest of 2,227 bucks.

In the period from July 1, 1977 to June 30, 1978 a total of 259 deer were killed in the region by vehicles (UDWR, 1979). This figure represents 3.6 percent of the total harvest during 1978. The magnitude of this loss is compounded by the fact that 51.8 percent of the total reported casualties were mature does. A 33-mile stretch of I-70 from Fremont Junction to Salina is averaging 107 deer traffic mortalities annually with a high of 317 in 1978-79, a heavy snow year.

The region includes two elk herd units, Manti (12), and Fishlake (11). The location of these herd units and distribution of other big game species (except deer) are shown on Figure 3-8. The units

total 2,722 square miles, and include some of the most productive elk habitat in the State. Elk summer range is the Aspen and Conifer-Aspen type located at the higher elevations of the Wasatch Plateau. Elk usually utilize bench areas above the Cliff zone of the Wasatch Plateau that have been described as critical and high priority winter ranges. These winter ranges are located within the Transition and Canadian life zones. Elk use various poorly defined migration routes off East Mountain and North Horn Mountain to reach lower elevations during heavy snow years.

Utah Division of Wildlife Resources (UDWR) has a proposal to build an antelope herd of 700 animals by transplanting on 226,560 acres in Castle Valley. A resident herd in Icelander Wash in eastern Carbon and Emery Counties has fluctuated around 200 animals since a 1972 transplant.

Moose were introduced into the Fish Creek drainage west of Scofield Reservoir in 1973. The initial herd of 18 was supplemented with 19 moose in 1974 and 6 moose in 1978. Moose are scattered in that region, but illegal killing is presently limiting expansion of herd size. Current population levels are unknown but the herd is producing. UDWR projects establishment of a future herd of 487 animals spread out on 981,130 acres of the Wasatch Plateau.

Mountain lion population, characteristics, and distribution data are not available for Utah, but the harvest trend indicates an increasing population (UDWR, 1977). Studies in California, Nevada, Idaho, and British Columbia indicated home range sizes from 15 to 43 square miles (USFWS, 1976). Population densities of suitable range in Utah are probably similar. The home range of resident female mountain lions often overlap completely and are also overlapped by resident male home ranges (Siedensticker et al, 1973).

Black bear numbers in the region are not known. Studies in other States indicate home range sizes of 0.12 to 50.3 square miles (Amstrup and Beecham, 1976; Lindzey and Meslow, 1977). Bray and Barnes (1967) estimate minimal annual home range sizes of 20 square miles for adult males and 10 square miles for adult females. Home ranges of adult male and female bears often have considerable overlap. In areas of suitable habitat on the Wasatch Plateau bear population density is probably near the Bray and Barnes estimate of 1.5 bears per 10 square miles.

Sage grouse populations are localized in disjunct habitats on the Wasatch Plateau. A small isolated population of 40 to 65 birds occurs on North Horn Mountain and some sage grouse summer on the Gordon Creek and Miller Creek tracts.

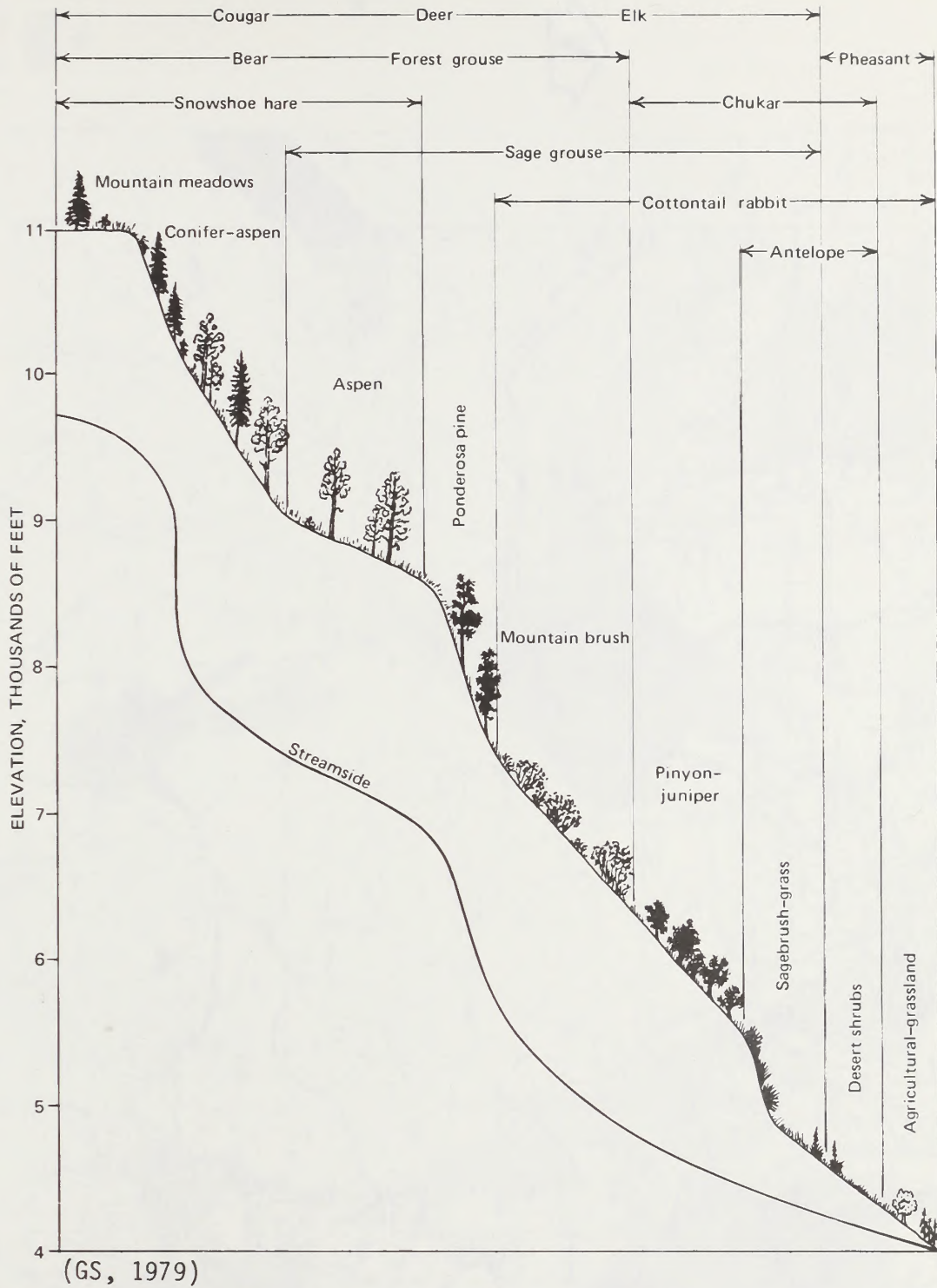


FIGURE 3-6

TYPICAL VEGETATION AND GAME DISTRIBUTION CHANGES WITH ELEVATION



Map Data U.S. Geological Survey
 Base Map No. 1:100,000 1967
 Scale 1:100,000

FIGURE 3-7

DEER MANAGEMENT AREAS (NUMBERED) AND
 MULE DEER WINTER RANGE (SHADED)

DESCRIPTION OF THE ENVIRONMENT

UDWR operates the Desert Lake Waterfowl Management Area approximately 35 miles north of the Emery North tract. This area has 2,621 total acres with 544 acres of open water. It provides habitat for 23 species of waterfowl, numerous shorebirds, raptors, and other bird species. Olson Slough, northeast of Desert Lake, provides limited waterfowl and hunter use.

The diversity of life zones in the region, represented by elevations from 11,600 feet in the Fishlake Mountains to 4,000 feet in the Green River drainage, provides habitat for a large variety of bird-life. At least 270 species of game and nongame birds are known to occur in the region. Golden eagles nest throughout the region and many active eyries are present. No eyries have been located on any of the tracts or in areas that would be disturbed by coal development associated with the leasing proposed in this statement; however, no inventories have been conducted on the tracts to systematically identify eyries.

Small mammals such as mice, rats, squirrels, shrews, moles, bats, gophers, and rabbits are distributed throughout the region. They serve as prey for larger predators such as raptors, badgers, foxes, coyotes, bobcats, and skunks. Small mammal populations are subject to extreme short-term fluctuations in response to weather, food supply, predation, and disease.

A total of 26 species of reptiles and 9 species of amphibians are known to occur in the region. They feed on vegetation, insects, fish, small mammals, reptiles, and amphibians, and are in turn prey for predatory mammals and birds. No threatened or endangered reptiles or amphibians are known to occur in the region.

Threatened and Endangered Species

The endangered American peregrine falcon has been sighted in the region. These birds are probably migrants although a few may be residents. The only known active eyrie is located adjacent to a historical eyrie along the San Rafael River in Emery County. Historically at least four to five eyries existed in Carbon and Emery Counties (Porter and White, 1973)

Bald eagles, an endangered species, are winter visitors to the region between November and March each year; they often congregate in groups at roost areas near food sources. A survey in January and February 1977 of known areas, recorded 31 bald eagles at four roost sites (Boner et al., 1977). None of the roost sites are near (within 5 miles) any of the proposed coal lease tracts.

The Uinta-Southwestern region includes the historical range of the endangered black-footed ferret (Snow, 1972; Scott et al., 1977). All of the Emery tracts are located within the historical range of the ferret. The nearest sighting of possible black-footed ferret sign occurred in 1977 and was 12 miles east of Ferron, Utah approximately 15 miles northeast of the Emery North tract (Boner et al., 1977). Location of this range and sightings of black-footed ferrets are shown on Figure 3-9. A survey during 1977 of the potential habitat in the region resulted in no direct observation or location of substantial sign of ferrets (GS, 1979).

Fisheries

Twenty-five species of fish are known to inhabit waters within the region. Some of the more common species are rainbow, cutthroat, brown, and brook trout, channel catfish, largemouth bass, Colorado squawfish, humpback chub, bonytail chub, and razorback sucker. Fish habitat in the region is shown in Figure 3-10.

The Price River system has the most extensive fish habitat in the region. It is impounded at about 7,700 feet elevation in Scofield Reservoir. Scofield Reservoir is a very popular fishing spot and one of Utah's few class I fisheries. The reservoir has 2,800 surface acres and is managed for rainbow and cutthroat.

Above Scofield Reservoir eight streams contain naturally reproducing cutthroat populations in 63 stream miles of fish habitat. These streams are relatively small but do provide an opportunity for fishermen to fish wild trout streams. These same streams provide important spawning and nursery areas for cutthroats in the Scofield Reservoir. Gooseberry Creek, one of the tributaries above Scofield Reservoir, includes a 90-acre impoundment (Gooseberry Reservoir), which is managed as a cutthroat-rainbow fishery. Catchable rainbows are stocked annually whereas the cutthroat population segment maintains itself through ingress of naturally produced fish from the stream above the reservoir.

Beaver Creek and White River enter the Price River above Price Canyon. Beaver Creek is a rather small stream with about 10 miles of trout habitat. The 38-mile White River system, including the Right, Left, and Middle Forks has a naturally reproducing cutthroat trout population.

Huntington Creek, the northernmost tributary of the San Rafael, heads on the Wasatch Plateau and flows generally south and south/southeastward. About half the length of Huntington Creek is in a

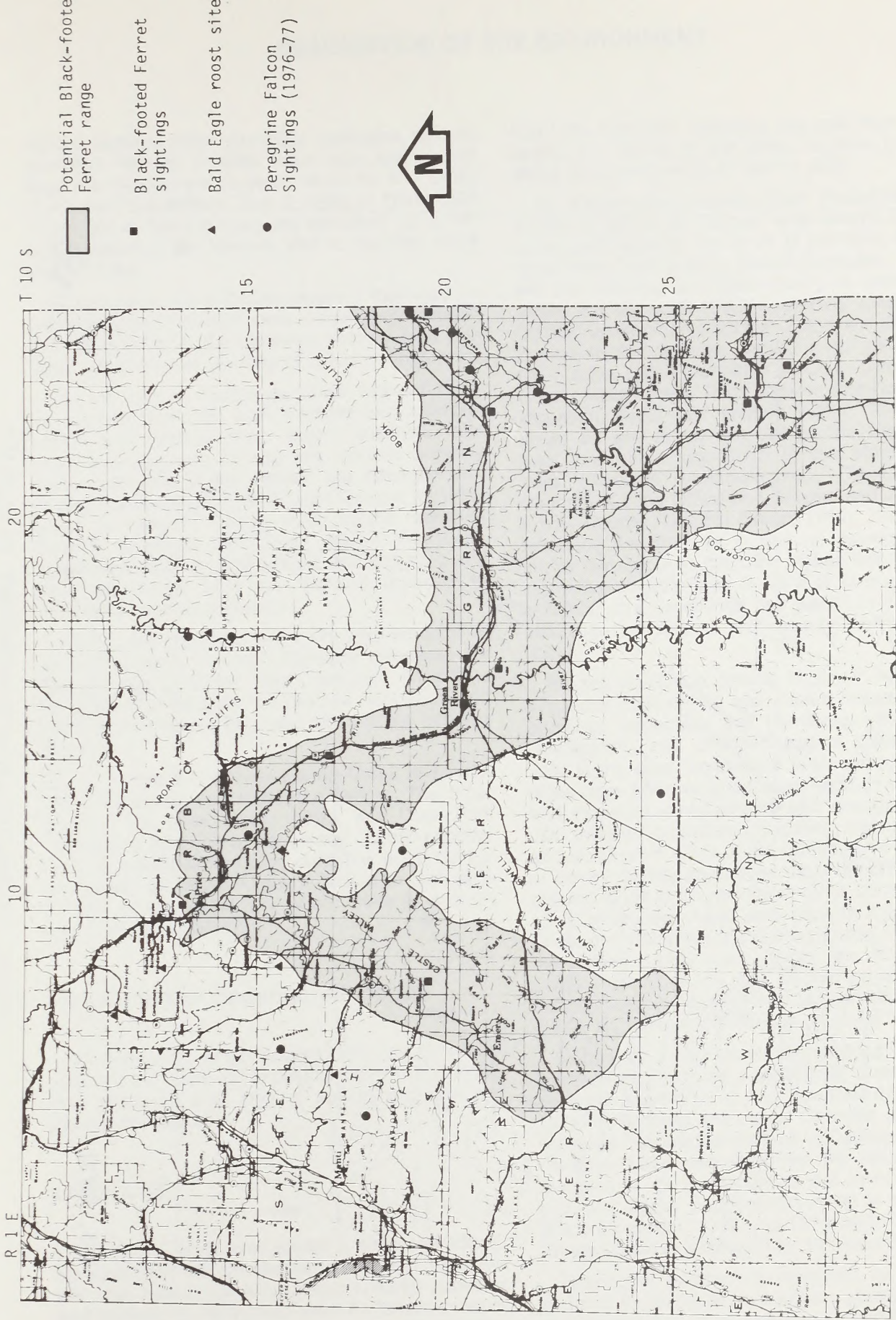


FIGURE 3-9
 LOCATIONS OF ENDANGERED SPECIES SIGHTINGS, AND BLACK-FOOTED FERRET RANGE

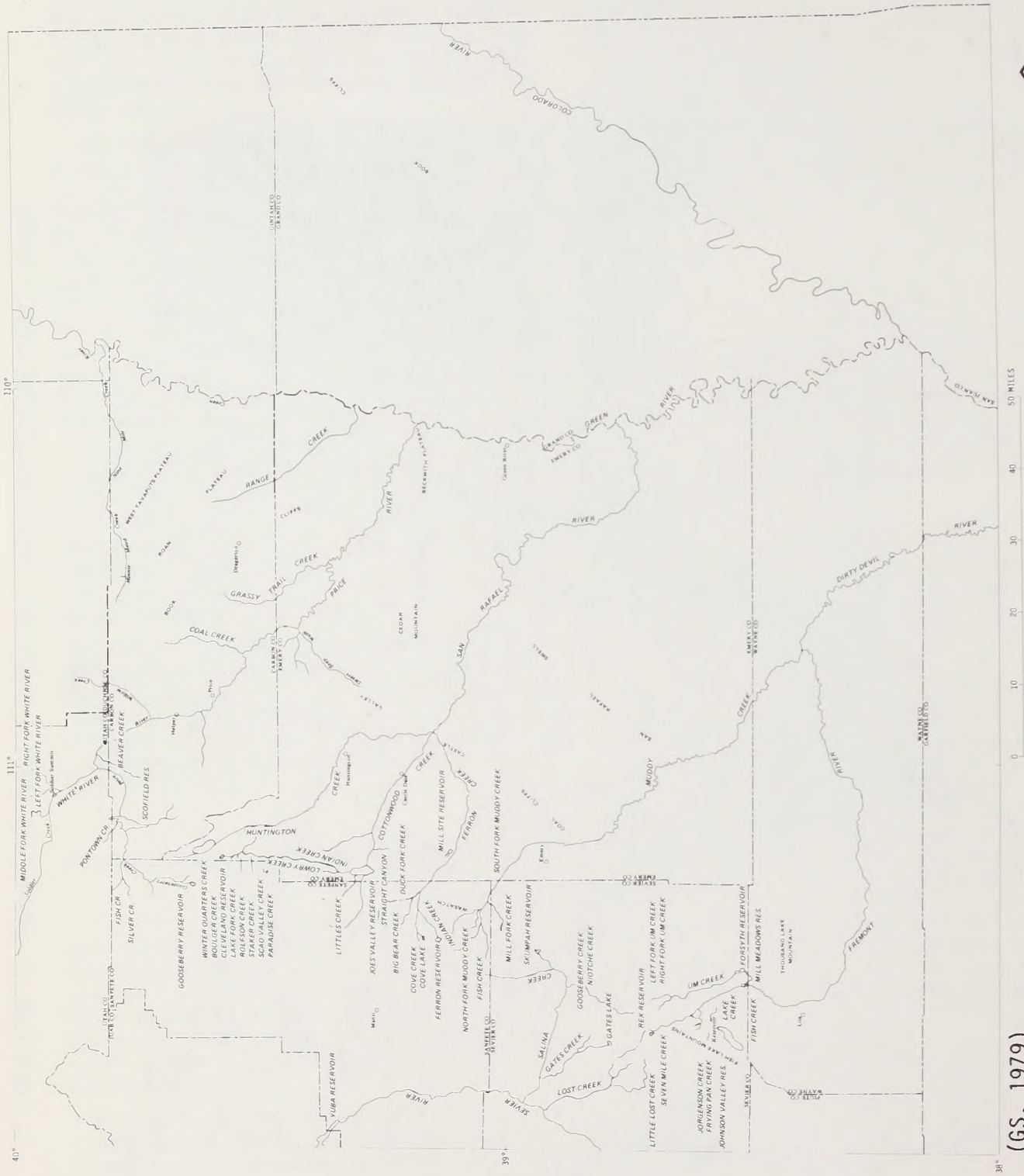


FIGURE 3-10
RIVERS, STREAMS AND LAKES OF IMPORTANCE TO WILDLIFE

(GS, 1979)

DESCRIPTION OF THE ENVIRONMENT

narrow canyon which generally coincides with its gamefish habitat. Electric Lake was constructed near the headwaters to store water for the UP&L Huntington powerplant. The 3 miles of Huntington Creek above Electric Lake are managed as a cutthroat spawning and nursery area to naturally stock Electric Lake.

Electric Lake is a 476-acre reservoir managed for cutthroat trout. Cutthroat stock comes from naturally produced fish in the upstream nursery area with some supplemental stocking of hatchery fingerlings.

The 22 miles of Huntington Creek between Electric Lake Dam and the main diversion has cutthroat, brown, and rainbow trout. Some catchable rainbows and fingerling browns are stocked annually while cutthroats in the stream are naturally produced. Cottonwood Creek-Straight Canyon provides about 9 miles of brown trout habitat between Swasey diversion and Joes Valley Reservoir. Spawning habitat is quite limited, and fingerling and catchable brown trout are stocked annually to maintain a fishable population.

Joes Valley Reservoir is a 1,170-acre reservoir in the Cottonwood drainage currently managed for rainbow and cutthroat trout. Hatchery fingerlings are planted to maintain the rainbow population and cutthroats immigrate from wild stock in the tributary streams.

Above Millsite Reservoir Ferron Creek is a naturally reproducing cutthroat trout fishery. The tributaries of Big Bear, Cove, Indian, and Duck Fork Creeks add 25 miles of trout water; all are populated by naturally reproducing cutthroat trout. Gamefish habitat on Muddy Creek is limited to the upper 4 miles of its headwaters where there is a small wild cutthroat population.

Threatened or Endangered Fishes

No threatened or endangered fish are known to exist on the tracts or within the zone of influence from proposed coal leasing and mining development in the region.

LAND USE

The Four-County area contains lands in Federal, State, county, and private ownership and 109 Federal coal leases involving about 126,950 acres of land surface. In 1979 there were 11 leases producing coal in Carbon County, ten in Emery County, two in both counties, and one in Sevier County. Those 24 leases produced coal totalling 7.07 mil-

lion tons that year. Including fee coal from private lands, coal mines in the three counties produced about 10.5 million tons of coal in 1979.

All Known Recoverable Coal Resource Areas (KRCRA) lands in Carbon and Emery Counties were, until recently, zoned as M and G-1, meaning that mining and grazing were acceptable. In 1980 the two counties amended zoning on some lands within the Wasatch KRCRA thereby creating two "critical environmental zones" (CE-1 and CE-2). According to the counties, mining is not permitted in CE-1 zone, but is permitted in CE-2. The Gordon Creek, Miller Creek, Rilda Canyon and North Horn Mountain tracts are entirely within CE-1 zoned areas as are about one-half of the Cottonwood tract and about one-fourth of the Meetinghouse tract (personal communication, Davis, Carbon County Planning Office and Almond and Johansen, Emery County Planning Office, 1980). The position taken by the counties is that no development of mines can occur in the CE-1 zones without rezoning of the minable area to CE-2 or M and G-1 and issuance of a conditional use permit by the county planning commission and county commissioners (ibid.).

Recent population growth, largely in response to increased coal mining and related industrial developments, especially the Huntington and Hunter powerplants, has changed and is changing land uses in the area. Agricultural lands around communities have been reduced in acreage by community and industrial development and change of water use. Irrigated croplands consisting mainly of alfalfa and small grain crops in the Huntington-Ferron area of Emery County have been most affected but agricultural lands in the vicinity of other communities in all four counties have also recently been retired. There are 180 acres of private irrigated cropland on the Emery North tract. There are no prime or unique farmlands on any of the tracts (personal communication, Brown, Soil Conservation Service, 1980). No other tracts contain cropland.

Grazing of sheep and cattle has long been an integral part of the area's agriculture. Sheep numbers declined steadily in all four counties from 1959 to 1974. In Sanpete and Sevier Counties a 41-percent decrease occurred and sheep in Carbon and Emery Counties have decreased by 53 percent. Cattle numbers in all four counties are increasing. Sanpete and Sevier Counties increased in cattle by 13 percent between 1959 and 1974 while Carbon and Emery Counties increased by 19 percent.

Grazing of livestock is permitted on public and national forest lands through an allotment system that determines where grazing is permitted coupled with an animal unit month (AUM, see glossary) allocation that determines the type and number of live-

DESCRIPTION OF THE ENVIRONMENT

stock that may be placed on an allotment. The Bureau of Land Management (BLM) San Rafael Planning Area contains 100 allotments totaling 80,418 AUMs. Three allotments (Lone Tree, Bunderson, and Sorenson) are on one or both of the Emery North and Emery Central coal tracts. The Lone Tree allotment contains a total of 5,371 AUMs, 34 of which are on the Emery North tract, 35 on Emery Central, and 35 on the Hollberg PRLA. The Bunderson allotment has 27 AUMs in total all of which are on the Emery North tract. The Sorenson allotment contains 630 AUMs, 36 of which are on the Emery Central tract and 25 on the Hollberg PRLA.

The Wasatch Plateau is grazed extensively. Most grazing occurs on FS allotments but BLM allotments and private lands are also grazed. Seventy-eight FS allotments on the eastern slope of the Plateau provide over 530,000 acres of grazing land which in 1978 provided 66,638 AUMs (FS, Ferron-Price Land Management Plan, 1979). Four tracts (Tucker Canyon, Miller Creek, Gordon Creek, and Slaughterhouse Canyon), are on 6,881 acres of private lands that are grazed.

Several east-slope canyons serve as transportation and/or utility corridors between Castle Valley and the Wasatch Plateau. Existing use and projected increased use due to expected baseline coal development and population growth makes increased congestion of certain canyon corridors inevitable. Most canyons with roads serve the livestock grazing industry as migration and transportation routes for animals that are seasonally grazed in the lowlands and on the Plateau. Huntington and Cottonwood Canyons are of particular concern because of heavy use by recreation, mine commuter, coal and service truck, and other traffic. Meetinghouse Canyon, while not heavily traveled by vehicles, is underlain by coal and has a 345-kV powerline extending through it. The canyons are also important wildlife migration corridors.

A 1,680-acre wetland is located about 2 miles southeast of the town of Emery and near, although not on, the Emery North and Emery Central tracts. Investigation determined that the acreage constitutes a wetland as defined in Executive Order 11990, Section 7(c).

The Denver and Rio Grande Western Railroad Company is considering constructing a railroad spur through the Castle Valley and has asked to consider a possible land exchange in the Castle Valley involving about 1,821 acres of private land and about 2,389 acres of public land. An environmental assessment on the exchange has been completed by BLM. Consummation of the exchange would result in 160 acres of the Emery North tract changing from public to private surface ownership. Minerals

would be retained in Federal ownership. The parcels comprising the 160 acres are T. 22 S, R. 5 E, Sec. 1 W 1/2 SE 1/4, Sec. 11 SE 1/4 NW 1/4, Sec. 15 NE 1/4 NE 1/4.

Additional facilities located on the tracts include high voltage powerlines crossing the Emery North and Meetinghouse tracts, 0.5 mile of 3-inch gas pipeline across the Slaughterhouse tract, and communication facilities on North Horn Mountain and Emery North tracts.

SOCIOECONOMICS

Economic and Demographic Conditions

Information contained in this section was developed through a BLM contract with Centaur Associates, Inc. of Washington, D.C., Task Order No. YA-510-PH9-109.

Between 1972 and 1978, most county economies in the Wasatch Plateau-Emery area were undergoing rapid expansion (Table 3-11). During these 6 years, total employment grew at an average rate of 6.7 percent annually in Carbon County, 16.0 percent in Emery County, and 5.6 percent in Sevier County.

The increase in employment in Carbon and Emery Counties was spurred by rapid growth in the mining sector, which in 1978 was the largest employer in Carbon County and the second largest in Emery County, with 22.0 and 31.3 percent of countywide wage and salary employment, respectively. As regional trade centers, Carbon and Sevier Counties have also benefitted from the secondary employment generated by local mining activities. In comparison, the trade and services sectors in Emery County are relatively underdeveloped (accounting for only 13.7 percent of countywide wage and salary employment), with the result that Emery County benefits relatively little from the secondary employment generated by local mining activities.

Partly due to the relatively high average wage rates paid in the mining sector, Carbon and Emery Counties had the highest per capita incomes in the Four-County area in 1978 (\$6,837 and \$5,788 respectively, versus \$4,616 in Sanpete and \$5,788 in Sevier). Nevertheless, every county except Carbon had a per capita income below the Statewide average in 1978 (\$6,594), and all four counties fell significantly short of the U.S. average (\$7,840) (Table 3-12).

The growth of employment opportunities has been accompanied by relatively rapid population growth in the Wasatch Plateau-Emery area (Table

TABLE 3-11

EMPLOYMENT TRENDS

TYPE OF EMPLOYMENT/SECTOR	CARBON COUNTY		EMERY COUNTY		SANPETE COUNTY		SEVIER COUNTY	
	1972	1978	1972	1978	1972	1978	1972	1978
Proprietors	581	746	563	710	1,285	1,341	972	1,094
Farm	163	158	409	398	863	792	515	447
Non-farm	418	588	154	312	422	549	457	647
Wage and Salary Employment ^a	5,114	7,660	1,873	4,409	3,537	3,498	3,376	4,662
Farming	53(1.0)	46(0.6)	43(2.3)	46(1.0)	348(9.8)	387(11.1)	167(4.9)	175(3.7)
Ag. Serv., For., Fish., and Other	9(0.2)	20(0.3)	L(--)	L(--)	16(0.5)	D(--)	20(0.6)	L(--)
Mining	1,004(20.4)	1,668(22.0)	474(25.3)	1,378(31.3)	2(0.1)	D(--)	53(1.6)	289(6.2)
Construction	121(2.4)	322(4.2)	440(23.5)	1,303(29.5)	319(9.0)	148(4.2)	123(3.6)	362(7.8)
Manufacturing	213(4.2)	301(3.9)	16(0.9)	21(0.5)	1,080(30.5)	957(27.4)	456(13.5)	505(10.8)
Transprt., Comm., and Utilities	517(10.1)	696(9.0)	D(--)	D(--)	38(1.1)	64(1.8)	152(4.5)	244(5.2)
Trade	1,043(20.4)	1,566(20.4)	206(11.0)	390(8.8)	408(11.6)	515(14.7)	932(27.6)	1,214(26.0)
Finance, Ins. and Real Estate	143(2.8)	238(3.1)	D(--)	D(--)	59(1.7)	84(2.4)	83(2.5)	149(3.2)
Services	446(8.7)	852(11.0)	146(7.8)	254(5.7)	344(9.7)	317(9.0)	416(12.3)	551(11.8)
Government	1,529(29.9)	1,764(23.0)	512(27.3)	582(13.2)	923(26.1)	965(27.6)	974(28.9)	1,168(25.0)
Total Employment	5,695	8,406	2,436	5,119	4,822	4,839	4,348	5,756

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, Table 25.00
(Washington, D.C.: computer printout, April, 1980)

^aFigures in parentheses represent sector wage and salary employment as a percentage of total wage and salary employment

(D) Not shown to avoid disclosure of confidential information. Data are included in totals

(L) Less than 10 wage and salary jobs

TABLE 3-12

PERSONAL INCOME

County	Carbon	Emery	Sanpete	Sevier
Total Personal Income (millions)				
1970	\$ 47.2	\$11.6	\$28.3	\$27.6
1978	\$148.8	\$60.0	\$60.1	\$80.1
Net Change	\$101.1	\$48.4	\$31.8	\$52.5
Annual Rate of Change (percent)	15	23	9.9	14
Average Weekly Wage (1978)				
County Average	\$238.00	\$326.00	\$142.00	\$178.00
Construction	\$289.00	\$457.00	\$209.00	\$222.00
Mining	\$423.00	\$347.00	\$200.00	\$366.00
Per Capita Income (1978)	\$6,837.00	\$5,788.00	\$4,616.00	\$5,788.00

DESCRIPTION OF THE ENVIRONMENT

3-13). Since 1970, with the exception of Salina, every community has experienced a growth rate significantly above either the Statewide (2.6 percent) or national (0.8 percent) average between 1970 and 1978. The steady population growth of the 1970s represents a reversal of earlier declining trends. Between 1960 and 1970, every community lost population; many had been losing population steadily since the 1940s. As a result, most communities started the 1970s with a substantial "cushion" of underutilized housing and public services.

Infrastructure Conditions

By 1978, the recent population growth was placing strains on the Wasatch Plateau-Emery area's capacity to provide the new residents with needed housing, education, health care, and municipal services (e.g., police and fire protection, water, and sewage disposal).

The predominant housing type in most local communities is the single family home. However, rapidly escalating housing demand coupled with the high price and/or unavailability of conventional housing in some communities has contributed to a great expansion in the number of mobile homes, particularly in Castle Dale (where mobile homes accounted for 51.7 percent of the total housing stock in 1978), and Huntington (58.3 percent). In all communities, the housing vacancy rate is extremely low (Table 3-14). A vacancy rate of 3 to 4 percent is desirable.

The Sevier, North Sanpete, and South Sanpete School Districts as a whole were overcrowded in 1978, although the planned completion of new high schools in each district in 1981, 1980, and 1984 respectively, should help to alleviate the overcrowding (Table 3-15). While the Carbon and Emery School Districts both had excess capacity on a district-wide basis, individual schools were overcrowded in 1978. The Carbon School District has dealt with this problem through the addition of portable classrooms. The Emery District expects two new elementary schools to be completed by 1980 and 1981 respectively.

There are four hospitals in the region located in Price, Gunnison, Mt. Pleasant and Richfield (with 75, 21, 25 and 28 beds respectively). The demand for acute care beds in the Gunnison hospital exceeds the nine acute care beds available, necessitating use of some of the hospital's 12 long-term beds for acute cases. The current level of health care personnel (doctors and nurses) is also inadequate by accepted standards of one physician per 1,000 inhabitants and one nurse per 285 inhabitants (Table 3-15).

Current levels of police protection in all local communities are insufficient, if judged according to the planning standard of 2.0 officers per 1,000 population for communities under 10,000 population (see Table 3-15). However, notwithstanding these deficiencies, crime rates in the area remain among the lowest in the State. Some local law enforcement agencies report difficulties in hiring and retaining qualified personnel in the face of stiff wage competition from the mines.

Among those communities with their own fire departments (Centerfield buys fire protection services from Gunnison), two (Helper and Gunnison) fall significantly below fire insurance underwriters' standards for pumping capacity based on population. The following communities have inadequate overall fire insurance ratings, based on such factors as pumping capacity, water supply, and personnel: Wellington, Emery, Huntington, Orangeville, Centerfield, Fairview, Gunnison, Mt. Pleasant, Spring City, Redmond, and Sigurd.

The availability of adequate water supplies constituted an actual or potential limit to growth in a number of communities in 1978, among them Price, Wellington, Castle Dale, Emery, Ferron and Gunnison (see Table 3-16). Price presently has an application pending for additional water rights from the White River, while Gunnison drilled a new well in 1979. Existing water treatment facilities were generally adequate in 1978, but many communities required upgrading of water storage capacity and/or transmission systems, particularly Helper, Price, Castle Dale, Huntington, Orangeville, Centerfield, Fairview, Gunnison, and Spring City.

By 1978, additional waste water treatment capacity was or shortly would be required in Helper, Price, Wellington, Ferron, Huntington, Emery, and Salina. Helper, Price, and Wellington are served by the Prive River Water Improvement District's trickling filter sewage treatment plant.

Social Conditions

The Wasatch Plateau-Emery area was settled by Latter-Day Saints (Mormon) pioneers, and today the overwhelming majority of the population consists of Latter-Day Saints (LDS) Church members. The beliefs and values of traditional rural culture emphasize family solidarity, the small-town way of life with its neighborliness and freedom from crime, pressure and haste, and the aesthetic and recreational value of the surrounding rural environment.

Recent population growth has been accompanied by some erosion of these values and beliefs. However, the traditional socio-cultural structure present-

TABLE 3-13

POPULATION TRENDS

County/Community	1970	1978	Net Change 1970 - 1978	Average Annual Rate of Change
CARBON COUNTY	15,647	21,643	5,996	4.1
Helper	1,964	3,030	1,066	5.6
Price	6,218	8,660	2,442	4.2
Wellington	922	1,299	377	4.4
EMERY COUNTY	5,137	9,849	4,712	8.5
Castle Dale	541	1,773	1,232	16.0
Emery	216	397	381	7.9
Ferron	663	1,280	617	8.6
Huntington	857	2,363	1,506	13.5
Orangeville	511	985	474	8.5
SANPETE COUNTY	10,976	14,119	3,143	3.2
Centerfield	419	600	181	4.6
Fairview	696	1,060	364	5.4
Gunnison	1,073	1,368	295	3.1
Mt. Pleasant	1,516	2,354	838	5.7
Spring City	456	698	242	5.5
SEVIER COUNTY	10,103	14,489	4,386	4.6
Aurora	493	779	286	5.9
Redmond	409	486	77	2.2
Salina	1,494	2,191	697	4.9
Sigurd	291	370	79	3.0
TOTAL AREA	42,079	60,497	18,618	4.6
Population				
Population Density	4.4	6.4	N/A	N/A

N/A - Not applicable.

TABLE 3-14

HOUSING BY NUMBER AND TYPE (1978)

	Single	Multi	Mobile	Total	Vacancy Rate
Carbon County	NA	NA	NA	6,566	
Helper	786	124	35	945	<1.0
Price	NA	NA	NA	2,683	<1.0
Wellington	250	13	82	345	<1.0
Emery County	NA	NA	NA	2,908	
Castle Dale	220	24	261	505	<1.0
Emery	100	0	27	127	<1.0
Ferron	197	12	124	333	<1.0
Huntington	248	20	375	643	<1.0
Orangeville	185	13	77	275	<1.0
Sanpete County	4,122	141	392	4,655	
Centerfield	165	0	22	187	Low
Fairview	332	0	28	360	Low
Gunnison	336	0	19	382	Low
Mt. Pleasant	617	9	93	719	<1.0
Spring City	268	0	11	279	2-3
Sevier County	3,850	56	431	4,337	
Aurora	240	24	0	228	1.5
Redmond	146	0	31	177	1.7
Salina	435	5	117	557	<1.0
Sigurd	100	0	9	109	<1.0

NA-not available

TABLE 3-15

EDUCATION, HEALTH, AND LAW ENFORCEMENT SERVICES (1978)

County	Carbon	Emery	Sanpete	Sevier
Education				
School Enrollment				
Elementary	2,198	1,188	982	1,370
Excess Capacity	236	6	-100	-87
Secondary	1,716	968	888	1,205
Excess Capacity	344	139	-406	-389
Student/Teacher Ratio	21.4	20.15	27	25
Health Facilities				
Hospital Beds	75	0	21	28
Occupancy Rate	63.6	0	108.4	60.9
Intensive Care Unit	yes	-	no	yes
Personnel				
Doctors	21	7	7	9
Per Population Ratio	1:2405	1:2462	1:2107	1:2415
Nurses	122	6	27	24
Per Population Ratio	1:408	1:2462	1:830	1:690
Law Enforcement				
Number of Officers	24	12.5	7	12.5
Officers and Population Ratio	1:902	1:788	1:2017	1:1159

TABLE 3-16

WATER CONSUMPTION AND MAXIMUM CAPACITY

	Million gallons per day		
	Consumption	Water Rights	Maximum Capacity Intake and Treatment
Carbon County			
Helper	0.8	2.133	1.0
Price	2.5	5.7	5.7
Wellington	0.33	0.39	4.0
Emery County			
Castle Dale	0.55	0.601	1.3
Emery	0.173	0.174	0.173
Ferron	0.75	NA	0.75
Huntington	0.5	0.606	0.5
Orangeville	0.22	0.357	0.288
Sanpete County			
Centerfield	0.21	0.646	0.433
Fairview	0.3	5.190	0.5
Gunnison	0.4	0.8	0.720
Mt. Pleasant	0.54	1.64	1.9
Spring City	0.17	0.288	0.288
Sevier County			
Aurora	0.192	0.36	0.168
Redmond	0.2	0.253	NA
Salina	1.5	1.375	1.365
Sigurd	0.09	0.923	NA
NA-not available			

DESCRIPTION OF THE ENVIRONMENT

ly remains largely intact in the Wasatch Plateau-Emery area. This observation is supported by trends in such objective indicators as local marriage rates (which, while they have declined in recent years, remain high by comparison with State and national averages) and the relatively low incidence of divorce, alcoholism, mental illness, and crime.

Local residents' subjective responses in a series of unstructured interviews conducted in the study area during the fall of 1979 support this same conclusion. Based on the beauty of the total environment, the quality of their friends and neighbors, and the small-town way of life centered around the family, respondents rated the quality of life in most study area communities as very high.

The chief exception is Huntington in Emery County. In the past decade Huntington has experienced explosive population growth which, in the eyes of many residents, has greatly diminished Huntington's intimate, small-town character. In spite of these perceptions, however, energy development and the resultant population growth is viewed as having resulted in a net increase in the quality of life in Huntington, through the expansion of local cultural and social facilities, and above all through the generation of employment. The additional jobs make it possible for more young people to remain in the community, rather than emigrating in search of work following completion of their education.

In the remaining communities, while the degree of satisfaction with existing conditions remains high, respondents were generally in favor of coal or other economic development, provided that the pace of growth is carefully controlled in order to enable communities to make adequate preparations. Respondents in Emery were particularly insistent that the pace of growth be strictly controlled to preserve the local lifestyle.

It may, however, be beyond the ability of some Emery County communities to control growth so that it occurs only at a rate that protects the local lifestyle or that enables adequate preparation by the towns to match growth in population with growth in community infrastructure and social services. Rapid population increase in Emery County has resulted in a corresponding increase in the incidence of social problems such as delinquency, mental illness, divorce, family violence, violent crime, alcoholism, drug abuse, and suicides.

TRANSPORTATION

Vehicular traffic within the area is carried on four major highways which form a loop through the area. The north leg is formed by U.S. 6, the east

leg by U-10, the south leg by I-70, and the west leg by U.S. 89. In addition, there is some local traffic across the Wasatch Plateau on U-29 between Orangeville and Ephraim, and on U-31 between Huntington and Fairview. The latter two roads are not always passable at higher elevations in the winter.

Average annual daily traffic (AADT) values for 1977 and 1978, are given in Table 3-17 at locations shown in Figure 3-11. In the locations where traffic is heaviest, (on U.S. 6 north and west of Price), there is already a four-lane highway. The Utah Department of Transportation is presently constructing a bypass south of Price which would relieve traffic congestion in the town. Highway U-10 immediately south of Price is reaching a practical maximum for a two-lane highway, considering the number of trucks it is carrying.

The main roads in this area are paved with asphalt. U-10, while paved with asphalt, was built for lighter-duty use than it is now getting from construction and increased coal mine development; furthermore, it was built on bentonitic Tropic shale, which has a very high shrink-swell coefficient. Continuing maintenance of this road is necessary. U-31 between Huntington and Fairview has been paved with asphalt. U-29 west of Orangeville has been paved as far as Joes Valley Reservoir; the county road connecting with Ephraim has a gravel surface.

The Denver & Rio Grande Western (D&RGW) Railroad mainline passes through Price and Helper, ascends to Soldier Summit, and descends through Spanish Fork Canyon into the Provo area. A D&RGW spur line south from Thistle continues as far as Salina. The Salina spur is too light to accommodate the heavier 100-ton coal cars. The Union Pacific Railroad mainline passes 2 miles west of Levan in Juab County. A coal loadout at this point is being used by Southern Utah Fuels in Convulsion Canyon. In addition, the Utah Railway goes southward from a point near Helper to serve the Hiawatha and Wattis mines. The Utah Railway shares track with the D&RGW to form a dual track system across Soldier Summit. Parts of the Union Pacific mainline are double track; parts are not. Both the Union Pacific and D&RGW mainline systems are heavily traveled; neither has reached capacity.

Projected for the future is a D&RGW Castle Valley spur line, to begin at the Wellington coal loadout facilities about 1 mile west of Wellington and continuing southward some 65 miles through Castle Valley to a proposed loop and coal loadout facility about 4 miles southeast of Emery. A detailed proposal is not available; however, judging from available information the route would closely follow a proposed route studied by Kaiser Engineers in 1976 (unpublished maps on file, BLM), except that the

TABLE 3-17

ANNUAL AVERAGE DAILY TRAFFIC FOR SELECTED YEARS

Point	Location	AADT 1977	AADT 1978
1.	Utah Hwy 96 between Scofield Res and U.S. 6	385	190
2.	U.S. 6 at Utah-Carbon County Line	4,450	4,085
4.	U.S. 6 North of Price	10,200	10,800
5.	U.S. 6 between Price and Wellington	5,610	5,800
11.	U.S. 6 West of Sunnyside Jct (Utah Hwy 123)	3,720	3,900
12.	Utah Hwy 123 between U.S. 6 and East Carbon City	2,000	2,115
13.	U.S. 6 near Carbon-Emery County Line	1,985	2,050
14.	Utah Hwy 10 South of Price	6,975	7,450
16.	Utah Hwy 10 North of Huntington	5,565	5,925
17.	Utah Hwy 31 West of Huntington	985	1,130
18.	Utah Hwy 10 South of Huntington	5,290	5,630
19.	Utah Hwy 29 West of Orangeville	700	735
20.	Utah Hwy 10 South of Castledale	2,650	2,850
22.	Utah Hwy 10 North of Ferron	1,895	2,020
23.	Utah Hwy 10 South of Ferron	1,825	1,940
25.	Utah Hwy 10 North of Emery	675	720
28.	Utah Hwy 10 North of I-70	405	540
30.	Utah Hwy 72 near Sevier-Wayne County Line	25	30
31.	Utah Hwy 72 South of I-70	25	30
33.	I-70 East of Salina	2,275	2,450
34.	U.S. 89 South of Richfield	3,035	3,225
35.	U.S. 89 North of Richfield	3,300	3,375
36.	U.S. 89 North of Aurora	2,275	2,395
37.	U.S. 89 South of Salina	2,800	2,945
38.	U.S. 89 near Sanpete-Sevier County Line	3,695	3,910
39.	Utah Hwy 28 North of Gunnison	1,970	2,080
40.	U.S. 89 North of Gunnison	1,365	1,445
41.	U.S. 89 North of Manti	2,375	2,500
43.	U.S. 89 North of Ephraim	1,850	1,960
44.	U.S. 89 South of Mt. Pleasant	4,050	4,285
45.	U.S. 89 North of Mt. Pleasant	1,765	1,825
46.	Utah Hwy 31 at Sanpete-Emery County Line	210	470
48.	Utah Hwy 31 East of Fairview	325	440
49.	U.S. 89 North of Fairview	1,735	1,775

Notes: Points correspond to map, Figure 3-11, and correspond to the same locations as are given in the Alternatives.

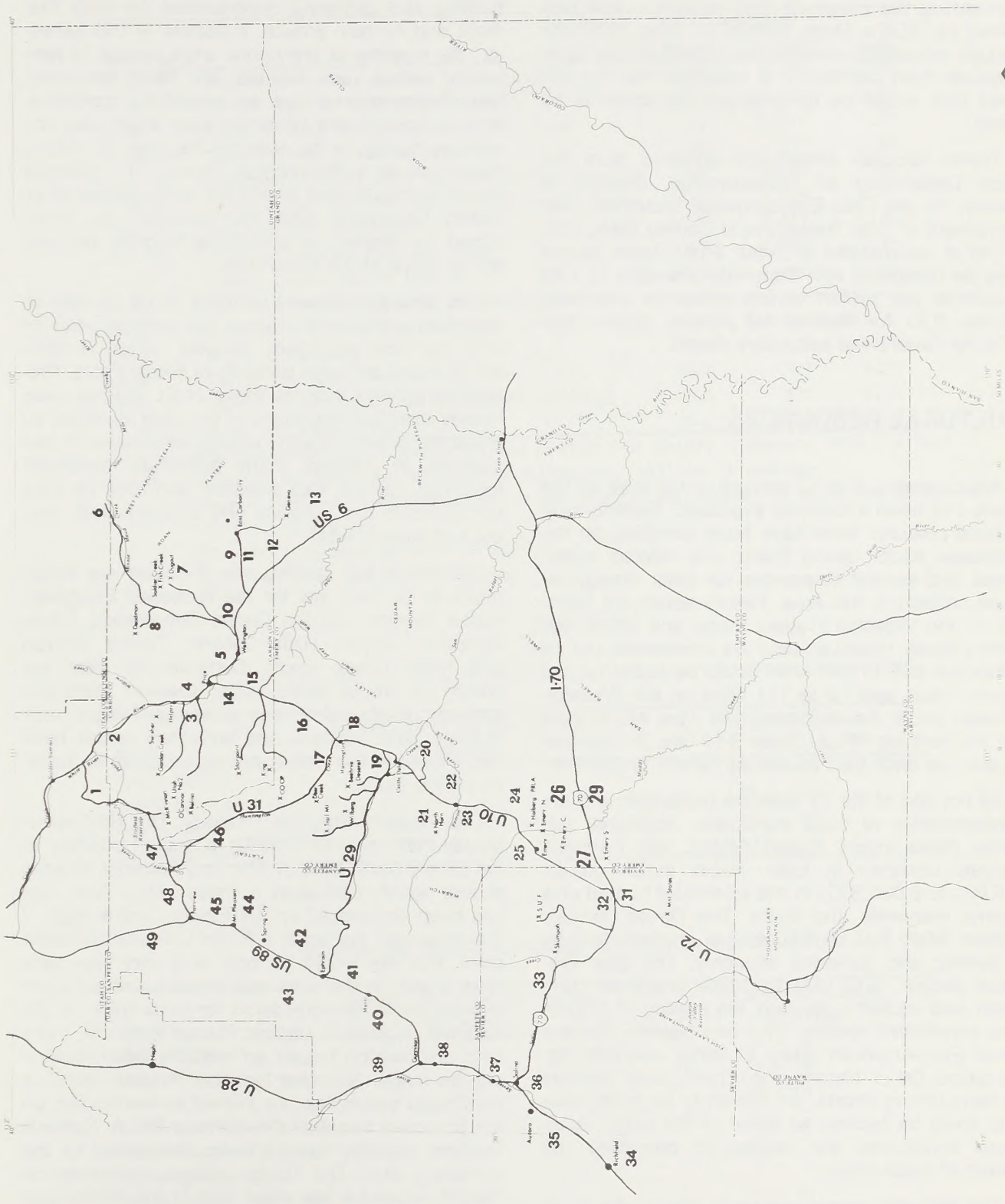


FIGURE 3-11
SELECTED MILEAGE CHART

DESCRIPTION OF THE ENVIRONMENT

D&RGW route would pass east of Elmo instead of west of it. An Environmental Assessment Report concerning the proposed land exchange was prepared by BLM's Moab District in June 1979. Although no definite construction schedule has been received from D&RGW, it is expected that the railroad spur would be constructed and operable by 1990.

Traffic accident information obtained from the Utah Department of Transportation, Division of Safety, for the Final Environmental Statement, Development of Coal Resources in Central Utah, (GS, 1979) is summarized in Table 3-18. These figures may be compared with Statewide averages of 1.43 accidents per million vehicle miles for interstate routes, 3.53 for Federal-Aid primary routes, and 5.05 for Federal-Aid secondary routes.

CULTURAL RESOURCES

Approximately 5 to 10 percent of the area on the tracts has been intensively evaluated. Seventy-nine cultural resource sites have been identified on the proposed tracts during these coal related inventories and several clearances for other energy related projects in the area. Twenty-seven are located on the Wasatch Plateau tracts and 52 on the Emery tracts. However, data are incomplete and an additional 235 to 290 sites could be found on the Emery tracts and 72 to 111 sites on the Wasatch Plateau tracts. An estimated 130 sites are located on the Hollberg PRLA. Table 3-19 lists the number of sites on each tract as well as density projections.

All but one of the 79 sites are prehistoric and are representative of three successive Aboriginal cultures, Paleo Indian, Desert Archaic and Fremont. Largely unknown in Utah, Paleo Indian groups (10,000 to 6,000 B.C.) in the southwest hunted now extinct mammals and bison. The Desert Archaic culture (8000 B.C. to A.D. 400) is characterized by a hunting and gathering economy. The later Fremont people (A.D. 400 to 1300) practiced corn, bean, and squash cultivation, the making of pottery, and permanent housing. The one historic site is a small Euro-American dump of minor scientific significance. Other historic sites, particularly remains of early mining efforts, are known to be in the area and could be located on some of the tracts. Additional inventories are needed to determine the extent of these sites.

The heaviest concentrations of sites in the study area are found on the proposed North Horn Mountain and Emery North tracts and the Hollberg PRLA (Table 3-19).

Varied plant and animal resources on the North Horn Mountain tract may have provided excellent hunting and gathering opportunities for both Fremont and Archaic groups. Indicative of this behavior, the majority of prehistoric sites consist of temporary camps, rock shelters, and open lithic scatters. Preliminary surveys are identifying concentrations of scientifically important sites which may collectively qualify to the National Register of Historic Places as an archaeological district. The potential for an archaeological district will be assessed when district boundaries and site densities are determined. Its eligibility as a National Register property will be made at the same time.

The Emery tracts and Hollberg PRLA contain an important resource of chert, a raw material used for tools by local prehistoric peoples, which is commonly found on large portions of these tracts. Preliminary surveys indicate these chert sources were heavily exploited and many of the sites identified on these tracts are amorphous large lithic scatters and quarries. In addition, many potentially significant temporary camps, rock shelters, and rock art sites are found in the canyons and pinyon-juniper sections of these tracts.

Prehistoric and historic site densities are anticipated to be very low for the proposed Slaughterhouse Canyon, Gordon Creek, Cottonwood, Meetinghouse Canyon, Rilda Canyon, Tucker Canyon and Miller Creek tracts. Currently no sites are known on any of these tracts; however small and sparsely distributed historic camps, prehistoric rock shelters, lithic scatters, and temporary camps have been found in the vicinity and some could be located on the tracts.

One National Register Property, The Rochester-Muddy Petroglyph (42EM392) is located adjacent to the Emery North tract. A lithic and Fremont ceramic scatter which contained a Paleo-Indian lithic tool has been discovered on the Emery Central tract. If the diagnostic artifact is a Plano Complex projectile point, the site would be one of a very few early sites known in the area and would be of sufficient importance to be considered for nomination to the National Register of Historic Places. However, more data are needed before an eligibility determination can be made. No other National Register listed or nominated properties are known to be located on the proposed tracts or the Hollberg PRLA. National Register eligibility has not been determined for the remaining sites. The Trough Hollow Archaeological District, located a few miles east of the Emery coal tracts, is a scientifically valuable resource. Steps are underway to nominate the area to the National Register of Historic Places.

TABLE 3-18

TRAFFIC ACCIDENT RATE, 1972 to 1976
CENTRAL UTAH REGION

Highway	Location	Length miles	ADT vpd	Accident Rate
I-70	Salina to Spring Canyon Interchange	17.5	1,274	3.09
I-70	Spring Canyon to Fremont Junction	16.4	1,217	3.46
I-70	Fremont Jct. to Sevier-Emery Co. Line	2.8	1,018	1.54
U-96	Total, Clear Creek to U.S. 6	22.9	337	2.80
U.S. 6	Wasatch-Utah Co. Line to Utah-Carbon Co. Line	9.0	3,122	1.42
U.S. 6	Utah-Carbon Co. Line to U-33 at Castle Gate	7.9	3,168	1.97
U.S. 6	U-33 to U-10 at Price	10.2	5,467	3.91
U.S. 6	U-10 to Carbon-Emery Co. Line	21.0	3,293	3.43
U-123	Total, Sunnyside to U.S. 6	11.4	1,148	3.94
U-10	U.S. 6 at Price to U-31 at Huntington	--data not available--		
U-10	U-31 to U-57 S of Castle Dale	--data not available--		
U-10	U-57 to Ferron	9.8	1,170	3.82
U-10	Ferron to Emery-Sevier Co. Line	30.2	527	3.25
U-10	Emery-Sevier Co. Line to Fremont Junction	5.8	372	3.30
U-29	U-10 to Orangeville	3.8	936	4.00

Source: Utah Department of Transportation, Division of Safety, February 1978 (letter)

Notes: Based on accidents per million vehicle-miles, 1972 to 76 averages

These locations approximate but do not exactly correspond to locations given for traffic projections

ADT - 1972-76 average daily traffic

vpd - vehicles per day, all types

TABLE 3-19

CURRENT AND PROJECTED NUMBER OF CULTURAL SITES ON EMERY COAL FIELD

Tracts	Number of Sites Currently Recorded	Projected Number of Sites
Emery North	40	150 - 175
Emery Central	12	75 - 100
Emery South	0	10 - 15
Hollberg PRLA	0	130

CURRENT AND PROJECTED NUMBER OF SITES ON WASATCH PLATEAU

Tracts	Number of Sites Currently Recorded	Projected Number of Sites
Tucker Canyon	0	1 - 2
Miller Creek	0	2 - 5
Gordon Creek	0	5 - 10
Slaughterhouse Canyon	0	1 - 2
Meetinghouse Canyon	0	2 - 5
Rilda Canyon	0	1 - 2
Cottonwood	0	5 - 10
North Horn Mountain	27	55 - 75

DESCRIPTION OF THE ENVIRONMENT

SPECIAL DESIGNATION AREAS

There are no officially designated wilderness areas, primitive areas, natural areas, or wild and scenic rivers within any of the proposed lease tracts.

Portions of the proposed Emery North, Emery Central, and Hollberg lease areas are located within BLM Roadless Inventory Unit UT-060-012 (for location of the unit see Figure 3-12). This roadless unit was previously inventoried for possible inclusion in the National Wilderness Preservation System, was determined to lack wilderness character, and was released from further wilderness review (BLM IPP EIS, 1979). However, the inventory findings and subsequent decision were appealed (January 1980) and until a decision is again reached (timeframe unknown), the unit remains under wilderness review and must be managed in a manner that will not impair any suitability it may have for wilderness designation.

The Heritage Conservation and Recreation Service (HCRS) is conducting an inventory of the Nation's rivers and river segments to identify those that merit recognition and protection under the Wild and Scenic Rivers Act. Seventy miles of Muddy Creek have been included in a resultant nationwide listing of rivers and river segments which, according to HCRS, are in a relatively natural and undeveloped condition. One and one-half miles of Muddy Creek cross the Emery North tract. The likelihood of Muddy Creek receiving official status under the Wild and Scenic Rivers Act is not known. At this time, Muddy Creek is not subject to protection provided by that Act.

Within the Four-County region, there are no officially designated wilderness areas, primitive areas, or wild and scenic rivers, and Link Flat (outside the proposed lease tracts) is the only designated natural area. Within the Four-County region there are 12 areas that are presently being reviewed for wilderness values and five rivers that are presently being reviewed for wild and scenic river values. These 17 areas with potential for special designation are listed in Appendix 4. They are not located in the lease tracts except as previously discussed.

VISUAL RESOURCES

The scenic character of the Four-County region is one of vast open space and variation in landform, vegetation, and color. The landscape includes sparsely vegetated desert valleys, forested plateaus, and colorful canyonlands. Rural towns, access roads, mining developments, power devel-

opments and transmission lines, livestock grazing, and recreational use have had some impact on natural scenic values, but much of the area appears undisturbed.

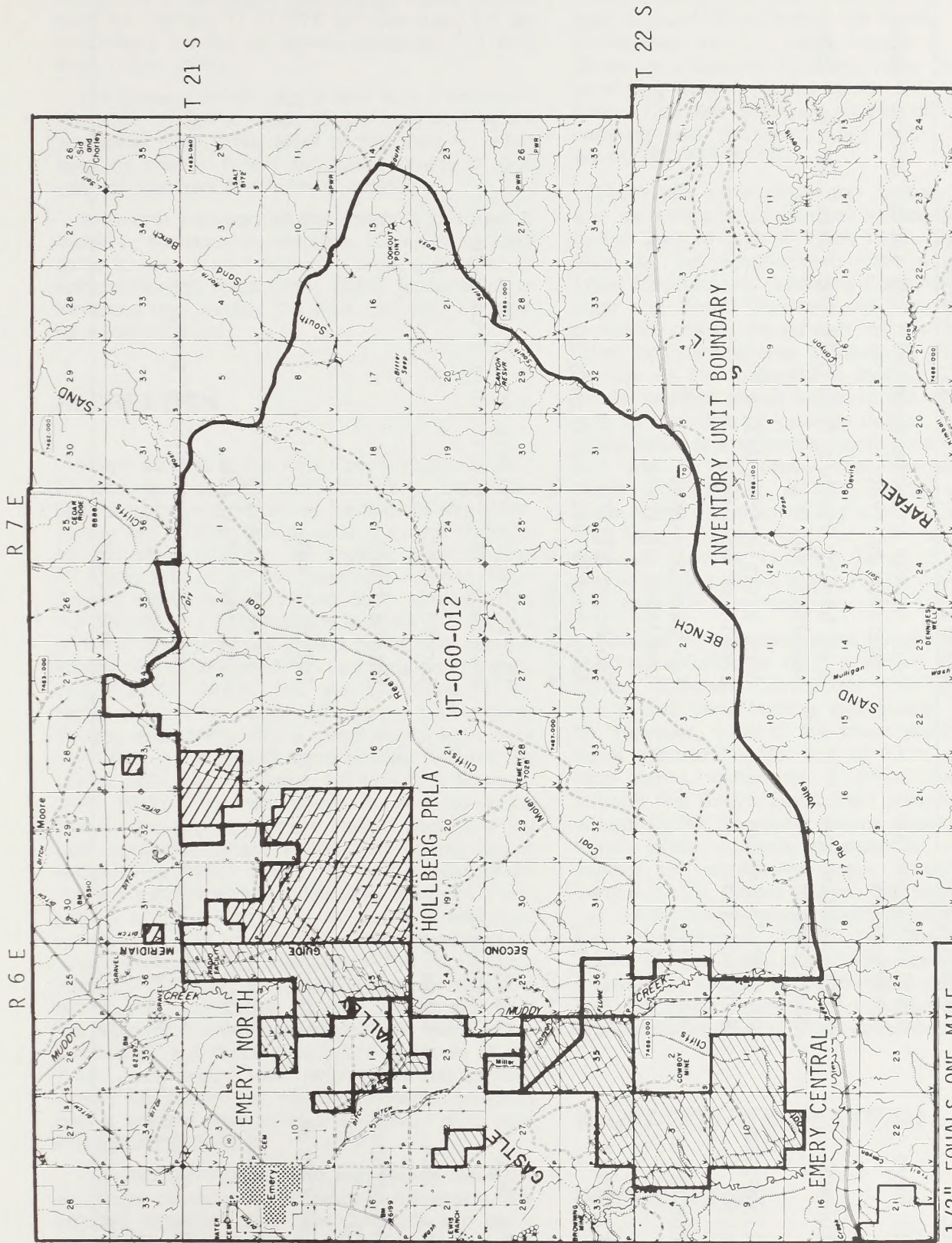
Coal mining and associated developments have modified the natural landscape character adjacent to the tracts on portions of the east Wasatch Plateau between Scofield Reservoir and Salina Canyon, and to a lesser extent in portions of the Emery coal field to the south and east of Ferron and Emery Utah. Landscape modification from coal mining is for the most part limited to areas with low or moderate scenic quality. The few intrusions that extend into areas of high scenic quality are limited to roadways, telephone lines, and powerlines. Direct mining activities are located away from major travel routes, and are seldom seen by individuals traveling through the region.

The lands containing the Wasatch Plateau and Emery lease tracts have been inventoried for visual resource values. The tract lands have neither outstanding nor unique scenic values. They are located on steeply dissected plateaus that are common to the region and are low to moderate in scenic quality. The tract lands have been given visual resource management (VRM) classifications as listed in Table 3-20. Management objectives for each VRM classification allow a different degree of modification in the landscape. Management objectives are described in Appendix 5.

The Tucker Canyon tract is located on a mountain slope visible from the following areas around Scofield Reservoir: (1) Scofield Reservoir State Park (more than 100,000 annual visits), viewing distance of approximately 4 miles; (2) Highway U-96 (345 vehicles daily), visible approximately 4 miles at a viewing distance of approximately 1.5 to 4 miles; (3) Scofield Lake, visible from as much as 40 percent of the lake at viewing distances of 0.5 to 4 miles and (4) Mountain Home and Aspen View subdivisions, three residential dwellings are located adjacent to the tract and the proposed Kristine mine would be highly visible at a distance of less than 0.3 mile. Other dwellings lie north of the tract boundary from where portions of the tract are visible from distances of less than 1 mile.

Although portions of the North Horn Mountain, Cottonwood, Meetinghouse and Rilda Canyon tracts are visible from well-traveled highways, the portions of the tracts where disturbance would occur are visible from low-volume, unpaved roads only. The Slaughterhouse, Gordon Creek, and Miller Canyon tracts are only visible from low-volume, unpaved roads. The number of travelers that would be affected is not known.

Most of the Emery North tract is visible from the town of Emery at a distance of approximately 2



1/2" EQUALS ONE MILE
BASE MAP BLM 1978

FIGURE 3-12

BLM ROADLESS INVENTORY UNIT UT-060-012

TABLE 3-20

VISUAL RESOURCE MANAGEMENT CLASSIFICATIONS

Tract	Classification	General Location of Classification Area
North Horn	Partial Retention Modification	Area highly visible from U-10 and forest access roads Remainder of tract
Cottonwood	Partial Retention Modification	Area highly visible from U-10 and forest access roads Remainder of tract
Meetinghouse Canyon	Partial Retention Modification	Area visible from U-31 Remainder of tract
Gordon Creek	Class III Class IV	Far east boundary Remainder of tract
Emery North	Class II Class III Class IV	Southeast cliffs Area highly visible from U-10 Remainder of tract
Emery Central	Class II Class III	Cliffs highly visible from I-70 Remainder of tract visible from U-10
Emery South	Class II	Entire tract
Slaughterhouse Canyon	Class IV	Entire tract
Tucker Canyon	Class III	Entire tract
Miller Creek	Class III Class IV	Far east boundary Remainder of tract
Rilda Canyon	Partial Retention Modification	Area visible from U.S. Highway 31 Remainder of tract
Hollberg PRLA	Class IV	Entire tract

DESCRIPTION OF THE ENVIRONMENT

miles. The Emery North tract is also visible to travelers on Highway U-10 (675 vehicles daily) for approximately 8 miles at viewing distances of 1 to 8 miles (Utah, 1978).

The Emery Central tract is less than 1 mile from Interstate 70, but is mostly hidden from view by the prominent Coal Cliffs. Most of the tract is visible from the town of Emery and from Highway U-10 at viewing distances of 4 miles or greater.

The north boundary of the Emery South tract is visible to travelers on Interstate 70 (1,690 vehicles daily) for less than 1 mile at a viewing distance of approximately 3 miles (Utah, 1980). Because of intervening high terrain, the tract can only be seen for a few seconds.

RECREATION

Nearly all land in the Four-County region is used for dispersed outdoor recreation (e.g., big game, upland game and waterfowl hunting, fishing, sightseeing and off-road vehicle use). If overall statistics for the State of Utah are applied, approximately 17.5 percent or 11,144 residents of the Four-County region presently hunt deer; approximately 1.7 percent or 1,083 residents hunt elk; 8.5 percent or 5,413 residents hunt upland game; and approximately 45 percent or 28,655 residents fish (Thayne and Hudson, 1978). The success trend in the region is down from early 1970 figures for big game hunting and fishing, but is generally up from early 1970 figures for upland game hunting (UDWR: Big Game, 1980; Upland Game, 1979; Fishery Management, 1979). Of the total people hunting deer in the Four-County region, no more than 41 percent of the deer hunters originate in the Four-County region (UDWR, Big Game, 1980). The percentages of elk hunters and fishermen originating from the Four-County area are unknown but probably less than the deer hunter percentage. The percentage of upland game hunters originating in the Four-County region is unknown but probably greater than the deer hunter percentage. Off-road vehicle activity in the region is generally associated with hunting. Approximately 6.8 percent or 5,177 residents in the Four-County region own motorcycles and approximately 25 percent or 19,034 residents presently own a 2-wheel drive truck or a 4-wheel drive vehicle (SCORP, 1978).

The Wasatch Plateau and San Rafael Swell are the major recreation attractions in the region. Developed recreation sites (campgrounds and picnic areas) within the Plateau and Swell areas and their current visitor use are listed in Table 3-21. Of the 34 developed sites, 16 are now being used beyond their capacity (use greater than 40 percent). The

Forest Service has found that sites receiving more than 40 percent use deteriorate rapidly, are difficult to maintain, and are highly subject to vandalism. Sevier and Sanpete Counties have camping and picnicking sites in excess of demand. Carbon and Emery Counties have an excess of demand for camping and picnicking sites over the current supply (SCORP, 1973).

There are not enough golf courses, playfields, and swimming pools to meet standards proposed by the State of Utah (SCORP, 1970, 1978). A 1980 study by the Southeastern Utah Association of Local Governments (including Carbon, Emery, San Juan and Grand Counties) indicates that of 586 residents polled, 86 percent of the respondents rated local recreational facilities as poor. Fifty-six percent of the respondents indicated that recreational facilities should be either first or second priority for spending of local tax dollars. In the study, playgrounds and swimming pools were rated as the first and second recreational needs (SEUALG, 1980). According to a 1980 Centaur Associates study, some of the towns in the Four-County impact area have identified needs for other diversified recreational facilities including handball and tennis courts, bowling alleys, skating rinks, city parks, and ball parks (Centaur Associates, Inc., 1980).

None of the proposed lease tracts contain developed recreation sites. All of the tracts support intermittent dispersed recreational activities (e.g., big and upland game hunting, sightseeing, ORV activity). However, none of the tracts provided exceptional opportunities for any of these activities. In most cases, visitor use is unquantified. A road through the Emery North tract provides the only access to the Rochester Muddy Creek Petroglyph Panel, which currently provides an unquantified number of sightseeing days. The Huntington Canyon (U-31), Eccles Canyon and Scofield Reservoir (U-96) roads, which would provide access to the Meetinghouse, Rilda, Slaughterhouse and Tucker Canyon tracts respectively, currently provide recreational access to the Wasatch Plateau. Average daily traffic on these roads is shown under the Transportation section of this document.

KAIPAROWITS PLATEAU

INTRODUCTION

The Utah Power and Light Company PRLAs are located on the northern part of the Kaiparowits Plateau. The PRLAs are primarily in Garfield County.

TABLE 3-21

RECREATION USE ON SELECTED DEVELOPED SITES IN THE FOUR-COUNTY REGION

Managing Agency	Site	Visitor Days ^a	Percent of Theoretical Maximum Capacity ^b
BLM			
1.	Price Canyon Recreation Area	NA ^c	NA
2.	Cleveland Lloyd Dinosaur Quarry	d4,000	NA
3.	Cedar Mountain Recreation Area	NA	NA
4.	San Rafael Campground	NA	NA
5.	The Wedge Overlook	NA	NA
FOREST SERVICE			
6.	Fish Creek Campground	2,200	50
7.	Flat Canyon Campground	27,600	114
8.	Gooseberry Campground	10,800	58
9.	Lake Hill Campground	4,000	20
10.	Old Folk Flat Campground	14,900	46
11.	Spring City Picnic Area	1,000	23
12.	Indian Creek Campground	5,900	8
13.	Manti Community Picnic Area	8,000	41
14.	Pinchot Picnic Area	5,800	30
15.	Joes Valley Campground	21,100	37
16.	Twelve Mile Campground	8,200	41
17.	Ferron Canyon Campground	6,800	18
18.	Maple Canyon Campground	4,200	18
19.	Maple Grove Campground	26,800	48
20.	Gooseberry Campground	10,800	58
21.	Doctor Creek Campground	12,400	30
22.	Mackinaw Campground	36,000	49
23.	Bowery Picnic Area	700	5
24.	Doctor Creek Group Camping	4,700	21
25.	Frying Pan Campground	3,800	25
26.	Bowery Campground	27,100	46
27.	Monrovia Picnic Area	4,300	8
28.	Forks of Huntington Campground	7,000	56
29.	Ferron Reservoir Campground	14,500	45
STATE OF UTAH			
30.	Scofield Lake State Recreation Area	100,000	78
31.	Huntington Lake State Beach	d104,180	10
32.	Palisade Lake State Recreation Area	d 36,490	130
33.	Green River State Recreation Area	d115,980	127
34.	Goblin Valley State Reserve	d 18,020	100

Source: DOI, GS, 1979, Central Regional Coal Environmental Statement

^aRecreation use reported in visitor days for 1977 (visitor day consists of 12 visitor hours which may be aggregated by one or more persons)

^bBeyond 40 percent use, sites deteriorate rapidly, require heavy maintenance, and user experience levels diminish from overcrowding (i.e., loss of privacy, increase in noise, etc.)

^cNot available

^dGiven in number of visits - visitor day estimates are not available

DESCRIPTION OF THE ENVIRONMENT

Mine number one and the railroad coal loadout are in Kane County.

The affected environment and environmental consequences of mining coal on the Kaiparowits Plateau are also discussed in the following documents: Final Environmental Impact Statement, Kaiparowits (DOI, 1976); Final Environmental Statement, Development of Coal Resources in Southern Utah (GS, 1979); and Kaiparowits Coal Development and Transportation Study (ERT, 1980).

CLIMATE AND AIR QUALITY

The climate of the Kaiparowits Plateau is characterized by hot summers and cold winters. Mean January maximum and minimum temperatures recorded at Escalante (approximately 5,700 feet elevation) in January are about 38 degrees F. and 10 degrees F. July temperatures consist of a mean maximum of 84 degrees F. and mean minimum of 53 degrees F.

The lease area generally averages 8 to 12 inches of precipitation annually. The wettest period of the year on the Plateau normally occurs during the winter with a broad secondary maximum extending through late summer. About 62 percent of the annual precipitation usually falls during the winter even though the winter season air masses from the Pacific Ocean reaching Southern Utah from the west are often dry and associated precipitation is light. During the summer, moist air masses move into southern Utah primarily from the Gulf of California. Precipitation from these air masses usually results in thunderstorms with maximum activity occurring during late July (ERT, 1980).

Surface winds in the area are strongly influenced by local topography. During the daytime and strong regional wind conditions, surface winds are channeled by valleys and around blocking terrain, decreasing in speed and increasing in turbulence. At night, the upper level winds often become decoupled from the surface winds which flow downhill as air near the ground cools.

The Kaiparowits Plateau area is primarily a rural area with light industrial activity. The existing air quality is generally excellent. Limited air quality monitoring within the region has been conducted by the Utah Air Quality Bureau, Arizona State Department of Health Services, Salt River Project, and other short-term monitoring performed for potential powerplant sites. The data have been summarized recently in a report by Environmental Research and Technology for BLM (ERT 1980). Within the area of study, all air quality parameters appear to be within allowable State and Federal air quality standards

with the exception of the short-term particulate limitations during wind periods.

SOILS

Soils in the study area receive 8 to 12 inches of rainfall annually and are moist for some part of the summer. Mean annual soil temperature is 47 degrees to 59 degrees F, while mean summer temperature is above 59 degrees F. Five soil associations have been identified in the area and are summarized as follows:

Deep Plateau Soils Association

The Deep Plateau Soils Association is about 70 percent alluvial soils, 20 percent warm-temperature soils, and 10 percent soils with higher than normal organic matter. Slopes in this association vary from nearly flat to moderately steep.

These soils contain small to moderate amounts of exchangeable sodium. Depth of the soil often exceeds 40 inches. Surface layers exhibit colors from light brownish gray to reddish brown, with particles moderately coarse to moderately fine. Subsoil and lower lying layers consist of light reddish brown to pinkish gray particles of medium texture. Erosion susceptibility, should vegetation be removed, would be moderate because of the unconsolidated and medium-textured nature of the soils.

Shallow Plateau Soils Association

The Shallow Plateau Soils Association is 55 percent soils 10 to 20 inches deep, and 45 percent soils deeper than 20 inches. These soils contain small to moderate amounts of exchangeable sodium. Surface layers display colors from reddish brown to yellowish red, with particles moderately coarse in texture. Subsoil contains medium-textured soil particles varying from brown to reddish brown to yellowish red. Substrata, found only in the deeper soils, varies from brown to yellowish red, with medium to coarse textured particles. Deeper soils also display a calcium carbonate layer between 6 and 24 inches deep.

Shallow Soil-Rock Outcrop Association

The Shallow Soil-Rock Outcrop Association is comprised of 60 percent shallow and warm-tem-

DESCRIPTION OF THE ENVIRONMENT

perature soils, 15 percent rock outcrops, and 25 percent cool-temperature soils. Slopes vary from moderately steep to steep at an elevation of 5,000 to 8,000 feet.

These soils also contain small to moderate amounts of exchangeable sodium. Surface layers consist of medium to moderately-fine particles, varying from light brownish gray to light yellowish brown. Subsoil contains moderately fine particles exhibiting colors from pale brown to brownish gray. Soil depth in this association is 20 inches or less.

Sandy Soils Association

The Sandy Soils Association is comprised of 60 percent sandy soils, and 20 percent warm-temperature soils. Slopes are nearly flat at an elevation of 4,400 to 5,500 feet. These soils contain small to moderate amounts of exchangeable sodium. Surface layer, substrata, and lower layers have coarse-textured, yellowish red particles.

Badland-Rockland Association

The Badland-Rockland Association consists of 30 to 50 percent rock outcrops, 20 to 40 percent shallow and very shallow soils over sandstone bedrock or shale, and 5 to 10 percent deep and moderately deep soils. Slopes vary from nearly level to very steep. This association occurs on benches and mesas along steep-sided canyons. Runoff is rapid to very rapid with high sediment production.

WATER RESOURCES

Surface drainage from the Plateau is through deeply cut steep-walled canyons. Drainage of the northern part of the Plateau is into the Escalante and Paria Rivers and in the southern part directly into Lake Powell through Wahweap, Last Chance, Warm Creek, Rock Creek, Little Valley, and Croton Canyon. All of these drainages are intermittent except the Paria and Escalante Rivers which are perennial streams draining the western and eastern sides of the Plateau. In late spring and early summer, the intermittent streams are completely dry except for occasional springs and seeps. Runoff is highly variable, generally of local extent, and may be of considerable magnitude during cloudburst activity.

The quality of surface water varies with the discharge, improving during periods of high flow.

Water samples taken during a period of low flow in October 1948 at the mouth of Wahweap, Warm, and Last chance Creeks, ranged from about 650 to 1,050 mg/L of dissolved solids. Water samples from springs and seeps contain a dissolved solids concentration commonly ranging from about 1,000 to 3,000 mg/L.

The regional water table beneath the Kaiparowits Plateau ranges from less than 100 feet beneath land surface in the southern part of the Plateau to several thousands of feet beneath the higher benches in the northern part of the Plateau. Limited data indicate that direction of ground water movement in the regional system beneath the Plateau is southward toward the Colorado River. The Navajo Sandstone forms the principal regional aquifer. Around the margins of the Plateau where the Navajo Sandstone occurs near the surface is found the best source of ground water for large sustained withdrawals by wells. In these areas saturated sections of fractured formation up to 1,000 feet thick can yield up to 1,000 gallons per minute to single wells.

Beneath the higher benches of the Plateau, however, shallower perched water of limited extent and amount occurs above the regional water table. Data from exploratory drilling indicate that the principal coal beds are above the regional water table, but one or more perched ground water bodies may occur above or within these beds. Water was obtained for drilling on the PRLAs by trenching the alluvium in the bottoms of Alvey Wash and Right Hand Collet Canyon (Camp Spring).

The few seeps and springs that have been identified in the area are either located at contacts between massive sandstone and mudstone beds or in the bottoms of a few of the washes (Table 3-22). Most of the springs on the Plateau are located at the contact of the thick mudstone unit at the base of the Wahweap Formation and the medium-grained massive sandstone beds at the top of the Drip Tank Member of the Straight Cliffs Formation. Other springs occur at the base of the porous and permeable sandstones within the Straight Cliffs Formation.

Little or no ground water quality data are available for large areas of the Kaiparowits Plateau. A regional analysis of ground water quality prepared for the Environmental Impact Statement for the Kaiparowits power project (BLM, 1976) was inferred largely from geology. That analysis indicated that ground water in most parts of the Plateau ranges from fresh (0 to 1,000 mg/L TDS) to slightly saline (1,000 to 3,000 mg/L TDS).

DESCRIPTION OF THE ENVIRONMENT

GEOLOGY, TOPOGRAPHY, PALEONTOLOGY, MINERAL RESOURCES

The Kaiparowits Plateau is a large high plateau which characterizes the physiography of south-central Utah. The interior of the Plateau where the PRLAs are located consists of stair-stepped benches which range in elevations from 7,600 to 9,100 feet. The coal field is an upland area about 20 miles wide and 50 miles long trending in a north-westerly direction from the Glen Canyon National Recreation Area toward Escalante. Precipitous cliffs form most of the plateau margins; Straight Cliffs Escarpment on the east, East Kaibab Monocline to the west, and several north/northwest trending incised canyons to the south. The transitional nature of the boundary on the north end of the Plateau is not well defined (Doelling, 1972).

The important coal beds in the Kaiparowits Plateau occur in three zones in the John Henry Member of the Cretaceous Straight Cliffs Formation. These three zones in descending order, Alvey, Rees, and Christensen, are separated by marine sandstones. Each zone may contain several potentially minable coal beds. The individual coal beds are generally quite lenticular and cannot be correlated with certainty without fairly detailed, closely spaced data which are not yet available.

Within the 18,000+ acres being proposed for exchange, Utah Power and Light Company has identified as many as 13 coal beds that may be of sufficient continuity to warrant mining. These lands contain coal resources estimated at almost 1.3 billion tons. The average heating value for the coal in all beds is 10,135 Btu/lb. as received. Ash content averages 10.5 percent and sulfur content 0.82 percent (UP&L, 1979).

The area is structurally simple with the coal-bearing strata dipping gently on the flanks of a north-south trending anticline and syncline. Overburden on the coal ranges from 0 feet at outcrops to 1,800 feet.

The PRLAs could possibly contain oil and gas, but the potential has not yet been tested. Only 3 wells have been drilled on the lands, none of which sustained commercial production. The nearest significant production has come from the Upper Valley Field 2 to 3 miles west of the PRLAs. Through October of 1979, in excess of 18 million barrels of oil had been produced from the field. All of the production has been from pre-Cretaceous rocks.

The Kaiparowits Plateau is characterized by expansive exposures of fossil-bearing sedimentary rocks, the only bedrock which has a realistic probability of yielding significant fossils. It is believed

that the fossils tend to occur in isolated pockets separated by wide horizontal and vertical expanses of unfossiliferous rock. The Moenkopi, Chenle, Kayenta, Kaiparowits and Wasatch Formations contain significant communities or individual organisms in abundance which have been afforded some form of legal or statutory protection (ERT, 1980).

VEGETATION

Vegetation on the PRLAs is characteristic of the cold desert zone. The major factors in distribution of vegetation types are climate, topography, aspect, soils and past land use.

Vegetation Types

Three major vegetation types are found on the PRLAs. The Pinyon-Juniper Woodland type is most common, occupying approximately 80 percent of the area. This type occurs on gentle to steep slopes with shallow to moderately deep soils. The Sagebrush Grass type occupies about 15 percent of the area in flats within the Pinyon-Juniper Woodland type. The Grassland type occupies less than 5 percent of the area and is currently being invaded by pinyon-juniper and sagebrush in some areas. The dominant species in these types are listed in Table 3-23.

Because of the lack of perennial streams, the Riparian type is limited to small patches of saltcedar (*Tamarix aphylla*) and greasewood (*Sarcobatus vermiculatus*) along the streambed in Alvey Wash and Little Valley Wash.

To enhance production of forage for grazing animals and stabilize soils, areas of Pinyon-Juniper Woodland and Sagebrush Grass vegetation types have been modified. On Camp Flat nearly 800 acres of pinyon-juniper were chained and the area seeded with crested wheatgrass. In Little Valley nearly 1,300 acres of sagebrush were sprayed or plowed, and seeded with crested wheatgrass. The success of these seedings indicates that reclamation of disturbed sites could be achieved. In terms of forage production, more usable forage would be produced after 5 years than is presently being produced on pinyon-juniper sites in the area (Phillips, 1976).

TABLE 3-22

SPRINGS IN THE GARFIELD DEPOSIT

Name	Type	Location	Formation	Date	Temp Degrees F	Flow in gal/min
Oak Spring	Spring	NE 1/4 NE 1/4 Sec. 13, T. 36 S., R. 2 E.	Ksd	7/21/79	66	0.125
Rock Spring	Spring	NE 1/4 NE 1/4 Sec. 6, T. 37 S., R. 3 E.	Kw ss	7/21/79	59	1
Camp Spring	Spring-Fed Stream	SW 1/2 SW 1/4 Sec. 36, T. 37 S., R. 2 E.	-	7/24/79	82	8.6
Hard Head Water	Developed Spring	SE 1/4 Sec. 15, T. 38 S., R. 3 E.	Kw	7/24/79	61.5	1

TABLE 3-23

MAJOR VEGETATION TYPES AND ASSOCIATED PLANT SPECIES

Type	Common Name	Scientific Name
Pinyon-Juniper Woodland	Pinyon pine	<i>Pinus edulis</i>
	Utah juniper	<i>Juniperus osteosperma</i>
	Big sage	<i>Artemisia tridentata</i>
	Rabbitbrush	<i>Chrysothamnus nauseosus</i>
	Cheatgrass	<i>Bromus tectorum</i>
Sagebrush-Grass	Big sage	<i>Artemisia tridentata</i>
	Rabbitbrush	<i>Chrysothamnus nauseosus</i>
	Wheatgrass	<i>Agropyron Spp.</i>
	Sand dropseed	<i>Sporobolus cryptandrus</i>
	Squirreltail	<i>Sitanion hystrix</i>
Three awn	<i>Aristida Spp.</i>	
Grassland	Blue grama	<i>Bouteloua gracilis</i>
	Indian ricegrass	<i>Oryzopsis hymenoides</i>
	Wheatgrass	<i>Agropyron Spp.</i>
	Sand dropseed	<i>Sporobolus cryptandrus</i>
	Cheatgrass	<i>Bromus tectorum</i>

DESCRIPTION OF THE ENVIRONMENT

Threatened or Endangered Plants

A survey in 1977 failed to locate any threatened or endangered plant species on the PRLAs (Welsh, 1977). A list of officially listed or candidate threatened or endangered plants in the region may be found in the Final EIS, Development of Coal Resources in Southern Utah (GS, 1979).

WILDLIFE

Wildlife in Garfield County is characterized by diversity of species and low population. The region is home for a large variety of species resulting from life zones ranging from desert shrub to high mountain forest. Species in the area include: 86 mammals, 328 birds, 36 reptiles, and 11 amphibians. Only species of significant human interest, and unique, rare, or endangered species are discussed here.

A relatively large amount of data are available for game species, however, data on nongame species are scarce. Data relating to big game species, cougar, and bear are discussed in terms of Utah Division of Wildlife Resources (UDWR) management units within the county. Information on upland game birds, waterfowl, and cottontail rabbits is given by county, as compiled by UDWR. Figures on current population are not available, but trends are known and relative abundance of game species can be inferred from harvest statistics.

The PRLAs are in deer herd unit 60 with deer herd unit 51B to the north on the Aquarius Plateau. A small recently introduced elk herd is spreading over the Aquarius Plateau. Presently only restricted hunting is allowed. Bighorn sheep were widespread in southern Utah before white men first came to the area. The larger populations are east of the Colorado River, and expansion to the west is blocked by Lake Powell. However, recent transplants were made in Moody Canyon and Rock Creek drainages west of the Colorado River.

Mountain lion (cougar) are found throughout the region where suitable habitat exists. Mule deer are their principal prey, and lion are usually associated with deer populations in remote areas. Currently, a 12-year cougar predation study is being conducted by UDWR in this remote area.

Cottontail rabbits, ring-neck pheasants, and doves are found on agricultural lands associated with communities in the area. Blue grouse are found in the forests and meadows of the Aquarius Plateau with small isolated chukar populations centered around the watering holes in the desert can-

yons (Table 3-24). Waterfowl use is concentrated on the Aquarius Plateau. In addition, the Escalante River, its drainages, other intermittent streams, stock ponds, etc., are also used.

Raptor nesting sites were studied in eastern Garfield County (Hoffman, 1978). Sparrow hawks were the most numerous nesters followed by red-tail hawks, Cooper's hawks, and great-horned owls. Most common nest sites were cliffs, riparian tree vegetation, and solitary Douglas fir stands. Nesting concentration areas were Fifty Mile Mountain, upper Alvey Wash, The Gulch, Black Canyon, and the north 4 miles of Straight Cliffs. Spotted owls, a UDWR sensitive species, were noted in upper Alvey Wash, west of the PRLAs.

Several species of small mammals, such as mice, rats, squirrels, shrews, moles, bats, gophers, and rabbits, are distributed throughout the region. Many of these are prey for raptors, badger, fox, coyote, bobcat, and skunk. Rabbits, bobcat, fox and coyote are hunted or trapped for sport and pelts. The high price of bobcat pelts has led to their increased hunting and trapping and declining population.

A total of 36 species of reptiles and 11 species of amphibians are in the area. They feed on vegetation, insects, fish, small mammals, reptiles, and amphibians, and are, in turn, prey for predatory mammals and birds. No threatened or endangered reptiles or amphibians are known in the region.

The American peregrine falcon (*Falco peregrinus anatum*) is one of the endangered bird species known in the region. Most sightings in recent years are probably migrant birds. The Northern bald eagle, an endangered species, winters in the valleys of Garfield County and along the Escalante River drainage.

In general, tributaries in the headwaters of the Escalante and Paria Rivers are cool, clear, and capable of supporting trout. As streamflow progresses downstream, irrigation withdrawals prevent stream growth; upper midsections of streams are usually dewatered. Downstream characteristics include warm temperature, high turbidity, heavy sediment load, high hardness and conductivity, fluctuating flow, many sections dewatered at times, and scarce fish.

Fish in the Escalante River system were investigated by McAda and others in their survey of fish in the southeastern Utah streams (McAda et al., 1977). It provides most of the fish data for this stream system. Although occasional trout are found in the Escalante, it is not classified as a sportfish stream by the Utah Division of Wildlife Resources. There are no reported endangered fish in the river. Seven streams tributary to the Escalante River

DESCRIPTION OF THE ENVIRONMENT

have fish populations: Deer, Calf, Sand, Death Hollow, Pine, North, and Birch Creeks. Sections of Boulder and Pine Creeks are dewatered for irrigation, whereas sections of Sand and Death Hollow Creeks have slickrock substrates and steep gradients, limiting their capacities to produce fish.

The Utah Division of Wildlife Resources does not classify the Paria River as a gamefish stream, and in McAda's survey (1977) they found only speckled dace at six sampling stations, both inside and outside the county.

The Aquarius Plateau and Griffin Top have 40 reservoirs and/or lakes classified as trout waters. Only three of these reservoirs cover more than 40 acres and more than half of them cover less than 5 acres.

LAND USE

The Kaiparowits Plateau is rural in character and nearly all of the lands are publicly owned and administered by BLM. Grazing is the predominate land use in the area. Parts of two grazing allotments (Alvey Wash and Last Chance) for cattle use during summer months are located on the PRLAs. About 200 AUMs are involved and the main grazing locations are in Little Valley, Camp Flat, and Relishen Seep areas. There are four springs on the two allotments.

In addition to grazing, the Federal lands are also managed for recreation use and mineral exploration and development.

Agricultural crop production is limited to small areas in or near the communities of Tropic, Henrieville, Cannonville, and Escalante. The predominant use of irrigated land is for pasture and alfalfa production, with limited acreage for small grains and corn. Lack of developed irrigation water and unfavorable economics have deterred further agriculture development.

SOCIOECONOMICS

To an even greater extent than the Wasatch Plateau-Emery area, Garfield County and its constituent communities retain a rural flavor. The largest of these communities (Escalante) had less than 800 inhabitants in 1978; the remainder had populations ranging between approximately 140 and 400. Population growth in Garfield County has been rather lethargic. Between 1960 and 1970 the population decreased 11.7 percent (from 3,577 to 3,157). From 1970 to 1976, the population remained around

3,200. In 1978, the population was estimated to be around 3,600.

The individual communities of Cannonville, Escalante, Henrieville, and Tropic have shown similar trends (Table 3-25). In the absence of major resource development projects, most of the communities in Garfield County are expected to either maintain approximately their current population levels or experience relatively slow but steady growth.

Employment in Garfield County has increased from 1,509 jobs in 1973 to 1,809 in 1978 (an increase of 20 percent, or an annual growth rate of 3.7 percent). At present, government is the largest employer providing 477 jobs or 26 percent of the total county employment. The service and manufacturing sectors are the next largest employer providing 296 jobs (16 percent) and 263 jobs (15 percent) respectively. Mining employment in Garfield County has grown from 13 jobs in 1973 to 113 jobs in 1978 (an increase of almost 800 percent). Total personal income in Garfield County has grown from \$10.9 million in 1973 to \$19.9 million in 1979 (an annual increase of 10.5 percent). Per capita income in Garfield County in 1978 was \$5,574, 15 percent below the State average of \$6,594 and 29 percent below the national average of \$7,840.

The Garfield School District has substantial unused pupil capacity in nearly all schools. The district has been losing pupils at the rate of 2 to 3 percent per year resulting in loss of appropriations for school programs and teacher salaries. In the 1950s, there were approximately 1,600 pupils enrolled in district schools. At present, the figure is approximately half of that (842 pupils projected for fall of 1980). This decline in enrollment is most severe in Escalante where they are in danger of losing bus service due to declining enrollments. It is estimated that the district enrollment could double without the need for any additional construction (personal communication, Jolley, 1980). The exception to this situation is Escalante where little excess capacity exists in the elementary school.

The county is served by Garfield Memorial Hospital, a new 20-bed facility located in Panguitch. The hospital has been operating between 30 and 35 percent capacity. Based at the hospital, a team of three physicians and other health professionals extend health services to outlying areas through a network of satellite clinics.

None of the four communities under study has a full-time police force of its own; instead they rely on the Garfield County Sheriff's Office for police protection. These arrangements appear adequate at present, as attested by the extremely low local crime rates. Fire insurance ratings in all communities are unsatisfactory (i.e., between eight and ten).

TABLE 3-24

UPLAND GAME IN GARFIELD COUNTY

Species	Vegetation Types	1979 Harvest	Percent of State Total	Remarks
Mourning Dove	Agricultural land, streamside, seedings	3,915	1.1	Generally found throughout county below 9,000 foot elevation.
Cottontail Rabbits	Agricultural streamside, sagebrush	1,270	0.6	Generally found throughout county below 9,000 foot elevation.
Sage Grouse	Sagebrush	1,223	4.32	Concentrate on Aquarius Plateau, John's Valley, Sevier River.
Forest Grouse	Conifer-Aspen Mountain Meadow	204	0.34	Mountains above 8,500 foot elevation
Ring-neck Pheasant	Agricultural land	190	0.09	Sevier River Valley
Chukar	Desert Shrub	175	0.30	Escalante and Paria drainages.

TABLE 3-25

POPULATION TRENDS IN GARFIELD COUNTY AND POTENTIALLY AFFECTED COMMUNITIES

	^a 1960	^a 1970	^b 1980	Percent Change 1960-1970	Percent Change 1970-1980
Garfield County	3,577	3,157	3,513	-11.7	11
Cannonville	153	113	132	-26.1	17
Escalante	702	638	641	- 9.1	5
Henrieville	152	145	161	- 4.6	11
Tropic	382	392	334	-15.2	-15
Panguitch	1,435	1,318	1,328	-11.2	

^a1970 Census^b1980 Census preliminary estimates (these are subject to change)

DESCRIPTION OF THE ENVIRONMENT

All of the communities, with the exception of Tropic, rely on individual septic tank systems. These systems are adequate to meet the communities' present liquid waste disposal requirements. Every community either has or is constructing an adequate water system. Escalante, for example, has been approved by FHA for a loan to upgrade the current culinary water system. The New Escalante Irrigation Company and the Pine Creek Irrigation Company are currently negotiating with the State Water Resources Division to improve existing irrigation systems.

While life in Garfield County remains largely rural in orientation and lifestyle, local residents are very aware of the implications of large-scale coal development for their area. A 1978 public opinion poll conducted in Tropic, Cannonville, and Henrieville revealed that although 95 percent of the interviewees wanted coal development to occur, most favored a moderate rate of coal development to allow local communities to provide necessary facilities and services. While undoubtedly leading to an erosion of the small-town, rural way of life, coal development was viewed as offering offsetting advantages, particularly in the form of new job opportunities which would enable young people to remain in the community rather than emigrating in search of work. Other potential advantages foreseen by respondents include better public services and facilities, entertainment, and cultural opportunities.

TRANSPORTATION

Vehicular traffic into eastern Garfield County is carried almost entirely by Utah Highway 12, connecting Escalante with U.S. 89. Utah Highway 12 leaves U.S. 89 south of Panguitch going east passing through Red Canyon and the northern portion of Bryce Canyon National Park. Both areas have excellent scenic values and carry considerable tourist traffic. U-12 then goes through the small communities of Tropic, Cannonville, Henrieville, and Escalante before terminating at Boulder, Utah. A road, presently being upgraded, connects Boulder with Grover and Torrey and Utah Highway 24, around the east side of Boulder Mountain through rough terrain. None of these routes are satisfactory for moving heavy traffic volumes. Fortunately, except for the 1,620 vpd between the junction with U.S. 89 and Bryce Canyon, these roads carry light traffic (between 100 and 650 vpd), including petroleum tank trucks from the west side of the Escalante Mountains westward to U.S. 89.

Access to the north end of the Kaiparowits Plateau is almost entirely by an unpaved road south and west out of Escalante through Alvey Wash.

This road continues southward to U.S. 89 at Glen Canyon City. In places a safe speed on this road may be 20 miles per hour. It is also possible to reach the area over a poor road from the base of the Straight Cliffs southeast of Escalante up the Left Hand Collet Canyon, thus approaching the area from the south. Although traffic counts are not available, traffic across the Plateau would run on the order of 20 to 30 vpd, mostly trucks and four-wheel drive vehicles.

At present, no railroads serve the area. The nearest spur lines are a Union Pacific spur about 130 miles west of Escalante at Cedar City, and a Denver & Rio Grande spur line, partly in poor condition, about 118 miles northwest at Marysvale. A study was recently completed to determine effects if any of several alternative rail routes projected to serve the Kaiparowits Plateau (ERT, 1980). Under consideration would be a 190-mile route from the Union Pacific mainline at Milford generally south and east to Alton, then in a general concave northward curve onto the south edge of the Kaiparowits Plateau, from where various spur lines would branch to proposed mining developments including the PRLAs.

Scheduled air service is maintained to Cedar City and Page. The Escalante municipal airport has a paved and lighted runway for light planes.

CULTURAL RESOURCES

Cultural resource inventories for the proposed lease area are incomplete, yet various research studies indicate that the Alvey Wash area supports a highly significant diverse and complex cultural resource base. The area represents a contact zone for northern and southern prehistoric (Fremont-Anasazi) and historic (Paiute-Navajo) culturally unique groups. The nature of this relationship between co-existent Fremont-Anasazi and Paiute-Navajo cultures is a major archaeological unknown which the Alvey Wash area has a potential for clarifying.

Site densities on the tract are anticipated to exceed five sites per square mile. Brief reconnaissance surveys performed adjacent to existing roads and drainages, identified 16 prehistoric and historic sites of Sevier Fremont, Kayenta Anasazi, and historic Paiute, Ute, and Navajo affiliation. Site types range from highly significant masonry structures and rockshelters to temporary camps, lithic scatters, and rock art. National Register of Historic Places eligibility for known sites has not been determined. It is anticipated that sites along Alvey Wash and environs represent a portion of an as yet undefined archaeological district of National Register caliber.

DESCRIPTION OF THE ENVIRONMENT

No National Register listed or nominated properties are located on the PRLAs.

SPECIAL DESIGNATION AREAS

Within Garfield County there are five designated natural areas located outside of PRLAs. There are no officially designated wilderness areas, primitive areas, or wild and scenic rivers in the County. There are, however, 24 areas that are presently being reviewed for wilderness values. Four rivers are presently being reviewed for wild and scenic river values. These 28 areas with potential for special designation are listed in Appendix 6. They are located outside of the PRLAs except for the three BLM roadless units previously mentioned.

The PRLAs are located within portions of three BLM roadless inventory units: UT-040-075, UT-040-076, and UT-040-078. These units were inventoried for possible inclusion in the National Wilderness Preservation System, were determined to lack wilderness character and were released from further wilderness review (Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980).

However, the inventory findings and the subsequent decision were protested (December, 1980) and until a decision is again reached (timeframe unknown) the units remain under wilderness review and must be managed in a manner that will not impair any suitability they may have for wilderness designation.

VISUAL RESOURCES

The scenic character of Garfield County is one of open space and variation in landform, vegetation, and color with minimal human influence. The landscape includes sparsely vegetated desert valleys, forested plateaus and colorful canyonlands. Garfield County is rich in natural scenic attraction, including five designated outstanding natural areas, Kodachrome Basin State Reserve, and portions of Bryce Canyon National Park, Capitol Reef National Park, Glen Canyon National Recreation Area, Dixie National Forest, and the Kaiparowits Plateau. Small, somewhat isolated rural towns, access roads, mining developments, transmission lines, livestock grazing, and recreational developments have had only minimal impact on the area, which remains largely undisturbed by the presence of man.

The PRLAs are located in the north portion of the Kaiparowits Plateau, and would be highly visible from an ungraded low-volume access road. The

remote and pristine qualities of the Kaiparowits Plateau are valued by individuals and organizations throughout the nation. The lands encompassed by the PRLAs have neither outstanding nor unique scenic values. They are located in a rolling portion of the Kaiparowits that is moderate to low in scenic quality, is common throughout the area, and has been given a VRM Class IV rating. In some portions of the PRLAs, roads and other disturbances resulting from mineral exploration and livestock development are prevalent. However, most of the PRLAs and surrounding lands appear natural.

RECREATION

Garfield County has an abundance of recreation resource lands and, along with Kane County, is the most tourism-dependent county in Utah. Within Garfield County are portions of the Dixie National Forest, Bryce Canyon National Park, Glen Canyon National Recreation Area, Capitol Reef National Park, and five designated outstanding natural areas.

Nearly all land in Garfield County is used for dispersed outdoor recreation (e.g., hunting, fishing, sightseeing, off-road vehicle use and backpacking. The Escalante River is known nationally for its backpacking opportunities). If Statewide statistics are applied, approximately 17.5 percent or 691 residents of Garfield County presently hunt deer; approximately 1.7 percent or 67 residents hunt elk; 8.5 percent or 336 residents hunt upland game and 45 percent or 1,778 residents fish (Thayne and Hudson, 1978). The success trend in the county is down from early 1970 figures for big game hunting and fishing, but is generally up from 1970 figures for upland game hunting (UDWR, Big Game, 1980; Upland Game, 1979; Fishery Management, 1979). Of the total people hunting deer in the Four-County region, only about 11 percent of the deer hunters originate in Garfield County (UDWR, Big Game, 1980).

Despite the recreation resources in the county, developed recreation sites (campgrounds and picnic areas), particularly campsites, are in short supply and do not meet standards proposed by the State of Utah (SCORP, 1973). Nine of the 17 developed sites listed in Table 3-26 demonstrate 1976 use rates at or greater than capacity.

There are not sufficient golf courses, tennis courts, playing fields and swimming pools in Garfield County to meet standards proposed by the State of Utah (SCORP, 1970).

The PRLAs support intermittent dispersed recreational activities (e.g. sightseeing and ORV activity).

TABLE 3-26

RECREATION USE ON SELECTED SITES IN GARFIELD COUNTY

Agency	Site	Visitor Days ^a	Percent of Managing Theoretical Maximum Capacity ^b
BLM	1. Calf Creek	4,154	Use at capacity
	2. Lonesome Beaver	500	Use below capacity
	3. McMillan Springs	250	Use below capacity
	4. Starr Springs	10,000	Use at capacity
	5. Deer Creek	1,000	Use below capacity
	6. Devil's Garden	1,000	Use below capacity
FS	1. Panguitch Lake North Campground	28,600	63
	2. Spruces Campground	11,200	34
	3. Duck Creek	43,100	33
	4. Panguitch Lake South Campground	10,300	54
	5. Pine Lake Campground	17,300	55
	6. Blue Spruce Campground	1,000	16
	7. Posey Lake Campground	4,900	15
	8. White Bridge Campground	15,600	50
NPS	1. North and Sunset Campgrounds	NA ^c (101,977 visits)	Use above capacity
	2. Bullfrog (just outside Garfield County)	NA	Use above capacity
	3. Hite (just outside County)	NA	Use above capacity

Source: BLM, FS, NPS 1979-1980 visitor use figures

^aRecreation use reported in visitor days for 1979-1980 (visitor day consists of 12 visitor hours which may be aggregated by one or more persons)

^bBeyond 40 percent use, sites deteriorate rapidly, require heavy maintenance, and user experience levels diminish from overcrowding (i.e., loss of privacy, increase in noise, etc.)

^cNot available

DESCRIPTION OF THE ENVIRONMENT

Approximately 6.8 percent or 269 residents in Garfield County own motorcycles and approximately 35 percent or 383 residents presently own a two-wheel drive truck or a four-wheel drive vehicle. The region provides adequately for presently occurring off-road vehicle activity (SCORP, 1978). However, the area is not suited to provide intensively for any increase of these activities. The PRLAs do not contain any developed recreation sites. The existing road in Alvey Wash is used by an unquantified number of travelers for recreational access onto the Kaiparowits Plateau and could eventually be upgraded as a main access into the area.

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This portion of the chapter (the first of three parts), is a description of the assumptions and guidelines used for impact analysis. The second part is a detailed analysis of the impacts of the five alternatives identified for the Federal coal leasing program and the Hollberg PRLA. Finally, the third part is an analysis of the two alternatives identified for the proposed Utah Power and Light (UP&L) exchange.

Discussion of impacts is focused on those resources which would be most significantly affected. The majority of physical impacts would be restricted to the actual tracts or Preference Right Lease Applications (PRLAs). However, anticipated impacts to resources such as air quality, socioeconomic, transportation, recreation, and visual resources would have regional implications and are considered on a broader basis.

ANALYSIS ASSUMPTIONS AND GUIDELINES

The following basic assumptions and estimates were made to facilitate analysis of the environmental impacts of mining and coal related developments considered in this statement:

1. The impacts described in this Chapter that are attributable to Alternatives One through Four would be in addition to those baseline impacts described in Alternative Five (No Action). The cumulative impacts that would result by the year 2000 can be determined by adding the projected impacts from proposed leasing to the projected baseline impacts from other development.
2. Proposed mines would not be producing before 1985, but would all begin production by 1987. Full projected production would be reached by 1990.
3. Coal production figures are based on a 31 to 50-percent recovery rate for underground mines and an 85 to 90-percent recovery rate for surface mines.
4. Mine production would average 15 tons per man-shift for underground mining and 75 tons per man-shift for surface mining.
5. In underground mines, longwall mining methods would be used where technically and economically feasible. Room and pillar methods would be used where necessary.
6. Disturbed lands not occupied by housing development would be reclaimed. Lands converted to housing or retired to provide community water would not be reclaimed or returned to agriculture in the future.
7. Community development would be at the rate of 18 people per acre, half of which would be on irrigated agricultural land. The water required to irrigate 1 acre annually would supply the annual water needs of 14.3 people.
8. Water needs for mining and expanded communities would be met by obtaining rights to irrigation water. For each acre of community development, 0.38 acre of irrigated cropland would be retired to provide community water needs.
9. Annual water use per person would be at the rate of 225 gallons per day. For each gallon used, 0.5 gallon would be returned to the system for downstream irrigation use.
10. Sewage treatment plants and effluent would conform to State and/or EPA standards.
11. The planned Castle Valley Railroad Spur would be built by Denver and Rio Grande Western (D&RGW) and functioning by the time the tracts begin producing coal.
12. Future traffic projections for 1995 on highway segments are based on historic trends plus projections for a coal production rate of 24 million tons per year and the distribution of increased population resulting from Federal coal leasing considered in this statement.
13. Future traffic would be accommodated on the existing and presently proposed highway system. Shortfalls in capacity would be accommodated through expansion of the specific overloaded elements of this system.
14. Coal-haul trucks using public roads would have a net load capacity of 25 tons.
15. All coal transportation to railroad loading facilities would be by truck with the possible exception of the North Horn Mountain tract on which a conveyor could be used to move the coal from the mine to UP&L's Hunter powerplant.
16. Incidental service-truck traffic to mines would be 20 visits per day per million tons per year of coal production.

ENVIRONMENTAL CONSEQUENCES

17. If the proposed UP&L exchange is not consummated and commercial quantities of coal on UP&L's PRLAs are subsequently proven, the PRLAs on the Kaiparowits Plateau would be developed in accordance with applicable laws and regulations.

18. Coal would be hauled off the Kaiparowits Plateau by railroad (ERT, 1980) in association with production of other mines in the area.

FEDERAL COAL LEASING PROGRAM

Alternative One

Alternative One considers the leasing of all eleven tracts identified in this EIS, and represents the maximum level of coal leasing proposed. The Hollberg PRLA is also considered as part of this Alternative. Tracts that would be mined by underground methods include Tucker Canyon, Slaughterhouse Canyon, Miller Creek, Gordon Creek, Meetinghouse Canyon, Rilda Canyon, Cottonwood, North Horn Mountain, and Emery South. The Emery Central tract would be surface mined. The Emery North tract would be mined by a combination of surface and underground methods. The following section discusses anticipated impacts that would result from implementing Alternative One.

AIR QUALITY

Impacts to air quality would be particulate emissions from mining and related activities and increased emissions of all National Ambient Air Quality Standards (NAAQS) criteria pollutants from the resulting population increases. Dispersion modeling was performed by Radian Corporation under contract to BLM to estimate ground-level concentrations of total suspended particulates (TSP), sulfur dioxide, and nitrogen dioxide. Details of the model used, assumed meteorological conditions, and emission factors are presented in Appendix 7. The predicted annual TSP concentrations (above background levels) for Alternative One in the year 2000 are shown in Figure 4-1. The levels shown include impacts caused by mining, population related activities and major industrial sources, as well as impacts caused by leasing the tracts considered in this Alternative. Figure 4-2 shows the impacts from these sources without the impacts that would result from leasing under this Alternative.

When the concentrations shown in Figure 4-1 are added to estimated annual background concentrations of 38 micrograms per cubic meter, TSP levels within several kilometers of the tracts and haul roads would exceed the secondary and possibly the primary annual NAAQS of 60 and 75 micrograms per cubic meter, respectively. The major contributor to the high particulate concentrations is dust from unpaved haul or access roads associated with underground and surface mines. The analysis assumed a worst case condition of only watering of unpaved roads as control for fugitive dusts. However, the State of Utah Air Quality Bureau in their comments on the DEIS, stated: "The State of Utah is committed to the maintenance of air quality standards and will insure through application of BACT that the NAAQS are not exceeded." Best Available Control Technology (BACT) would be determined at the time the State reviewed mine applications for issuance of an Air Quality Approval Order.

The population and transportation growth would have an insignificant effect on TSP concentrations near Price and Helper. However, the proximity of lease tracts to Castle Dale and Orangeville would cause an estimated 10 micrograms per cubic meter increase in TSP over the no action levels near these towns.

The population and transportation growth would have a small effect on the levels of nitrogen dioxide and sulfur dioxide in the region. A comparison of the estimated concentrations of nitrogen dioxide and sulfur dioxide for Alternative One (Figures 4-3 and 4-4) with the estimated concentrations with no new leasing (Figures 4-5 and 4-6) shows a negligible impact regionally. No exceedence of the NAAQS would be expected (Radian 1981).

A statistical technique was applied to annual average modeling results to estimate maximum short-term pollutant levels (Larsen, 1971). It was found that the major contribution to short-term (24 hour) TSP concentrations would be from mine haul roads. Since haul road traffic is proportional to the annual production, fugitive emissions generated by vehicle travel would be greater at the larger mines. High annual TSP concentrations were predicted to occur near the North Horn Mountain, Emery Central, Emery North, and Gordon Creek tracts.

Maximum 24-hour TSP concentrations (including background) calculated for these areas were 210, 170 and 200 micrograms per cubic meter respectively. The possible interaction of emissions from the Cottonwood and Meetinghouse Canyon tracts and from nearby mines (several of which utilize the same haul road) would result in a 24-hour TSP level of 185 micrograms per cubic meter. These concentrations would be greater than the allowable

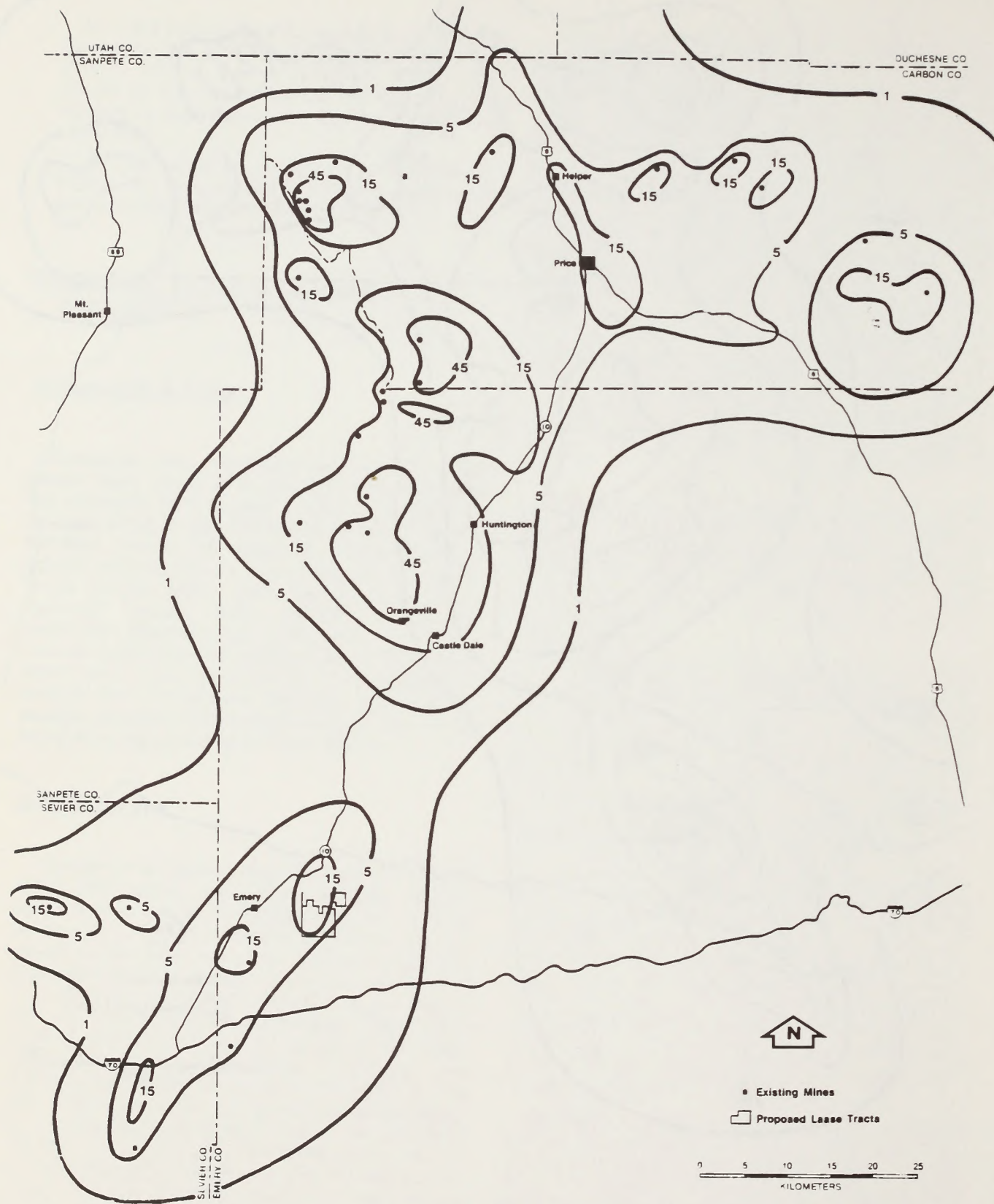


FIGURE 4-2

ANNUAL AVERAGE TOTAL SUSPENDED PARTICULATES CONCENTRATION ISOPLETHS IN THE YEAR 2000 WITH NO NEW COAL LEASING (MICROGRAMS PER CUBIC METER)

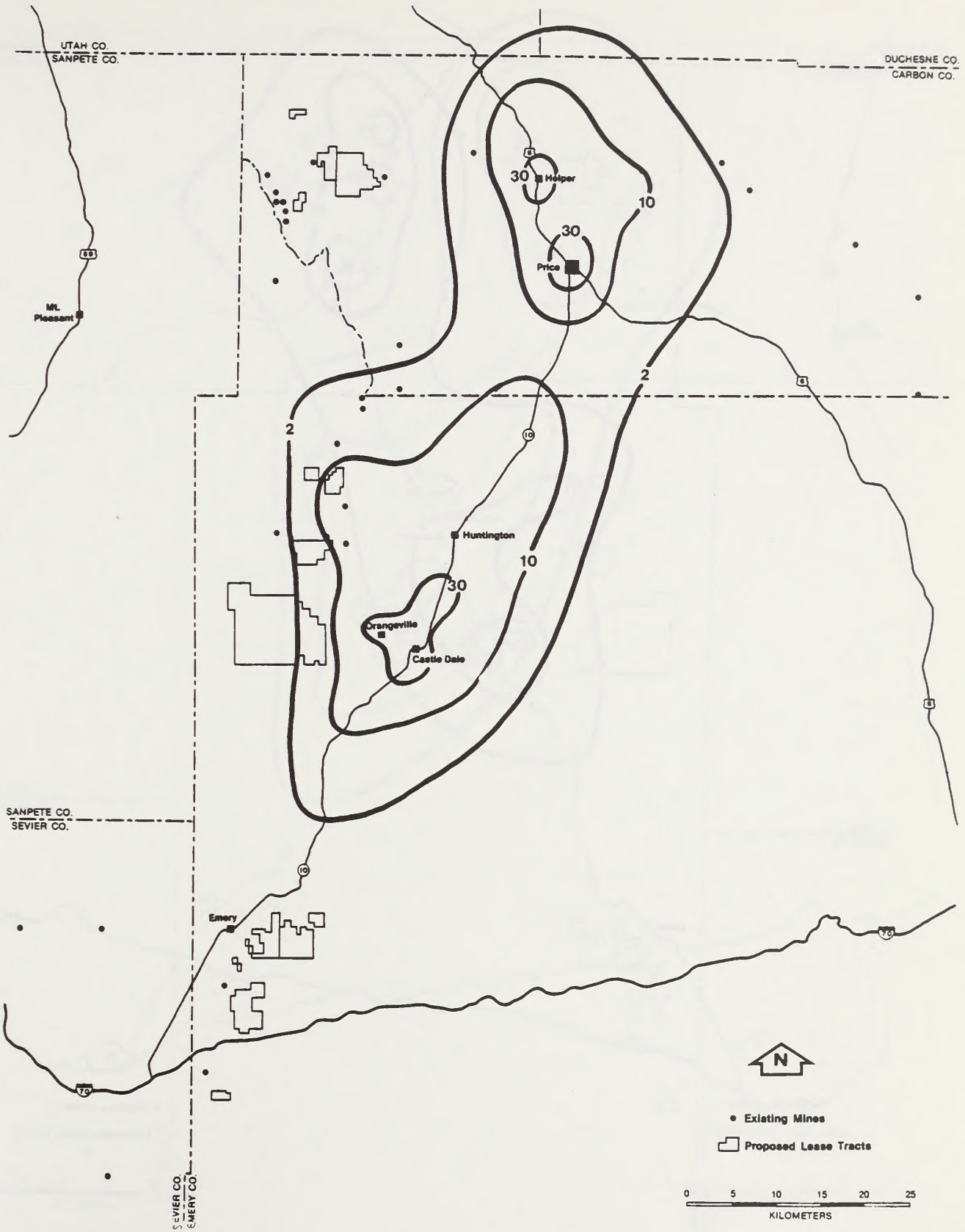


FIGURE 4-3

ANNUAL AVERAGE NITROGEN DIOXIDE CONCENTRATION ISOPLETHS
IN THE YEAR 2000 FOR ALTERNATIVE ONE (MICROGRAMS PER CUBIC METER)

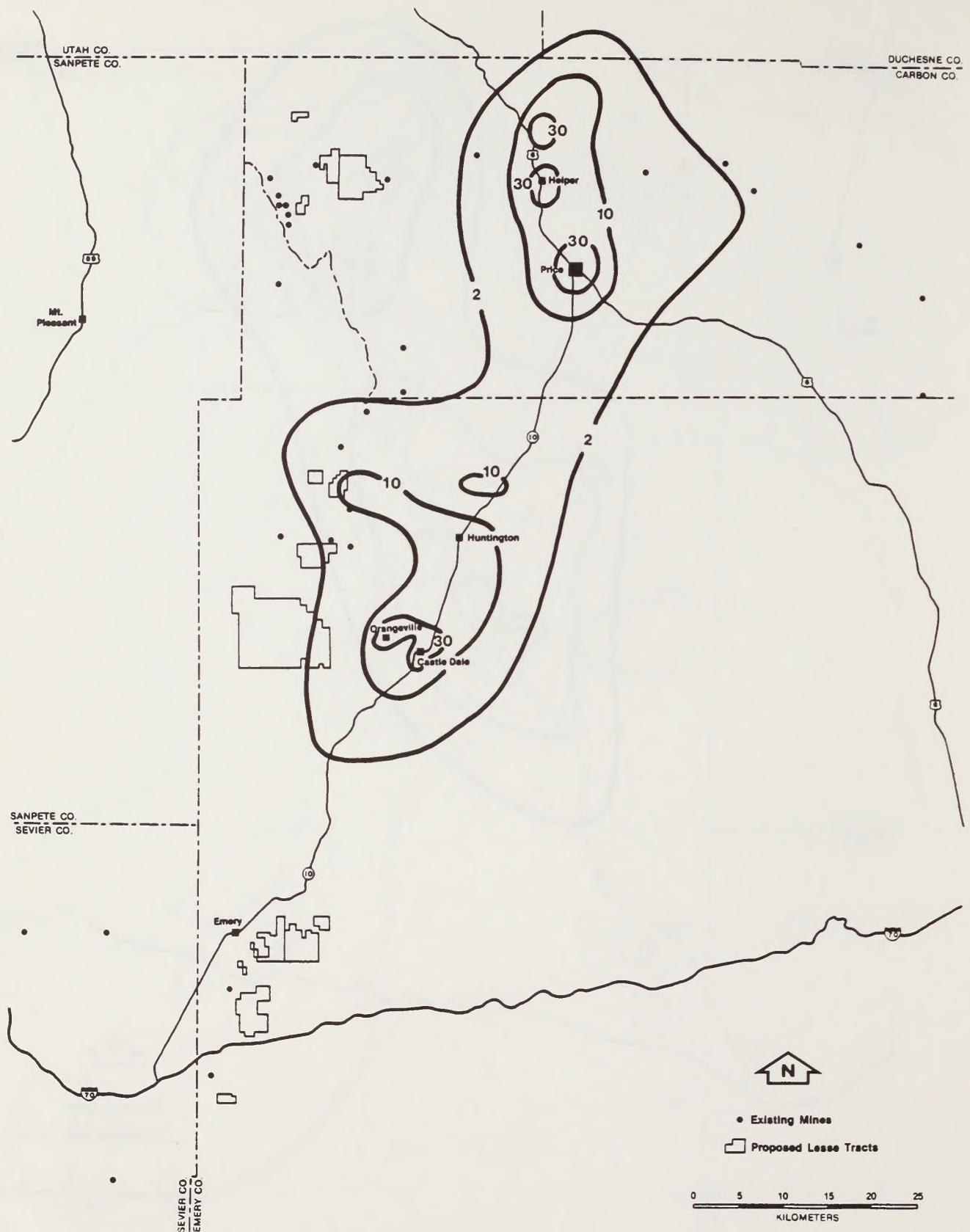


FIGURE 4-4

ANNUAL AVERAGE SULFUR DIOXIDE CONCENTRATION ISOPLETHS
IN THE YEAR 2000 FOR ALTERNATIVE ONE (MICROGRAMS PER CUBIC METER)

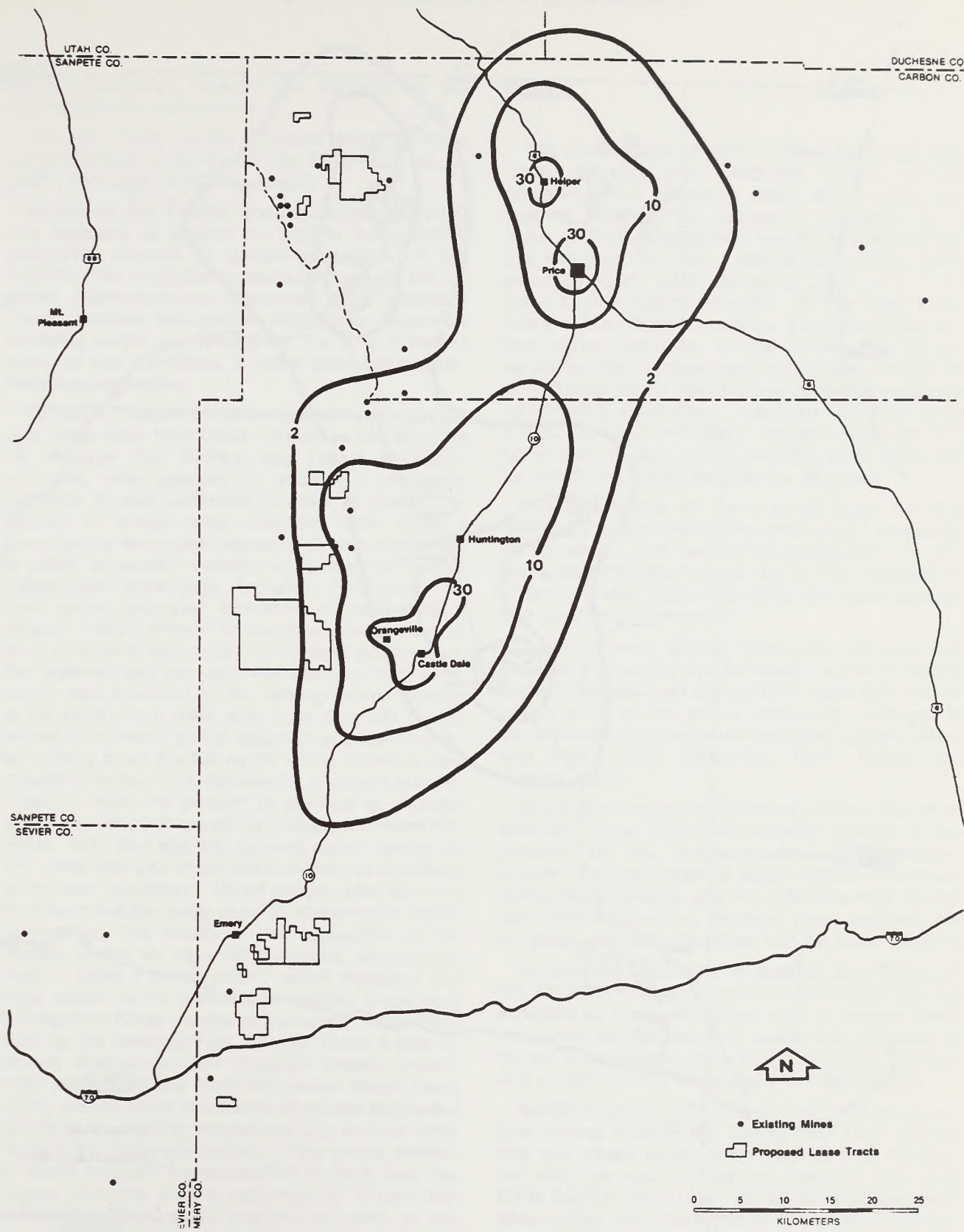


FIGURE 4-5

AVERAGE ANNUAL NITROGEN DIOXIDE CONCENTRATION ISOPLETHS
 IN THE YEAR 2000 WITH NO NEW COAL LEASING (MICROGRAMS PER CUBIC METER)

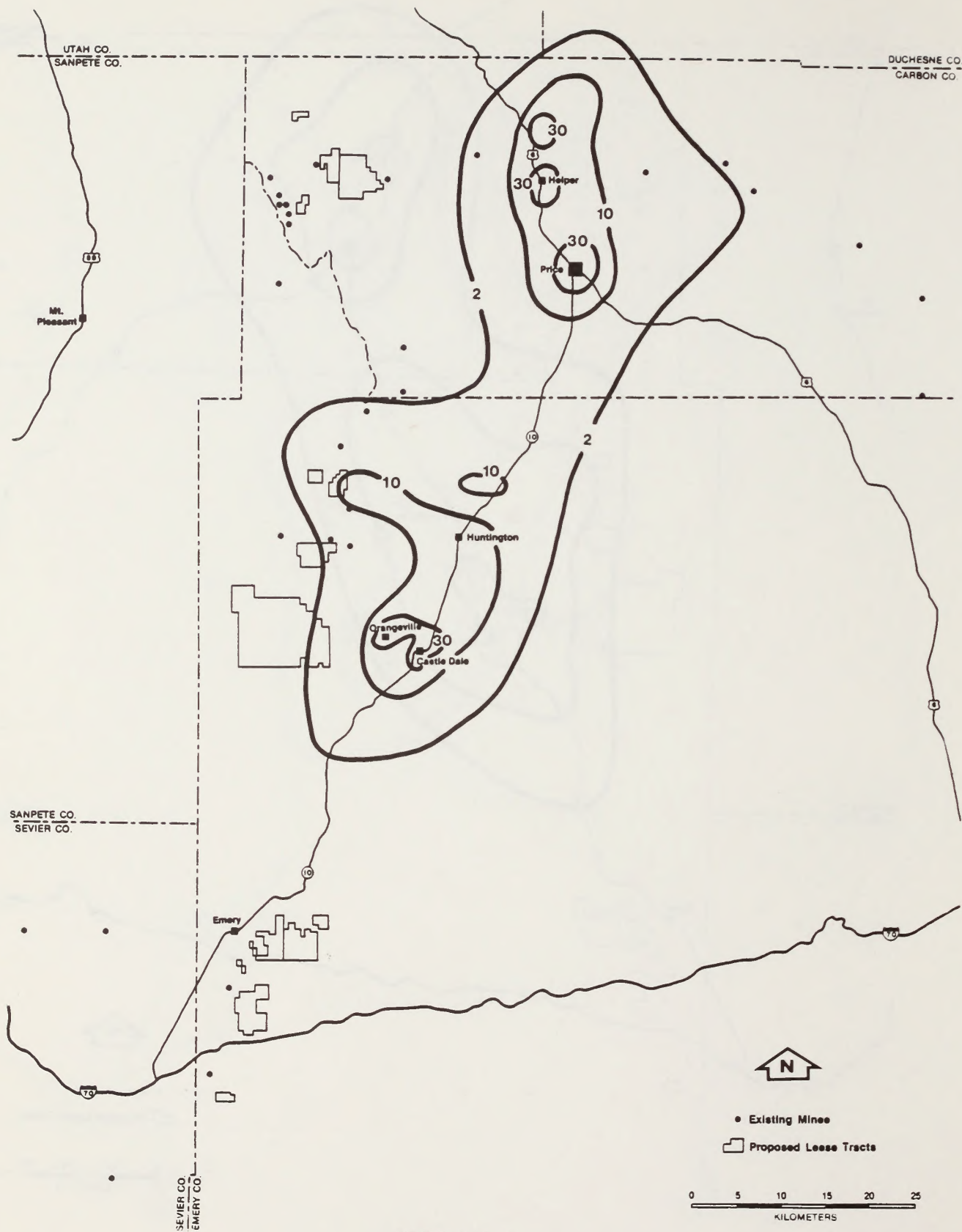


FIGURE 4-6

AVERAGE ANNUAL SULFUR DIOXIDE CONCENTRATION ISOPLETHS
IN THE YEAR 2000 WITH NO NEW COAL LEASING (MICROGRAMS PER CUBIC METER)

ENVIRONMENTAL CONSEQUENCES

24-hour secondary NAAQS TSP standard of 150 micrograms per cubic meter.

The contribution of the proposed action to these concentrations would be 95, 20, 15, and 15 micrograms per cubic meter respectively.

Based on the Radian analysis, which assumed only watering as control for fugitive dusts, BACT would be required to assure protection of the NAAQS. The predicted concentration values are regional approximations determined from statistical trends. Precise site-specific microscale dispersion modeling would be needed, at the time a mining proposal was submitted, to more adequately determine concentrations.

To predict regional visibility impacts upon important vistas seen from Class I areas, as identified by the National Park Service, four impact simulation scenarios were selected. In addition a simulation (scenario 5) was performed in order to predict the visibility of onsite mine emissions from Class I areas and a simulation (scenario 6) was performed in order to predict visibility impairment in Castle Valley under worst-case stagnation conditions. The sight paths and wind directions for scenarios 1 through 4 were chosen to maximize the amount of mine emissions that would be transported between the observer and the vista. For scenario 5, the observer was assumed to be looking almost directly at the North Horn mine area from a variety of distances. In scenario 6, the observer was assumed to be looking down the full length of the Castle Valley modeling region. This represents a worst-case orientation, since the amount of polluted air through which the observer would be looking is maximized. Higher than average background visual ranges of 121 miles and 243 miles were chosen to represent worst-case conditions. Visual range reduction and contrast reduction were used to characterize visibility impacts. The results of the application of the models to the six selected scenarios are summarized in Table 4 in Appendix 7 which indicates that there would be no perceptible visibility impairment looking from Class I areas to the scenic vistas identified by the National Park Service. Table 4 also indicates that perceivable regional visibility impairment caused by the proposed action would rarely occur, except under conditions of severe stagnation (scenario 6). Visibility impairment due to dust emissions in the immediate vicinity of the mines, however would probably be perceptible at fairly long distances from the source (scenario 5). Onsite dust clouds, therefore, would probably be seen by observers in Class I areas who are looking directly at the mines (Radian 1981). Particulate emission rates used for visibility modeling assumed only watering for control of fugitive dusts from unpaved haul and access roads. Application of BACT would reduce visibility impacts.

SOILS

The construction of mine facilities (buildings, haul roads, storage sites, sediment ponds, portals, powerlines and telephone lines), and housing and support facilities for population increases as a result of mine development, would cumulatively disturb 679 acres by 1987, 1,688 acres by 1990, 2,215 acres by 1995, 2,696 acres by 2000, and 4,114 acres by the end of mine life. Of this total, 2,720 acres of disturbance would be associated with surface mining activities. A total of 93 acres of soil would be disturbed annually by surface mining. As reclamation efforts would occur contemporaneously with mining operations, maximum disturbed area subject to wind and water erosion would be 279 acres from surface mining and 953 acres disturbed for onsite and offsite facilities for all mines.

The disturbance on 3,673 acres would be of a temporary nature since the land would eventually be reclaimed. The loss of soil productivity on 441 acres would be permanent due to the construction of housing and support facilities for future population increases in the region.

Surface mining activity would alter soil structure causing changes in the soil-water regime including water infiltration and permeability rates and the inherent ability of the soil to hold water. Changes in the soil-water regime would limit plant growth (Merz and Finn, 1951; Chapman, 1967; Geyer and Rogers, 1972).

Soil erosion would occur where surface disturbing activities occur. Soil loss through erosion is dependent on the soil's physical characteristics, degree of slope, length of slope, climatic conditions during soil exposure, and the effectiveness of erosion control measures. Because these variables are so great, soil loss estimates can be quite variable.

No attempt was made to quantify soil losses on the Wasatch Plateau, because information was not available as to exactly where mine or support facilities might be located. Soil losses are expected to be low if reasonable care in site selection is taken and erosion control measures are implemented.

Sediment yield studies conducted on a simulated post mining area in the Emery coal field indicate that soil losses would range from 0.45 to 1.2 tons per acre per year for surface mines in that area (BLM EMRIA Report No. 16, 1979). Soil loss tolerance values (maximum rate of soil erosion that can occur and still remain productive) are 1 to 2 tons per acre per year (1 ton = 0.0063 inch soil acre). No significant increase in sediment yields is expected assuming reasonable care in surface shaping is employed during reclamation (BLM EMRIA Report No. 16, 1979). Assuming a 3-year period from the

ENVIRONMENTAL CONSEQUENCES

disturbance until initial establishment of vegetation cover, and a soil loss of 1 ton per acre per year, 0.0189 inch of soil would be lost for each acre disturbed by surface mining (Soil Conservation Service, 1978).

Potentially toxic and nutrient deficient overburden not adequately buried or treated would delay reclamation of some disturbed areas (Berg, 1975). Areas where timely revegetation did not occur would be subject to continued wind and water erosion at approximately the above mentioned rate until vegetation became established.

Stockpiled topsoil on the Wasatch Plateau and Emery tracts would be subjected to wind and water erosion, causing additional soil losses. Soil loss amounts from this source cannot be quantified. Other impacts to soil as a result of removal, handling, and stockpiling include the loss of fertility by the introduction of inferior subsoils and the biological death of soil micro-organisms (Environmental Protection Agency, 1974). The overall effect would be a loss in soil productivity for the period from disturbance until reclamation was successful.

WATER RESOURCES

The proposed leasing and development of coal would have little impact on water resources on a regional basis. Enforcement of regulatory requirements related to the Surface Mining Control and Reclamation Act of 1977 would minimize the impact of mining and confine effects to the extent possible to the leased tracts. Consequently the impacts on water resources resulting directly from leasing and development of new Federal coal would occur almost entirely in the vicinity of the lease tracts and would have no significant effect on the regional hydrologic system. Impacts that would result from underground and surface mining are discussed below.

Surface Water Source Distribution

The existing surface water source distribution would be disrupted by surface mining and by possible subsidence associated with underground mining. The impact would be that of the shift of the water source physical location. Surface mining would disrupt existing drainage patterns and remove any natural ephemeral ponds or tanks.

Muddy Creek, a perennial stream, crosses the Emery North coal tract. The Muddy's 100-year peak flood flow is 4,590 cubic feet per second (CFS) which is 12 feet higher in the channel than the

medium flow. The floodplain would be excluded from the minable coal area because of the floodplain determination (43 CFR 3461.1 no. 16). Office of Surface Mining regulations 30 CFR 816.57 would require a buffer strip of 100 feet beyond the actual floodplain width. Therefore, no impacts to the floodplain would occur.

Subsidence from underground mining could affect stream flow and ponded water such as Snow Lake. The overburden of three underground mines ranges from 200 feet thick at South Emery to 2,000 feet thick at North Horn. The deeper the overburden the less likely fissures would affect the surface waters. Subsidence fissures that intersect surface water supplies would dewater them to some extent depending on several factors such as depth of overburden, soil texture, formation, water flow, etc. This dewatering could be of short duration if the fissures were filled quickly with sediment or long lasting when the fissures are not able to be sealed off naturally.

Water Quantity

The increased consumptive use of water attributable to the leasing of coal and associated population increases is shown in Table 4-1. The increased use would be 577 acre-feet in 1987, increasing to 1,075 acre-feet in 2000. This would represent a loss of stream flow in certain tributaries of the Green and Colorado Rivers of less than 1 percent. The water would come from existing permitted uses that are not being fully utilized or the transfer of current water rights from other uses such as irrigation.

Water Quality

Additional development within the region would generally increase sedimentation and salinity of streams. The causes would be: (1) increased sediment and salt loading from municipal and industrial wastes, leaching of spoil piles, construction sites, and mine effluent, and (2) the concentrating effects of the consumptive use of good-quality water that formerly diluted poorer quality water entering the surface-water system downstream.

Chemical quality alterations of the water due to the coal mining operations would be generally of local extent. The coal being mined has a sulfur content of less than 1 percent, therefore, leaching would add very little sulfur to the drainage and (because most of the water in the study area is highly alkaline), it would buffer any acid mine water that

TABLE 4-1

CUMULATIVE IMPACTS ON WATER RESOURCES AND REGIONAL SIGNIFICANCE
ALTERNATIVE ONE

Item	1987	1990	1995	2000
Population Impact from Leasing	3,777	6,616	7,744	7,931
Consumptive Use of Water ^a Increase (+) or Decrease (-) in Stream Flow (ac-ft/yr)	-476	-834	-976	-974
Mining Use	-101	-101	-101	-101
Percent Change in Stream Flow	-0.26	-0.42	-0.48	-0.48
Decrease in Irrigated Acreage	-160	-260	-299	-299
Increase in Dissolved Solids in Colorado River mg/L	0.05	0.07	0.09	0.09
Increased Cost to Downstream Users (Dollars ^b)	20,000	28,000	35,000	35,000

^aUsed 225 gallons per day per person and allowed 50 percent return flow through sewage effluent

^bBased on \$393,000 (1978 dollars) for each 1 mg/L increase in dissolved solid concentration rounded to nearest 1,000

ENVIRONMENTAL CONSEQUENCES

reached the drainages. A study of mine drainage in Colorado shows essentially no coal-mine drainage problems attributed mainly to the low sulfur content of western coal (Wentz, 1974).

The total dissolved solids (TDS) in streams on the Wasatch Plateau range from 200 to 500 milligrams per liter (mg/L). UP&L monitoring of their Wilberg Mine for 1979 showed an average TDS concentration of 283 mg/L for Cottonwood Creek and an average TDS concentration of 915 mg/L for Wilberg. The 1979 discharge from Wilberg Mine into Grimes Wash was 217 acre-feet for the year (UP&L, 1980). Therefore, the weighted average TDS concentration for Cottonwood Creek is 284.95 mg/L, only a 1.95 mg/L increase with the mine discharge. For other mines the increase could be more or less than experienced at the Wilberg Mine depending on the relative amounts of water and the dissolved solids concentration of the different sources of water involved. However, it is believed that the conditions at the Wilberg Mine are representative of conditions to be found in the proposed lease areas. It seems unlikely, therefore, that mine discharge would require special treatment. The impact of discharging mine effluent into local streams is not expected to have any significant impact on water quality with respect to aquatic biota or downstream use.

Muddy Creek, which flows through the area of the Emery tracts is saline. Monitoring in the area shows the Muddy TDS to be 5,380 mg/L (BLM EMRIA No. 16, 1979). Also sampling of the Browning mine spoil leachates shows a TDS concentration of 4,970 mg/L. It is assumed that the leachates from the Emery tracts would be similar to that of the Browning mine. The discharge of water used for washing coal or leachate issuing from waste-rock piles is expected to contain dissolved solids concentration approximately twice that occurring in the wash water (Colorado School of Mines Research Institute and Engineering Enterprises, Inc., 1976). If the quality of this water did not meet the established effluent limitation (CFR 30 817.42), treatment would be required prior to discharge.

The increase in salinity at Imperial Dam as a result of the proposed coal development was computed using a mathematical model prepared by the Water and Power Resources Service Colorado River Water Quality Office (BLM, 1980). The increase in salinity at Imperial Dam would range from 0.05 mg/L in 1987 to 0.09 mg/L in 1995 and remain at 0.09 mg/L in 2000 (Table 4-1). Increased costs to downstream users would range from \$20,000 to \$35,000 per year for commercial garden vegetable production in Imperial Valley.

The growth in population associated with the proposed coal development would result in discharge

of about 974 acre-feet per year of sewage effluent. This effluent would contribute an estimated 397 tons per year of salt to the receiving streams tributary to the Colorado River. Any activity contributing to the salinity of the river is of major concern to member States of the Colorado River Compact, related Federal and State agencies and downstream users. This impact on water quality would continue after mining was completed.

Mining would increase the potential for accidental spills of chemicals, fuel oils or other pollutants. North Horn Mountain, Cottonwood, Rilda Canyon, Meetinghouse Canyon, and Slaughterhouse Canyon tracts lay within municipal watersheds. These spills could contaminate the drinking water supplies and present a significant health hazard. Such spills would be monitored and cleaned up according to State regulations. Damage to the water supply would be minor if the spills are contained, otherwise, water supplies could be contaminated for a long period of time.

Erosion and Sediment

Concentrations of suspended sediments would increase temporarily several fold in the tract areas particularly if high-intensity rainfall occurs during construction, or if sediment-retaining structures fail. The runoff from areas disturbed by surface activities associated with surface or underground mining must not transport offsite more than 30 mg/L total suspended solids as an average of daily values for 30 consecutive discharge days (30 CFR 816.42 and 817.42). If the regulations are adhered to the sediment increase would be relatively insignificant compared to the naturally occurring sediment loads in the lower stream reaches.

Analysis of stripmining in other areas having similar environmental characteristics (Van Voast and Hedges, 1975), indicates that during the initial years of mining the sediment yield may be two or more times the amount under natural conditions. As mining progresses and reclamation practices begin, the rate of erosion is slowed. Retention of sediment from the mined areas on the lease tracts, would largely eliminate the potential for increased sediment yields from surface mined areas to reach the streams.

Ground Water

The impacts to the ground water resources as a result of the proposed leasing and development of coal would occur almost entirely in the mine areas

ENVIRONMENTAL CONSEQUENCES

and would not have any effect on the regional ground water system. Impacts would be from disturbance of certain aquifers; the modification of aquifers by replaced spoils materials, collapsed overburden, and subsidence or fracturing of overlying rocks from underground mining; water diversion from one drainage to another; and water quality impairment by leaching.

Disturbance of Aquifers

Surface mining of the Emery coal field tracts would replace the coal beds and any overlying aquifer with a single aquifer comprised of broken spoil materials. It is expected that these tracts would be mined by dragline method; therefore, the spoil material can be expected to have a higher recharge capacity plus more capacity to store and transmit ground water than the present conditions (Rahn, 1975).

Underground mine workings would intercept perched ground water and percolating ground water recharge supporting spring discharge, thereby causing the flow of springs and seeps to diminish or go dry. As mining progresses, roofs would begin to subside and ultimately collapse. Successive layers of overburden up to a limit of about 30 times the thickness of the coal removed would collapse and subside. As fracturing progresses upward, perched water would probably drain through the rubble down to the working level of the mine or below. Ultimately this water would discharge elsewhere and present springs and seeps supported by perched water would lose flow or dry up.

Transbasin Diversion

In large underground workings extending under more than one surface water basin, mine drainage could intercept water from one drainage basin and divert it to another. The extent of this impact is unknown but it would be of local significance only.

Trace Elements

Mine drainage may contain concentration of trace elements, particularly arsenic, iron, manganese, and selenium, slightly greater than normally found in natural streams of the area, as experienced in some coal mines in central Utah based on unpublished data from Southeastern Utah Association of Governments. However, total quantities of mine drainage associated with the leases considered in

this EIS would be less than 500 acre-feet per year. Reasonable enforcement of mitigations regarding FWPCA of 1977, SMCRA of 1977 and State of Utah effluent standards would prevent contamination of streams. I04Water Quality

It is unlikely that underground mining would seriously affect the chemical quality of ground water or adversely affect the quality of the water for onsite or downstream uses.

GEOLOGY, TOPOGRAPHY, PALEONTOLOGY, MINERAL RESOURCES

Wasatch Plateau Coal Field

Topography would be altered mostly as a result of subsidence on portions of the 32,028 total acres leased. The surface area affected by subsidence would range from 90 to 130 percent of the area mined (GS, 1979). The amount of subsidence would range from a maximum in the center of the mined areas to very small amounts in the peripheral areas. Maximum subsidence would be from 50 to 90 percent of the thickness of the coal removed and, therefore, would probably not exceed 10 feet on any of the tracts involved in underground mining. Surface expressions of subsidence could include open and closed fractures, buckled and bulged bedrock, and sinkholes and other depressions (Dunrud, 1976); however, thick overburden would limit surface expressions of subsidence. An undetermined amount of slumping of escarpments associated with underground mining activities could occur but would be minor.

Underground hazards to miners, including cave-ins, bumps, squeezes, flooding, and dangerous concentrations of methane, are in part unavoidable. About 3 fatalities and 233 nonfatal accidents would be expected per year owing to coal mining at proposed new mines (according to 1979 Mine Safety and Health Administration statistics).

Significant plant fossils used for correlation and paleo-environmental guides could be inadvertently destroyed by coal removal in the Blackhawk Formation. Significant disturbances to the other scientifically important fossils mentioned in Chapter 3 most likely would not occur if mitigating measures are followed. However, surveys and mining activities could also expose new fossils and enhance paleontological studies.

Approximately 282.9 million tons of coal would not be recovered using current mining techniques. The unrecovered portion represents 50 to 69 per-

ENVIRONMENTAL CONSEQUENCES

cent of the total coal resource. The mineral value of the land would be depleted except for the oil and gas potential.

Potential oil and gas resources occur stratigraphically well below the coal-bearing Blackhawk Formation. While the resource itself would not be damaged, surface and subsurface changes due to subsidence could hinder subsequent exploration, and location of facilities related to oil and gas development.

Emery Coal Field

Topography would be altered on portions of 5,877 acres. Subsidence resulting from underground mining of the Emery North and South tracts would be similar to that discussed for the Wasatch Plateau coal field except that subsidence effects would be more pronounced due to the shallower overburden. Subsidence could be as much as 10 feet in some areas of underground mining, but would generally average much less. Surface mining in the Emery Central tract could alter local topography as much as 30 feet, but would generally average less after reclamation. Minor slumping of escarpments on the Emery Central and Emery South tracts could occur.

Significant plant fossils used for correlation and paleoenvironmental guides, and any vertebrate fossils present could be inadvertently destroyed by coal removal in the Ferron Sandstone Member. Significant disturbances to other scientifically important fossils mentioned in Chapter 3 would most likely not occur if mitigating measures are followed. However, surveys and mining activities could also expose new fossils and enhance paleontologic studies.

About 22.7 million tons would not be recovered using current mining techniques. This represents 50 to 60 percent of the total resource if underground mined and 10 to 15 percent if surface mined. The mineral value of the land would be depleted except for the oil and gas potential.

The potential oil and gas resources occur stratigraphically well below the coal-bearing Ferron Sandstone Member of the Mancos Shale Formation. Surface and subsurface changes due to subsidence, while not affecting the resource itself, could hinder subsequent exploration and location of facilities related to oil and gas development.

VEGETATION

Implementation of this Alternative, involving development of coal on 11 tracts, would disturb a total of approximately 4,114 acres of vegetation by the year 2026. Acres of vegetation that would be lost are shown by year and vegetation type in Table 4-2. The vegetation types that would be impacted most are: Pinyon-Juniper Woodland, Desert Shrub, and Agricultural. This disturbance of vegetation would result from development of stripmines on the two Emery tracts (2,720 acres), onsite facilities for all mines (484 acres), offsite facilities (469 acres), and development of housing (441 acres) for the increased population. Since mining plans have not been submitted or housing areas identified, the figures are only estimates based on projected areas of development and the percentage of vegetation types found in those areas. The actual acreage of vegetation types that would be disturbed, should this Alternative be implemented, may vary from these projected figures.

Loss of vegetation production would result from disturbance or removal of plants for development of mine facilities, access roads, powerlines, topsoil stockpiles, and urban development. Stripmining on two tracts would result in total removal of vegetation from 2,720 acres by the year 2026. However, only 93 acres would be disturbed annually by stripmining, and required reclamation of mined lands would follow resulting in a total of 279 acres of unreclaimed mined lands annually after the third year. When added to the lands disturbed for onsite and offsite facilities (394 acres) the maximum unreclaimed lands after the third year would be 673 acres annually from stripmining.

Vegetation loss on 953 acres would begin in 1985 with the construction of roads and surface facilities; these developments plus 441 acres for housing and stripmining operations on 2,720 acres would total 4,114 acres by 2026. This loss would be reduced progressively as reclamation becomes effective. Loss of vegetation on 441 acres due to housing development associated with this Alternative would continue since these areas would remain committed to urbanization and would not be reclaimed. The acreage lost to housing development would be in the following vegetation types: Agriculture 50 percent (220 acres), Sagebrush-Grass 25 percent (111 acres), Pinyon-Juniper Woodland 15 percent (66 acres), and Desert Shrub 10 percent (44 acres). An additional 97 acres of irrigated agricultural land would be retired because of conversion of irrigation water to community and industrial use.

For areas that would be reclaimed, the duration of the impact of total vegetation loss would depend

TABLE 4-2

TOTAL CUMULATIVE IMPACTS ON VEGETATION
ALTERNATIVE ONE

Vegetation Types	Impacts On Tract ^a (Acres)				Impacts Off Tract ^b (Acres)				TOTAL ^c
	1987	1990	1995	2000	1987	1990	1995	2000	
Agriculture	6	14	34	52	10	10	10	10	62
Riparian	10	17	29	50	23	23	23	23	73
Grassland	29	43	81	118	-	-	-	-	118
Desert Shrub	90	212	410	551	42	42	42	42	593
Sagebrush Grass	44	44	44	44	102	102	102	102	146
Pinyon-Juniper Woodland	137	260	376	565	73	73	73	73	638
Mountain Brush	21	21	21	21	93	93	93	93	114
Aspen	40	72	106	76	39	39	39	39	115
Conifer Aspen	48	60	70	42	67	67	67	67	109
Non Productive	54	108	145	267	20	20	20	20	287
Total	479	851	1,316	1,786	469	469	469	469	2,255

^aIncludes mining operation and onsite facilities

^bIncludes offsite facilities (roads, powerlines, etc.)

^cTotal disturbance by year 2000 (housing development would require an additional 441 acres bringing total vegetation disturbance to 2,696 acres; disturbance from stripmining would continue through 2026 bringing the total disturbance to 4,114 acres)

ENVIRONMENTAL CONSEQUENCES

upon the success of reclamation. Because of the well developed soils and annual average precipitation of 25 inches, reclamation attempts on the Wasatch Plateau tracts are expected to be 50 to 80 percent successful (Hagihara et al., 1972). On steep slopes and areas of poorly developed soils in this area, 30 percent of revegetation attempts are expected to be successful. At the end of the mine life, vegetation loss would continue for about 7 years. Two years would be required for reclamation work and 5 years for establishment of vegetation cover. Shrub and tree cover would not become established for approximately 15 years after reclamation begins. Reestablishment of native species is expected to occur through natural succession over the long term. On areas of Aspen-Conifer, restoration to the original type would take longer. Fifteen to 20 years or more would be required for a return to original conditions.

Reclamation of vegetation on the Emery tracts would be more difficult. Due to climate (average annual precipitation 7.55 inches) and soil conditions, some special treatment and supplemental irrigation may be necessary. The disturbance of topsoil through stripmining would compound this problem. Studies at nearby Huntington and other sites in Utah indicated a decrease in plant production of approximately 40 percent with removal of the top 3 inches of soil. The amount of water needed to produce predisturbance levels of vegetation increased 60 to 90 percent (Lyons, 1978). In a study of the reclaimability of these lands (EMRIA Report No. 16, 1979) it was concluded that because of the extent and sensitivity of present vegetation and the severity of the climate, the post-mining environment on some sites would probably not be suitable for plant growth without significant long-term support for seeded shrubs and grasses; however reclamation would be successful with proper treatment. Positive results would be achieved in years with above normal precipitation, but success in dry years may depend on supplemental irrigation (Bleak et al., 1965; Aldon and Springfield, 1975).

The use of native species for reclamation has the highest potential for reclamation success (BLM EMRIA Report No. 16, 1979). On similar sites in the southwest, seeding with fourwing saltbush and alkali sacaton achieved a 25-percent ground cover of perennial vegetation (Aldon, 1973). Grasses may be a significant part of reclamation efforts; studies on the nearby Manti LaSal National Forest showed an increase in production of air dry forage of 403 pounds per acre following chaining and seeding of pinyon-juniper sites. Of this total, 379 pounds were contributed by grass (Phillips, 1977). In this study shrub cover increased only 2 percent. Grass competition is a major deterrent of shrub and forb sur-

vival, and could produce a monoculture as a result of reclamation (Hubbard, 1956).

Mitigating measures regarding survey and clearance of proposed onsite and offsite locations and routes for mining facilities associated with the Emery South tract would effectively eliminate impacts to the candidate endangered species *Townsendia aprica*. Formal consultation, as provided for in Section 7 of the Threatened and Endangered Species Act, was initiated with the Fish and Wildlife Service, February 1, 1980. This consultation resulted in a biological opinion regarding distribution of this plant and potential impacts of the proposed action. Consultation was reinitiated August 1980 based on additional information. An amendment to the biological opinion based on the new information was received October 21, 1980. The biological opinion and amendment are included as Appendix 8.

WILDLIFE

The surface disturbance of 1,232 acres in 2000 from portal, road, and facilities construction plus the unreclaimed stripmined lands could decrease the deer population in herd units 34, 35, 36, and 45 by 69 deer or 1 percent in 2000 (Table 4-3). This loss would not be significant even when combined with losses from traffic collisions and illegal killing.

Elk use of winter migration routes off East and North Horn Mountains could be altered for 40 years by the placement of portals and roads in Killpack or Rock Canyon and the subsequent activity. It is difficult to quantify this effect but herds from 40 to 250 animals per event have utilized these routes (personal communications, Ward, FS 1980). The restriction of access to winter range would be critical to elk during heavy snow years if they are forced to exist on lower elevation wintering grounds. An undetermined loss of elk could occur.

Encroachment by mining activity on mountain lion and black bear home ranges, illegal killing, and loss of prey species such as deer and elk would reduce lion and bear populations by an unknown amount until reclamation was completed. The increased development and widespread human disturbance on this range would cause abandonment of some home areas and a reduction in size or use of others.

Potential damage to riparian zones, a critical element of wildlife habitat, could occur from portal and road construction; however stipulations, where practical, could alleviate this impact. Moose require willows year-round and disturbance of riparian habitat associated with development of the Slaughter-

TABLE 4-3

BIG GAME IMPACTS
ALTERNATIVE ONE

Tract	Acres Disturbed	Disturbed Range	Species	Losses/Year ^a
Gordon Creek	90	High Priority - Summer	Deer	12
		Critical - Winter	Elk	4
		Critical - Yearlong	Moose	4
Slaughterhouse Canyon	47	High Priority - Summer	Deer	7
		Substantial - Summer	Elk	2
		Critical - Yearlong	Moose	1
Meetinghouse Canyon	40	High Priority - Summer	Deer	5
		Critical - Winter	Elk	0
Cottonwood	40	High Priority - Winter	Deer	5
		Critical - Winter	Elk	0
North Horn Mountain	145	High Priority - Winter	Deer	18
		Critical - Winter	Elk	8
Emery North	259	Limited - Yearlong	Deer	1
Emery Central	414	Limited - Yearlong	Deer	1
Emery South	40	Limited - Yearlong	Deer	0
Rilda Canyon	63	High Priority - Summer	Deer	8
		High Priority - Winter	Elk	2
Miller Creek	60	High Priority - Summer	Deer	8
		Critical - Winter	Elk	3
		Critical - Yearlong	Moose	2
Tucker Canyon	34	High Priority - Summer	Deer	4
		Critical - Yearlong	Moose	1
		Critical - Winter	Elk	1
Total	1,232		Deer	69
			Elk	20
			Moose	8

^aIncludes 0.1-mile influence zone.

ENVIRONMENTAL CONSEQUENCES

house Canyon (8 years), Gordon Creek (40 years), Tucker Canyon (20 years), and Miller Creek (40 years) tracts could displace nine moose annually (based on 1.12 moose per linear mile of suitable riparian habitat). This displacement would begin with construction in 1985 on tracts in and adjacent to the restricted area now supporting the nucleus of the introduced herd (UDWR, 1979). This displacement would become significant as the moose herd expands to occupy available habitat. The present expansion of this herd has been impaired by an illegal kill of 6 to 9 animals annually.

Acreage converted to urban use would be irreversibly lost as wildlife habitat. Half of the acreage would come from irrigated farmlands adjacent to existing communities. Many species inhabit these farmlands, notably pheasants, cottontails, doves, small birds, and rodents. With 299 acres committed to urban use or retired from change of water use by 2000, a total of 209 pheasants could be displaced (Appendix 9). This loss would be insignificant since 0.1 percent of the pheasant habitat would be affected regionally. Even in Emery County, which could receive a population growth of 38 percent by 1995 over the 1980 base, less than 1 percent of the pheasant habitat would be lost.

Rehabilitation success on 2,720 acres of surface mined lands would vary; however, overall productivity on disturbed acreage would probably increase. From recent experience at other sites only a simple vegetation type may result from reclamation efforts. Thus the variety and distribution of wildlife would be affected as the wildlife communities would be typified by high density populations of a few species. The change to a more homogenous plant community would affect the distribution of predator species. Generally open field hunters such as buteos would be benefitted by increased grassland, but the accipters could not utilize their hunting techniques in this open plant community.

Surface expression of subsidence such as cracks, bulges, and displacements are not expected to directly affect wildlife, but any reduction or elimination of surface water flows and associated vegetation communities due to subsidence could adversely affect some species. Loss of water sources would result in reduced utilization of habitat by mobile species such as deer, elk, beaver, and birds, and elimination of species such as small mammals, reptiles, and amphibians that are unable to relocate. Because of lack of data on wildlife population and the unpredictability of subsidence and its effects, the number of animals that could be affected cannot be quantified. At the projected production level up to 32,776 acres could be susceptible to subsidence.

Construction of 35 miles of new utility lines in the area would provide additional perching and hunting sites for raptors and other birds. This would be a beneficial impact; however, use of these structures along roadsides or in areas open to significant human access would expose the birds to illegal shooting and disturbance. The Utah Division of Wildlife Resources (UDWR) records of reported raptor mortality during 1974 to 1976 indicate shooting was the most common cause of death for bald and golden eagles in the State. Studies in Utah found a significant increase in raptor mortality due to shooting along utility lines paralleled by a road (Ellis et al., 1969). The extent of losses from this activity cannot be quantified, but any loss would be significant if it included birds of national interest. The new utility lines would also create an additional flight hazard for all bird species (Stahlecker, 1975; Weir, 1976), and an unknown number of birds would be killed. If birds such as the peregrine falcon or bald eagle, already limited in number, are killed the loss would be significant.

With this proposed level of production 31.1 miles of new road would need to be constructed for access and truck hauling of coal. Most of these roads would be in high priority (UDWR Habitat Rating) deer, elk, and moose summer or winter range, and would be a new hazard for these animals and other forms of wildlife. In Colorado with similar situations, it was projected from past experience that annually 7.6 percent of the deer utilizing habitat adjacent to a new road system could become a traffic mortality (personal communication, Reed, 1977). In 1977-78, a normal snow year, 70 verified traffic mortalities occurred on highways in deer herd units 33, 34, 35, 36 and 45 (usually only 55 percent of the actual losses are verified). With this proposal, by 1990 an additional 68 deer would be killed annually by traffic (Table 4-4) but after the initial impact, habituation to the road and dispersal of deer by human activity would reduce this impact. However the projected increase in traffic on the region's highways would result in some increased deer mortality. There would be an 83-percent increase equal to 5 percent of the 1979 legal harvest in these units. This is less than 1 percent of the deer populations on these units.

New roads could be a limiting factor to small isolated populations and become a barrier to small animal movement especially among forest dwelling species (Oxley et al., 1973). On the Wasatch Plateau many of the new roads would pass through forest and meadow habitat.

Raptors, especially owls, buteos, and eagles are frequently killed on roads and highways while scavenging. According to UDWR records of reported raptor mortality in the State during 1974 to 1976, highway mortality was the second most common

TABLE 4-4

POTENTIAL DEER TRAFFIC MORTALITY FROM NEW ROADS
ALTERNATIVE ONE

Lease	New Roads (Miles)	Deer Range	Deer Loss/ Year ^a	Total Number of Years
Gordon Creek	3.5	Summer	14	40
Slaughterhouse Canyon	3.2	Summer	13	8
Emery Tracts	8.7	Yearlong	2	40
Cottonwood	2.2	Winter	4	40
Meetinghouse Canyon	2.0	Winter	4	40
North Horn	6.0	Winter	12	40
Tucker Canyon	2.0	Summer	8	20
Miller Creek	1.0	Summer	4	40
Rilda Canyon	2.5	Summer	7	40
Total	31.1		68	

^a1,280 acres (1 mile each side of road) X road length/deer density
(Dalton, UDWR) X 0.076 = Deer Loss/Year

ENVIRONMENTAL CONSEQUENCES

cause of death. With the projected traffic increase, raptor traffic mortality would also increase. Quantification is impossible without specific research to record mortality and population densities.

Another potential effect of new road construction and increased use of existing road systems would be the harassment effect. Elk, a species sensitive to vehicle traffic, would be adversely affected by the increased use of unimproved roads from an expanding outdoor oriented population (Hieb, 1976). By 2000 an additional 2,522 off-road vehicles would be located in the Four-County region. The elk range of the Manti elk unit on the Wasatch Plateau is an area with an extensive road system that leaves few areas inaccessible to vehicles. Assuming future use of this road system remains unregulated, elk use up to 0.5 mile from each side of the roads could be reduced (Lyon, 1979). Seventy-five percent of the elk habitat (summer and winter) in the Manti elk herd unit is located within 1 mile of a road.

The presence of a larger human population (10 percent increase by 2000) could exert greater pressures on the wildlife populations through harvest, harassment, and displacement from habitat. The legal harvest could be controlled by instituting more stringent regulations and harassment could be partially controlled by regulations, but the presence of humans in wildlife habitat could not be eliminated.

UDWR reports a 250-percent increase in citations issued for violations of wildlife laws and regulations from 1972 to 1979 (personal communication, Dalton, UDWR 1980). Population increase for the same period was 48 percent. In 1975, 73 percent (319) of the citations issued were for violations that directly reduced wildlife populations. With an 10-percent projected population increase by 2000 the illegal taking of wildlife could increase a minimum of 50 percent (assuming a rate equal to the 1972 to 1979 increase).

Increased human disturbance could jeopardize the utilization of most of the potential moose habitat on the Wasatch Plateau and the establishment of a future herd of 487 moose and an antelope herd of 700 animals in Castle Valley. Presently a known illegal kill of 6 to 9 moose each year is delaying expansion of the herd. Increased disturbance and illegal killing would exacerbate this situation. Following a 1973 antelope transplant of 125 animals on Clark Bench in Kane County continuous illegal killing prevented the establishment of a herd commensurate with the habitat potential. Presently less than 20 antelope occupy the site (personal communication, Helms, UDWR, 1980).

Fisheries

Pollution of fisheries from coal wastes and coal mine drainage would not be anticipated with reasonable enforcement of applicable State and Federal laws. Fugitive dust from hauling trucks could add sediment and coal fines to 3.0 miles of stream habitat located in steep canyons where roads could not be located more than 0.25 mile from the streambed. If accidental pollution (such as the recent accidental cement poisoning in Huntington Creek which adversely affected 2 miles of cutthroat trout fishery) from spillages of coal, untreated mine drainage, caustics, sewage, or petroleum products occurs, fisheries that would be affected are the Price River, Huntington Creek, and Pleasant Valley Creek. This could directly kill fish and/or the aquatic fauna, or increase algae growth choking the stream. The effects would be localized and, where coal sediments were involved, prolonged.

Four streams, Beaver, Gordon, Jump, and Miller Creeks could suffer dewatering for short sections if subsidence occurred and altered the channels. Mitigation measures could repair the channel and restore the flow avoiding permanent damage and total loss of fisheries.

Anticipated population increases could significantly increase fishing pressure on popular waters such as Electric Lake, Huntington Creek, Joes Valley Reservoir, and Scofield Reservoir. These same waters could become fished out unless hatchery production was increased to satisfy the demand, or harvest limits reduced.

LAND USE

A projected maximum total of 2,696 acres would change from one land use to another by year 2000, principally from grazing to mining and support uses, from irrigated cropland to community use, and from irrigated cropland to retired cropland. Of this amount, 2,255 acres would be temporarily disturbed; 1,302 by mining operations, 469 by on-tract support facilities, and 484 by offsite support facilities. The remaining 441 acres would be permanently changed to housing and community infrastructure use.

Changed use of the 2,696 acres would affect irrigated cropland agriculture, community development, and livestock grazing in Carbon and Emery counties. By the year 2000 Carbon and Emery Counties would experience a permanent 237-acre decline in irrigated cropland, consisting mainly of alfalfa and small grains, to meet community growth and water requirements. Crop production on an-

ENVIRONMENTAL CONSEQUENCES

other 138 acres would be temporarily lost (40 years) until termination of mining; 28 acres retired to provide water for mining-related activities, and 110 acres on the Emery North tract that would be disturbed by surface mining operations. It is assumed that the 110 acres would be reclaimed and returned to agricultural production after reclamation. Less than 1 percent of the two-county total of irrigated cropland would be lost but would consist mainly of lands that are among the finest for agricultural use because of favorable soil, slope, water availability, and accessibility. Such cropland comprises only a small percentage of the overall cropland base in the region. Some prime farmland could be among that which is converted or retired, unless wise planning is employed to avoid such areas.

Community development in the Helper-Price-Wellington area and the Huntington- Castle Dale-Orangeton-Ferron area would result in the permanent loss of 154 of the 237 acres. These communities are sited largely on lands that, if available for agriculture, would be highly productive. About one-half of future community expansion would occur on remaining similar farmland if current community development trends in the area persist (personal communication, Davis, Carbon County Planner, and Almond, Emery County Planner, 1980). No significant impacts would occur to Sanpete or Sevier counties. Table 4-5 shows county, selected community, and total acreage figures for community development, irrigated cropland converted to community use, and irrigated cropland retired to provide community water. Acreage retired for lack of irrigation water could be retained as productive agricultural land by using a rest-rotation pattern that would grow irrigated crops on a bi-yearly basis, alternating with acreage for which water is available.

The impacts of community development on conversion and retirement of irrigated cropland could be reduced significantly if measures such as regulation of community expansion to avoid good cropland, lining canals to eliminate seepage, and sprinkler application of irrigation water were implemented. Without these or other effective measures, the losses described above would be expected to occur.

Three grazing allotments in Castle Valley would be temporarily reduced in available AUMs by development of the Emery North and Emery Central tracts. The Lone Tree allotment would be reduced by 69 AUMs annually, from 5,371 to 5,302. Over the life of the two mines, a total of 2,080 Lone Tree AUMs would be lost. The Bunderson allotment of 27 annual AUMs would be eliminated for the life of the Emery North tract surface operations for a total loss of 540 AUMs. The Sorenson allotment of 630 AUMs would be reduced by 36 AUMs annually for a total of 1,440 over the life of the mines. The effects

of the AUM losses described would be a 1-percent reduction in grazing on the Lone Tree allotment and a 6-percent reduction on the Sorenson allotment. Post-reclamation grazing could be enhanced with improvement of forage production on the reclaimed lands.

Impacts to the livestock grazing industry in the Wasatch Plateau area would be caused by increased difficulty in moving animals to and from grazing areas served by Huntington Canyon. Congestion caused by greater development and traffic in the canyon would result in greater hazards of road strikes to migrating livestock.

Only a minor reduction of grazing acreage in the Wasatch Plateau area would result directly from development of coal tracts because a maximum of 411 acres of surface disturbance would occur, 123 acres of which would be on private land. However, subsidence could cause livestock-related impacts by reducing the flow of or drying up an undetermined number of natural springs thereon. Livestock watering impoundments and livestock water conveyance pipelines could be disrupted by subsidence also, resulting in the inability of livestock to graze where water sources would be eliminated. Actual land that would be affected by subsidence cannot be determined at this time.

Land-use zoning (CE-1) in Carbon and Emery Counties on lands occupied by the Cottonwood, Gordon Creek, Meetinghouse Canyon, Miller Creek, North Horn Mountain, and Tucker Canyon tracts could possibly impede development of any or all of those tracts if the counties were to oppose rezoning requests.

About 2.6 miles of the proposed Castle Valley railroad spur on the Emery North tract would not be viable if the tract were developed unless mine development could be designed to avoid or otherwise protect the railroad. This would require an agreement between the surface owner and proponents of the railroad.

High voltage powerlines crossing Emery North and Meetinghouse tracts are located above coal seams proposed for underground extraction. Proposed mitigation would prevent damage to the powerlines from subsidence. Communication sites on North Horn and Emery North tracts would likewise be protected from subsidence damage through proposed mitigation. An existing 3-inch gas pipeline crossing the Slaughterhouse tract would require protection from surface disturbance or subsidence.

TABLE 4-5

ACREAGE CONVERTED TO COMMUNITY DEVELOPMENT, IRRIGATED GROPLAND CONVERTED TO COMMUNITY DEVELOPMENT, AND IRRIGATED GROPLAND RETIRED TO PROVIDE COMMUNITY WATER ALTERNATIVE ONE

Location	Total Acreage Converted ^a		Irrigated Acreage Converted		Irrigated Acreage Retired		Total Acreage Converted		Irrigated Acreage Converted		Irrigated Acreage Retired	
	Base	Alt. 1	Base	Alt. 1	Base	Alt. 1	Base	Alt. 1	Base	Alt. 1	Base	Alt. 1
	1987											
Carbon County	283	65	141	33	33	8	352	129	176	64	41	15
Helper	39	9	19	5	4	1	49	19	25	9	6	2
Price	117	27	59	14	14	3	149	54	74	27	17	6
Wellington	48	5	24	3	6	1	52	12	26	6	6	1
Emery County	104	115	52	57	12	13	156	191	78	95	18	22
Castle Dale	19	24	9	12	2	3	28	65	14	33	3	8
Emery	4	11	2	5	0	1	6	10	3	5	1	1
Ferron	25	27	13	13	3	3	35	48	17	24	4	6
Huntington	0	12	0	6	0	1	0	36	0	18	0	4
Orangeville	25	16	13	8	3	2	30	29	15	15	3	3
Sanpete County	102	14	51	7	12	2	162	21	81	11	19	3
Fairview	9	4	5	2	1	0	13	5	7	3	2	1
Mt. Pleasant	15	9	7	5	2	1	29	9	15	4	3	1
Gunnison	1	0	0	0	0	0	20	2	10	1	2	0
Centerfield	1	0	0	0	0	0	9	1	4	0	1	0
Spring City	4	1	2	0	2	0	8	2	4	1	1	0
Sevier County	204	17	102	8	24	2	294	26	147	13	34	3
Aurora	12	3	6	2	1	0	19	4	9	2	2	0
Redmond	9	2	4	1	1	0	11	2	5	1	1	0
Salina	29	8	15	4	3	1	63	14	32	7	8	2
Sigurd	11	0	5	0	1	0	6	0	3	0	1	0
Four-County Total	693	211	346	105	81	25	964	367	482	183	112	43

(Continued)

TABLE 4-5, Concluded

Location	1995			2000								
	Total Acreage Converted ^a	Irrigated Acreage Converted	Irrigated Acreage Retired	Total Acreage Converted	Irrigated Acreage Converted	Irrigated Acreage Retired						
	Base	Alt. 1	Base	Alt. 1	Base	Alt. 1						
Carbon County	433	159	216	80	50	18	453	157	226	78	52	18
Helper	61	22	30	11	7	3	64	22	32	11	7	3
Price	193	68	96	39	22	9	213	69	106	35	25	8
Wellington	59	16	29	8	7	2	61	13	30	7	7	2
Emery County	201	215	101	107	23	25	203	229	101	115	23	26
Castle Dale	36	45	18	23	4	5	36	48	18	24	4	6
Emery	7	22	4	11	1	3	6	23	3	12	1	3
Ferron	42	56	21	28	5	6	42	62	21	31	5	7
Huntington	8	24	4	12	1	3	8	28	4	14	1	3
Orangeville	36	30	18	15	4	3	36	32	18	16	4	4
Sanpete County	221	24	111	12	26	3	289	22	145	11	34	3
Fairview	15	6	8	3	2	1	16	5	8	3	2	1
Mt. Pleasant	35	9	18	5	4	1	36	8	18	4	4	1
Gunnison	28	3	14	1	3	0	30	2	15	1	3	0
Centerfield	12	1	6	0	1	0	13	1	7	0	2	0
Spring City	9	3	4	1	1	0	10	2	5	1	1	0
Sevier County	456	32	228	16	53	4	571	33	286	16	66	4
Aurora	33	5	17	2	4	0	33	6	17	3	4	1
Redmond	19	3	9	1	2	0	19	3	10	1	2	0
Salina	99	16	50	8	12	2	105	17	52	9	12	2
Sigurd	8	1	4	0	1	0	12	1	6	0	1	0
Four-County Total	1,311	430	656	215	152	50	1,516	441	758	220	175	51

^aAssumes one-half of total acreage required for community development would come from irrigated cropland

ENVIRONMENTAL CONSEQUENCES

SOCIOECONOMICS

Economic and Demographic Impacts

Information in this section was developed through a BLM contract with Centaur Associates, Inc. of Washington, D.C.

Additional employment in Emery County would peak at 1,559 jobs in 2000, compared to 4,984 jobs in 1977 and 24 percent above the baseline estimate of 6,592 in 2000 (Table 4-6). Direct employment at the mines would account for two-thirds of the additional employment bringing employment in mining to 3,851 or 47 percent of total employment in Emery County by 2000 (compared to 2,894 or 43.9 percent under the projected baseline), and increasing the county economy's already great dependency on the mining sector. This increased dependency would carry with it greater risk of severe economic dislocation if mining operations are disrupted (e.g., by a labor stoppage).

Increased employment effects on the remaining three counties would be much smaller. Carbon County would gain up to 1,162 additional jobs (including 500 in mining) bringing total employment to 13,578 by 2000 (an increase of 5,902 since 1977). Although both Sanpete and Sevier Counties are expected to experience large employment increases between 1977 and 2000, only a small fraction of the additional jobs (144 in Sanpete, 244 in Sevier) would be attributable to renewed coal leasing.

In addition to mining, a large proportion of the new jobs generated would be in the construction sector. Because of their relatively high wage scales, competition from the mining and construction sectors would make it more difficult for employers in lower-paying industries and government to hire and retain qualified employees. Raising their pay scales to compete with mining and construction would reduce profits, even jeopardize the continued existence of some businesses, and would increase government operating costs.

Annual earnings are projected to increase by \$107.3 million by the year 2000, including \$42.8 million in Carbon County and \$45.6 million in Emery County. (All figures are expressed in constant 1977 dollars.) As a result, total personal income in Carbon County would reach \$301.9 million or \$9,299 per capita by 2000, compared with a 1978 per capita income of \$6,837 and an estimated per capita income of \$8,668 in 2000 without further coal development. Similarly, Emery County would have a total personal income of \$164.3 million by 2000 or a per capita income of \$9,104 (versus \$5,788 in 1978 and \$8,550 in 2000 without further

coal development). The resultant increase in individual average buying power would, in turn, intensify inflationary pressures in the study area, to the detriment of persons on low or fixed incomes.

Due to the relatively small pool of unemployed labor in the Wasatch Plateau-Emery area, and the special skills required for underground coal mining, most of the employment openings would be filled by new in-migrants rather than existing residents. The majority of these in-migrants would be expected to settle in Emery County. As result, Emery County's population would increase by 4,124 by the year 2000 compared to its 1978 population of 9,849 and 30 percent above its projected baseline population of 13,922 in 2000 (Table 4-7).

The following communities would sustain the largest population increases: Ferron, whose population would increase by 1,113 by 2000, i.e., 53 percent above its projected baseline population of 2,088; Castle Dale, an increase of 866 in 2000, or 35 percent above its baseline estimate of 2,506; and Price, an increase of 1,242 or 10 percent above its baseline estimate of 12,555.

Projected population growth in these and other communities, in addition to the number of new residents, would also be a function of their respective capacity to absorb the additional residents without placing excessive strain on local infrastructure, e.g., housing, public services, and facilities. The effects of population growth on the social fabric of individual communities must also be taken into consideration in assessing the local impacts of population growth. The sections below address the infrastructure and social impacts of the forecasted population growth.

Infrastructure

This section analyzes the most significant potential increased demands on housing, education, health care, and municipal services in Carbon and Emery counties. No significant infrastructure impacts in Sanpete or Sevier counties would be anticipated. The most severe stress on infrastructure would be felt in Emery County and its constituent communities. Overcrowding in the county's elementary and secondary schools (which would need approximately 660 and 470 additional pupil spaces respectively by 2000 as a result) would result unless new school facilities were built. Increases in population would also exacerbate the countywide shortage of doctors (four doctors would be required by 2000 in addition to the 14 that would be needed under the projected baseline) and 15 nurses would be needed in 2000, in addition to the 48 required under the projected baseline) (Table 4-8).

TABLE 4-7

PROJECTED POPULATION IMPACTS
ALTERNATIVE ONE

	1978 Total Population	1987			1990		
		Total Without the Proposed Alternative	Total With the Proposed Alternative	Increment Due to the Proposed Alternative	Total Without the Proposed Alternative	Total With the Proposed Alternative	Increment Due to the Proposed Alternative
		Alternative	Alternative	Alternative	Alternative	Alternative	Alternative
Carbon	21,643	26,919	28,090	1,171	28,173	30,502	2,329
Helper	3,030	3,751	3,915	164	3,944	4,293	349
Price	8,660	10,858	11,350	492	11,429	12,407	978
Wellington	1,299	2,167	2,265	98	2,254	2,464	210
Emery	9,849	12,168	14,230	2,062	13,113	16,553	3,440
Castle Dale	1,773	2,204	2,637	433	2,360	3,530	1,170
Emery	397	492	698	206	525	697	172
Ferron	1,280	1,782	2,269	487	1,967	2,827	860
Huntington	2,363	2,239	2,460	221	2,360	3,014	654
Orangeville	985	1,483	1,772	289	1,574	2,090	516
Sanpete	14,119	18,362	18,608	246	19,442	19,826	384
Centerfield	600	890	891	1	1,027	1,039	12
Fairview	1,060	1,256	1,319	63	1,322	1,410	88
Gunnison	1,368	2,011	2,014	3	2,355	2,393	38
Mt. Pleasant	2,354	2,669	2,822	153	2,933	3,087	154
Spring City	698	785	792	7	850	889	39
Sevier	14,489	18,687	18,985	298	20,309	20,772	463
Aurora	779	1,034	1,085	51	1,155	1,234	79
Redmond	486	658	688	30	694	736	42
Salina	2,191	2,774	2,911	137	3,384	3,616	232
Sligurd	370	564	565	1	486	492	6
Regional Total	60,100	76,136	79,913	3,777	81,037	87,653	6,616

(Continued)

TABLE 4-7 (Concluded)

	1978 Total Population	1995				2000			
		Total Without the Proposed Alternative	Total With the Proposed Alternative	Increment Due to the Proposed Alternative	Total Without the Proposed Alternative	Total With the Proposed Alternative	Increment Due to the Proposed Alternative		
		Alternative	Alternative	Alternative	Alternative	Alternative	Alternative		
Carbon	21,643	29,626	32,491	2,865	29,889	32,712	2,823		
Helper	3,030	4,148	4,585	401	4,184	4,579	395		
Price	8,660	12,217	13,449	1,232	12,555	13,797	1,242		
Wellington	1,299	2,370	2,657	287	2,391	2,617	226		
Emery	9,849	13,913	17,785	3,872	13,922	18,046	4,124		
Castle Dale	1,773	2,505	3,318	813	2,506	3,372	866		
Emery	397	554	941	387	540	952	412		
Ferron	1,280	2,087	3,094	1,007	2,088	3,201	1,113		
Huntington	2,363	2,505	2,931	426	2,506	3,001	495		
Orangeville	985	1,670	2,212	542	1,671	2,248	577		
Sanpete	14,119	20,509	20,943	434	21,687	22,027	390		
Centerfield	600	1,091	1,104	13	1,103	1,115	12		
Fairview	1,060	1,355	1,455	100	1,367	1,457	90		
Gunnison	1,368	2,503	2,546	43	2,531	2,558	27		
Mt. Pleasant	2,354	3,031	3,196	165	3,060	3,212	152		
Spring City	698	879	926	47	886	929	43		
Sevier	14,489	23,228	23,801	573	25,170	25,764	594		
Aurora	779	1,412	1,509	97	1,417	1,524	107		
Redmond	486	843	895	52	849	908	59		
Salina	2,191	4,028	4,297	269	4,138	4,441	303		
Sigurd	370	515	527	12	585	603	18		
Regional Total	60,100	87,276	95,020	7,744	90,668	98,599	7,931		

Source: UPED model

TABLE 4-8

IMPACTS ON EDUCATION, HEALTH, AND POLICE SERVICE REQUIREMENTS IN 2000
ALTERNATIVE ONE

County	Existing Capacity 1978	Total Need With Alt. 1	Increment Due To Alt. 1	Percent Increase Due To Alt. 1
Carbon County				
Pupil Spaces ^a				
Elementary	2,828	3,827	330	9.4
Secondary	2,139	2,911	251	9.4
Teachers ^b	192	315	33	12.0
Doctors ^c	21	33	3	10.0
Nurses	122	115	10	9.5
Police Officers ^d	24	65	5	8.3
Emery County				
Pupil Spaces				
Elementary	1,940	2,887	660	30.0
Secondary	1,417	2,057	470	30.0
Teachers	129	246	56	29.0
Doctors	7	18	4	29.0
Nurses	6	63	15	31.0
Police Officers	12.5	36	8	29.0
Sanpete County				
Pupil Spaces				
Elementary	1,789	2,489	44	2.0
Secondary	743	1,984	35	2.0
Teachers	152	172	3	2.0
Doctors	7	22	0	0.0
Nurses	27	78	2	2.0
Police Officers	7	44	1	2.0
Sevier County				
Pupil Spaces				
Elementary	1,783	3,349	77	2.0
Secondary	1,111	2,396	55	2.0
Teachers	165	230	5	2.0
Doctors	9	26	1	4.0
Nurses	24	90	2	2.0
Police Officers	12.5	52	1	2.0

^aProjected enrollment is based on the assumption that school district enrollment is the same proportion of county population in the future as in 1978

^bProjected need for teachers assumes the same teacher/pupil ratio as in 1978

^cProjected need for doctors and nurses is based on the planning standard of one per 1,000 population and one per 285 population, respectively

^dProjected need for police officers is based on a standard of two full time equivalent officers per 1,000 person

ENVIRONMENTAL CONSEQUENCES

In order to meet the housing needs of the additional population, Castle Dale would need an additional 262 housing units by 2000; Ferron would require an additional 337 units; Huntington 150 units; and Orangeville 178 (Table 4-9).

Communities in Emery County would have adequate firefighting capacity to handle increased fire protection needs. Levels of police coverage would decline in all communities. Local police departments are already understaffed and renewed coal leasing would account for a relatively small proportion of the additional police officers required.

In order to meet the demands of increased population growth, Castle Dale would have to acquire rights to an additional 0.2 million gallons per day (mgd) of water by 2000 (in addition to the 0.6 mgd needed to satisfy the projected baseline need). While it would have adequate supplies of treated water to meet the anticipated demand, Emery would have insufficient sewage treatment capacity. As a result, Emery would have to expand its existing 0.013 mgd total-containment sewage treatment lagoon and/or meet the State requirements for secondary waste water discharges (Table 4-10).

The amount of Ferron's present water rights could not be determined, but the town would probably need to secure new water rights or sources. Ferron's sewage treatment lagoon, while presently overloaded and discharging wastes into Ferron Creek, nevertheless meets EPA standards for such secondary discharges. Renewed coal leasing would increase the likelihood that Ferron would have to build an expanded sewage treatment facility capable of treating 0.4 mgd of wastes by 2000.

Huntington's existing infrastructure could adequately absorb expected growth resulting from proposed leasing. However, Orangeville, while it currently has rights to 0.4 mgd of water, would need to secure rights to an additional 0.09 mgd by 2000. No additional water rights would be needed if no further coal development takes place.

Carbon County would also experience significant infrastructure stress although to a lesser extent than Emery County. The county schools would need to provide approximately 330 additional places for elementary students and 251 for secondary students by 2000, or otherwise face overcrowding (Table 4-8). (Under the baseline, the county would have adequate capacity in its elementary schools through 2000, but would need 630 more secondary school places in order to avoid overcrowding.)

To meet the projected population growth the city of Price would require 376 additional housing units by 2000. In Helper, 120 more housing units would be required by 2000.

There should be no significant impacts on municipal services and facilities in Carbon County.

In general, counties, school districts, and municipalities in the Wasatch Plateau-Emery area have substantial unused taxing and bonding authority on which to rely in funding needed infrastructure improvements. An increase in local assessed valuations, which determine the amount of revenues communities receive at a given property tax rate as well as their maximum allowable bonded indebtedness would also require consideration.

As an alternative to increased outlays on public services and facilities, with the associated burden on taxpayers, local governments could accept a degradation in the quality and quantity of services offered. For example, school overcrowding could be alleviated by busing pupils or resorting to split sessions. Increased water demand could be met by restrictions on non-essential water uses, such as watering lawns. However, in addition to the hardship or inconvenience caused to residents, local governments' ability to cut back services may be limited by State or Federal regulations (such as EPA regulations governing sewage discharge).

Local governments are more limited in their ability to assure provision of adequate supplies of housing and health care personnel, which are largely private sector functions. Failure to provide enough new housing of suitable quality and at an affordable price (due to high land and construction costs, restrictive zoning regulations or limitations on new sewer or water hookups) would force many new residents to live in substandard housing or in unplanned trailer settlements on unincorporated lands. From the community standpoint, this situation could result in a loss of potential tax revenues, create obstacles to effective community planning, and make it more difficult to integrate the newcomers into the local political process.

A further decline in the availability of health care facilities and/or personnel would result, at a minimum, in greater inconvenience to residents forced to travel long distances for health care. At worst, it could contribute to an increase in the incidence and severity of health problems among residents, if the latter respond to the inconvenience by foregoing needed health care.

A reduction in hunting opportunities would cause an unquantified loss in revenue in the region from hunting-related expenditures.

Social Impacts

Information in this section was obtained by Drs. Bruce Chadwick, Stanley Albrecht, and Howard

TABLE 4-9
PROJECTED HOUSING IMPACTS IN 2000
ALTERNATIVE ONE

	Projected Need Without This Proposed Action	Projected Need With This Proposed Action	Increment Due To The Proposed Action	Percent Increase Due To The Proposed Action
Carbon County	9,057	9,912	855	9.4
Helper	1,268	1,388	120	9.4
Price	3,805	4,181	376	9.8
Wellington	724	792	68	9.4
Emery County	4,219	5,469	1,250	30.0
Castle Dale	759	1,021	262	34.0
Emery	163	288	125	77.0
Ferron	633	970	337	53.0
Huntington	759	909	150	20.0
Orangeville	506	684	178	35.0
Sanpete County	6,571	6,689	118	2.0
Centerfield	334	338	4	1.0
Fairview	414	441	27	6.5
Gunnison	767	775	8	1.0
Mt. Pleasant	927	973	46	5.0
Spring City	268	281	13	5.0
Sevier County	7,627	7,806	180	2.3
Aurora	429	461	32	7.5
Redmond	257	276	18	7.2
Salina	1,254	1,346	92	7.3
Sigurd	177	182	5	2.7
Regional Total	27,474	29,876	2,403	8.7

TABLE 4-10

IMPACTS ON WATER SUPPLY AND SEWAGE TREATMENT REQUIREMENTS
ALTERNATIVE ONE

	Water Requirements (MGD)		Sewage Treatment Capacity (MGD)	
	Projected Need In 2000	Increment Due To Alt. 1	Projected Need In 2000	Increment Due To Alt. 1
Carbon County	7.3	0.63	3.6	0.3
Helper	1.0	0.08	0.5	0.04
Price	3.0	0.25	1.5	0.13
Wellington	0.6	0.05	0.3	0.03
Emery County	4.0	0.8	2.0	0.4
Castle Dale	0.75	0.17	0.4	0.09
Emery	0.2	0.07	0.1	0.04
Ferron	0.7	0.21	0.35	0.1
Huntington	0.66	0.09	0.33	0.05
Orangeville	0.50	0.11	0.25	0.06
Sanpete County	4.9	0.09	2.5	0.05
Centerfield	0.25	0.003	0.13	0.002
Fairview	0.32	0.02	0.16	0.01
Gunnison	0.57	0.006	0.29	0.003
Mt. Pleasant	0.72	0.03	0.36	0.02
Spring City	0.20	0.01	0.1	0.005
Sevier County	5.7	0.13	2.9	0.07
Aurora	0.34	0.02	0.17	0.01
Redmond	0.20	0.01	0.1	0.005
Salina	1.0	0.07	0.5	0.04
Sigurd	0.13	0.003	0.07	0.002

(MGD) million gallons per day

ENVIRONMENTAL CONSEQUENCES

Bahr of Brigham Young University. In the fall of 1979 they conducted field studies to determine social well-being and public attitudes in the study area.

Even without further coal development, most communities in the study area would experience, to varying degrees, a diminution of their small-town ambience and way of life due to population growth; and a decrease in cultural homogeneity and social solidarity proportional to the number of non-LDS Church members among the new in-migrants. However, the incremental social changes would be negligible in communities located in Sanpete and Sevier counties, which are located far from the proposed mine sites and would experience less population growth than Emery and Carbon Counties. Although the Helper-Price-Wellington area of Carbon County would gain an additional 1,863 residents by 2000, the incremental social changes of this population growth would likewise probably be minor. With 13,000 residents in 1978, and expected to grow to 19,000 by 2000 even without further coal development, the Helper-Price-Wellington area is already becoming relatively urbanized, with a concomitant increase in social and cultural heterogeneity. While the pace of social changes already taking place in Helper-Price-Wellington would accelerate, renewed coal leasing would not have a significant effect on the nature or direction of those changes.

In Emery County, the likelihood of significant social changes is substantially greater, particularly in the community of Emery, where newcomers would outnumber native residents by 1990. Emery's small size (less than 400 residents in 1978), rural lifestyle, and cultural homogeneity make it more susceptible to the effects of sudden, rapid population growth than other study area communities. This susceptibility is reflected in the attitudes expressed in interviews with Emery residents. The latter, while not actively hostile toward development, are less enthusiastic about it than residents of other Emery County communities and favor a moderate, controlled approach to growth.

The effects of rapid population growth on Castle Dale, Ferron, and Orangeville would be mitigated somewhat by their larger size, greater experience in integrating non-LDS outsiders into their community fabric, and residents' relatively favorable attitudes toward development. (In interviews, respondents in these three communities were found to have fewer reservations about development than respondents in Emery. While aware of the social costs of development, they generally considered these costs justified by the potential benefits of growth in terms of access to improved public services, facilities, and better shopping, cultural, and recreational facilities.)

Of the five Emery County communities studied, Huntington would be the least likely to experience severe social change. Huntington has a relatively large population base to begin with (2,363 residents in 1978), and the incremental population would not exceed 500 persons. Perhaps most important, Huntington already went through a period of adjusting to the social impacts of rapid population growth in the 1970s. As a result, Huntington has largely lost its small-town atmosphere and values, but residents have also enjoyed the benefits of development in terms of jobs, better public service, etc., and are therefore very receptive to further growth.

The fact remains, however, that the growth that would occur as a result of development of newly leased coal would increase the burden on Carbon and Emery Counties and the communities therein to deal with social disorders such as mental illness, family violence, violent crime, divorce, suicide, drug abuse, and alcoholism. The extent of the impact cannot be quantified but would be greater in Emery County than in Carbon County. The experiences in recent years in Gillette and Rock Springs, Wyoming from social problems arising from rapid community growth illustrate what can occur where community services cannot keep pace with growth.

TRANSPORTATION

Table 4-11 shows predicted increases in traffic due to development of the eleven tracts during full mine operation (1990 and thereafter). The greatest volume of traffic increase would occur along U-10 from Clawson northward. Values shown in the table are as predicted with the Castle Valley RR spur line in place; if the railroad spur is not built for some reason, there would be a large increase in the number of trucks going northward along U-10, mainly to the Wellington loadout and to existing loadout facilities at Mohrland, on the Utah Railway system.

Additional traffic due entirely to mining development would not itself be enough to overload any of the State highways in the area. However, additional traffic would be enough to exceed a practical maximum of 500 vehicles per day (vpd) for the existing gravel surface of the Gordon Creek road from the mine to the Utah Railway, beyond which the road is now hard surfaced.

Direct, mine-related traffic would add about 3,350 vpd to the highways of the area, traveling approximately 16 million miles per year. Cumulative traffic for the entire area is shown in Table 4-12 (point numbers refer to locations in Figure 3-11 (Chapter 3), and are the same for the incremental and cumulative tables for all alternatives).

TABLE 4-11

ANNUAL AVERAGE DAILY TRAFFIC INCREASE
DUE TO ALTERNATIVE (1990-2000)
ALTERNATIVE ONE

Point	Location	All	Trucks
1.	U-96 South of U.S. 6	119	43
2.	U.S. 6 at Utah-Carbon County Line	458	61
3.	Gordon Creek Road	488	214
4.	U.S. 6 North of Price	858	280
5.	U.S. 6 Between Price and Wellington	111	0
14.	U-10 South of Price	1,336	499
15.	Wellington Loadout Road	189	189
16.	U-10 North of Huntington	1,147	310
17.	U-31 West of Huntington	391	176
18.	U-10 South of Huntington	1,092	422
19.	U-29 West of Orangeville	459	201
19a.	Castle Valley RR Loadout S of Castle Dale	334	334
20.	U-10 South of Castle Dale	1,297	215
21.	North Horn Mountain Mine	1,228	99
22.	U-10 North of Ferron	695	116
23,25.	U-10 South of Ferron, North of Emery	300	29
26.	Emery North Mine	162	34
27.	Emery Central Mine	153	38
27a.	U-10 South of Emery	101	21
27b.	Castle Valley RR Loadout South of Emery	41	41
28.	U-10 North of I-70	142	62
29.	Emery South and Dog Valley Mines	97	46
33.	I-70 East of Salina	17	0
37.	U.S. 89 South of Salina	33	16
47.	New Road, Pleasant Valley to U-31	48	0
48.	U-31 East of Fairview	48	0

Note: Castle Valley RR spur assumed built to Emery

TABLE 4-12

ANNUAL AVERAGE DAILY TRAFFIC PROJECTED FOR SELECTED YEARS
ALTERNATIVE ONE

Point	Location	1985		1987		1990		1995		2000	
		All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks
1.	U-96 S of U.S. 6	953	171	1,075	208	1,327	291	1,377	293	1,427	295
2.	U.S. 6 at Utah-Carbon County Line	8,740	1,430	9,519	1,575	11,166	1,844	13,166	2,144	15,128	2,362
3.	Gordon Creek Road	339	139	339	139	827	353	827	353	827	353
4.	U.S. 6 N of Price	17,563	3,033	18,201	3,210	20,018	3,715	21,518	3,940	22,893	4,093
5.	U.S. 6 between Price & Wellington	11,156	1,806	16,394	2,698	25,490	3,959	39,703	6,102	43,667	5,958
6.	Soldier Cr Rd at Duchesne-Carbon Co Line	65	3	68	3	75	5	90	4	112	5
7.	Soldier Cr Rd at Soldier Cr Mine	145	14	193	17	295	23	333	24	355	25
8.	Deadman Canyon Mine	322	160	408	191	551	243	794	348	794	348
9.	Dugout Canyon Road	965	80	1,242	103	1,555	128	1,555	128	1,555	128
10.	Soldier Cr Rd at U.S. 6	1,431	301	1,855	314	2,424	394	2,682	500	2,704	501
11.	U.S. 6 W of U-123 (Sunnyside Jct)	5,356	851	5,890	906	6,256	986	7,056	1,106	8,140	1,206
12.	U-123 E of U.S. 6	2,656	160	2,850	168	3,056	176	3,156	180	3,256	184
13.	U.S. 6 near Carbon-Emery County Line	3,300	495	3,460	520	3,700	555	4,100	615	4,500	675
14.	U-10 S of Price	5,983	1,407	6,082	1,353	7,881	2,072	8,393	2,166	8,830	2,229
15.	Wellington Loadout Road	883	883	970	970	589	589	620	620	620	620
16.	U-10 N of Huntington	5,514	1,290	5,614	1,290	6,694	1,369	7,144	1,502	7,430	1,543
17.	U-31 W of Huntington	1,483	185	1,697	189	2,307	378	2,532	392	2,668	404
18.	U-10 S of Huntington	3,883	979	4,024	983	5,139	1,213	5,636	1,260	6,018	1,313
19.	U-29 W of Orangeville	2,103	559	3,190	597	3,871	812	4,001	817	4,019	817
19a.	Castle Valley RR Loadout S of Castle Dale	834	834	1,500	1,500	2,435	2,435	2,435	2,435	2,435	2,435
20.	U-10 S of Castle Dale	1,250	150	1,460	210	3,060	507	3,613	557	3,999	570
21.	North Horn Mountain Mine	-	-	-	-	1,228	99	1,228	99	1,228	99
22.	U-10 N of Ferron	1,250	150	1,460	210	2,458	408	3,011	458	3,397	471
23.	U-10 S of Ferron, N of Emery	1,050	126	1,226	181	1,791	288	2,355	333	2,709	343
26.	Emery North Mine	-	-	-	-	162	34	162	34	162	34
27.	Emery Central Mine	-	-	-	-	153	38	153	38	153	38

(Continued)

TABLE 4-12 (Concluded)

Point	Location	1985		1987		1990		1995		2000	
		All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks
27a.	U-10 S of Emery	930	112	1,090	131	1,582	214	2,234	320	2,643	350
27b.	Castle Valley RR Loadout S of Emery	-	-	-	-	840	840	840	840	840	840
28.	U-10 N of I-70	930	112	1,090	131	1,817	407	2,069	465	2,508	515
29.	Emery South & Dog Valley Mines	70	10	70	10	167	56	167	56	167	56
30.	U-72 near Sevier-Wayne County Line	37	1	40	2	45	2	55	2	66	2
31.	U-72 S of I-70	270	184	368	185	442	185	454	185	454	185
32.	Spring Canyon Road at I-70	1,085	591	1,085	591	949	283	961	348	961	348
33.	I-70 E of Salina	5,075	1,520	5,047	1,412	4,772	928	4,355	993	4,479	1,079
34.	U.S. 89 S of Richfield	5,143	771	5,538	830	5,770	866	5,770	866	5,599	866
35.	U.S. 89 N of Richfield	6,800	1,020	7,738	1,161	7,835	1,175	6,800	1,020	6,121	910
36.	U.S. 89 N of Aurora	7,835	1,175	8,711	1,307	8,800	1,320	7,835	1,175	6,645	910
37.	U.S. 89 S of Salina	3,175	1,135	2,866	828	2,716	587	2,471	652	2,586	610
38.	U.S. 89 near Sanpete-Sevier County Line	5,828	1,170	6,132	1,113	6,000	720	6,000	720	6,390	1,070
39.	U-28 N of Gunnison	3,848	873	3,822	777	3,500	420	3,500	420	3,818	720
40.	U.S. 89 N of Gunnison	1,870	75	1,874	75	1,980	79	2,250	90	2,570	110
41.	U.S. 89 N of Manti	2,875	115	2,518	101	2,635	105	3,500	140	4,973	110
42.	Public Road E of Ephraim	285	11	317	12	380	15	510	20	665	20
43.	U.S. 89 N of Ephraim	2,255	90	2,277	91	2,415	97	2,745	110	3,127	110
44.	U.S. 89 S of Mt. Pleasant	1,645	66	1,574	63	1,660	66	2,000	80	2,475	90
45.	U.S. 89 N of Mt. Pleasant	3,770	151	3,859	154	4,000	160	4,225	169	4,432	169
46.	U-31 at Sanpete-Emery County Line	540	22	627	25	725	29	840	34	992	34
47.	New Road, Pleasant Valley to U-31	1,067	43	1,216	48	1,583	61	2,276	89	3,123	110
48.	U-31 E of Fairview	1,607	64	1,843	73	2,308	90	3,116	123	4,065	110
49.	U.S. 89 N of Fairview	2,040	82	2,029	81	2,150	86	2,485	100	2,898	110

Note: Castle Valley Railroad assumed built to Emery by 1990

ENVIRONMENTAL CONSEQUENCES

Without any additional Federal coal leasing, it is expected that U-10 would become crowded from Price southward to about Castle Dale. With the leasing of the 11 coal tracts, U-10 would become crowded throughout most of its length, including the length of road northward from I-70 to the Emery loadout. The Gordon Creek Road would become seriously overcrowded for a gravel road carrying 45 percent trucks. West of Orangeville, U-29 would become crowded beginning about 1990, as would the roads serving both the central and southern loadouts on the Castle Valley Railroad spur.

Additional passage of 34 to 40 trucks per day from the Tucker Canyon tract through Scofield would cause a significant impact upon its residents and visitors in the form of safety concerns and noise.

Traffic increases due to additional leasing would reduce the level of service afforded by the existing Forest highway system. In most cases the present level of service is at stable flow with reduced speed, due to the percentage of truck traffic and limited passing opportunities. The level of service would approach unstable flow or forced flow at decreased speed with the additional traffic. Accident rates would increase due to the additional traffic at grade intersections and increased congestion.

Additional development of existing lease and additional leasing, within the Forest boundary served by Highway 31, would be expected. The percentage of truck traffic would be expected to increase as would overall traffic from this development. The total traffic could reach or exceed the maximum capacity of the existing road.

Highway construction and maintenance is primarily funded from taxes on motor fuel. Due to increased engine efficiencies and the continuing effects of inflation, the Utah Department of Transportation (UDOT) feels that present funding formulas would be inadequate to meet increased maintenance needs of highways which would be exposed to increased use by coal haulage.

Information from UDOT Division of Traffic Safety indicates that the traffic accident rate would not increase, i.e., that the number of traffic accidents would be expected to increase in proportion to the volume of traffic. On the basis of Statewide accident rates as shown in Chapter 3, the incremental traffic increase would cause about 72 additional traffic accidents per year.

The increased travel projected under the four alternatives would generate from \$67,500 to \$144,000 in increased fuel revenues annually. This revenue would be sufficient to apply only a minimum surface rehabilitation treatment to 1 mile of

highway each year where many hundreds of miles are affected.

Utah's highways have usually been constructed to accommodate traffic for 20 years after they were built. Nearly all of the highways impacted by the proposed coal development are approaching or have already exceeded the 20 year design traffic volume. Significant traffic increases will only exacerbate an already serious deficiency in the financial resources required to maintain, let alone improve, the affected highways. With many of the highways in a precarious condition, the increased travel (with a high percentage of trucks) would precipitate the deterioration of many highways. Immediate attention would be required just to retain a tolerable level of service. Without additional financing by a factor somewhere between fifty and one hundred times the previously mentioned revenue, the impacted roads will be adversely affected. Even then, it is assumed that such amounts would be made available each year over the life of the impact and that the onset of development would occur slowly (UDOT, 1980).

Energy Requirements and Conservation Potential

The additional traffic would consume about 1.6 million gallons of fuel per year in transporting coal to railroad loadouts, in commuting of miners, and in providing service from Price to the various mines. These figures already reflect Environmental Protection Agency fuel consumption standards for light vehicles. The use of community-to-mine buses could reduce fuel consumption materially. One operator in the Pleasant Valley area has instituted a trial contract carrier bus service for employees with origins in Spanish Fork, Payson, and Price. The results of this experimental program are not known.

A net energy analysis estimate was made comparing the amount of energy in the coal produced from the tracts, the energy expended in its production, and the energy in the coal left in the ground after mining. Total energy output for this Alternative is estimated at 6.15 million billion Btu. Energy required for production of the coal is estimated at 212,949 billion Btu. Finally, energy left underground, and considered unrecoverable after mining is estimated at 7.55 million billion Btu.

See Appendix 10 for tract-by-tract energy balance analysis.

ENVIRONMENTAL CONSEQUENCES

CULTURAL RESOURCES

Because site densities are fairly low (1 to 15) on tracts that would be underground mined, except the North Horn Mountain tract, and proposed surface disturbance is relatively minimal, most direct impacts would be avoided by relocating or adjusting facilities. With increased site densities (55 to 75 projected number of sites on the North Horn Mountain tract) there would be less opportunity for avoidance of sites. Where avoidance would be impossible, excavation and salvage would result in saving important cultural values.

The loss of up to 275 projected cultural sites on the tracts proposed for surface mining would occur because of the nature of ground-disturbing activities associated with surface mining. This would be particularly evident on the Emery North and Central tracts which have projected site densities of 150 to 175 and 75 to 100 respectively. Avoidance through facility relocation and adjustment would not be possible; therefore, an intensive excavation and salvage program would be required. Significant loss of cultural sites on the Slaughterhouse tract is expected to be low because of the projected low site density.

No direct impacts to the Rochester-Muddy Petroglyph, a National Register property, are anticipated because it is not located on an area that would be surface mined. The mitigation measure requiring monitoring of the effects of blasting and vandalism would protect the site from mining-related and other activities. One potentially significant Paleo Indian site on the Emery Central tract would be destroyed although salvage of scientific values would occur.

The extent of losses from the construction of off-site facilities is unknown. Excavation and salvage would reduce the chances of inadvertent losses of cultural values.

the damage or destruction of cultural sites from mining activities would result in the following losses: (1) scientific and cultural information for future research; (2) resources that may be valuable in terms of uniqueness in their natural setting; and (3) buried, unsalvaged sites. The loss of these values, on the other hand, would be partially offset by information gained from an overall excavation and salvage program. Such information would add to the growing data base on cultural resources in Utah and the knowledge of resource utilization and settlement patterns.

Indirect impacts would increase as a result of greater accessibility and local population increases. Recreational activities of two types, those intentional, illegal activities associated with artifact collection

and treasure hunting, and unintentional recreational use (hiking, hunting, ORV), would cause irreplaceable, unmitigatable site damage. Both scientific and aesthetic site values would be lost as a result of these indirect impacts. This loss would occur to many on and offsite significant cultural resources in Emery, Sevier, and Carbon Counties.

SPECIAL DESIGNATION AREAS

If allowed, mining activities, surface mining disturbance, and the construction and presence of ancillary facilities in the Emery North and Emery Central tracts would impair wilderness character and, therefore, wilderness designation suitability within the portion of BLM Roadless Unit UT-060-012 where development would occur. However, because wilderness suitability impairment would result, mining and construction would not be allowed in Unit UT-060-012 as long as it is undergoing wilderness review. (See Chapter 2, Mitigation Section.)

Mining activities, surface mining disturbance, and the construction and presence of ancillary facilities would probably foreclose potential wild and scenic river designation for the 1.5 miles of the Muddy River that flow through the Emery North tract. Foreclosure would continue during the life of the mining operation until rehabilitation restored the natural character of the tract. Because the river channel would not be altered and because the water quality and quantity would not be affected to any noticeable extent, it is unlikely that the Muddy River's potential for wild and scenic river designation would be affected below the Emery North tract.

Some of the 17 areas in the region with potential for wilderness or other special designation could receive additional off-road vehicles and/or other dispersed recreational use because of the coal-related population increase. Resultant littering and vandalism would degrade values for which the areas are being studied. Federal agencies managing the lands (BLM and FS) may be under stress to protect these values with no foreseeable increase in funding for that purpose. However, it is very unlikely that possible degradation would affect the designation suitability of any area due to the temporary nature of impacts resulting from dispersed recreational use.

VISUAL RESOURCES

At the Emery North and Emery Central tracts, surface mining and associated onsite development

ENVIRONMENTAL CONSEQUENCES

would severely modify the land form, would dominate the landscape, and would change the scenic character of the two tracts from natural to industrial setting until rehabilitation was completed. The additional impact to the Emery North tract from underground mining would be insignificant. Although no outstanding or unique scenic values would be lost, surface mining activity would conflict with visual resource management (VRM) guidelines for VRM class III areas on the Emery North and Central tracts. Surface mining disturbance and facilities on the Emery North tract would be clearly visible from the town of Emery and to travelers on Highway U-10 (675 vehicles daily). These mining activities on the Emery North tract would be considered an unacceptable intrusion to some, and an item of interest to others.

Because of the intervening Coal Cliffs, surface mining and subsequent land disturbance on the Emery Central tract would not be visible to travelers on I-70, although fugitive dust resulting from the mining operation may be visible. Surface mining disturbance would be visible from the town of Emery and from Highway U-10, but because of the viewing distance of at least 4 miles, the visual disturbance would not be obvious or disturbing to most people. The development of associated facilities off the Emery North and Emery Central tracts is not anticipated to significantly impact visual resource values because developments and disturbance would be similar to existing disturbance in the areas affected, and would be designed to meet the VRM objectives of those areas.

Visual impact resulting from underground mining and associated development at the Emery South tract would be less significant than the surface mining impact previously discussed. Development would modify the natural appearing landscape in areas on and off the tract, but overall the scenic character of the tract would remain natural. Visual impact would be similar through all mining years. No outstanding or unique scenic qualities would be lost from development of this tract.

Development of new portals and associated facilities (e.g. buildings, transmission lines, access roads, and coal conveyors) both on and off the Slaughterhouse Canyon, North Horn, Cottonwood, Rilda Canyon, Meetinghouse, Gordon Creek, and Miller Creek tracts would not be anticipated to significantly impact visual resource values. Generally development and disturbance would be visible from low-volume ungraded roads only, would be similar to existing disturbance in the areas affected, and would be designed to meet the VRM objectives of the areas. If existing portals were used for development of Rilda Canyon, Meetinghouse Canyon, and Cottonwood, no additional visual impact would be anticipated on or off these tracts.

There would be a visual conflict with Tucker Canyon (Class III) where developments would be clearly visible from large areas on and about Scofield Reservoir, including the Scofield Reservoir State Park, Highway 96, and the Mountain Home and Aspen View subdivisions. The proposed mining would degrade the visual resources enjoyed by recreationists visiting the reservoir. However, due to the viewing distance from most of Scofield Lake, and from Scofield Reservoir State Park U-96, and if properly located and colored, most structures would be largely unnoticed by recreationists. Roads for access or exploration could be plainly visible if located on mountain slopes facing the reservoir. Mining disturbance would significantly degrade the visual resources enjoyed by residents of the adjacent subdivisions. Because the tracts are so close to subdivisions, mining roads, drill pads, and shaft hoists could be clearly visible and mining associated noise could be clearly audible from several dwellings, depending on the exact placement of facilities.

Reclamation would be effective in reestablishing the present scenic quality and character of the Wasatch Plateau tracts upon completion of the mining operations. The arid nature and lack of topsoil in the three Emery tracts would make reclamation difficult and the Emery tracts would probably continue to appear somewhat disturbed after reclamation was completed. The average visitor would probably note little change in the region's overall scenic character from development and reclamation of the tracts.

RECREATION

By the year 2000, mining-related population growth would increase the local demand (users originating from within the Four-County region) for both dispersed and developed recreation opportunities in the Four-County region by approximately 13 percent from 1980 use figures.

Table 4-13 shows the anticipated increase in local demand for hunting and fishing during selective mining operation years. This increase in demand would occur at the same time that game numbers would be reduced from mining-related displacement and road kills. The additional competition for available game and fish would lead to less hunting and fishing success. To maintain present hunting success it could be necessary to restrict animal harvests, thereby reducing hunting opportunities. To maintain present fishing success, stocking activities would have to be increased by the Utah Division of Wildlife Resources, which has no foreseeable increase in funds for this purpose.

ENVIRONMENTAL CONSEQUENCES

Table 4-14 shows the anticipated increase in local demand for off-road vehicle (ORV) activities during selective mining operation years. Although the Four-County area has adequate miles of primitive dirt roads to absorb the ORV demand, the increase would conflict with other recreational uses, reducing the overall opportunity for dispersed recreation and reducing the quality of the recreational experience to some visitors.

Developed recreation sites in the Four-County region would receive increased use by the new population. Additional recreational pressures would most often occur at sites being used at greater than 20 percent of their design capacity, probably increasing use to 40 percent or more at some of the sites, which would result in overcrowding, user dissatisfaction, and deterioration of the environment and facilities through vandalism and littering. Overcrowding and deterioration would intensify at some sites presently being used at greater than 40-percent capacity. These overcrowded conditions would cause additional recreational pressures on undeveloped, dispersed areas. Federal and State governments would be under greater stress to provide adequate maintenance for existing developed sites and to construct adequate new sites, although there is no foreseeable increase in funding for these purposes. The overcrowded conditions of available recreation facilities in the towns would accelerate, resulting in facility deterioration and in user dissatisfaction. Stress would be placed on local governments (again, with limited funds) to provide recreation facilities (e.g., playfields, swimming pools, golf courses) to meet minimum standards recommended by the Utah Outdoor Recreation Agency (SCORP, 1978).

Development of the tracts, including onsite and offsite disturbance and development of homesites, would displace dispersed recreational use from as much as 679 acres in 1987, 1,688 acres in 1990, 2,215 acres in 1995 and 2,696 acres in the year 2000 and 4,114 by end of mine life in 2026. Because surrounding areas offer comparable or better opportunities and because access to these surrounding areas would not be eliminated, the recreational opportunity lost would not be significant, even when the increase in recreational demand is considered. Visual and audio impacts from mining the Tucker Canyon and North Emery tracts would, however, reduce the quality of the recreational experience to some recreationists visiting the Scofield Reservoir area and the Rochester-Muddy Creek petroglyphs. Also, increased industrial traffic resulting from mining operations in the Meetinghouse, Rilda Canyon, Slaughterhouse, and Tucker Canyon tracts would present a danger to recreational traffic on the Huntington Canyon, Eccles Canyon, and Scofield Reservoir access roads, resulting in stress to

the recreational visitor, and loss of enjoyment with the recreational experience.

UNAVOIDABLE ADVERSE IMPACTS

A short-term increase in TSP would occur because of surface mine disturbance and traffic increases on unpaved roads. The increased population would cause an increase in the emission of all NAAQS pollutants.

The loss of soil and vegetation productivity on 4,114 acres would be unavoidable for the life of the mines. An unquantified amount of soil would be lost from disturbed areas prior to reclamation. The mining of coal in the region would result in 305.6 million tons of coal becoming unrecoverable by present technology. Changes in aquifers and distribution of surface water due to subsidence could not be avoided. The consumptive use of water in the region would increase by 1,075 acre-feet by the year 2000. Increased sewage effluent would add 397 tons of salts per year to the Colorado River. The loss of wildlife due to occupation (69 deer annually) or disturbance of habitat and illegal killing or highway mortality (68 deer annually) would be unavoidable.

Conversion of irrigated cropland to urban use and retirement of irrigated land to provide water for mining and community needs would result in a loss of 299 acres of agricultural land in the region. The loss of crop production on 110 acres of irrigated cropland disturbed by surface mining on the Emery North tract could not be avoided. Stripmining on the Emery tracts would result in a loss of 4,060 AUMs over the life of the mines.

Population in the region would increase by 7,931 in the year 2000, and housing needs would increase by 2,403 units. The additional income (\$107.3 million annually) and buying power generated would increase the local rate of inflation. The effects of this inflation would be felt most acutely by persons living on fixed incomes and those with lower-paying employment such as trade and service workers. The greatly increased labor requirements (3,109 jobs) of the mining and construction industries, together with their relatively high wage scales, would make it more difficult for employers in lower-paying industries and government to hire and retain qualified employees.

Capital and operating expenditure requirements of local counties, school districts, and municipalities would rise as a result of the need to expand public services and facilities. Unless communities plan needed improvements in advance and assure adequate funding, there would be at least a temporary

TABLE 4-13

PROJECTED INCREASE IN LOCAL HUNTER AND FISHERMAN DEMAND
ALTERNATIVE ONE

Year	Coal-Related Population	Projected Annual Increase In Numbers						Overall Percent In- crease from 1980
		Deer Hunters	Elk Hunters	Upland Game/Water- fowl Hunters	Fishermen	Increased Demand For Fish	Overall Percent In- crease from 1980	
1987	3,777	661	64	321	1,700	36,890	5.9	
1990	6,616	1,158	113	562	2,977	64,601	10.4	
1995	7,744	1,355	132	658	3,485	75,625	12.2	
2000	7,931	1,388	135	674	3,569	77,447	12.5	

Note: Projections were made assuming that the percentage of Utah's population that currently hunts or fishes would remain the same, and that the Utah percentage can be applied to the Four-County area. Approximately 17.5 percent of Utah's population hunt deer, 1.7 percent hunt elk, and 8.5 percent hunt upland game or waterfowl. Approximately 53 percent of Utah's population under the age of 12 and 42 percent of the population over the age of 12 fish. Approximately 27 percent of Utah's population is under 12 and 73 percent is over 12 in age (Thayne and Hudson, 1978).

TABLE 4-14

PROJECTED INCREASE IN LOCAL OFF-ROAD VEHICLE DEMAND WITHIN THE FOUR-COUNTY REGION
ALTERNATIVE ONE

Year	Projected Coal- Related Popula- tion Increase	Project Increase in Pickup and Four-wheel Drive		Projected In- crease in Motorcycle Numbers		Overall Percent Increase from 1980
		Numbers	Numbers	Numbers	Numbers	
1987	3,777	944	257	5.9		
1990	6,616	1,654	500	10.4		
1995	7,744	1,936	527	12.2		
2000	7,931	1,983	539	12.5		

Note: Projections were made assuming that the percentage of the population in the Four-County region that owns off-road vehicles would remain the same (6.8 percent of the population currently owns motorcycles, and 25 percent of the population currently owns four-wheel drive vehicles or light pickups) (Scorp, 1978)

ENVIRONMENTAL CONSEQUENCES

deterioration in the quality of services, causing inconvenience and dissatisfaction among those affected.

By 2000, housing units would increase by 2,403 units. Several communities, particularly Emery but also Castle Dale, Ferron, and Orangeville, would experience some loss of their present small-town atmosphere.

Mine-related traffic would add 3,350 vpd to highways in the region. Increased traffic on U-10 would result in increased maintenance cost and a doubling of traffic accidents. A 23-percent increase in truck traffic on Highways 31 and 29 west of Huntington and Orangeville would conflict with recreation and other traffic in those canyons. Traffic accidents would increase by 72 accidents annually.

Inadvertent destruction or disturbance of undetected cultural resources and losses through illegal collection or vandalism could not be avoided. The 13-percent increase in demand for recreational activities resulting from population increases could result in overutilization and crowding of existing recreation developments and reduced hunting and fishing success. The landscape modifications that would result from mining and associated development would degrade the visual quality of those areas. The modification would be adverse only where it would exceed VRM objectives in the Emery North, Emery Central and Tucker Canyon tracts.

THE RELATIONSHIP BETWEEN THE SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The increased population associated with mining development would result in a long-term decrease in air quality in the region; however, NAAQS would not be exceeded.

Coal mining in the region could result in some loss of paleontological resources, but where a paleontologist is available to monitor mining activities, significant fossils may be recovered which would be otherwise unavailable. Recovery would add to the long-term knowledge of paleontological resources in the area.

The short-term use of the environment for coal production and associated housing development would result in a long-term loss of soil and vegetation productivity on 441 acres permanently occupied by housing. A long-term increase in vegetation productivity on the Emery tracts (2,720 acres) would probably occur if reclamation was successful.

Replacement of native plant species with introduced species would cause a long-term change in species composition. The extraction of 256.2 million tons of coal would render the remaining unmined 305.6 million tons of coal unrecoverable over the long term. Changes in aquifers and points of surface discharge due to subsidence would result in a long-term local change in surface water distribution and ground water storage. The short-term consumptive use of 1,075 acre-feet of water per year would be reduced by 101 acre-feet when mining ceases. The use of 974 acre-feet per year for community use and salt load of 397 tons per year would continue in the long term.

Disturbance or occupation of habitat up to 40 years by mining activity would result in a long-term redistribution of wildlife populations and migration routes. Permanent occupation of 441 acres by urban development would cause a long-term loss of wildlife habitat principally occupied by 209 pheasants, and an unknown number of cottontail rabbits and mourning doves. The loss of crop production on 220 acres occupied by housing and 168 acres retired due to conversion of water use would be a long-term loss in productivity. The 29 acres of irrigated cropland retired due to conversion of irrigation water for mining use could be restored to production in the long term.

The growth in population of 7,931 people in the region would increase the area's potential productivity by enlarging its labor force, but the 3,109 jobs associated with Federal leases mining would not continue in the long-term. Infrastructure improvement such as water systems would also contribute to increased productivity by providing facilities useful for commerce and industry as well as the residential population. The increase of 2,403 housing units would be long-term. Higher incomes and increased buying power in the area would attract trade and service establishments, contributing to a larger and more diversified trade and service sector.

Any loss of cultural resources would result in a long-term loss of scientific knowledge and interpretive values. Excavation and salvage of sites would expand knowledge of cultural resources in the region. The development of recreational facilities as a result of demand by the increased population would be a long-term increase in capacity of recreation developments in the region.

IRRETRIEVABLE OR IRREVERSIBLE COMMITMENT OF RESOURCES

Emissions attributable to population growth in the region would cause an irreversible deterioration in

ENVIRONMENTAL CONSEQUENCES

air quality. Soil and vegetation productivity on 1,394 acres would be irretrievably lost for the life of the mines. Productivity on 441 acres occupied by housing would be irreversibly lost. Soil lost to wind and water erosion prior to reclamation would be irretrievable. Replacement of native vegetation with introduced species would irreversibly commit those areas to a different species composition.

The 256.2 million tons of coal mined would be irretrievable and the 305.6 million tons of coal left in the ground would be irreversibly unrecoverable by present technology. Increased water consumption for mining and community needs would be irretrievable. Any change in aquifers, ground water storage potential, or point of discharge due to subsidence would be irreversible. The increased consumptive use of water for community use (974 acre-feet per year) and increased salt loading of 397 tons per year into the Colorado River would be irreversible.

Any wildlife losses (including 137 deer annually) through displacement from habitat, traffic mortality, or illegal killing would be irretrievable. Habitat (for 209 pheasants, cottontail rabbits, and mourning doves) occupied by community development would be irreversibly lost. The loss of 4,060 AUMs of grazing on the Emery tracts would be irretrievable.

The growth in population of 7,931 persons foreseen under this alternative would be irreversible except at considerable economic and human cost. Likewise, the commitment of capital, physical resources, and labor to build 2,403 housing units and infrastructure that would be required to support the growth in population, commerce, and industry would be an irretrievable impact. The loss of small-town atmosphere and community solidarity in some communities as a consequence of coal development would be irreversible.

Development of the coal mines as proposed would result in the irretrievable consumption of 1.6 million gallons of petroleum fuels. Lives and money lost as a result of an increase of 72 traffic accidents per year would be irretrievable.

The loss of cultural resources in context would be irretrievable and any loss of interpretive values would be irreversible. The adverse impacts to visual resources would be irretrievable for the life of the mines, but would be reversible following reclamation.

HOLLBERG PRLA

AIR QUALITY

Minimal emission increases of other pollutants, such as nitrogen oxides, sulfur oxides, carbon monoxide, and photo-chemical oxidants would occur from vehicular traffic and sources associated with population growth.

Visibility reduction and atmospheric discoloration would periodically occur in the immediate vicinity of the mine and associated haul and access roads as a result of particulate emissions but the effects would be highly localized and insignificant on a regional basis.

The nearest Class I area is Capitol Reef National Park about 25 air miles south of the tract. Considering the distance from the tract to Capitol Reef and the rapid fallout of particulates with distance from the mine and unpaved roads, no impacts to air quality and air quality related values (including visibility) would occur at Capitol Reef.

SOILS

Construction of mine facilities, exploration, and population increases as a result of mine development would cumulatively disturb 109 acres by the end of mine life. By 1988, reclamation would occur on an estimated 15 acres required for exploration purposes. The disturbance on 77 acres would be of a temporary nature since the land would eventually be reclaimed. The loss of soil productivity on 32 acres would be a permanent impact from the construction of housing and support facilities for future population increases.

Surface facilities for underground mining would impact soils by alteration of existing soil properties and characteristics through disturbance and mixing of soil. These properties include soil micro-organism composition, structure, infiltration rates, permeability rates, water holding capacities, nutrient levels, and productivity potentials.

The primary impact to soils would be a small increase in soil erosion, caused by surface disturbance associated with construction of buildings, haul roads, storage sites, sediment ponds, powerlines, telephone lines, and portals.

Sediment yield studies conducted in the Emery area indicate that soil losses would range from 0.45 to 1.2 tons per acre per year for surface mines (BLM EMRIA Report No. 16, 1979). Soil losses resulting from surface disturbing activity associated

ENVIRONMENTAL CONSEQUENCES

with underground mining would be less than or equal to this amount.

WATER RESOURCES

The existing water source distribution could be disrupted by subsidence in connection with the mining. The subsidence could impact both the ground water aquifers and the distribution of surface waters in the area. The water affected, however, would stay within the drainage basins and the impact would be that of the shift of water-source physical location. Changes in location would disrupt livestock and wildlife water in the area and any other uses taking place there. However, surface water is scarce on the tract with only a few springs and seeps known. If these waters are affected by mining, the lessee would replace the water or make restitution, as required by the State of Utah (Title 73323), or by Office of Surface Mining Reclamation and Enforcement regulations (30 CFR 211), whichever is applicable.

The minor consumptive use of water ranges from 13 acre-feet in 1985 to 81 acre-feet in 2000. This would represent a loss of stream flow of less than 1 percent in 1985 to 2000.

The waters within the Muddy Creek Basin are fully appropriated (Burton, 1980). Therefore, an individual or corporation would have to acquire water rights by purchasing or leasing. Some water use would change from irrigation to municipal and industrial use for this coal lease. The loss of irrigated acres to municipal and industrial use would range from 4 acres in 1985 to 28 acres in 2000.

Muddy Creek changes from a fresh water stream to a saline condition below the town of Emery. The chemical quality of the water is not likely to be affected by coal mining because sampling of existing mine leachates in the area has shown them to be of higher quality than the Muddy. Mine drainage may contain concentrations of trace elements and others in slightly greater than normal amounts for the area waters. However, reasonable enforcement of mitigations regarding Office of Surface Mining regulations and State effluent standards would prevent contamination of streams. Concentration of suspended sediment may increase several-fold temporarily during times of construction but due to the small acreages it should not be significant.

The increased population would cause an increase in waste products which could contaminate aquatic environments if proper sanitation practices are not followed; such potential would be generally of local extent.

GEOLOGY, TOPOGRAPHY, PALEONTOLOGY, MINERAL RESOURCES

Subsidence could occur on most of the 3,035.7 acres, and would be affected by several variables including: (1) mining methods, (2) overburden thickness, (3) extraction amount, and (4) geometry of mine workings. Tension cracks could occur above barrier pillars a few months after mining, while compression bulges could be formed on the surface approximately 1.5 to 2 years after completion of mining. Also, additional tension cracks could occur as the surface subsides several years after mining completion (Dunrud, 1976; DOI, 1979). However, the nearby Emery mine has experienced few problems with subsidence using the room and pillar method in the same coal field (BLM, 1979).

Construction of surface facilities would cause permanent changes of the natural topography on 6.8 acres. Road construction would affect 56 acres due to leveling, cuts, and fills.

No known faults occur on the subject land and mine stress releases are expected to be minimal due to shallow overburden.

Inadvertent losses of plant, invertebrate, and vertebrate fossils could occur as a result of mining activities. Unauthorized collection and vandalism could also occur. However mining and excavation could expose fossils which would otherwise not have been discovered. Avoidance or recovery of fossils encountered during development and mining would occur as stipulated in approved mining plan.

At a 49.6 percent recovery rate, 50.4 percent (19,800,000 tons) of coal in the minable seams would be left in place along with coal in seams not presently considered to be economically minable.

Among the hazards of underground mining are cave-ins, bumps, squeezes, flooding, and accumulations of methane gas. These hazards can be very dangerous to personnel and property but can be alleviated by detailed geologic and engineering studies prior and during mining operations (DOI, 1979).

Drilling for uranium and oil and gas in areas which have been mined would be difficult due to the loss of mining fluids in mined-out areas until the hole is cased. Oil, gas, and uranium potential exists in the area and drilling for any of these commodities would conflict with coal development. After extraction is completed, exploratory well activity would require close coordination between the drilling company and Emery Energy Corporation. Mining of any uranium ore bodies would not be affected by the coal mine.

ENVIRONMENTAL CONSEQUENCES

VEGETATION

Development of mine facilities, haul road, and utilities for the Hollberg PRLA would result in destruction of vegetation on 77 acres beginning in 1987 and continuing for the 40-year life of the mine. This loss of vegetation would be primarily Pinyon-Juniper Woodland and Desert Shrub vegetation types. Reclamation of this acreage is expected to be successful in less than 30 percent of attempts (Hagihara et.al., 1972).

Development of housing for the population increase associated with development of this tract would destroy vegetation on an increasing number of acres until full development occurred in the year 2000. Principal types that would be affected are Agricultural, Sagebrush-Grass, and Pinyon-Juniper Woodland. Vegetation would be lost as follows: 14 acres in 1987, 25 acres in 1990, 30 acres in 1995, and 32 acres in the year 2000. This loss would be permanent since the area occupied by housing would not be reclaimed. The total vegetation loss including full development of mining and housing needs in the year 2000 would be 109 acres.

WILDLIFE

The surface disturbance of 77 acres would not impact the widely scattered deer population. A few rabbits and rodents would be displaced by the surface disturbance.

The 5.6 miles of haul road have the potential of killing one deer per year. Construction of new utility lines in the open area could provide additional perching and hunting sites for raptors. Use of these structures along roadsides or in areas open to human access would expose the birds to illegal shooting and disturbance.

The addition of 471 people to Emery County would cause an irreversible loss of 26 acres. Half of this would be farmland supporting seven pheasants annually. This loss is not significant but would add to the total losses expected from the combined projected levels of (coal mining) production in the region (Wildlife, Alternative One).

LAND USE

A total of about 109 acres of land would change in use. Seven acres would be used for onsite mining facilities and 70 acres for offsite facilities. The remaining 32 acres would be used for housing and community development. All acreage except

that used for housing and community development would be reclaimed after termination of mining activities.

Land use impacts would be largely confined to Emery County where all mine-related land disturbance and 26 of 32 acres changed to community development would occur. Castle Dale would increase in size by 8 acres and Ferron by 15 acres as a result of housing development caused by development of the PRLA.

About 16 acres of irrigated cropland would be converted to housing and other community infrastructure, 4 acres would be retired to provide community water, and 2 acres would be retired to provide mine water. Crops lost from the 22 converted or retired acres would be mostly alfalfa and small grains such as wheat.

There are two grazing allotments with a small portion of their AUMs on the PRLA. Of the 60 annual AUMs on the PRLA only a small portion would be lost as a result of development and operation of the mine.

About 1 mile of the projected Castle Valley Railroad spur which would cross private surface on the PRLA would be jeopardized unless the mine development could be designed to avoid or otherwise protect the railroad. This would require an agreement between the surface owner and the lessee.

SOCIOECONOMICS

Development of the Hollberg tract as a result of the PRLA would result in additional impacts to the impact area as discussed below. The baseline environment would be the same as discussed previously.

The maximum employment impacts attributable to the Hollberg tract would occur in Emery County, where tract development would generate an additional 197 jobs (including 131 direct mining jobs) by 2000, or 3 percent above the baseline. Carbon, Sanpete, and Sevier Counties would experience minimal employment impacts.

Development of the Hollberg tract would generate an additional \$1.26 million in annual earnings by the year 2000, including \$159,000 in Carbon County and \$1.03 million in Emery County (1977 dollars). This is compared to a base of \$259.2 million and \$118.9 million for each county respectively.

As a result of the increased employment opportunities Emery County would receive significant increases in population (471 persons by the year 2000). Individual communities which would experience the most significant impacts are Emery (147

ENVIRONMENTAL CONSEQUENCES

persons, or 21 percent of the town's total projected population in 2000) and Ferron (269 or 11 percent of the total population in 2000). Tract-related population increments in the remaining communities would amount to less than 1 percent of the projected 2000 population.

For the most part incremental needs for infrastructure and community services due to development of the Hollberg tract are insignificant. The exceptions are discussed below.

In the town of Emery an additional 43 housing units (21 percent of the projected total growth by 2000) would be needed. In Ferron, 79 additional units (11 percent of the projected total growth by 2000) would be required.

Long-term additional water needs generated by tract development would be greatest in Emery (0.07 mgd or 51 percent of the projected deficit in 2000), and Ferron (0.12 mgd or 39 percent of their projected deficit).

There would also be increased need for an additional 0.1 mgd of sewage treatment capacity in the town of Ferron by 1990. While small in absolute terms, this amounts to 25 percent of its total projected need in 1990.

Other infrastructure and community service needs would not be affected to any significant degree in these or other communities by development of the Hollberg tract.

TRANSPORTATION

The company could utilize rail facilities at either Price or Salina, with the coal trucked over U-10 to Price, or U-10 and I-70 to Salina. The proposed action would result in 80 to 100 truck trips per day on the roads (based on 5 days worked per week and loads of 25 tons per trip). The average of this range would represent a 12.5-percent increase in traffic on U-10 between the towns of Emery and Ferron if the Price route is chosen, and a 3.6-percent increase on I-70 at the Salina interchange if the Salina route is chosen. The 12.5-percent increase in traffic on U-10 would aggravate an already undesirable situation since coal hauling has increased traffic since early 1975. Road deterioration would accelerate and noise and air pollution would increase for residents living near U-10. Traffic accidents would increase by four accidents per year.

If the Castle Valley Railroad spur is built (the addition of this mine may help to make such a venture profitable), the transportation effects would be

reduced. The primary impact would be the increased truck traffic to the rail loading facility.

CULTURAL RESOURCES

Of the 130 known cultural sites on the PRLA, 20 appear to be located on proposed facility or corridor areas. However, this is an estimate and the location of proposed facilities would need to be inventoried to identify all sites, known and unknown, which might be affected by proposed developments. It is anticipated that most direct impacts would be avoided by relocating or adjusting facilities. Inventories and salvage measures would mitigate impacts to cultural resources on sites where it would not be possible to relocate or adjust facilities. With salvage would be the loss of some scientific data. Such a loss would be considered insignificant.

SPECIAL DESIGNATION AREAS

Mining activities and the construction of ancillary facilities in the Hollberg PRLA would impair wilderness character and therefore wilderness suitability in BLM Roadless Unit UT-060-012. Because impairment would occur, mining and construction could not be allowed as long as Unit UT-060-012 is undergoing wilderness review (see Chapter 2, Mitigation Section).

VISUAL RESOURCES

Mining and associated developments would modify the natural appearing landscape in a portion of the tract, but would not conflict with the area's VRM Class IV objectives, nor affect any outstanding or unique scenic values. Visual impact on the tract would be similar through all operational years. Reclamation would not be entirely effective in reestablishing present scenic quality and character upon completion of the mining operation.

RECREATION

Displacement of recreation visitors would be of minimal impact because the surrounding country offers comparable values and experiences. At the height of the mining activity, mining-related population growth would increase the regional demand for

ENVIRONMENTAL CONSEQUENCES

both dispersed and developed recreation opportunities to an unknown amount.

UNAVOIDABLE ADVERSE IMPACTS

A short-term reduction in visibility would occur as a result of particulate emissions from construction and operation of the mine.

Soil and vegetation productivity would be lost on 109 acres for the life of the mine. Of this amount, 77 acres would be reclaimed, and 32 acres would be permanently occupied by housing development. Soil losses ranging from 0.45 to 1.2 tons per acre would occur until reclamation was completed.

Subsidence could occur on 3,036 acres due to underground mining. The extraction of coal would render 19.8 million tons of coal unrecoverable by present technology. An undetermined number of fossils would be lost as a result of mining.

Consumptive use of water would increase by 81 acre-feet in the year 2000.

Some wildlife would be unavoidably displaced from habitat and highway mortality would increase slightly. About 28 acres of irrigated cropland would be changed to community use or retired. Crop production on this acreage would be lost. A small loss in grazing AUMs would occur.

Population increases would require 122 new houses and increased demand for water and sewer hookups. Traffic in the area would increase slightly.

Some loss of cultural resources and scientific data would occur. Recreation demand would increase slightly.

THE RELATIONSHIP BETWEEN THE SHORT-TERM USE OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The short-term use of the area for mining would result in a long-term loss of soil, vegetation, and wildlife productivity on 32 acres occupied permanently by housing development. Extracting coal as proposed would cause 19.8 million tons of coal to be unrecoverable, and potential subsidence would limit certain uses over the long term. Crop production on 28 acres of irrigated cropland would be permanently lost. Loss of cultural sites in context would limit long-term gathering of scientific data in areas disturbed.

IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

The loss of soil, vegetation, and wildlife productivity on 109 acres would be irretrievable. The 19.5 million tons of coal mined would be irretrievable and the 19.8 million tons left in the ground would be irreversibly lost. Subsidence on up to 3,036 acres would be irreversible. The 81 acre-feet of water used annually would be irretrievable. Wildlife lost to traffic mortality or illegal killing would be irretrievable. Lost crop production on 28 acres would be irretrievable and this acreage would be irreversibly committed to urban development. Any loss of cultural resources would be irretrievable.

Alternative Two (Preferred Alternative)

INTRODUCTION

Seven tracts are considered for leasing: Tucker Canyon, Miller Creek, Gordon Creek, Meetinghouse, Rilda Canyon, Cottonwood, and North Horn Mountain. The following section discusses anticipated impacts that would result from implementing Alternative Two.

Possible development of the Hollberg PRLA is considered to be a part of this Alternative. Development of the PRLA has been analyzed in Alternative One and will not be repeated here. The reader is referred to Alternative One.

AIR QUALITY

Interaction of emissions from the Gordon Creek, Miller Creek, and existing mines in the area would increase annual average TSP concentrations by 5 to 10 micrograms per cubic meter above the no action levels. Concentrations in the five other lease areas would be essentially the same as described in Alternative One (Figure 4-1). The TSP concentrations predicted would result in localized violations of the NAAQS unless BACT is applied.

The lesser development considered in Alternative Two would result in a 28 percent decrease in emission rates considered in scenario 6 (Table 4, Appendix 7) and would correspondingly reduce the visibility impacts. Impacts identified for scenario 5 (looking at the North Horn Mountain plume) would

ENVIRONMENTAL CONSEQUENCES

remain the same as described in the Alternative One analysis.

SOILS

The construction of mine facilities, housing, and support facilities for population increases as a result of mine development would cumulatively disturb 638 acres by 1985, 765 acres by 1990, and 834 by end of mine life. The disturbance of 472 acres would be a temporary loss of soil productivity since the area would be eventually reclaimed. The loss of productivity on 362 acres would be permanent due to occupation by housing and support facilities for future population increases in the region.

As discussed in Alternative One, development of surface facilities for underground mining would reduce soil productivity by alteration of existing soil properties and characteristics through disturbance and mixing of soil and stockpiling topsoil. These properties include soil micro-organism composition, structure, infiltration rates, permeability rates, water holding capacities, nutrient levels, and productivity potentials (for detailed analysis see Alternative One).

The primary impact to soils would be a small increase in soil erosion caused by surface disturbance associated with the construction of buildings, haul roads, storage sites, sediment ponds, powerlines, telephone lines, and portals.

Sediment yield resulting from mining activities cannot be quantified because detailed soils data are not available. However, data from general soils maps indicate that low yields would be expected on most disturbed areas on the Wasatch Plateau.

WATER RESOURCES

The hydrologic impacts having regional consequence would result from an increased consumptive use of about 867 acre-feet of water per year for mine use and domestic purposes and the discharge of about 795 acre-feet per year of sewage effluent (see Table 4-15).

The conversion of water use from agricultural to industrial and community use would result in a reduction of about 241 acres of irrigated agriculture land. The use of water for mining would decrease when mining ceases but demand for community use would continue because the related population increase would be expected to remain.

The growth in population would result in a degradation of water quality from the estimated average annual discharge of 172 tons of salt in 1987 to 331 tons of salt in 2000 in sewage effluent. The increase in salinity at Imperial Dam as a result of new Federal coal development would range from 0.04 mg/L in 1987 to 0.07 mg/L in 1995 and remain at 0.07 mg/L in 2000. Increased costs to the farmers as a result of this salinity problem would range from \$16,000 per year in 1987 to \$28,000 per year in 2000 for commercial garden vegetable production.

Potential subsidence on 31,588 acres could impact both the ground water aquifers and the distribution of surface waters in the area. The water affected however would stay within the drainage basins and the impact would be that of the shift of water-source physical location. However, surface water is scarce on the tracts with only a few springs and seeps known. If these waters are affected by mining the lessee would replace the water or make restitution, as required by the State of Utah (Title 73323), 30 CFR 211, or the Office of Surface Mining Reclamation and Enforcement, whichever is applicable.

Mine drainage may contain concentrations of trace elements and others in slightly greater than normal amounts for the area waters. However, reasonable enforcement of mitigations regarding Office of Surface Mining (OSM) Regulations and State effluent standards would prevent contamination of streams. Concentration of suspended sediment may increase temporarily several-fold during construction but due to the small acreages and enforcement of OSM Regulations it should not be significant.

GEOLOGY, TOPOGRAPHY, PALEONTOLOGY, MINERAL RESOURCES

Wasatch Plateau Coal Field

No significant changes are anticipated to topography or geology on the 31,588 acres that would be leased. However, some subsidence would be expected. The surface area that would be susceptible to subsidence would range from 90 to 130 percent of the area actually mined. Subsidence would be greatest at the center of the mined-out area and much less in the peripheral areas. Maximum subsidence would be from 50 to 90 percent of the thickness of the coal removed. It is not anticipated that subsidence would exceed 10 feet in any area. Expressions of subsidence reflected at the land surface include open and closed fractures, buckled

ENVIRONMENTAL CONSEQUENCES

and bulged bedrock, sinkholes, and other depressions (Dunrud, 1976). Mining hazards as described in Alternative One, and operation of the proposed mines would result in two fatalities and 157 nonfatal accidents per year by 1990.

Significant plant fossils used for correlation and paleoenvironmental guides could be inadvertently destroyed by coal removal in the Blackhawk Formation. Disturbances to the other scientifically important fossils probably would not occur. Mining activities and required surveys could also expose new fossils and enhance paleontological studies.

Approximately 279.1 million tons of coal would not be recovered using current mining techniques. This represents 50 to 60 percent of the total in-place coal resource. The mineral value of the land would be depleted except for the oil and gas potential.

The potential oil and gas resources occur well below the Blackhawk Formation, and subsurface mining activities could hinder subsequent exploration and location of facilities related to oil and gas development.

VEGETATION

Implementation of this Alternative involving underground mining on seven tracts would result in loss of vegetation production on 834 acres by the year 2000. The principal cause of this loss would be housing development on the Agricultural, Sagebrush-Grass, and Pinyon-Juniper Woodland types, and development of portal facilities and access roads associated with mining the tracts. The acres of vegetation that would be lost are shown by year and vegetation type in Table 4-16.

No unique or rare vegetation types or plant associations would be affected by coal development as proposed in this Alternative. As discussed under Alternative One, reclamation attempts on these tracts are expected to be successful (50 to 80 percent). Aspen, which reproduces by sprouting, would invade disturbed areas if mature trees are nearby.

Lands occupied for housing development would be committed to urbanization, and vegetation productivity on 362 acres would be permanently lost. Distribution of this loss among vegetation types would be in the approximate percentages discussed in the Alternative One analysis. An additional 60 acres of irrigated agricultural land would be retired because of conversion of irrigation water to community and industrial use by the year 2000. The balance of the disturbed acreage would be reclaimed and vegetation production restored in approximately 2 to 5 years after mining ceases.

This Alternative would not directly impact any listed or candidate threatened or endangered plant species; however, inadvertent destruction of threatened or endangered species found in the region could occur through housing development, off-road vehicle activities, or unlawful collecting of these species.

WILDLIFE

The surface disturbance of 472 acres (beginning in 1985 and continuing for 40 years) from portal, road, and facilities construction could decrease the deer population annually in herd units 34, 35, 36, and 45 by 60 deer or 1 percent (Table 4-17). This loss would not be significant even when combined with losses from traffic collisions and illegal killing.

Elk use of winter migration routes off East and North Horn Mountains could be restricted for 40 years by the placement of a portal in Killpack or Rock Canyons and the subsequent activity. It is difficult to quantify this effect but herds up to 250 animals per event have utilized these routes (personal communications, Ward, FS). The restriction of access would be critical to elk during heavy snow years when they are forced to exist on lower elevation wintering grounds, and an undetermined loss of elk could occur.

The slight loss of prey species such as deer and elk could reduce lion and bear populations by an unknown amount until reclamation was completed. The increase in widespread human disturbance could cause abandonment of some home ranges and a slight reduction in the overall population.

As discussed in Alternative One, damage to riparian habitat could occur from road construction. The disturbance of riparian habitat in the Gordon Creek (40 years), Tucker Canyon (20 years), and Miller Creek (40 years) tracts could displace seven moose annually. This displacement would become significant when the herd expands to occupy all available habitat.

Half of the acreage required for urban use would come from irrigated farmlands adjacent to existing communities. Many species inhabit these farmlands, notably pheasants, cottontails, doves, small birds, and rodents. With 241 acres committed to urban use and water withdrawals by 2000, a total of 157 pheasants could be displaced (Appendix 9). This loss would be insignificant since less than 0.1 percent of the pheasant habitat would be affected regionally.

Surface expression of subsidence such as cracks, bulges, and displacements are not expected to directly affect wildlife, but any reduction or

TABLE 4-15

CUMULATIVE IMPACTS ON WATER RESOURCES AND REGIONAL SIGNIFICANCE
ALTERNATIVE TWO

ITEM	1987	1990	1995	2000
Population Impact from Leasing	2,993	5,265	6,105	6,516
Consumptive Use of Water ^a Increase (+) or Decrease (-) in Stream Flow (ac-ft/yr)	-377	-663	-769	-795
Mining Use	- 72	- 72	- 72	- 72
Percent Change in Stream Flow	-0.21	-0.34	-0.39	-0.41
Decrease in Irrigated Acreage	-125	-204	-234	-241
Increase in Dissolved Solids In Colorado River mg/L	0.04	0.06	0.07	0.07
Increased Cost to Downstream Users (Dollars ^b)	16,000	24,000	28,000	28,000

^aUsed 225 gallons per day per person and allowed 50 percent return flow through sewage effluent

^bBased on 393,000 (1978 dollars) for each 1 mg/L increase in dissolved solid concentration

TABLE 4-16

TOTAL CUMULATIVE IMPACTS ON VEGETATION
ALTERNATIVE TWO

Vegetation Types	Impacts On Tract ^a (Acres)				Impacts Off Tract ^b (Acres)				TOTAL ^c
	1987	1990	1995	2000	1987	1990	1995	2000	
Agriculture	-	-	-	-	-	-	-	-	0
Riparian	7	7	7	7	23	23	23	23	30
Grassland	-	-	-	-	-	-	-	-	0
Desert Shrub	-	-	-	-	10	10	10	10	10
Sagebrush Grass	44	44	44	44	86	86	86	86	130
Pinyon-Juniper Woodland	16	16	16	16	30	30	30	30	46
Mountain Brush	21	21	21	21	75	75	75	75	96
Aspen	28	28	28	28	39	39	39	39	67
Conifer Aspen	40	40	40	40	53	53	53	53	93
Total	156	156	156	156	316	316	316	316	472

^aIncludes mining operation and onsite facilities

^bIncludes offsite facilities (roads, powerlines, etc.)

^cTotal disturbance by year 2000 (housing development would require an additional 362 acres bringing total vegetation disturbance to 834 acres)

ENVIRONMENTAL CONSEQUENCES

elimination of surface water flows and associated vegetation communities due to subsidence could adversely affect some species (see description in Alternative One). At the projected production level, up to 31,588 acres could be susceptible to subsidence.

Construction of 19 miles of utility lines in the area would provide additional perching and hunting sites for raptors and other birds. This would be a beneficial impact; however, as analyzed in Alternative One, the use of these structures along roadsides or in areas open to significant human access would expose the birds to illegal shooting and disturbance.

Construction and use of 19.2 miles of new road would result in the loss of an additional 53 deer that would be killed annually by traffic (Table 4-18). This would be a 70-percent increase equal to 3 percent of the 1979 legal harvest in these units. This is less than 1 percent of the unit's populations.

Another potential effect of new road construction and increased use of existing road systems would be the harassment effect. Elk, a species sensitive to vehicle traffic, would suffer reduced use of habitat due to the increased use of unimproved roads from an expanding outdoor oriented population (Hieb, 1976). By 2000 due to population increases an additional 2,072 off-road vehicles would be located in the Four-County region.

The 9-percent increase in human population could cause some additional loss of wildlife through harvest, harassment, and displacement from habitat. The legal harvest could be controlled, but the population increase could increase the illegal harvest of wildlife by 36 percent. Increased human population pressures could delay the establishment of a moose herd of 487 animals on the Wasatch Plateau and an antelope herd of 700 animals in Castle Valley.

Fisheries

Accidental pollution from spillages of coal, untreated mine drainage, caustics, sewage, or petroleum products could adversely affect fisheries in Price River, Huntington Creek, and Pleasant Valley Creek. This could directly kill fish and/or the aquatic fauna. The effects would be localized and where coal sediments occurred, could be prolonged.

Anticipated population increases could slightly increase fishing pressure on popular waters such as Electric Lake, Huntington Creek, Joes Valley Reservoir, and Scofield Reservoir.

LAND USE

A projected maximum total of 834 acres would change in use from grazing and irrigated cropland to mining and community development by the year 2000. Of this amount, 472 acres would be temporarily disturbed, 156 by onsite support facilities, and 316 by offsite support facilities. The remaining 362 acres would be permanently changed to housing and community infrastructure use.

Community development in Carbon and Emery Counties would cause the permanent loss of 206 acres of irrigated cropland consisting mostly of alfalfa and small grains. Another 20 acres would be temporarily retired from crop production to provide water for mining. Less than 1 percent of the irrigated cropland in the two counties would be affected but the loss would be significant because the lost acreage would be among the most productive farmlands and would be concentrated around community fringes, resulting in reduced availability of livestock feed in affected communities. Sanpete and Sevier Counties would not be significantly affected. See Table 4-19 for acreage requirements for community development and associated irrigated acreage losses. Some prime farmland could be lost, but it would be possible to avoid this with wise planning.

Development of the Meetinghouse Canyon tract would cause increased congestion and traffic in Huntington Canyon. This would hinder movement of livestock to and from grazing areas. About 472 acres of land on the Wasatch Plateau would be removed from grazing for the life of the coal mines. Subsidence could cause displacement or total loss of livestock water in the areas of underground mining.

All tracts have areas that have been zoned to exclude mining as a permitted activity. This could impede development of the mines.

SOCIOECONOMICS

The greatest employment increase would be felt in Emery County, where additional employment would be 1,308 by the year 2000, compared to 4,984 jobs in 1977 and 20 percent above the projected baseline of 6,592 (see Table 4-20). Direct mining employment would account for 815 new jobs, bringing employment in mining to 3,745 or 47 percent of total employment in Emery County, compared with 2,894 or 43.6 percent under the projected baseline.

TABLE 4-17

BIG GAME IMPACTS
ALTERNATIVE TWO

Tract	Acres Disturbed	Disturbed Range	Species	Losses/Year ^a
Gordon Creek	90	High Priority - Summer	Deer	12
		Critical - Winter	Elk	4
		Critical - Yearlong	Moose	4
Meetinghouse Canyon	40	High Priority - Summer	Deer	5
		Critical - Winter	Elk	0
Cottonwood	40	High Priority - Winter	Deer	5
		Critical - Winter	Elk	0
North Horn Mountain	145	High Priority - Winter	Deer	18
		Critical - Winter	Elk	8
Rilda Canyon	63	High Priority - Summer	Deer	8
		High Priority - Winter	Elk	2
Miller Creek	60	High Priority - Summer	Deer	8
		Critical - Winter	Elk	3
		Critical - Yearlong	Moose	2
Tucker Canyon	34	High Priority - Summer	Deer	4
		Critical - Yearlong	Moose	1
		Critical - Winter	Elk	1
Total	472		Deer	60
			Elk	18
			Moose	7

^aIncludes 0.1-mile influence zone.

TABLE 4-18

POTENTIAL DEER TRAFFIC MORTALITY FROM NEW ROADS
ALTERNATIVE TWO

Lease	New Roads (Miles)	Deer Range	Deer Loss/ Year ^a	Total Number of Years
Gordon Creek	3.5	Summer	14	40
Cottonwood	2.2	Winter	4	40
Meetinghouse	2.0	Winter	4	40
North Horn	6.0	Winter	12	40
Tucker Canyon	2.0	Summer	8	20
Miller Creek	1.0	Summer	4	40
Rilda Canyon	2.5	Summer	7	40
Total	19.2		53	

^a1,280 acres (1 mile each side of road) X road length/deer density
(Dalton, UDWR) X 0.076 = Deer Loss/Year

TABLE 4-19

ACREAGE CONVERTED TO COMMUNITY DEVELOPMENT, IRRIGATED CROPLAND CONVERTED TO COMMUNITY DEVELOPMENT, AND IRRIGATED CROPLAND RETIRED TO PROVIDE COMMUNITY WATER ALTERNATIVE TWO

Location	1987			1990		
	Total Acreage Converted ^a	Irrigated Acreage Converted	Irrigated Acreage Retired	Total Acreage Converted	Irrigated Acreage Converted	Irrigated Acreage Retired
	Base	Alt. 2	Base	Alt. 2	Base	Alt. 2
Carbon County	283	72	36	126	176	39
Helper	39	10	5	19	25	6
Price	117	30	15	55	74	16
Wellington	48	6	3	11	26	6
Emery County	104	81	41	146	78	17
Castle Dale	19	15	8	41	14	3
Emery	4	0	0	0	3	1
Ferron	25	8	4	24	17	4
Huntington	0	8	4	0	0	0
Orangeville	25	10	13	27	15	13
Sanpete County	102	12	6	18	81	18
Fairview	9	3	1	4	7	2
Mt. Pleasant	15	6	3	8	15	3
Gunnison	1	0	0	1	10	0
Centerfield	1	0	0	0	4	1
Spring City	4	1	0	2	4	1
Sevier County	204	2	1	3	147	32
Aurora	12	0	0	0	9	2
Redmond	9	0	0	0	5	1
Salina	29	0	0	1	32	0
Sigurd	11	0	0	0	3	1
Four-County Total	693	191	96	293	482	106
						32

TABLE 4-19, Concluded

Location	1995				2000						
	Total Acreage Converted ^a		Irrigated Acreage Converted		Total Acreage Converted		Irrigated Acreage Converted				
	Base	Alt. 2	Base	Alt. 2	Base	Alt. 2	Base	Alt. 2			
Carbon County	433	146	216	73	48	16	453	156	226	78	50
Helper	61	21	30	11	7	2	64	22	32	11	7
Price	193	63	96	31	21	7	213	69	106	34	23
Wellington	59	13	29	7	7	2	61	13	30	7	7
Emery County	201	170	101	85	22	19	203	182	101	91	17
Castle Dale	36	48	18	24	4	5	36	51	18	25	4
Emery	7	0	4	0	1	0	6	0	3	0	1
Ferron	42	29	21	15	5	3	42	32	21	16	5
Huntington	8	27	4	13	1	3	8	29	4	15	1
Orangeville	36	32	18	16	4	4	36	35	18	18	4
Sanpete County	221	20	111	10	25	2	289	19	145	10	32
Fairview	15	5	8	2	2	0	16	5	8	3	2
Mt. Pleasant	35	9	18	4	4	1	36	8	18	4	4
Gunnison	28	1	14	0	3	0	30	1	15	0	3
Centerfield	12	0	6	0	1	0	13	0	7	0	2
Spring City	9	3	4	1	1	0	10	2	5	1	1
Sevier County	456	3	228	2	50	0	571	5	286	2	63
Aurora	33	0	17	0	4	0	33	0	17	0	4
Redmond	19	0	9	0	2	0	19	0	10	0	2
Salina	99	1	50	0	11	0	105	1	52	0	12
Sigurd	8	0	4	0	1	0	12	0	6	0	1
Four-County Total	1,311	339	656	170	145	37	1,516	362	758	181	274

^aAssumes one-half of total acreage required for community development would come from irrigated cropland

TABLE 4-20

PROJECTED EMPLOYMENT IMPACTS
ALTERNATIVE TWO

	Carbon County			Emery County			Sanpete County			Sevier County						
	1987	1990	1995	2000	1987	1990	1995	2000	1987	1990	1995	2000				
Additional Employment by Alternative Two	95	0	0	0	263	0	0	0	0	0	0	0				
Mine Construction	268	534	534	534	408	815	815	815	28	56	56	56				
Mining	288	495	574	623	378	402	468	493	62	66	75	81				
Other (secondary)	651	1,029	1,108	1,157	786	1,217	1,283	1,308	90	122	131	137				
Total	10,572	28,173	11,701	12,416	5,506	5,944	6,294	6,592	6,435	6,662	7,100	7,925	8,179	9,479	10,832	
Projected Employment w/o Alternative Two	11,223	29,202	12,809	13,573	6,292	7,161	7,577	7,900	6,525	6,784	7,231	7,989	7,560	8,211	9,519	10,875
Total Employment Including Alternative Two	21,795	57,375	24,510	26,000	11,798	13,105	13,871	14,492	12,960	13,446	14,331	15,914	15,719	17,690	20,351	

Source: UPED model

ENVIRONMENTAL CONSEQUENCES

Carbon County would experience smaller employment increases resulting in a maximum of 1,157 jobs (including 534 direct mining jobs) in 2000. Total employment in Carbon County would reach 13,573 by 2000 (an increase of 5,922 since 1977). The employment increases in Sanpete and Sevier Counties would be minimal.

The additional employment would bring in an additional \$88.9 million in annual earnings by 2000, most of it concentrated in Carbon (\$43.1 million) and Emery (\$37.3 million) Counties. (All figures are expressed in 1977 dollars.) Total personal income in Carbon County would thus be \$302.2 million in 2000 or \$9,244 per capita (compared with \$6,837 in 1978 and \$8,673 in 2000, under the baseline projection). Emery County would have a total personal income of \$156.3 million or \$9,926 per capita. (Emery County had an average per capita income of \$5,788 in 1978, and is projected to reach \$8,544 by 2000 under the baseline.)

The magnitude of the projected increase in employment, combined with the small pool of unemployed labor in the Four-County area, means that most of the job openings would be filled by new in-migrants rather than existing residents. In addition, special skills are required for underground mining, further reducing the number of local residents available to fill new job openings in the mines.

The majority of new in-migrants would probably reside in Emery County resulting in a population increase of 3,271 by the year 2000 (see Table 4-21). This figure is 23 percent above Emery County's projected population of 13,922 in the year 2000. The largest community-level population impacts would be felt by Price (1,233 additional inhabitants, 10 percent above its projected population of 12,555, and 5,128 above the 1978 population); Castle Dale (916 additional inhabitants or 36 percent above the baseline estimate of 2,506 in 2000); and Orangeville (621 new residents, 37 percent above its estimated baseline population of 1,671 in 2000).

Infrastructure

The most severe stress on infrastructure would be felt in Emery County and its constituent communities. Overcrowding in the county's elementary and secondary schools would mean an additional 523 and 372 pupil spaces respectively by 2000 would be required. The countywide shortage of doctors and nurses would be exacerbated. Three doctors would be needed in 2000 in addition to the projected baseline need of 14 and 11 nurses would be needed in 2000, in addition to the 49 under the projected baseline need (Table 4-22).

In order to meet the projected housing needs of the additional population, Castle Dale would need an additional 278 housing units by 2000 (36 percent above the projected baseline need of 759); Ferron would require an additional 175 units by 2000 (27 percent above the baseline); Huntington 158 units (21 percent above the baseline); and Orangeville 188 (37 percent greater). (See Table 4-23.)

Communities in Emery County have adequate firefighting capacity to handle the anticipated increased demand. While levels of police coverage would decline in all communities, local police departments already are understaffed and additional coal leasing would account for a relatively small proportion of the additional police officers required.

Carbon County would also experience significant infrastructure stress although to a lesser extent than Emery County. The County's schools would need to provide 329 additional places for elementary students and 249 secondary students by 2000. (Under the baseline, the County would have adequate capacity in its elementary schools through 2000, but would need 630 more secondary school places in order to avoid overcrowding.)

Carbon County faces a serious shortage of doctors and nurses under the projected baseline. To meet the needs of the additional population that would result from this alternative two additional physicians and ten additional nurses would be needed to meet accepted health planning standards (Table 4-22).

To meet the projected population growth, Price would require 374 additional housing units by 2000. In Helper, 122 more housing units would be required by 2000.

There would be no significant infrastructure impacts in Sanpete or Sevier Counties.

Social Impacts

Sanpete and Sevier Counties would experience negligible social impacts because they are located some distance from the proposed mine sites and would experience little incremental population growth as a result of renewed leasing. Although the Helper-Price-Wellington area of Carbon County would gain an additional 1,870 residents by 2000, the incremental social impacts of this growth would be minimal. The Helper-Price-Wellington area, which had 13,000 residents in 1978 and is expected to reach 19,000 by 2000, is already becoming relatively urbanized, with a concomitant increase in ethnic and cultural heterogeneity. While the pace of social changes already taking place in Helper-Price-

TABLE 4-21

PROJECTED POPULATION IMPACTS
ALTERNATIVE TWO

	1978 Total Population	1987			1990		
		Total Without the Proposed Alternative	Total With the Proposed Alternative	Increment Due to the Proposed Alternative	Total Without the Proposed Alternative	Total With the Proposed Alternative	Increment Due to the Proposed Alternative
		Alternative	Alternative	Alternative	Alternative	Alternative	Alternative
Carbon	21,643	26,919	28,206	1,287	28,173	30,436	2,263
Helper	3,030	3,751	3,938	187	3,944	4,279	335
Price	8,660	10,858	11,398	540	11,429	12,420	991
Wellington	1,299	2,167	2,270	103	2,254	2,455	201
Emery	9,849	12,168	13,628	1,460	13,113	15,746	2,633
Castle Dale	1,773	2,204	2,481	277	2,360	3,097	737
Emery	397	492	492	0	525	525	0
Ferron	1,280	1,782	1,932	150	1,967	2,407	440
Huntington	2,363	2,239	2,385	146	2,360	2,808	448
Orangeville	985	1,483	1,670	187	1,574	2,066	492
Sanpete	14,119	18,362	18,572	210	19,442	19,758	316
Centerfield	600	890	891	1	1,027	1,029	2
Fairview	1,060	1,256	1,311	55	1,322	1,394	72
Gunnison	1,368	2,011	2,012	1	2,355	2,361	6
Mt. Pleasant	2,354	2,669	2,778	109	2,933	3,072	139
Spring City	698	785	808	23	850	884	34
Sevier	14,489	18,687	18,723	36	20,309	20,362	53
Aurora	779	1,034	1,035	1	1,155	1,158	3
Redmond	486	658	659	1	694	695	1
Salina	2,191	2,774	2,780	6	3,384	3,393	9
Sigurd	370	564	565	1	491	505	13
Regional Total	60,100	76,136	79,129	2,993	81,037	86,302	5,265

(Continued)

TABLE 4-21 (Concluded)

	1978 Total Population	1995			2000		
		Total Without the Proposed Alternative	Total With the Proposed Alternative	Increment Due to the Proposed Alternative	Total Without the Proposed Alternative	Total With the Proposed Alternative	Increment Due to the Proposed Alternative
Carbon	21,643	29,626	32,251	2,625	29,889	32,691	2,802
Helper	3,030	4,148	4,531	383	4,184	4,585	401
Price	8,660	12,217	13,346	1,129	12,555	13,788	1,233
Wellington	1,299	2,370	2,596	226	2,391	2,627	236
Emery	9,849	13,913	16,965	3,052	13,922	17,193	3,271
Castle Dale	1,773	2,505	3,360	855	2,506	3,422	916
Emery	397	554	554	0	540	540	0
Ferron	1,280	2,087	2,600	513	2,088	2,664	576
Huntington	2,363	2,505	2,984	479	2,506	3,029	523
Orangeville	985	1,670	2,250	580	1,671	2,292	621
Sanpete	14,119	20,509	20,875	366	21,687	22,032	345
Centerfield	600	1,091	1,093	2	1,103	1,105	2
Fairview	1,060	1,355	1,439	84	1,367	1,453	86
Gunnison	1,368	2,503	2,510	7	2,531	2,538	7
Mt. Pleasant	2,354	3,031	3,192	161	3,060	3,212	152
Spring City	698	879	923	44	886	927	41
Sevier	14,489	23,228	23,290	62	25,170	25,268	98
Aurora	779	1,412	1,415	3	1,417	1,420	3
Redmond	486	843	844	1	849	852	3
Salina	2,191	4,028	4,037	9	4,138	4,153	15
Sigurd	370	515	519	4	585	592	7
Regional Total	60,100	87,276	93,381	6,105	90,668	97,184	6,516

Source: UPED model

TABLE 4-22

IMPACTS ON EDUCATION, HEALTH, AND POLICE SERVICE REQUIREMENTS IN 2000
ALTERNATIVE TWO

County	Existing Capacity 1978	Total Need With Alt. 2	Increment Due To Alt. 2	Percent Increase Due To Alt. 2
Carbon County				
Pupil Spaces ^a				
Elementary	2,828	3,825	329	9.4
Secondary	2,139	2,909	249	9.4
Teachers ^b	192	315	27	9.4
Doctors ^c	21	32	2	7.0
Nurses	122	115	10	9.5
Police Officers ^d	24	65	5	8.3
Emery County				
Pupil Spaces				
Elementary	1,940	2,751	523	23.0
Secondary	1,417	1,960	372	23.0
Teachers	129	234	44	23.0
Doctors	7	17	3	21.0
Nurses	6	60	11	22.0
Police Officers	12.5	34	7	26.0
Sanpete County				
Pupil Spaces				
Elementary	1,789	2,490	39	2.0
Secondary	743	1,983	31	2.0
Teachers	152	172	3	2.0
Doctors	7	22	0	0.0
Nurses	27	78	1	1.0
Police Officers	7	44	1	2.0
Sevier County				
Pupil Spaces				
Elementary	1,783	3,282	11	0.3
Secondary	1,111	2,349	8	0.3
Teachers	165	225	1	0.4
Doctors	9	25	0	0.0
Nurses	24	89	0	0.0
Police Officers	12.5	50	0	0.0

^aProjected enrollment is based on the assumption that school district enrollment is the same proportion of county population in the future as in 1978

^bProjected need for teachers assumes the same teacher/pupil ratio as in 1978

^cProjected need for doctors and nurses is based on the planning standard of one per 1,000 population and one per 285 population, respectively

^dProjected need for police officers is based on a standard of two full time equivalent officers per 1,000 person

TABLE 4-23

PROJECTED HOUSING IMPACTS IN 2000
ALTERNATIVE TWO

	Projected Need Without This Proposed Action	Projected Need With This Proposed Action	Increment Due To The Proposed Action	Percent Increase Due To The Proposed Action
Carbon County	9,057	9,906	849	9.4
Helper	1,268	1,390	122	9.6
Price	3,805	4,179	374	9.8
Wellington	724	796	72	10.0
Emery County	4,219	5,210	991	23.0
Castle Dale	759	1,037	278	36.0
Emery	163	163	0	0.0
Ferron	633	808	175	27.0
Huntington	759	917	158	21.0
Orangeville	506	694	188	37.0
Sanpete County	6,571	6,675	104	1.6
Centerfield	334	360	26	7.7
Fairview	414	460	46	11.0
Gunnison	767	769	2	0.2
Mt. Pleasant	927	928	1	0.1
Spring City	268	280	12	4.4
Sevier County	7,627	7,657	30	0.3
Aurora	429	430	1	0.2
Redmond	257	258	1	0.4
Salina	1,254	1,258	4	0.3
Sigurd	177	179	2	1.0
Regional Total	27,474	29,448	1,974	7.2

ENVIRONMENTAL CONSEQUENCES

Wellington would be accelerated, it is unlikely to have a significant impact on the nature or direction of these changes.

The Emery County communities of Castle Dale, Ferron, and Orangeville would experience a more significant incremental social change. Even without renewed leasing, these communities are expected to experience considerable population growth, entailing some loss of small-town values and an increase in social heterogeneity, particularly if a large proportion of the new in-migrants are non-Mormons. A population increase of 36 percent in Castle Dale and Orangeville and 28 percent in Ferron by 2000, would lead to a further lessening of the small-town atmosphere and an increase in social heterogeneity. More social services would be required to deal with increasing problems such as alcoholism, divorce, mental disorders, drug abuse, and family violence. However, the results of local interviews indicate that residents, while aware of the social costs, are receptive to development because of the advantages it brings in terms of access to better public services, facilities, improved shopping, cultural, and recreational facilities.

The town of Emery would experience no incremental population growth, and therefore no direct social change. Huntington would also be unlikely to experience severe social impacts since Huntington has a relatively large population base to begin with (2,363 residents in 1978), and the incremental population would not exceed 523 persons. Perhaps most important, Huntington has already gone through a period of adjusting to the social impacts of rapid population growth in the 1970s. As a result, Huntington has largely lost its small-town atmosphere and values but residents have also enjoyed the benefits of development in terms of jobs, better public services, etc., and are therefore very receptive to further growth.

TRANSPORTATION

Traffic increases due to additional leasing of tracts under Alternative Two are shown in Table 4-24. The traffic increase by itself is not enough to overload any of the State highways, but would be enough on the Gordon Creek Road and on the North Horn Mountain mine access road to justify paving with a hard surface. The traffic increase would aggregate to about 13 million miles annually of direct, mine-related traffic, consuming about 1.33 million gallons of petroleum-based fuels per year. Additional traffic would require increased road maintenance, which, according to UDOT, is inadequately funded by present motor fuel tax distribution formulas.

Traffic increases due to additional leasing would reduce the level of service afforded by the existing Forest highway system. In most cases the present level of service is at stable flow with reduced speed, due to the percentage of truck traffic and limited passing opportunities. The level of service would approach unstable flow or forced flow at decreased speed with the additional traffic. Accident rates would increase due to the additional traffic at grade intersections and increased congestion.

Additional development of existing lease and additional leasing, within the Forest boundary served by Highway 31, would be expected. The percentage of truck traffic would increase as would overall traffic from this development. The total traffic could reach or exceed the maximum capacity of the existing road.

Cumulative traffic is shown in Table 4-25. The increases in traffic would be enough to exacerbate the crowding of the north end of U-10, down to Castle Dale, but would raise only two new crowded categories, in the vicinity of the Hunter powerplant south of Castle Dale about 2000, and along U-29 in the vicinity of Orangeville. According to UDOT Division of Traffic Safety, the traffic accident rate is not expected to increase due to the increase in traffic although the number of accidents would increase.

On the basis of Statewide accident rates, there would probably be an increase of about 49 vehicle accidents per year in the area due to the increased traffic.

The increased travel projected under the four alternatives would generate from \$67,500 to \$144,000 in increased fuel revenues annually. This revenue would be sufficient to apply only a minimum surface rehabilitation treatment to 1 mile of highway each year where many hundreds of miles are affected.

Utah's highways have usually been constructed to accommodate traffic for 20 years after they were built. Nearly all of the highways impacted by the proposed coal development are approaching or have already exceeded the 20-year design traffic volume. Significant traffic increases will only exacerbate an already serious deficiency in the financial resources required to maintain, let alone improve, the affected highways. With many of the highways in a precarious condition, the increased travel (with a high percentage of trucks) would precipitate the deterioration of many highways. Immediate attention would be required just to retain a tolerable level of service. Without additional financing by a factor somewhere between fifty and one hundred times the previously mentioned revenue, the impacted roads will be adversely affected. Even then, it is assumed that such amounts would be made available each year over the life of the impact and

TABLE 4-24

ANNUAL AVERAGE DAILY TRAFFIC INCREASE
DUE TO ALTERNATIVE (1990-2000)
ALTERNATIVE TWO

Point	Location	All	Trucks
1.	U-96 South of U.S. 6	98	33
2.	U.S. 6 at Utah-Carbon County Line	412	44
3.	Gordon Creek Road	488	214
4.	U.S. 6 North of Price	814	263
5.	U.S. 6 Between Price and Wellington	107	0
14.	U-10 South of Price	1,062	389
15.	Wellington Loadout Road	189	189
16.	U-10 North of Huntington	873	200
17.	U-31 West of Huntington	391	176
18.	U-10 South of Huntington	905	317
19.	U-29 West of Orangeville	459	201
19a.	Castle Valley RR Loadout S of Castle Dale	334	334
20.	U-10 South of Castle Dale	1,104	116
21.	North Horn Mountain Mine	1,228	99
22.	U-10 North of Ferron	502	17
23,25.	U-10 South of Ferron, North of Emery	0	0
26.	Emery North Mine	0	0
27.	Emery Central Mine	0	0
27a.	U-10 South of Emery	0	0
27b.	Castle Valley RR Loadout South of Emery	0	0
28.	U-10 North of I-70	0	0
29.	Emery South and Dog Valley Mines	0	0
33.	I-70 East of Salina	0	0
37.	U.S. 89 South of Salina	0	0
47.	New Road, Pleasant Valley to U-31	41	0
48.	U-31 East of Fairview	41	0

Note: Castle Valley RR spur assumed built to Emery

TABLE 4-25

ANNUAL AVERAGE DAILY TRAFFIC PROJECTED FOR SELECTED YEARS
ALTERNATIVE TWO

Point	Location	1985		1987		1990		1995		2000	
		All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks
1.	U-96 S of U.S. 6	953	171	1,075	208	1,306	281	1,356	283	1,406	285
2.	U.S. 6 at Utah-Carbon County Line	8,740	1,430	9,519	1,575	11,120	1,827	13,120	2,127	15,082	2,345
3.	Gordon Creek Road	339	139	339	139	827	353	827	353	827	353
4.	U.S. 6 N of Price	17,563	3,033	18,201	3,210	19,974	3,698	21,474	3,923	22,849	4,076
5.	U.S. 6 between Price & Wellington	11,156	1,806	16,394	2,698	25,486	3,959	39,699	6,102	43,663	5,958
6.	Soldier Cr Rd at Duchesne-Carbon Co Line	65	3	68	3	75	5	90	4	112	5
7.	Soldier Cr Rd at Soldier Cr Mine	145	14	193	17	295	23	333	24	355	25
8.	Deadman Canyon Mine	322	160	408	191	551	243	794	348	794	348
9.	Dugout Canyon Road	965	80	1,242	103	1,555	128	1,555	128	1,555	128
10.	Soldier Cr Rd at U.S. 6	1,431	301	1,855	314	2,424	394	2,682	500	2,704	501
11.	U.S. 6 W of U-123 (Sunnyside Jct)	5,356	851	5,890	906	6,256	986	7,056	1,106	8,140	1,206
12.	U-123 E of U.S. 6	2,656	160	2,850	168	3,056	176	3,156	180	3,256	184
13.	U.S. 6 near Carbon-Emery County Line	3,300	495	3,460	520	3,700	555	4,100	615	4,500	675
14.	U-10 S of Price	5,983	1,407	6,082	1,353	7,607	1,962	8,119	2,056	8,556	2,119
15.	Wellington Loadout Road	883	883	970	970	589	589	620	620	620	620
16.	U-10 N of Huntington	5,514	1,290	5,614	1,290	6,420	1,259	6,870	1,392	7,156	1,433
17.	U-31 W of Huntington	1,483	185	1,697	189	2,307	378	2,532	392	2,668	404
18.	U-10 S of Huntington	3,883	979	4,024	983	4,952	1,108	5,449	1,155	5,831	1,208
19.	U-29 W of Orangeville	2,103	559	3,190	597	3,871	812	4,001	817	4,019	817
19a.	Castle Valley RR Loadout S of Castle Dale	834	834	1,500	1,500	2,435	2,435	2,435	2,435	2,435	2,435
20.	U-10 S of Castle Dale	1,250	150	1,460	210	2,867	408	3,420	458	3,806	471
21.	North Horn Mountain Mine	-	-	-	-	1,228	99	1,228	99	1,228	99
22.	U-10 N of Ferron	1,250	150	1,460	210	2,265	309	2,818	359	3,204	372
23.	U-10 S of Ferron, N of Emery	1,050	126	1,226	181	1,491	259	2,055	304	2,409	314
26.	Emery North Mine	-	-	-	-	-	-	-	-	-	-

(Continued)

TABLE 4-25 (Concluded)

Point	Location	1985		1987		1990		1995		2000	
		All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks
27.	Emery Central Mine	-	-	-	-	-	-	-	-	-	-
27a.	U-10 S of Emery	930	112	1,090	131	1,481	193	2,133	299	2,542	34
27b.	Castle Valley RR Loadout S of Emery	-	-	-	-	799	799	799	799	799	799
28.	U-10 N of I-70	930	112	1,090	131	1,675	345	1,927	403	2,366	45
29.	Emery South & Dog Valley Mines	70	10	70	10	70	10	70	10	70	1
30.	U-72 near Sevier-Wayne County Line	37	1	40	2	45	2	55	2	66	1
31.	U-72 S of I-70	270	184	368	185	442	185	454	185	454	18
32.	Spring Canyon Road at I-70	1,085	591	1,085	591	949	283	961	348	961	34
33.	I-70 E of Salina	5,075	1,520	5,047	1,412	4,755	928	4,338	993	4,462	1,03
34.	U.S. 89 S of Richfield	5,143	771	5,538	830	5,770	866	5,770	866	5,599	84
35.	U.S. 89 N of Richfield	6,800	1,020	7,738	1,161	7,835	1,175	6,800	1,020	6,121	91
36.	U.S. 89 N of Aurora	7,835	1,175	8,711	1,307	8,800	1,320	7,835	1,175	6,645	99
37.	U.S. 89 S of Salina	3,175	1,135	2,866	828	2,683	571	2,438	636	2,553	62
38.	U.S. 89 near Sanpete-Sevier County Line	5,828	1,170	6,132	1,113	6,000	720	6,000	720	6,390	1,04
39.	U-28 N of Gunnison	3,848	873	3,822	777	3,500	420	3,500	420	3,818	73
40.	U.S. 89 N of Gunnison	1,870	75	1,874	75	1,980	79	2,250	90	2,570	10
41.	U.S. 89 N of Manti	2,875	115	2,518	101	2,635	105	3,500	140	4,973	19
42.	Public Road E of Ephraim	285	11	317	12	380	15	510	20	665	2
43.	U.S. 89 N of Ephraim	2,255	90	2,277	91	2,415	97	2,745	110	3,127	12
44.	U.S. 89 S of Mt. Pleasant	1,645	66	1,574	63	1,660	66	2,000	80	2,475	9
45.	U.S. 89 N of Mt. Pleasant	3,770	151	3,859	154	4,000	160	4,225	169	4,432	17
46.	U-31 at Sanpete-Emery County Line	540	22	627	25	725	29	840	34	922	3
47.	New Road, Pleasant Valley to U-31	1,067	43	1,216	48	1,576	61	2,269	89	3,116	12
48.	U-31 E of Fairview	1,607	64	1,843	73	2,301	90	3,109	123	4,038	16
49.	U.S. 89 N of Fairview	2,040	82	2,029	81	2,150	86	2,485	100	2,898	11

Note: Castle Valley Railroad assumed built to Emery by 1990

ENVIRONMENTAL CONSEQUENCES

that the onset of development would occur slowly (UDOT, 1980)

Energy Requirements and Conservation Potential

It is anticipated that the 2,890 vpd of direct, mine-related traffic would consume about 1.33 million gallons of petroleum-based fuel and consume the equivalent lives of 75 vehicles annually in traveling about 13 million miles per year. The use of buses in hauling commuting miners from homes to jobs and return, or even van pools could reduce these figures substantially.

A net energy analysis estimate was made comparing the amount of energy in the coal produced from the tracts, the energy expended in its production, and the energy in the coal left in the ground after mining. Total energy output for this Alternative is estimated at 4.63 million billion Btu. Energy required for production of the coal is estimated at 152,038 billion Btu. Finally, energy left underground, and considered unrecoverable after mining is estimated at 6.39 million billion Btu.

See Appendix 10 for tract-by-tract energy balance analyses.

CULTURAL RESOURCES

Impacts to cultural resources would be the same as analyzed for underground mining on the Wasatch Plateau, Alternative One. In summary, there would be insignificant direct losses of cultural resources on these tracts with low densities of cultural sites because of avoidance, excavation, and salvage measures. There would be less of an opportunity for avoidance of sites on the North Horn Mountain tract where the projected site density is higher (55 to 65 sites).

Expanded populations and better access would cause a loss of cultural sites within the region from vandalism, pothunting, and arrowhead collecting.

SPECIAL DESIGNATION AREAS

Some of the 17 areas in the Four-County region with potential for wilderness or other special designation could receive increased ORV and other dispersed recreation use because of the coal related population increase. Resultant littering and vandalism would degrade values for which the areas are being studied. Federal agencies managing the

lands (BLM and FS) may be under stress to protect these values with no foreseeable increase in funding for that purpose. However, it is very unlikely that possible degradation would affect the designation suitability of any area due to the temporary nature of impacts resulting from dispersed recreational use.

VISUAL RESOURCES

Impacts to visual resources in the North Horn Mountain, Cottonwood, Meetinghouse, Tucker Canyon, Gordon Creek, Miller Creek, and Rilda Canyon tracts would be the same as identified in Alternative One. A summary of these impacts follows.

Disturbance and facilities (e.g., transmission lines, access roads, and coal conveyors) associated with underground mining of the North Horn, Cottonwood, Rilda Canyon, Meetinghouse, Gordon Creek, and Miller Creek tracts, and located both on and off the tracts, would not be highly visible nor conflict with VRM objectives. There would be a visual conflict with Tucker Canyon (VRM Class III) where facilities and disturbance associated with underground mining would be clearly visible from large areas on and about Scofield Reservoir, including the Scofield Reservoir State Park, Highway 96, and the Mountain Home and Aspen View subdivisions, degrading the visual resources enjoyed by visitors to the reservoir and residents of the subdivisions.

In most cases, reclamation would be effective in reestablishing the present scenic quality and character of the Wasatch Plateau tracts upon completion of the mining operations. The average visitor would probably note little change in the region's overall scenic character from development and reclamation of the tracts.

RECREATION

By the year 2000 mining-related population growth would increase the local demand (users originating from within the Four-County region) for both dispersed and developed recreation opportunities by approximately 10 percent from 1980 use figures. Table 4-26 and Table 4-27 show the anticipated increases in demand for hunting and fishing and ORV activity respectively during the life of the mining operation. Increased demand for dispersed activities, as well as increased use of developed recreation sites and urban facilities, would result in impacts similar to those identified for Alternative One but smaller in extent and intensity. The extent

TABLE 4-26
PROJECTED INCREASE IN LOCAL HUNTER AND FISHERMAN DEMAND
ALTERNATIVE TWO

Year	Coal-Related Population	Projected Annual Increase In Numbers					Overall Percent Increase from 1980
		Deer Hunters	Elk Hunters	Upland Game/Waterfowl Hunters	Fishermen	Increased Demand For Fish	
1987	2,993	524	51	254	1,347	29,230	4.7
1990	5,265	921	90	448	2,369	51,407	8.3
1995	6,105	1,068	104	519	2,747	59,610	9.6
2000	6,516	1,140	111	554	2,932	63,624	10.2

Note: Projections were made assuming that the percentage of Utah's population that currently hunts or fishes would remain the same, and that the Utah percentage can be applied to the Four-County area. Approximately 17.5 percent of Utah's population hunt deer, 1.7 percent hunt elk, and 8.5 percent hunt upland game or waterfowl. Approximately 53 percent of Utah's population under the age of 12 and 42 percent of the population over the age of 12 fish. Approximately 27 percent of Utah's population is under 12 and 73 percent is over 12 in age (Thayne and Hudson, 1978).

TABLE 4-27
PROJECTED INCREASE IN LOCAL OFF-ROAD VEHICLE DEMAND WITHIN THE FOUR-COUNTY REGION
ALTERNATIVE TWO

Year	Projected Coal-Related Population Increase	Project Increase		Overall Percent Increase from 1980
		in Pickup and Four-wheel Drive Numbers	Projected Increase in Motorcycle Numbers	
1987	2,993	748	204	4.7
1990	5,265	1,316	358	8.3
1995	6,105	1,526	415	9.6
2000	6,516	1,629	443	10.2

Note: Projections were made assuming that the percentage of the population in the Four-County region that owns off-road vehicles would remain the same (6.8 percent of the population currently owns motorcycles, and 25 percent of the population currently owns four-wheel drive vehicles or light pickups) (Scorp, 1978)

ENVIRONMENTAL CONSEQUENCES

cannot be quantified. In summary, the additional competition for fish and game would lead to less hunter and fisherman success or restricted harvests. Increased use would increase ORV conflict with other recreational uses. Overuse of developed campgrounds, picnic areas, playfields, swimming pools and golf courses would result in continued deterioration of existing facilities, user dissatisfaction, and additional recreation pressures on undeveloped areas. Federal, State, and local governments would be under stress with limited funds to provide recreation facilities to meet minimum standards recommended by the Utah Outdoor Recreation Agency (SCORP, 1978).

Development of the tracts and of homesites would displace dispersed recreational use from as much as 638 acres in 1987, 765 acres in 1990, 811 acres in 1995, and 834 acres in the year 2000.

Loss of recreational opportunities from displacement would be minimal. Visual and audio impacts from mining the Tucker Canyon tract would reduce the quality of the recreational experience of people visiting the adjacent Scofield Reservoir and residents of the adjacent subdivision. Impacts to recreational traffic on the Huntington Canyon, Eccles Canyon, and Scofield Reservoir roads would be the same as were identified in Alternative One (i.e., increase in danger, stress, and visitor dissatisfaction).

UNAVOIDABLE ADVERSE IMPACTS

In localized areas, high particulate concentrations could occur near unpaved haul and access roads. This would result in a short-term degradation of air quality.

The loss of soil and vegetation productivity on 834 acres would be unavoidable for the life of the mines. Changes in aquifers and surface distribution of water due to subsidence could not be avoided. The consumptive use of water in the region would increase by 867 acre-feet annually; sewage effluent discharge would increase by 795 acre-feet annually, and would increase the annual discharge of salt into Colorado River tributaries by 331 tons. The loss of wildlife including 53 deer annually due to highway mortality and a 36-percent increase in illegal killing would be unavoidable. Surface disturbance would reduce the carrying capacity of the region by 60 deer annually for the life of the mines. Conversion of irrigated cropland for urban use and retirement of irrigated land to provide water for community and mining would result in loss of 241 acres of irrigated cropland in the region. About 472 acres of grazing land would be occupied for the life of the mines.

The unavoidable adverse socioeconomic impacts of this alternative would include: (1) a worsening of the local inflation rate, which would be particularly detrimental to persons living on low or fixed incomes; (2) an increase of 2,645 mining jobs would cause competition for labor, with the relatively high wages paid in mining and construction making it difficult for other sectors to hire and retain qualified employees; (3) increased capital and operating outlays by local governments; and (4) a population increase of 6,516 would result in some loss of small-town atmosphere and cultural homogeneity in the affected communities, particularly Castle Dale, Ferron, and Orangeville.

The adverse impacts on Highways U-10 and U-29, and conflicts with recreational traffic on roads on the Wasatch Plateau would be unavoidable. Increased traffic would result in an increase of about 49 traffic accidents annually.

Inadvertent loss of cultural resources could occur, and sites that are salvaged would lose context for further study. The demand for recreation opportunities would increase by about 10 percent.

Landscape modification resulting from mining and associated development would be an unavoidable adverse impact on the Tucker Canyon tract where it would exceed VRM objectives.

THE RELATIONSHIP BETWEEN THE SHORT-TERM USE OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Housing development associated with coal production in the region would occupy 362 acres resulting in a long-term loss of soil and vegetation productivity on those acres. The 279.1 million tons of coal left in the ground after mining would be unrecoverable resulting in a long-term loss of that resource. Changes in aquifers or points of surface discharge due to the potential subsidence on 31,588 acres would be a long-term change in local surface water distribution and ground water storage potential. Consumptive use of water for community use (795 acre-feet annually) would continue. The 72 acre-feet used annually for coal mining would become available for other use after mining ceases.

Disturbance or occupation of wildlife habitat for up to 40 years by mining activity would result in a long-term redistribution of wildlife populations and migration routes. The long-term productivity of wildlife, including habitat for 157 pheasants, on 241 acres occupied by housing development or retired would be permanently lost. The occupation of 181

ENVIRONMENTAL CONSEQUENCES

acres of cropland for housing and the retiring of 60 acres because of the change in water use would continue after mining ceases and would result in a long-term reduction in cropland productivity.

Implementation of this Alternative would have a positive long-term impact on productivity through: (1) an increase in the size of the labor force; (2) infrastructure improvements useful for commercial and industrial development; and (3) increased income and buying power which would contribute to the development of a larger and more diversified trade and services sector. This Alternative would also have one potential negative impact on productivity, i.e., an increased vulnerability to economic disruptions caused by fluctuations in the coal industry.

IRRETRIEVABLE OR IRREVERSIBLE COMMITMENT OF RESOURCES

Emissions attributable to increased population growth in the region would cause an irreversible deterioration in air quality. Soil and vegetation productivity on 834 acres would be irretrievably lost for the life of the mines. Productivity on 362 acres permanently occupied by housing development would be irreversibly lost.

The 186.1 million tons of coal mined would be ir retrievable, and the 279.1 million tons left in the ground would be unrecoverable by present technology. Increased water consumption (867 acre-feet annually) for mining and community needs would be ir retrievable. Any change in aquifers or point of water discharge due to subsidence would be irreversible. The degradation in downstream water quality due to the discharge of 331 tons of salt annually in sewage effluent would be irreversible.

Lost production of crops from irrigated lands converted to community use or retired because of conversion of water use would be ir retrievable, and the 181 acres would be irreversibly committed to urban use. Lost grazing capacity due to occupation by mining facilities would be ir retrievable. Wildlife productivity on these lands would be irreversibly lost. Wildlife losses to traffic mortality, loss of habitat, and illegal killing would be ir retrievable.

The growth in population expected to result from this Alternative would be ir retrievable except at considerable human and economic cost. The commitment of capital, physical resources, and labor to build 1,974 housing units and infrastructure required to support the additional population, commerce, and industry would be an ir retrievable impact. The loss of small-town atmosphere and community soli-

arity in some communities as a result of development would be ir retrievable.

Haulage of coal to existing loadouts, commuting from local communities, and services to the mines from Price would result in the consumption of 1.34 million gallons of petroleum fuels per year, and over the mining period ir retrievably commit the lifetimes of 75 vehicles annually for the life of the mines. Lives and money lost due to an increase of 49 traffic accidents annually would be ir retrievable.

The landscape modification associated with the Tucker Canyon tract and associated loss in visual quality would be ir retrievable for the life of the mine.

Alternative Three

INTRODUCTION

Alternative Three considers leasing three tracts: Meetinghouse Canyon, Cottonwood, and North Horn Mountain. All mining would be underground. These are the three tracts identified for exchange by UP&L. The tracts are not available for consideration for competitive lease until a decision is reached concerning the proposed exchange. The following section discusses anticipated impacts that would result from implementing Alternative Three.

Possible development of the Hollberg PRLA is considered to be a part of this Alternative. Development of the PRLA has been analyzed in Alternative One and will not be repeated here. The reader is referred to Alternative One.

AIR QUALITY

TSP concentrations near the tracts considered in this Alternative would be approximately the same as described under Alternative One (Figure 4-1). Localized violations of the NAAQS for TSP would occur unless BACT is applied.

Development of the tracts included in Alternative Three would result in a 28 percent reduction from emission rates used for scenario 6 with a corresponding reduction in visibility impacts. Impacts identified for scenario 5 (looking at the North Horn Mountain mine) would be the same as described in Alternative One.

ENVIRONMENTAL CONSEQUENCES

SOILS

The construction of mine facilities, housing, and support facilities for population increases as a result of mine development would cumulatively disturb 248 acres by 1985, 425 acres by 1990, and 472 acres by the end of mine life. The disturbance of 225 acres would be a temporary loss of soil productivity since the area would eventually be reclaimed. The loss of productivity on 247 acres would be permanent due to occupation by housing and support facilities for future population increases in the region.

As discussed in Alternative One the primary impacts to soils would be a temporary loss of soil productivity and a small increase in soil erosion caused by surface disturbance associated with the construction of buildings, haul roads, storage sites, sediment ponds, powerlines, telephone lines, and portals.

Data from general soils maps indicate that sediment yield resulting from mining activities would be low on most disturbed areas on the Wasatch Plateau.

WATER RESOURCES

The hydrologic impacts having regional consequence would result from an increased consumptive use of about 612 acre-feet of water per year for mine use and domestic purposes and the discharge of about 560 acre-feet per year of sewage effluent (Table 4-28).

The change of water use from agricultural to industrial and community use would result in a reduction of about 170 acres of irrigated agriculture land. The use of water for mining would decrease when mining ceases but demand for community use would continue because the related population increase would be expected to remain.

The growth in population would result in degradation of water quality from the estimated average annual discharge of 45 tons of salt in 1985 to 207 tons of salt in sewage effluent by 2000. The increase in salinity at Imperial Dam as a result of new Federal coal development would range from 0.01 mg/L in 1985 to 0.04 mg/L in 1995 and remain at 0.04 mg/L in 2000. Increased costs to the farmers as a result of this salinity problem would range from \$4,000 per year in 1985 to \$16,000 per year in 2000 for commercial garden vegetable production.

Potential subsidence on 24,507 acres could impact both the ground water aquifers and the distribution of surface waters in the area. The water

affected however would stay within the drainage basins and the impact would be that of the shift of water-source physical location. Surface water is scarce on the tracts with only a few springs and seeps known. If these waters are affected by mining the lessee would replace the water or make restitution, as required by the State of Utah (Title 73323), 30 CFR 211, or the Office of Surface Mining Reclamation and Enforcement, whichever is applicable.

GEOLOGY, TOPOGRAPHY, PALEONTOLOGY, MINERAL RESOURCES

No significant changes are anticipated to topography or geology on the 24,507 acres that would be leased on the Wasatch Plateau coal field. However, some subsidence could be expected. The surface area that would be susceptible to subsidence has been calculated to range from 90 to 130 percent of the area mined. Subsidence of up to 10 feet would be expected in some areas where the coal is nearest the surface but would probably average much less. Surface expressions of subsidence include open and closed fractures, buckled and bulged bedrock, sinkholes, and other depressions. Mining hazards as described in Alternative One, and operation of the proposed mines would result in 1.7 fatalities and 117 nonfatal accidents per year by 1990.

Significant plant fossils used for correlation and paleoenvironmental guides could be inadvertently destroyed by coal removal in the Blackhawk Formation. Disturbances to the other scientifically important fossils probably would not occur. Mining activities and required surveys could also expose new fossils and enhance paleontological studies.

Approximately 201.2 million tons of coal would not be recovered using current mining techniques. This represents 60 percent of the total in-place coal resource. The mineral value of the land would be depleted except for the oil and gas potential.

The potential oil and gas resources occur well below the Blackhawk Formation. While not disturbing the resource itself, subsurface mining activities could hinder subsequent exploration and location of facilities related to oil and gas development.

VEGETATION

Implementation of this Alternative would result in loss of vegetation production on 472 acres by the year 2000. The principal cause of this loss would

ENVIRONMENTAL CONSEQUENCES

be housing development on the Agricultural, Sagebrush-Grass, and Pinyon-Juniper Woodland types, and development of mining facilities and roads in the Conifer- Aspen and Sagebrush-Grass vegetation types. The acres of vegetation that would be lost are shown by year and type in Table 4-29.

The area that would be disturbed does not contain any unique or rare vegetation types, and there would be no significant impacts beyond the period when reclamation would be successful. As discussed in Alternative One, reclamation on these tracts is expected to be successful in 50 to 80 percent of attempts. Vegetation production would be restored in approximately 2 to 5 years after mining ceases. Lands occupied by housing developments would be committed to urbanization and would not be reclaimed. Therefore, vegetation production on 247 acres would be permanently lost. An additional 46 acres of irrigated agricultural land would be retired because of conversion of irrigation water to community and industrial use by the year 2000.

Implementation of this Alternative would not directly impact any threatened or endangered plant species; however, inadvertent destruction of these species could occur in the region through housing development, off-road vehicle activities, or unlawful collecting.

WILDLIFE

The surface disturbance of 225 acres beginning in 1985 for portal, road, and facilities construction could decrease the deer population in herd units 34, 35, 36 and 45 by 28 deer, an insignificant loss (Table 4-30). Elk and moose losses would also be insignificant.

Elk use of winter migration routes off East and North Horn Mountains could be restricted for 40 years by the placement of portals and roads and the subsequent activity in Killpack Canyon or Rock Canyon. It is difficult to quantify this effect but herds up to 250 animals per event have utilized these routes (personal communications, Ward, FS). The restriction of access would be critical to elk during heavy snow years when they are forced to exist on lower elevation wintering grounds and some elk loss could occur.

Encroachment by mining activity on mountain lion and black bear home ranges could reduce these populations slightly. The increased human disturbance would cause abandonment of some home areas and a reduction in size or use of others.

Half of the acreage converted to urban use would come from irrigated farmlands adjacent to existing communities. With 170 acres committed to

urban use or retired due to change of water use by 2000, a total of 103 pheasants could be displaced (Appendix 9). This loss would be insignificant.

Surface expressions of subsidence such as cracks, bulges, and displacements are not expected to directly affect wildlife, but any reduction or elimination of surface water flows and associated vegetation communities due to subsidence could adversely affect some species (see Alternative One). At the projected production level, up to 24,507 acres could be susceptible to subsidence.

Construction of 10.2 miles of new utility lines in the area would provide a few additional perching and hunting sites for raptors and other birds. Some of these sites would be alongside roads where the raptors would be susceptible to indiscriminant shooting. The expected loss would be small.

With this proposed level of production 10.2 miles of new road would be needed. All of these roads would be in deer and elk winter range. Highway mortality of deer would increase by 20 deer annually (Table 4-31). The road in North Horn tract could cause an unknown amount of elk highway mortality especially during heavy snow years when the elk are concentrated at lower elevations. The deer mortality is expected to be insignificant.

Another potential effect of new road construction and increased use of existing road systems would be the harassment effect. Elk, a species sensitive to vehicle traffic, would be adversely affected by the increased use of improved roads from an expanding outdoor-oriented population (Hieb, 1976). By 2000 due to population increases an additional 1,413 off-road vehicles would be located in the Four-County region. Assuming future use of this road system remains unregulated, elk use up to 0.5 mile from each side of the roads would be reduced (Lyon, 1979).

The slight increase in population (7 percent) due to this proposal would not significantly impact wildlife region-wide. Some local impacts may occur in Emery County where the greatest population growth would occur (30 percent by 2000). Species located adjacent to the growing communities such as pheasants, doves, rabbits, and birds would incur most of the illegal killing.

Fisheries

Pollution of fisheries from coal wastes and coal mine drainage would not be anticipated, with reasonable enforcement of applicable State and Federal laws, if accidental pollution from spillages of coal, untreated mine drainage, caustics, sewage, or petroleum products occurs. Huntington Creek could

TABLE 4-28

CUMULATIVE IMPACTS ON WATER RESOURCES AND REGIONAL SIGNIFICANCE
ALTERNATIVE THREE

ITEM	1987	1990	1995	2000
Population Impact from Leasing	2,136	3,595	4,222	4,444
Consumptive Use of Water ^a Increase (+) or Decrease (-) in Stream Flow (ac-ft/yr)	-269	-453	-532	-560
Mining Use	- 52	- 52	- 52	- 52
Percent Change in Stream Flow	-0.22	-0.36	-0.40	-0.43
Decrease in Irrigated Acreage	- 89	-140	-162	-170
Increase in Dissolved Solids In Colorado River mg/L	0.03	0.04	0.04	0.04
Increased Cost to Downstream Users (Dollars ^b)	12,000	16,000	16,000	16,000

^aUsed 225 gallons per day per person and allowed 50 percent return flow through sewage effluent

^bBased on 393,000 (1978 dollars) for each 1 mg/L increase in dissolved solid concentration

TABLE 4-29

TOTAL CUMULATIVE IMPACTS ON VEGETATION
ALTERNATIVE THREE

Vegetation Types	Impacts On Tract ^a (Acres)				Impacts Off Tract ^b (Acres)				TOTAL ^c
	1987	1990	1995	2000	1987	1990	1995	2000	
Agriculture	-	-	-	-	-	-	-	-	0
Riparian	-	-	-	-	-	-	-	-	0
Grassland	-	-	-	-	-	-	-	-	0
Desert Shrub	-	-	-	-	-	-	-	-	0
Sagebrush Grass	32	32	32	32	42	42	42	42	74
Pinyon-Juniper Woodland	16	16	16	16	14	14	14	14	30
Mountain Brush	4	4	4	4	32	32	32	32	36
Aspen	3	3	3	3	26	26	26	26	29
Conifer Aspen	20	20	20	20	36	36	36	36	56
Total	75	75	75	75	150	150	150	150	225

^aIncludes mining operation and onsite facilities

^bIncludes offsite facilities (roads, powerlines, etc.)

^cTotal disturbance by year 2000 (housing development would require an additional 247 acres bringing total vegetation disturbance to 472 acres)

TABLE 4-30

BIG GAME IMPACTS
ALTERNATIVE THREE

Tract	Acres Disturbed	Disturbed Range	Species	Losses/Year ^a
Meetinghouse Canyon	40	High Priority - Summer	Deer	5
		Critical - Winter	Eik	0
Cottonwood	40	High Priority - Winter	Deer	5
		Critical - Winter	Eik	0
North Horn Mountain	145	High Priority - Winter	Deer	18
		Critical - Winter	Eik	8
Total	225		Deer	28
			Eik	8
			Moose	0

^aIncludes 0.2-mile influence zone.

TABLE 4-31

POTENTIAL DEER TRAFFIC MORTALITY FROM NEW ROADS
ALTERNATIVE THREE

Lease	New Roads (Miles)	Deer Range	Deer Loss/ Year ^a	Total Number of Years
Cottonwood	2.2	Winter	4	40
Meetinghouse	2.0	Winter	4	40
North Horn	6.0	Winter	12	40
Total	10.2		20	

^a1,280 acres (1 mile each side of road) X road length/deer density
(Dalton, UDWR) X 0.076 = Deer Loss/Year

ENVIRONMENTAL CONSEQUENCES

be affected. This could directly kill fish and/or the aquatic fauna, or increase algae growth choking the stream. The effects would be localized and, where coal sediments occurred, would be prolonged.

LAND USE

A projected maximum total of 472 acres would change in use from grazing and irrigated cropland to mining and community development by the year 2000. Of this amount, 225 acres would be temporarily disturbed, 75 by onsite support facilities, and 150 by offsite support facilities. The remaining 247 acres would be permanently changed to housing and community infrastructure use.

About 156 acres of good-quality, irrigated cropland, some of which may be prime, would be permanently lost in Carbon and Emery counties to provide for community expansion and community water requirements. An additional 14 acres would be retired for the life of the mines in order to meet mining water requirements. The loss of prime land could be avoided with wise planning. See Table 4-32 for acreage requirements for community development and associated irrigated acreage losses.

Increased congestion and traffic in Huntington Canyon would hinder movement of livestock to and from grazing areas. About 225 acres of land on the Wasatch Plateau would be disturbed by mine development and would be removed from grazing for the life of the coal mines. Subsidence could cause displacement or total loss of livestock water in the areas of underground mining.

All tracts have areas that have been zoned to exclude mining as a permitted activity. This would impede development of the mines.

SOCIOECONOMICS

The greatest employment increases would be felt in Emery County, where additional employment would reach 1,300 by the year 2000, 20 percent above the projected baseline of 6,592 jobs (Table 4-33). Direct mining employment would account for 796 new jobs, bringing employment in mining to 3,630 or 46 percent of total employment in Emery County by 2000.

Carbon County would experience much smaller employment increases, i.e., a maximum of 465 jobs. Total employment in Carbon County would reach 12,881 by 2000 (an increase of 5,230 since 1977). The employment increases in Sanpete and Sevier Counties would be negligible.

The additional employment would bring in an additional \$58.2 million in annual earnings by 2000, most of it concentrated in Carbon (\$18.4 million) and Emery (\$35.6 million) Counties. (All figures are expressed in 1977 dollars.) Total personal income in Carbon County would thus be \$277.5 million in 2000, or \$8,952 per capita (a \$2,034 per capita increase since 1978, and slightly more than the \$8,673 projected in the baseline). Emery County would have a total personal income of \$154.6 million or \$9,076 per capita. (Emery County had an average per capita income of \$5,788 in 1978, and is projected to reach \$8,544 by 2000 in the baseline.)

The magnitude of the projected increase in employment, combined with the small pool of unemployed labor in the Four-County area, means that most of the job openings would be filled by new in-migrants rather than existing residents. In addition, special skills are required for underground mining, further reducing the number of local residents available to fill new job openings in the mines.

The majority of new in-migrants would probably reside in Emery County whose population as a result would increase by 3,111 people by the year 2000 (see Table 4-34). This figure is 22 percent above Emery County's projected population of 13,922 in 2000. On the individual community level, the following communities would sustain the largest population increases: Castle Dale (whose population would increase by 902 by 2000, or 36 percent above its projected population of 2,506 in 2000; Orangeville (591 more than its projected baseline of 1,671); and Price (522 more than its projected baseline population of 12,555).

Infrastructure

The most severe stress on infrastructure would be felt in Emery County and its constituent communities. Overcrowding in the County's elementary and secondary schools would mean an additional 498 and 355 pupil spaces would be required respectively by 2000). The increased population would also exacerbate the County-wide shortage of doctors (three more would be needed, in addition to the projected baseline need of 14) and nurses (of whom 11 more would be needed in 2000, in addition to the 49 required under the baseline), Table 4-35.

In order to meet the housing needs of the increased population, Castle Dale would need an additional 273 housing units by 2000; Ferron would require an additional 170 units by 2000; Huntington 142 units; and Orangeville 179 (see Table 4-36).

TABLE 4-32

ACREAGE CONVERTED TO COMMUNITY DEVELOPMENT, IRRIGATED CROPLAND CONVERTED TO COMMUNITY DEVELOPMENT, AND IRRIGATED CROPLAND RETIRED TO PROVIDE COMMUNITY WATER ALTERNATIVE THREE

Location	Total Acreage Converted ^a		Irrigated Acreage Converted		Irrigated Acreage Retired		Total Acreage Converted		Irrigated Acreage Converted		Irrigated Acreage Retired	
	Base	Alt. 3	Base	Alt. 3	Base	Alt. 3	Base	Alt. 3	Base	Alt. 3	Base	Alt. 3
	1987											
Carbon County	283	28	141	14	36	4	352	48	176	24	45	6
Helper	39	4	19	2	5	1	49	8	25	4	6	1
Price	117	12	59	6	15	2	149	22	74	11	19	3
Wellington	48	2	24	1	6	0	52	5	26	3	7	1
Emery County	104	84	52	42	13	11	156	142	78	71	20	18
Castle Dale	19	24	9	12	2	3	28	40	14	20	4	5
Emery	4	0	2	0	1	0	6	0	3	0	1	0
Ferron	25	14	13	7	3	2	35	26	17	13	4	3
Huntington	0	11	0	5	0	1	0	23	0	12	0	3
Orangeville	25	16	13	8	3	2	30	27	15	13	4	3
Sanpete County	102	4	51	2	13	1	162	6	81	3	21	1
Fairview	9	1	5	0	1	0	13	1	7	0	2	0
Mt. Pleasant	15	2	7	1	2	0	29	3	15	1	4	0
Gunnison	1	0	0	0	0	0	20	0	10	0	3	0
Centerfield	1	0	0	0	0	0	9	0	4	0	1	0
Spring City	4	1	2	0	1	0	8	1	4	0	1	0
Sevier County	204	2	102	1	26	0	294	4	147	2	29	1
Aurora	12	0	6	0	2	0	19	0	9	0	2	0
Redmond	9	0	4	0	1	0	11	0	5	0	1	0
Salina	29	0	15	0	4	0	63	1	32	0	8	0
Sigurd	11	0	5	0	1	0	6	0	3	0	1	0
Four-County Total	693	118	346	59	88	16	964	200	482	100	115	26

(Continued)

TABLE 4-33

PROJECTED EMPLOYMENT IMPACTS
ALTERNATIVE THREE

	Carbon County			Emery County			Sanpete County			Sevier County		
	1987	1990	1995	2000	1987	1990	1995	2000	1987	1990	1995	2000
Additional Employment by Alternative Three												
Mine Construction	0	0	0	0	220	0	0	0	0	0	0	0
Mining	72	158	158	796	398	796	796	796	15	29	29	29
Other (secondary)	183	248	281	307	370	414	483	504	20	26	30	31
Total	255	406	439	465	988	1,210	1,279	1,300	35	55	59	60
Projected Employment w/o Alternative Three	10,572	11,048	11,701	12,416	5,506	5,994	6,294	6,592	6,435	6,662	7,100	7,925
Total Employment Including Alternative Three	10,827	11,454	12,140	12,881	6,494	7,204	7,573	7,892	6,470	6,717	7,159	7,985

Source: UPED model

TABLE 4-34

PROJECTED POPULATION IMPACTS
ALTERNATIVE THREE

	1978 Total Population	1987			1990		
		Total Without the Proposed Alternative	Total With the Proposed Alternative	Increment Due to the Proposed Alternative	Total Without the Proposed Alternative	Total With the Proposed Alternative	Increment Due to the Proposed Alternative
Carbon	21,643	26,919	27,431	512	28,173	29,036	863
Helper	3,030	3,751	3,826	75	3,944	4,082	138
Price	8,660	10,858	11,073	215	11,429	11,826	397
Wellington	1,299	2,167	2,210	43	2,254	2,340	86
Emery	9,849	12,168	13,685	1,517	13,113	15,665	2,552
Castle Dale	1,773	2,204	2,641	437	2,360	3,087	727
Emery	397	492	492	0	525	525	0
Ferron	1,280	1,782	2,025	243	1,967	2,426	459
Huntington	2,363	2,239	2,436	197	2,360	2,768	408
Orangeville	985	1,483	1,771	288	1,574	2,058	484
Sanpete	14,119	18,362	18,426	64	19,442	19,550	108
Centerfield	600	890	891	1	1,027	1,029	2
Fairview	1,060	1,256	1,270	14	1,322	1,344	22
Gunnison	1,368	2,011	2,012	1	2,355	2,360	5
Mt. Pleasant	2,354	2,669	2,699	30	2,933	2,979	46
Spring City	698	785	794	9	850	864	14
Sevier	14,489	18,687	18,730	43	20,309	20,381	72
Aurora	779	1,034	1,037	3	1,155	1,159	4
Redmond	486	658	660	2	694	695	1
Salina	2,191	2,774	2,782	8	3,384	3,398	14
Sigurd	370	564	567	2	486	490	4
Regional Total	60,100	76,136	78,272	2,136	81,037	84,632	3,595

(Cont Inued)

TABLE 4-34 (Concluded)

	1978 Total Population	1995			2000		
		Total Without the Proposed Alternative	Total With the Proposed Alternative	Increment Due to the Proposed Alternative	Total Without the Proposed Alternative	Total With the Proposed Alternative	Increment Due to the Proposed Alternative
Carbon	21,643	29,626	30,682	1,056	29,889	31,000	1,111
Helper	3,030	4,148	4,317	169	4,184	4,362	178
Price	8,660	12,217	12,713	496	12,555	13,077	522
Wellington	1,299	2,370	2,465	95	2,391	2,491	100
Emery	9,849	13,913	16,868	2,955	13,922	17,033	3,111
Castle Dale	1,773	2,505	3,359	854	2,506	3,408	902
Emery	397	554	554	0	540	540	0
Ferron	1,280	2,087	2,610	523	2,088	2,648	560
Huntington	2,363	2,505	2,948	443	2,506	2,973	467
Orangeville	985	1,670	2,231	561	1,671	2,262	591
Sanpete	14,119	20,509	20,636	127	21,687	21,820	133
Centerfield	600	1,091	1,093	2	1,103	1,105	2
Fairview	1,060	1,355	1,379	24	1,367	1,394	27
Gunnison	1,368	2,503	2,509	6	2,531	2,538	7
Mt. Pleasant	2,354	3,031	3,087	56	3,060	3,117	57
Spring City	698	879	896	17	886	903	17
Sevier	14,489	23,228	23,312	84	25,170	25,259	89
Aurora	779	1,412	1,415	3	1,417	1,421	4
Redmond	486	843	844	1	849	853	4
Salina	2,191	4,028	4,041	13	4,138	4,151	16
Sigurd	370	515	521	6	585	601	16
Regional Total	60,100	87,276	91,498	4,222	90,668	95,112	4,444

Source: UPED model

TABLE 4-35

IMPACTS ON EDUCATION, HEALTH, AND POLICE SERVICE REQUIREMENTS IN 2000
ALTERNATIVE THREE

County	Existing Capacity 1978	Total Need With Alt. 2	Increment Due To Alt. 2	Percent Increase Due To Alt. 2
Carbon County				
Pupil Spaces ^a				
Elementary	2,828	3,627	130	3.7
Secondary	2,139	2,759	99	3.7
Teachers ^b	192	298	11	3.8
Doctors ^c	21	31	1	3.0
Nurses	122	108	3	3.0
Police Officers ^d	24	62	2	3.0
Emery County				
Pupil Spaces				
Elementary	1,940	2,725	498	22.0
Secondary	1,417	1,942	355	22.0
Teachers	129	232	42	22.0
Doctors	7	17	3	21.0
Nurses	6	60	11	22.0
Police Officers	12.5	34	6	21.0
Sanpete County				
Pupil Spaces				
Elementary	1,789	2,467	15	0.6
Secondary	743	1,965	12	0.6
Teachers	152	170	1	0.5
Doctors	7	22	0	0.0
Nurses	27	77	0	0.0
Police Officers	7	44	0	0.0
Sevier County				
Pupil Spaces				
Elementary	1,783	3,282	12	0.3
Secondary	1,111	2,348	8	0.3
Teachers	165	225	1	0.4
Doctors	9	25	0	0.0
Nurses	24	89	0	0.0
Police Officers	12.5	50	0	0.0

^aProjected enrollment is based on the assumption that school district enrollment is the same proportion of county population in the future as in 1978

^bProjected need for teachers assumes the same teacher/pupil ratio as in 1978

^cProjected need for doctors and nurses is based on the planning standard of one per 1,000 population and one per 285 population, respectively

^dProjected need for police officers is based on a standard of two full time equivalent officers per 1,000 person

TABLE 4-36

PROJECTED HOUSING IMPACTS IN 2000
ALTERNATIVE THREE

	Projected Need Without This Proposed Action	Projected Need With This Proposed Action	Increment Due To The Proposed Action	Percent Increase Due To The Proposed Action
Carbon County	9,057	9,394	337	3.7
Helper	1,268	1,322	54	4.3
Price	3,805	3,963	158	4.1
Wellington	724	754	30	4.1
Emery County	4,219	5,162	943	22.0
Castle Dale	759	1,032	273	36.0
Emery	163	163	0	0.0
Ferron	633	803	170	27.0
Huntington	759	901	142	19.0
Orangeville	506	685	179	35.0
Sanpete County	6,571	6,611	40	0.6
Centerfield	334	335	1	0.2
Fairview	414	423	9	2.0
Gunnison	767	769	2	0.2
Mt. Pleasant	927	944	17	2.0
Spring City	268	274	5	0.6
Sevier County	7,627	7,654	27	0.3
Aurora	429	430	1	0.2
Redmond	257	258	1	0.4
Salina	1,254	1,259	5	0.3
Sigurd	177	179	2	1.0
Regional Total	27,474	28,821	1,347	5.0

ENVIRONMENTAL CONSEQUENCES

Communities in Emery County have adequate firefighting capacity to handle the increased demand. Levels of police coverage would decline in all communities. Local police departments already are understaffed and renewed coal leasing would account for a relatively small proportion of the additional police officers required.

Carbon County would also experience significant stress on infrastructure although to a lesser extent than Emery County. The County schools would need to provide 130 additional places for elementary students and 99 for secondary students by 2000. Under the projected baseline, the County would have adequate capacity in its elementary schools through 2000, but would need 630 more secondary school places in order to avoid overcrowding.

Carbon County faces a serious shortage of doctors and nurses even without renewed leasing. One additional physician and three more nurses would be needed to meet accepted health planning standards (Table 4-35).

To meet the projected population growth, Price would require 158 additional housing units by 2000, compared with the 3,805 units needed under the projected baseline. In Helper, 54 additional housing units would be required by 2000, bringing the total requirement to 1,322 housing units.

No significant infrastructure impacts would occur in Sanpete or Sevier counties.

Social Impacts

Communities in Sanpete and Sevier Counties would experience only negligible social changes. Although the Helper-Price-Wellington area of Carbon County would gain an additional 800 residents by 2000, the incremental social impacts of this growth would be minimal. The Helper-Price-Wellington area, which had 13,000 residents in 1978 and is expected to reach 19,000 by 2000, is already becoming relatively urbanized, with a concomitant increase in ethnic and cultural heterogeneity. The pace of social changes already taking place in Helper-Price-Wellington would probably accelerate; however, it is unlikely to have a significant change on the nature or direction of these changes.

Significant incremental social impacts on the Emery County communities of Castle Dale, Ferron and Orangeville would be expected. Even without renewed leasing, these communities will experience considerable population growth, entailing some loss of small-town values and an increase in social heterogeneity, particularly if a large proportion of the

new in-migrants were non-Mormons. An additional population increase of 36 percent by 2000 in Castle Dale and Orangeville and 27 percent in Ferron, would lead to a further lessening of the small-town atmosphere and an increase in social heterogeneity. More social services would be required to deal with increasing problems such as alcoholism, divorce, mental disorders, drug abuse, and family violence. However, the results of local interviews indicate that residents, while aware of the social costs, are receptive to development because of the advantages it brings in terms of access to better public services, facilities, and improved shopping, cultural, and recreational facilities.

The town of Emery would experience no significant incremental population growth. Huntington would be unlikely to experience severe social impacts since the community has a relatively large population base to begin with (2,363 residents in 1978), and the incremental population would not exceed 500 persons. Perhaps most important, Huntington has already gone through a period of adjusting to the social impacts of rapid population growth in the 1970s. Huntington has largely lost its small-town atmosphere and values, but residents have also enjoyed the fruits of development in terms of jobs, better public services, etc., and are therefore very receptive to further growth.

TRANSPORTATION

Additional traffic volumes due to leasing proposed under Alternative Three are shown in Table 4-37. Except for some minor traffic increase between Price and Salt Lake City due to general population increase, all the increase in traffic would occur on U-10 and its feeder routes between Price and Ferron. The increase in traffic is not enough to crowd any of the local roads, but in conjunction with other traffic on the roads is likely to contribute to an average of about 29 increased traffic accidents per year, resulting from a direct, mine-related traffic increase of some 8 million miles per year.

Traffic increases due to additional leasing would reduce the level of service afforded by the existing Forest highway system. In most cases the present level of service is at stable flow with reduced speed, due to the percentage of truck traffic and limited passing opportunities. The level of service would approach unstable flow or forced flow at decreased speed with the additional traffic. Accident rates would increase due to the additional traffic at grade intersections and increased congestion.

Additional development of existing lease and additional leasing, within the Forest boundary served by Highway 31, would be expected. The percent-

TABLE 4-37

ANNUAL AVERAGE DAILY TRAFFIC INCREASE
DUE TO ALTERNATIVE (1990-2000)
ALTERNATIVE THREE

Point	Location	All	Trucks
1.	U-96 South of U.S. 6	0	0
2.	U.S. 6 at Utah-Carbon County Line	186	9
3.	Gordon Creek Road	0	0
4.	U.S. 6 North of Price	289	9
5.	U.S. 6 Between Price and Wellington	74	0
14.	U-10 South of Price	816	189
15.	Wellington Loadout Road	0	0
16.	U-10 North of Huntington	816	189
17.	U-31 West of Huntington	246	108
18.	U-10 South of Huntington	785	255
19.	U-29 West of Orangeville	459	201
19a.	Castle Valley RR Loadout S of Castle Dale	274	274
20.	U-10 South of Castle Dale	1,098	106
21.	North Horn Mountain Mine	1,228	99
22.	U-10 North of Ferron	496	17
23,25.	U-10 South of Ferron, North of Emery	0	0
26.	Emery North Mine	0	0
27.	Emery Central Mine	0	0
27a.	U-10 South of Emery	0	0
27b.	Castle Valley RR Loadout South of Emery	0	0
28.	U-10 North of I-70	0	0
29.	Emery South and Dog Valley Mines	0	0
33.	I-70 East of Salina	0	0
37.	U.S. 89 South of Salina	0	0
47.	New Road, Pleasant Valley to U-31	0	0
48.	U-31 East of Fairview	0	0

Note: Castle Valley RR spur assumed built to Emery

ENVIRONMENTAL CONSEQUENCES

age of truck traffic would increase as would overall traffic from this development. The total traffic could reach or exceed the maximum capacity of the existing road.

Cumulative traffic in the area is shown on Table 4-38. U-10 would be crowded as far south as Castle Dale without any additional leasing. Alternative Three would add to the traffic volume and add to the crowded category of that section of U-10 between Castle Dale and Ferron. Although the number of traffic accidents would increase, the traffic accident rate is expected to stay about at Statewide levels for the types of roads in the area.

Increased traffic would require increased road maintenance, presently inadequately funded by motor fuel tax distribution formulas, according to UDOT. Additional mine-related traffic is likely to cause some interference with recreation traffic in the canyons, and vice versa.

The increased travel projected under the four alternatives would generate from \$67,500 to \$144,000 in increased fuel revenues annually. This revenue would be sufficient to apply only a minimum surface rehabilitation treatment to one mile of highway each year where many hundreds of miles are affected.

Utah's highways have usually been constructed to accommodate traffic for 20 years after they were built. Nearly all of the highways impacted by the proposed coal development are approaching or have already exceeded the 20 year design traffic volume. Significant traffic increases would only exacerbate an already serious deficiency in the financial resources required to maintain, let alone improve, the affected highways. With many of the highways in a precarious condition, the increased travel (with a high percentage of trucks) would precipitate the deterioration of many highways. Immediate attention would be required just to retain a tolerable level of service. Without additional financing by a factor somewhere between fifty and one hundred times the previously mentioned revenue, the impacted roads would be adversely affected. Even then, it is assumed that such amounts would be made available each year over the life of the impact and that the onset of development would occur slowly (UDOT, 1980).

Energy Requirements and Conservation Potential

About 1,900 vehicles per day of direct, mine-related traffic, would travel about 8 million miles per year, consume about 0.75 million gallons of petroleum-based fuels per year, and wear out the annual

equivalent of 49 vehicles. The practice of busing miners from homes to jobs and return could reduce these figures substantially.

A net energy analysis estimate was made comparing the amount of energy in the coal produced from the tracts, the energy expended in its production, and the energy in the coal left in the ground after mining. Total energy output for this Alternative is estimated at 3.36 million billion Btu. Energy required for production of the coal is estimated at 103,540 billion Btu. Finally, energy left underground, and considered unrecoverable after mining is estimated at 5.03 million billion Btu.

See Appendix 10 for tract-by-tract energy balance analyses.

CULTURAL RESOURCES

Low site densities and the avoidance, excavation, and salvage on the Meetinghouse and Cottonwood tracts would mitigate most direct adverse impacts to cultural resources. Increased density of sites on the North Horn Mountain tract (55 to 75) would result in avoidance being less successful. However, the chances of inadvertent losses would be reduced because of excavation and salvage.

Loss of cultural sites from vandalism, pot-hunting, and arrowhead collecting would result from an expanded population and better access. The extent of such losses is unknown.

SPECIAL DESIGNATION AREAS

Some of the 17 areas in the Four-County region with potential for wilderness or other special designation could receive increased ORV and other dispersed recreation use because of the coal-related population increase. Resultant littering and vandalism would degrade values for which the areas are being studied. Federal agencies managing the lands (BLM and FS) may be under stress to protect these values with no foreseeable increase in funding for that purpose. However, it is very unlikely that possible degradation would affect the designation of suitability of any area due to the temporary nature of impacts resulting from dispersed recreational use.

VISUAL RESOURCES

Impacts to visual resources in the Meetinghouse, Cottonwood, and North Horn tracts would be the

TABLE 4-38

ANNUAL AVERAGE DAILY TRAFFIC PROJECTED FOR SELECTED YEARS
ALTERNATIVE THREE

Point	Location	1985		1987		1990		1995		2000	
		All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks
1.	U-96 S of U.S. 6	953	171	1,075	208	1,208	248	1,258	250	1,308	252
2.	U.S. 6 at Utah-Carbon County Line	8,740	1,430	9,519	1,575	10,862	1,791	12,862	2,091	14,834	2,309
3.	Gordon Creek Road	339	139	339	139	339	139	339	139	339	139
4.	U.S. 6 N of Price	17,563	3,033	18,201	3,210	19,413	3,443	20,913	3,668	22,288	3,821
5.	U.S. 6 between Price & Wellington	11,156	1,806	16,394	2,698	25,441	3,959	39,654	6,102	43,618	5,958
6.	Soldier Cr Rd at Duchesne-Carbon Co Line	65	3	68	3	75	5	90	4	112	5
7.	Soldier Cr Rd at Soldier Cr Mine	145	14	193	17	295	23	333	24	355	25
8.	Deadhan Canyon Mine	322	160	408	191	551	243	794	348	794	348
9.	Dugout Canyon Road	965	80	1,242	103	1,555	128	1,555	128	1,555	128
10.	Soldier Cr Rd at U.S. 6	1,431	301	1,855	314	2,424	394	2,682	500	2,704	501
11.	U.S. 6 W of U-123 (Sunnyside Jct)	5,356	851	5,890	906	6,256	986	7,056	1,106	8,140	1,206
12.	U-123 E of U.S. 6	2,656	160	2,850	168	3,056	176	3,156	180	3,256	184
13.	U.S. 6 near Carbon-Emery County Line	3,300	495	3,460	520	3,700	555	4,100	615	4,500	675
14.	U-10 S of Price	5,983	1,407	6,082	1,353	7,207	1,730	7,719	1,824	8,156	1,887
15.	Wellington Loadout Road	883	883	970	970	400	400	431	431	431	431
16.	U-10 N of Huntington	5,514	1,290	5,614	1,290	6,209	1,216	6,659	1,349	6,945	1,390
17.	U-31 W of Huntington	1,483	185	1,697	189	2,162	310	2,387	324	2,523	336
18.	U-10 S of Huntington	3,883	979	4,024	983	4,713	1,017	5,210	1,064	5,592	1,117
19.	U-29 W of Orangeville	2,103	559	3,190	597	3,871	812	4,001	817	4,019	817
19a.	Castle Valley RR Loadout S of Castle Dale	834	834	1,500	1,500	2,375	2,375	2,375	2,375	2,375	2,375
20.	U-10 S of Castle Dale	1,250	150	1,460	210	2,625	382	3,178	432	3,564	445
21.	North Horn Mountain Mine	-	-	-	-	945	76	945	76	945	76
22.	U-10 N of Ferron	1,250	150	1,460	210	2,162	306	2,715	356	3,101	365
23.	U-10 S of Ferron, N of Emery	1,050	126	1,226	181	1,491	259	2,055	304	2,409	314
26.	Emery North Mine	-	-	-	-	-	-	-	-	-	-
27.	Emery Central Mine	-	-	-	-	-	-	-	-	-	-

(Continued)

TABLE 4-38 (Concluded)

Point	Location	1985		1987		1990		1995		2000	
		All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks
27a.	U-10 S of Emery	930	112	1,090	131	1,491	193	2,133	299	2,542	348
27b.	Castle Valley RR Loadout S of Emery	-	-	-	-	799	799	799	799	799	799
28.	U-10 N of I-70	930	112	1,090	131	1,675	345	1,927	403	2,366	451
29.	Emery South & Dog Valley Mines	70	10	70	10	70	10	70	10	70	10
30.	U-72 near Sevier-Wayne County Line	37	1	40	2	45	2	55	2	66	66
31.	U-72 S of I-70	270	184	368	185	442	185	454	185	454	185
32.	Spring Canyon Road at I-70	1,085	591	1,085	591	949	283	961	348	961	348
33.	I-70 E of Salina	5,075	1,520	5,047	1,412	4,755	928	4,338	993	4,462	1,030
34.	U.S. 89 S of Richfield	5,143	771	5,538	830	5,770	866	5,770	866	5,599	841
35.	U.S. 89 N of Richfield	6,800	1,020	7,738	1,161	7,835	1,175	6,800	1,020	6,121	918
36.	U.S. 89 N of Aurora	7,835	1,175	8,711	1,307	8,800	1,320	7,835	1,175	6,645	991
37.	U.S. 89 S of Salina	3,175	1,135	2,866	828	2,683	571	2,438	636	2,553	621
38.	U.S. 89 near Sanpete-Sevier County Line	5,828	1,170	6,132	1,113	6,000	720	6,000	720	6,390	1,041
39.	U-28 N of Gunnison	3,848	873	3,822	777	3,500	420	3,500	420	3,818	731
40.	U.S. 89 N of Gunnison	1,870	75	1,874	75	1,980	79	2,250	90	2,570	101
41.	U.S. 89 N of Manti	2,875	115	2,518	101	2,635	105	3,500	140	4,973	191
42.	Public Road E of Ephraim	285	11	317	12	380	15	510	20	665	22
43.	U.S. 89 N of Ephraim	2,255	90	2,277	91	2,415	97	2,745	110	3,127	121
44.	U.S. 89 S of Mt. Pleasant	1,645	66	1,574	63	1,660	66	2,000	80	2,475	91
45.	U.S. 89 N of Mt. Pleasant	3,770	151	3,859	154	4,000	160	4,225	169	4,432	171
46.	U-31 at Sanpete-Emery County Line	540	22	627	25	725	29	840	34	992	36
47.	New Road, Pleasant Valley to U-31	1,067	43	1,216	48	1,535	61	2,228	89	3,075	121
48.	U-31 E of Fairview	1,607	64	1,843	73	2,260	90	3,068	123	3,997	161
49.	U.S. 89 N of Fairview	2,040	82	2,029	81	2,150	86	2,485	100	2,898	111

Note: Castle Valley Railroad assumed built to Emery by 1990

ENVIRONMENTAL CONSEQUENCES

same as identified in Alternative One. In summary, the disturbance and facilities associated with underground mining of the three tracts, where located both on and off the tracts, would not be highly visible nor conflict with VRM objectives. Reclamation would be effective in reestablishing the present scenic quality of the three tracts upon completion of the mining operations.

The average visitor would probably note little change in the region's overall scenic character from development of the tracts.

RECREATION

By the year 2000, mining-related population growth would increase the local demand for both dispersed and developed recreation opportunities by approximately 7 percent from 1980 use figures. Tables 4-39 and Table 4-40 show the anticipated increases in demand for hunting, fishing, and ORV activity during the life of the mining operation. Increased demand for dispersed activities, as well as increased use of developed recreation sites and urban facilities, would result in impacts similar to those identified for Alternative One but reduced in extent and intensity. The extent cannot be quantified. In summary, the additional competition for fish and game would lead to reduced hunter and fisherman success or restricted harvest. Increased use would increase ORV conflict with other recreational uses. Overuse of developed campgrounds, picnic areas, playfields, swimming pools, and golf courses would result in continued deterioration of existing facilities, user dissatisfaction, and additional recreational pressures on undeveloped areas. Federal, State, and local governments would be under stress with limited funds to provide recreation facilities to meet minimum standards recommended by the Utah Outdoor Recreation Agency (SCORP, 1978).

Development of the tracts and of homesites would displace dispersed recreational use from as much as 344 acres in 1987, 425 acres in 1990, 460 acres in 1995, and 472 acres in the year 2000. Loss of recreational opportunities would be minimal. Impacts to recreational traffic on the Huntington Canyon road would be similar to those identified in Alternative One, but less in extent and intensity (i.e., increase in danger, stress, and visitor dissatisfaction).

UNAVOIDABLE ADVERSE IMPACTS

Some local short-term degradation of air quality would result from traffic on unpaved haul and access roads. Population increases would result in increased emissions of all NAAQS pollutants.

Soil and vegetation productivity on 472 acres would be lost for the life of the mines. Approximately 201.2 million tons of coal would be made unrecoverable as a result of proposed mining. Changes in aquifers and points of surface discharge due to potential subsidence on 24,507 acres could not be avoided. The consumptive use of water would increase by 612 acre-feet annually, and discharge of sewage effluent would increase 560 acre-feet per year. This discharge would add 207 tons of salt annually to Colorado River tributaries. Conversion of irrigated land for community expansion and retirement of irrigated land to provide water for community and mining use would result in the loss of 170 acres of irrigated cropland in the region. The loss of wildlife habitat, including habitat for 103 pheasants on irrigated cropland, and disturbance of wildlife due to mining activities could not be avoided. Surface disturbance caused by mining would result in the loss of 28 deer in the region and deer highway mortality would increase by 20 deer annually.

The unavoidable adverse socioeconomic impacts of this Alternative would include: (1) a worsening of the local inflation rate, which would be particularly detrimental to persons living on low or fixed incomes; (2) competition for labor (1,862 new jobs), with the relatively high wages paid in mining and construction making it difficult for other sectors to hire and retain qualified employees; (3) increased capital and operating outlays by local governments; and (4) an increase in population of 4,444 persons resulting in some loss of small-town atmosphere and cultural homogeneity in the affected communities, particularly Castle Dale, Ferron, and Orangeville.

Moderate increases in traffic on U-10 would cause overcrowding, increased traffic accidents (29 annually), and conflicts with recreation traffic.

Some inadvertent loss of cultural resources could occur and vandalism and illegal artifact collecting would increase due to the increased population. The demand for recreation opportunities would increase by 7 percent. Overutilization at some sites would cause user dissatisfaction.

TABLE 4-39
 PROJECTED INCREASE IN LOCAL HUNTER AND FISHERMAN DEMAND
 ALTERNATIVE THREE

Year	Coal-Related Population	Projected Annual Increase in Numbers					Overall Percent In- crease from 1980
		Deer Hunters	Elk Hunters	Upland Game/Water- fowl Hunters	Fishermen	Increased Demand For Fish	
1987	2,136	374	36	182	961	20,854	3.4
1990	3,595	629	61	306	1,618	35,111	5.7
1995	4,222	739	72	359	1,900	41,230	6.6
2000	4,444	778	76	378	2,000	43,400	7.0

Note: Projections were made assuming that the percentage of Utah's population that currently hunts or fishes would remain the same, and that the Utah percentage can be applied to the Four-County area. Approximately 17.5 percent of Utah's population hunt deer, 1.7 percent hunt elk, and 8.5 percent hunt upland game or waterfowl. Approximately 53 percent of Utah's population under the age of 12 and 42 percent of the population over the age of 12 fish. Approximately 27 percent of Utah's population is under 12 and 73 percent is over 12 in age (Thayne and Hudson, 1978).

TABLE 4-40
 PROJECTED INCREASE IN LOCAL OFF-ROAD VEHICLE DEMAND WITHIN THE FOUR-COUNTY REGION
 ALTERNATIVE THREE

Year	Projected Coal- Related Popula- tion Increase	Project Increase		Overall Percent Increase from 1980
		in Pickup and Four-wheel Drive Numbers	Projected In- crease in Motorcycle Numbers	
1987	2,136	534	145	3.4
1990	3,595	899	245	5.7
1995	4,222	1,056	287	6.6
2000	4,444	1,111	302	7.0

Note: Projections were made assuming that the percentage of the population in the Four-County region that owns off-road vehicles would remain the same (6.8 percent of the population currently owns motorcycles, and 25 percent of the population currently owns four-wheel drive vehicles or light pickups) (Scorp, 1978)

ENVIRONMENTAL CONSEQUENCES

THE RELATIONSHIP BETWEEN THE SHORT-TERM USE OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The degradation of air quality attributable to the population increase in the region would continue into the long term.

Housing development associated with coal production in the region would permanently occupy 247 acres resulting in a long-term loss of soil, vegetation, and wildlife productivity on those lands.

Mining coal at a 40-percent recovery rate would render 201.2 million tons of coal unrecoverable by present technology. Changes in aquifers or points of surface discharge would result in a long-term change in local surface water distribution and ground water storage potential. The demand for 560 acre-feet annually for community use would continue into the long term. About 156 acres of irrigated cropland would be kept out of production in the long term due to occupation by housing and conversion of water use to culinary use.

Implementation of this Alternative would have a positive long-term impact on productivity through: (1) an increase of 1,862 workers in the labor force; (2) infrastructure improvements useful for commercial and industrial development; and (3) increased income and buying power which would contribute to the development of a larger and more diversified trade and services sector. This Alternative would also have one potential negative impact on productivity, i.e., an increased vulnerability to economic disruptions caused by fluctuations in the coal industry.

IRRETRIEVABLE OR IRREVERSIBLE COMMITMENT OF RESOURCES

Emissions attributable to increased population would cause an irreversible deterioration in air quality. The loss of soil, vegetation, and wildlife productivity on 472 acres for the life of the mines would be irretrievable. On the lands committed to urbanization and not reclaimed (247 acres), the loss would be irreversible.

The 134.1 million tons of coal that would be mined would be irretrievable, and the 201.2 million tons left in the ground would be unrecoverable by present technology. The 612 acre-feet of water used annually for mining and community use would be irretrievable, and the demand for 560 acre-feet annually for community use would be irreversible.

The increased salt loading of 207 tons annually in Colorado River tributaries would be irreversible. Any change in aquifers or surface water distribution due to subsidence would be irreversible. The 124 acres of irrigated croplands committed to community use would be irreversibly lost and lost crop production on those lands plus 46 acres of land retired from change of water use would be irretrievable.

The growth in population of 4,444 persons expected to result from coal development would be irreversible except at considerable human and economic cost. The commitment of capital, physical resources and labor to build 1,347 housing units and infrastructure required to support the additional population, commerce, and industry would be an irretrievable impact. The loss of small-town atmosphere and community solidarity in some communities as a result of development would be irreversible.

Haulage of coal to existing loadouts, commuting from local communities, and services to the mines from Price would result in the consumption of 0.66 million gallons of petroleum fuels per year. Lives and money lost due to the increased number of traffic accidents would be irretrievable.

Alternative Four

INTRODUCTION

Alternative Four considers leasing three tracts: Gordon Creek, Meetinghouse Canyon, and Cottonwood. All mining would be underground. The following section discusses anticipated impacts that would result from implementing Alternative Four.

Possible development of the Hollberg PRLA is considered a part of this Alternative. Development of the PRLA has been analyzed in Alternative One and will not be repeated here. The reader is referred to Alternative One.

AIR QUALITY

Concentrations of TSP would be an estimated 5 to 10 micrograms per cubic meter above the no new leasing levels (Figure 4-2) in the vicinity of the Gordon Creek tract. Levels near the Cottonwood and Meetinghouse Canyon tracts would be about 5 micrograms per cubic meter above the no new leasing level (Figure 4-2). Localized violations of the NAAQS for TSP would occur unless BACT is applied. There would be no perceivable regional

ENVIRONMENTAL CONSEQUENCES

visibility impairment caused by development of the tracts as proposed in Alternative Four.

SOILS

The construction of mine facilities and housing for population increases as a result of mine development would cumulatively disturb 188 acres by 1985, 271 acres by 1990 and 297 acres by the end of mine life. The disturbance on 170 acres would be a temporary loss of soil productivity since the area would be eventually reclaimed. The loss of productivity on 127 acres would be permanent due to occupation by housing and support facilities for future population increases in the region.

As discussed in Alternative One, primary impacts to soils would be a temporary loss of soil productivity and a small increase in soil erosion caused by surface disturbance associated with the construction of buildings, haul roads, sediment ponds, powerlines, telephone lines, and portals.

Data from general soils maps indicate that sediment yields resulting from mining activities would be low on most disturbed areas on the Wasatch Plateau.

WATER RESOURCES

The hydrologic impacts having regional consequence would result from an increased consumptive use of about 312 acre-feet of water per year for mine use and domestic purposes and the discharge of about 288 acre-feet per year of sewage effluent (see Table 4-41).

The impact of changing water use from agricultural to industrial and community use would result in a reduction of about 87 acres of irrigated agriculture land. The use of water for mining would end when mining ceases, but demand for community use would continue because the related population increase would be expected to remain.

The growth in population would result in degradation of water quality from the estimated average annual discharge of 17 tons of salt in 1985 to 117 tons of salt in sewage effluent by 2000. The increase in salinity at Imperial Dam as a result of new Federal coal development would range from 0.01 mg/L in 1985 to 0.02 mg/L in 1995 and remain at 0.03 mg/L in 2000. Increased costs to the farmers as a result of this salinity problem would range from \$4,000 per year in 1985 to \$12,000 per year in 2000 for commercial garden vegetable production.

Potential subsidence on 7,744 acres could impact both the ground water aquifers and the distribution of surface waters in the area. The water affected, however, would stay within the drainage basins and the impact would be that of the shift of water-source physical location.

GEOLOGY, TOPOGRAPHY, PALEONTOLOGY, MINERAL RESOURCES

No significant changes are anticipated to topography or geology on the 7,744 acres that would be leased on the Wasatch Plateau coal field. However, some subsidence could be expected. The surface area susceptible to subsidence has been calculated to range from 90 to 130 percent of the area mined. Subsidence of up to 10 feet would be expected in some areas where the coal is nearest the surface but would probably average much less. Surface expressions of subsidence include open and closed fractures, buckled and bulged bedrock, sinkholes, and other depressions. Mining hazards as described in Alternative One, and operation of the proposed mines would result in 0.8 fatalities and 60 nonfatal accidents per year by 1990.

Significant plant fossils used for correlation and paleoenvironmental guides could be inadvertently destroyed by coal removal in the Blackhawk Formation. Significant disturbances to the other scientifically important fossils mentioned in Chapter 3 most likely would not occur. However, mining activities and required surveys could also expose new fossils and enhance paleontological studies.

Approximately 92.2 million tons of coal would not be recovered using current mining techniques. This represents 50 to 60 percent of the total in-place coal resource. The mineral value of the land would be depleted except for the oil and gas potential.

The potential oil and gas resources occur well below the Blackhawk Formation, and subsurface mining activities could hinder subsequent exploration and location of facilities related to oil and gas development.

VEGETATION

Implementation of this Alternative would result in loss of vegetation production on 297 acres by the year 2000. The principal cause of this loss would be housing development on the Agricultural, Sagebrush-Grass, and Pinyon-Juniper Woodland types, and development of mining facilities and roads in the Aspen, Sagebrush-Grass and Conifer-Aspen

ENVIRONMENTAL CONSEQUENCES

vegetation types. The acres of vegetation that would be lost are shown by year and type in Table 4-42.

The area that would be disturbed does not contain any unique or rare vegetation types, and there would be no significant impacts beyond the period when reclamation would be successful. As discussed in Alternative One, reclamation on these tracts is expected to be successful in 50 to 80 percent of attempts. Vegetation production would be restored in approximately 2 to 5 years after mining ceases. Lands occupied by housing developments would be committed to urbanization and would not be reclaimed. Therefore, vegetation production on 127 acres would be permanently lost. An additional 23 acres of irrigated agricultural land would be retired because of conversion of irrigation water to community and industrial use by the year 2000.

Implementation of this Alternative would not directly impact any threatened or endangered plant species; however, inadvertent destruction of these species could occur in the region through housing development, off-road vehicle activities, or unlawful collecting.

WILDLIFE

The surface disturbance of 170 acres beginning in 1985 for portal, road, and facilities construction could decrease the deer population in herd units 34, 35, 36, and 45 by 22 deer annually, an insignificant loss (Table 4-43). As shown in Table 4-44 deer highway mortality in the region would increase by 22 deer annually.

Elk use of winter migration routes off East Mountain could be altered by development of the Cottonwood tract and other concurrent developments in the vicinity. Present data do not allow for quantification of this effect.

Encroachment by mining activity on mountain lion and black bear home ranges could reduce these populations slightly. The increased human disturbance would cause abandonment of some home areas and a reduction in size or use of others.

As analyzed in Alternative One, potential damage to riparian zones, a critical element of wildlife habitat, could occur from 7.7 miles of road construction. Moose require willows year-round and disturbance of riparian habitat in the Gordon Creek tract for 40 years could displace four moose annually. This could delay the expansion of this introduced herd.

Some irrigated acreage (87 acres) could be converted for urban use or retired due to change of

water use. This would reduce carrying capacity by 65 pheasants annually, an insignificant loss.

Any reduction or elimination of surface water flows and associated vegetation communities due to subsidence could adversely affect some species. Loss of water sources would result in reduced utilization of habitat by mobile species such as deer, elk, beaver, and birds, and elimination of species such as small mammals, reptiles, and amphibians that are unable to relocate. At the projected production level, up to 7,744 acres could be susceptible to subsidence.

Fisheries

Pollution of fisheries from coal wastes and coal mine drainage would not be anticipated with reasonable enforcement of applicable State and Federal laws. Fugitive dust from hauling trucks could affect 3.0 miles of stream habitat located in steep canyons where roads could not be located more than 0.25 miles from the streambed. If accidental pollution from spillages of coal, untreated mine drainage, caustics, sewage, or petroleum products occurs, fisheries that could be affected are the Price River and Huntington Creek. This could directly kill fish and/or the aquatic fauna, or increase algae growth choking the stream. The effects would be localized and, where coal sediments occurred, could be prolonged.

Three streams, Beaver, Gordon, and Jump Creeks, could suffer dewatering for short sections if subsidence occurs and alters the channels. Mitigation measures could repair the channel and restore the flow avoiding permanent damage and total loss of fisheries.

LAND USE

A projected maximum total of 297 acres would change in use from grazing and irrigated cropland to mining and community development by year 2000. Of this amount, 170 acres would be temporarily disturbed, 45 by onsite facilities, and 125 by offsite facilities. The remaining 127 acres would be permanently changed to housing and community infrastructure use.

About 80 acres of good quality irrigated cropland, possibly including some prime cropland, would be permanently lost to meet community growth (Table 4-45). Prime farmland could be avoided with proper planning. Another 7 acres would be retired from production in order to meet mining water require-

TABLE 4-41

CUMULATIVE IMPACTS ON WATER RESOURCES AND REGIONAL SIGNIFICANCE
ALTERNATIVE FOUR

ITEM	1987	1990	1995	2000
Population Impact from Leasing	993	1,812	2,124	2,282
Consumptive Use of Water ^a				
Increase (+) or Decrease (-) in Stream Flow (ac-ft/yr)	-125	-228	-268	-288
Mining Use	- 24	- 24	- 24	- 24
Percent Change in Stream Flow	-0.06	-0.11	-0.13	-0.14
Decrease in Irrigated Acreage	- 41	- 70	- 81	- 87
Increase in Dissolved Solids In Colorado River mg/L	0.01	0.02	0.02	0.03
Increased Cost to Downstream Users (Dollars ^b)	4,000	8,000	8,000	12,000

^aUsed 225 gallons per day per person and allowed 50 percent return flow through sewage effluent

^bBased on 393,000 (1978 dollars) for each 1 mg/L increase in dissolved solid concentration

TABLE 4-42

TOTAL CUMULATIVE IMPACTS ON VEGETATION
ALTERNATIVE FOUR

Vegetation Types	Impacts On Tract ^a (Acres)				Impacts Off Tract ^b (Acres)				TOTAL ^c
	1987	1990	1995	2000	1987	1990	1995	2000	
Agriculture	-	-	-	-	-	-	-	-	0
Riparian	-	-	-	-	-	-	-	-	0
Grassland	-	-	-	-	-	-	-	-	0
Desert Shrub	-	-	-	-	-	-	-	-	0
Sagebrush Grass	5	5	5	5	31	31	31	31	36
Pinyon-Juniper Woodland	9	9	9	9	20	20	20	20	29
Mountain Brush	3	3	3	3	24	24	24	24	27
Aspen	13	13	13	13	31	31	31	31	44
Conifer Aspen	15	15	15	15	19	19	19	19	34
Total	45	45	45	45	125	125	125	125	170

^aIncludes mining operation and onsite facilities

^bIncludes offsite facilities (roads, powerlines, etc.)

^cTotal disturbance by year 2000 (housing development would require an additional 127 acres bringing total vegetation disturbance to 297 acres)

TABLE 4-43

BIG GAME IMPACTS
ALTERNATIVE FOUR

Tract	Acres Disturbed	Disturbed Range	Species	Losses/Year ^a
Gordon Creek	90	High Priority - Summer	Deer	12
		Critical - Winter	Elk	4
		Critical - Yearlong	Moose	4
Meetinghouse Canyon	40	High Priority - Summer	Deer	5
		Critical - Winter	Elk	0
Cottonwood	40	High Priority - Winter	Deer	5
		Critical - Winter	Elk	0
Total	170		Deer	22
			Elk	4
			Moose	4

^aIncludes 0.1-mile influence zone.

TABLE 4-44

POTENTIAL DEER TRAFFIC MORTALITY FROM NEW ROADS
ALTERNATIVE FOUR

Lease	New Roads (Miles)	Deer Range	Deer Loss/ Year ^a	Total Number of Years
Gordon Creek	3.5	Summer	14	40
Cottonwood	2.2	Winter	4	40
Meetinghouse	2.0	Winter	4	40
Total	7.7		22	

^a1,280 acres (1 mile each side of road) X road length/deer density
(Dalton, UDWR) X 0.076 = Deer Loss/Year

TABLE 4-45

ACREAGE CONVERTED TO COMMUNITY DEVELOPMENT, IRRIGATED CROPLAND CONVERTED TO COMMUNITY DEVELOPMENT, AND IRRIGATED CROPLAND RETIRED TO PROVIDE COMMUNITY WATER
ALTERNATIVE FOUR

Location	1987				1990							
	Total Acreage Converted ^a	Irrigated Acreage Converted	Irrigated Acreage Retired	Total Acreage Converted	Irrigated Acreage Converted	Irrigated Acreage Retired	Total Acreage Retired					
	Base	Alt. 4	Base	Alt. 4	Base	Alt. 4	Base	Alt. 4				
Carbon County	283	34	17	35	4	4	352	62	176	31	44	8
Helper	39	5	19	3	1	1	49	10	25	5	6	1
Price	117	15	59	8	2	2	149	29	74	15	19	4
Wellington	48	3	24	2	1	1	52	6	26	3	7	1
Emery County	104	18	52	13	2	2	156	32	78	16	20	4
Castle Dale	19	5	9	2	1	1	28	9	14	5	4	1
Emery	4	0	2	1	0	0	6	0	3	0	2	0
Ferron	25	2	13	3	0	0	35	5	17	3	4	1
Huntington	0	2	0	0	0	0	0	6	0	3	0	1
Orangeville	25	3	13	3	1	1	30	6	15	3	4	1
Sanpete County	102	3	51	13	0	0	162	5	81	3	20	1
Fairview	9	1	5	1	0	0	13	1	7	0	2	0
Mt. Pleasant	15	1	7	2	0	0	29	3	15	1	4	0
Gunnison	1	0	0	0	0	0	20	1	10	0	3	0
Centerfield	1	0	0	0	0	0	9	0	4	0	1	0
Spring City	4	0	2	1	0	0	8	1	4	0	1	0
Sevier County	204	0	102	26	0	0	294	1	147	0	37	0
Aurora	12	0	6	2	0	0	19	0	9	0	2	0
Redmond	9	0	4	1	0	0	11	0	5	0	1	0
Salina	29	0	15	4	0	0	63	0	32	0	8	0
Sigurd	11	0	5	1	0	0	6	0	3	0	1	0
Four-County Total	693	55	346	87	6	6	964	100	482	50	121	13

(Continued)

TABLE 4-45, Concluded

Location	1995			2000								
	Total Acreage Converted ^a	Irrigated Acreage Converted	Irrigated Acreage Retired	Total Acreage Converted	Irrigated Acreage Converted	Irrigated Acreage Retired						
	Base	Alt. 4	Base	Alt. 4	Base	Alt. 4						
Carbon County	433	73	216	37	54	9	453	79	226	40	57	10
Helper	61	12	30	6	8	2	64	13	32	7	8	2
Price	193	34	96	17	24	4	213	38	106	19	26	5
Wellington	59	7	29	4	7	1	61	7	30	4	8	1
Emery County	201	38	101	19	25	5	203	41	101	20	25	5
Castle Dale	36	10	18	5	5	1	36	11	18	6	5	2
Emery	7	0	4	0	1	0	6	0	3	0	1	0
Ferron	42	6	21	3	5	1	42	6	21	3	5	1
Huntington	8	7	4	4	1	1	8	7	4	4	1	1
Orangeville	36	7	18	4	5	1	36	7	18	4	5	1
Sanpete County	221	6	111	3	28	1	289	6	145	3	36	1
Fairview	15	1	8	0	2	0	16	1	8	1	2	0
Mt. Pleasant	35	3	18	1	5	0	36	3	18	1	5	1
Gunnison	28	0	14	0	4	0	30	0	15	0	4	0
Centerfield	12	0	6	0	2	0	13	0	7	0	2	0
Spring City	9	1	4	0	1	0	10	1	5	0	1	0
Sevier County	456	1	228	0	57	0	571	1	286	1	72	0
Aurora	33	0	17	0	4	0	33	0	17	0	4	0
Redmond	19	0	9	0	2	0	19	0	10	0	3	0
Salina	99	0	50	0	13	0	105	0	52	0	13	0
Sigurd	8	0	4	0	1	0	12	0	6	0	2	0
Four-County Total	1,311	118	656	59	164	15	1,516	127	758	64	190	16

^aAssumes one-half of total acreage required for community development would come from irrigated cropland

ENVIRONMENTAL CONSEQUENCES

ments. Sanpete and Sevier Counties would not be significantly affected.

Impacts to livestock grazing from traffic and congestion in Huntington Canyon and the nature of impacts from subsidence that could result from underground mines on the Wasatch Plateau would be the same as described in Alternative One. Subsidence would only impact the areas that would be developed under this Alternative.

The implications of county zoning on development of the tracts, all of which are in CE-1 zoned areas, are the same as described in Alternative One.

SOCIOECONOMICS

Carbon and Emery Counties would experience an additional 543 and 340 jobs respectively by the year 2000 (see Table 4-46). Total employment in Carbon County would reach 12,959 in 2000 (a 5,308 job increase since 1977). Employment in Emery County would reach 6,932 in 2000 (1,948 more than in 1977). Forty-six percent of the additional employment generated in Carbon County (251 jobs) and 60 percent of the new jobs in Emery County (202 jobs) would be direct employment at the mines. Employment increases in Sanpete and Sevier Counties would be minimal.

For the four counties as a whole, new employment generated would bring an additional \$30.6 million (1977 dollars) in annual income by 2000, including \$18.2 million in Carbon County and \$8.5 million in Emery County. As a result, total personal income in Carbon County would reach \$277.3 million or \$8,858 per capita by 2000 (compared with \$6,837 in 1978, and \$8,673 in 2000 under the projected baseline). In Emery County, total personal income would be \$127.5 million or \$8,702 per capita (versus \$5,788 in 1978 and \$8,596 in 2000 under the projected baseline).

Over the long term, most of the new job openings generated would probably be filled by new in-migrants rather than existing residents. The pool of locally available unemployed labor is expected to be small, and underground coal mining requires special skills not readily available locally.

In spite of in-migration, the population increases would be relatively small (see Table 4-47). Most of the new residents would be expected to settle in Carbon County (which would receive an additional 1,415 inhabitants for a total population of 31,304 by 2000, an increase of 9,661 since 1978) and Emery County 730 additional residents for a total population of 14,652 by 2000, or 4,804 more than the 1978 population). Population impacts on the individ-

ual community level would be relatively small (i.e., less than 10 percent above the population projected for the year 2000 under the baseline).

Infrastructure

The added stress on infrastructure generally would not be severe. In Emery County, where the most stress would be felt, school facilities would still not be overburdened. However, the shortage of doctors and nurses would be slightly exacerbated. One more doctor would be required in Emery by 2000, in addition to the 14 more needed under the baseline, and three nurses would be needed by 2000, in addition to the 49 needed under the baseline (Table 4-48).

The communities of Castle Dale, Ferron, Huntington, and Orangeville would require a somewhat significant expansion of their existing housing stock (i.e., 62, 33, 40, and 40 units respectively) by the year 2000 in order to accommodate the projected growth in population (see Table 4-49). However, only 5 to 9 percent of the expected increases in individual community housing requirements would be attributed to renewed coal leasing. The remaining housing units would be required under the baseline needs.

Infrastructure stress on Carbon County generally would be even less severe than in Emery County. Carbon County's schools would need to provide 166 additional places for elementary students (see Table 4-48). Under the baseline, 630 secondary places would be required.

Carbon County would face a serious shortage of doctors and nurses. One additional physician and five additional nurses would be needed to meet accepted health planning standards (see Table 4-48).

To meet the projected population growth, the city of Price would require 206 additional housing units by 2000. In Helper, 68 more housing units would be required by 2000, bringing the total requirement to 1,336 housing units.

No significant infrastructure impacts would be anticipated for Sanpete or Sevier Counties.

Social Impacts

Communities in the Wasatch Plateau-Emery area would experience only a negligible social change. The incremental population increase (5 percent or less above the projected population baseline) is too small to have a measurable effect on local social structures beyond those already expected to occur.

TABLE 4-47

PROJECTED POPULATION IMPACTS
ALTERNATIVE FOUR

	1978 Total Population	1987			1990		
		Total Without the Proposed Alternative	Total With the Proposed Alternative	Increment Due to the Proposed Alternative	Total Without the Proposed Alternative	Total With the Proposed Alternative	Increment Due to the Proposed Alternative
Carbon	21,643	26,919	27,539	620	28,173	29,296	1,123
Helper	3,030	3,751	3,845	94	3,944	4,124	180
Price	8,660	10,858	11,129	271	11,429	11,955	526
Wellington	1,299	2,167	2,222	55	2,254	2,355	101
Emery	9,849	12,168	12,487	319	13,113	13,693	580
Castle Dale	1,773	2,204	2,290	86	2,360	2,517	157
Emery	397	492	492	0	525	525	0
Ferron	1,280	1,782	1,826	44	1,967	2,054	87
Huntington	2,363	2,239	2,277	38	2,360	2,464	104
Orangeville	985	1,483	1,542	59	1,574	1,678	104
Sanpete	14,119	18,362	18,408	46	19,442	19,537	95
Centerfield	600	890	890	0	1,027	1,027	0
Fairview	1,060	1,256	1,268	12	1,322	1,342	20
Gunnison	1,368	2,011	2,011	0	2,355	2,356	1
Mt. Pleasant	2,354	2,669	2,692	23	2,933	2,976	43
Spring City	698	785	792	7	850	863	13
Sevier	14,489	18,687	18,695	8	20,309	20,323	14
Aurora	779	1,034	1,035	1	1,155	1,156	0
Redmond	486	658	658	0	694	694	0
Salina	2,191	2,774	2,775	1	3,384	2,387	3
Sigurd	370	564	564	0	486	487	1
Regional Total	60,100	76,136	77,129	993	81,037	82,849	1,812

(Cont Inued)

TABLE 4-47 (Concluded)

1978 Total Population	1995			2000		
	Total Without the Proposed Alternative	Total With the Proposed Alternative	Increment Due to the Proposed Alternative	Total Without the Proposed Alternative	Total With the Proposed Alternative	Increment Due to the Proposed Alternative
Carbon	21,643	29,626	1,317	29,889	31,304	1,415
Helper	3,030	4,148	211	4,184	4,410	226
Price	8,660	12,217	619	12,555	13,234	679
Wellington	1,299	2,370	119	2,391	2,518	127
Emery	9,849	13,913	680	13,922	14,652	730
Castle Dale	1,773	2,505	184	2,506	2,710	204
Emery	397	554	0	540	540	0
Ferron	1,280	2,087	102	2,088	2,198	110
Huntington	2,363	2,505	122	2,506	2,637	131
Orangeville	985	1,670	122	1,671	1,802	131
Sanpete	14,119	20,509	107	21,687	21,801	114
Centerfield	600	1,091	0	1,103	1,103	0
Fairview	1,060	1,355	21	1,367	1,392	25
Gunnison	1,368	2,503	1	2,531	2,532	1
Mt. Pleasant	2,354	3,031	50	3,060	3,111	51
Spring City	698	879	15	886	901	15
Sevier	14,489	23,228	20	25,170	25,193	23
Aurora	779	1,412	1	1,417	1,418	1
Redmond	486	843	0	849	849	0
Salina	2,191	4,028	4	4,138	4,143	5
Sigurd	370	515	1	585	587	2
Regional Total	60,100	87,276	2,124	90,668	92,950	2,282

Source: UPED model

TABLE 4-48

IMPACTS ON EDUCATION, HEALTH, AND POLICE SERVICE REQUIREMENTS IN 2000
ALTERNATIVE FOUR

County	Existing Capacity 1978	Total Need With Alt. 2	Increment Due To Alt. 2	Percent Increase Due To Alt. 2
Carbon County				
Pupil Spaces ^a				
Elementary	2,828	3,662	166	4.7
Secondary	2,139	2,786	126	4.7
Teachers ^b	192	300	14	4.8
Doctors ^c	21	31	1	3.0
Nurses	122	109	5	4.8
Police Officers ^d	24	62	3	5.0
Emery County				
Pupil Spaces				
Elementary	1,940	2,344	117	5.2
Secondary	1,417	1,670	83	5.2
Teachers	129	201	10	5.2
Doctors	7	15	1	7.1
Nurses	6	52	3	6.1
Police Officers	12.5	29	2	7.4
Sanpete County				
Pupil Spaces				
Elementary	1,789	2,464	13	0.5
Secondary	743	1,962	10	0.5
Teachers	152	170	1	0.6
Doctors	7	22	0	0.0
Nurses	27	77	0	0.0
Police Officers	7	44	0	0.0
Sevier County				
Pupil Spaces				
Elementary	1,783	3,276	3	0.1
Secondary	1,111	2,343	2	0.1
Teachers	165	225	0	0.0
Doctors	9	25	0	0.0
Nurses	24	88	0	0.0
Police Officers	12.5	50	0	0.0

^aProjected enrollment is based on the assumption that school district enrollment is the same proportion of county population in the future as in 1978

^bProjected need for teachers assumes the same teacher/pupil ratio as in 1978

^cProjected need for doctors and nurses is based on the planning standard of one per 1,000 population and one per 285 population, respectively

^dProjected need for police officers is based on a standard of two full time equivalent officers per 1,000 person

TABLE 4-49

PROJECTED HOUSING IMPACTS IN 2000
ALTERNATIVE FOUR

	Projected Need Without This Proposed Action	Projected Need With This Proposed Action	Increment Due To The Proposed Action	Percent Increase Due To The Proposed Action
Carbon County	9,057	9,485	428	4.7
Helper	1,268	1,336	68	5.3
Price	3,805	4,011	206	5.4
Wellington	724	762	38	5.2
Emery County	4,219	4,440	221	5.2
Castle Dale	759	821	62	8.2
Emery	163	163	0	0.0
Ferron	633	666	33	5.2
Huntington	759	799	40	5.2
Orangeville	506	546	40	7.9
Sanpete County	6,571	6,606	35	0.5
Centerfield	334	334	0	0.0
Fairview	414	422	8	2.0
Gunnison	767	767	0	0.0
Mt. Pleasant	927	942	15	2.0
Spring City	268	273	5	2.0
Sevier County	7,627	7,634	7	0.01
Aurora	429	430	1	0.2
Redmond	257	257	0	0.0
Salina	1,254	1,255	1	0.01
Sigurd	177	178	1	0.6
Regional Total	27,474	28,165	691	2.5

ENVIRONMENTAL CONSEQUENCES

TRANSPORTATION

Additional traffic which would result from this Alternative is shown in Table 4-50.

Cumulative traffic volumes are shown in Table 4-51. This Alternative would add to the crowded conditions in the already crowded portion of U-10, i.e., that part between Price and Castle Dale. It would also add to congestion in the vicinity of Orangeville. It is anticipated, however, that the traffic accident rate would remain within the Statewide averages for the types of highways under consideration, although the number of accidents would increase.

The greatest impact of the additional traffic volume would be on the Gordon Creek Road, which has a gravel surface west of its crossing with the Utah Railway, and which already carries a substantial amount of coal-related traffic, where dust would create a traffic hazard and where increased maintenance would be necessary.

A moderate amount of increased maintenance would also be required on U-10 and its feeder routes south of Castle Dale. About 0.9 million gallons of petroleum fuels would be used per year by the increased traffic.

There would be a moderate amount of interference between mine-related and recreational traffic in Huntington and Cottonwood Canyons.

Based on Statewide accident figures, it is expected that additional coal-related traffic might have an additional 25 vehicle accidents per year in traveling some 6 million miles per year.

The increased travel projected under the four alternatives would generate from \$67,500 to \$144,000 in increased fuel revenues annually. This revenue would be sufficient to apply only a minimum surface rehabilitation treatment to 1 mile of highway each year where many hundreds of miles are affected.

Utah's highways have usually been constructed to accommodate traffic for 20 years after they were built. Nearly all of the highways impacted by the proposed coal development are approaching or have already exceeded the 20-year design traffic volume. Significant traffic increases would only exacerbate an already serious deficiency in the financial resources required to maintain, let alone improve, the affected highways. With many of the highways in a precarious condition, the increased travel (with a high percentage of trucks) would precipitate the deterioration of many highways. Immediate attention would be required just to retain a tolerable level of service. Without additional financing by a factor somewhere between fifty and one hundred times the previously mentioned revenue, the

impacted roads would be adversely affected. Even then, it is assumed that such amounts would be made available each year over the life of the impact and that the onset of development would occur slowly (UDOT, 1980).

Energy Requirements and Conservation Potential

It is expected that 1,200 vehicles per day would consume 0.9 million gallons of fuel per year in traveling about 6.2 million vehicle miles.

A net energy analysis estimate was made comparing the amount of energy in the coal produced from the tracts, the energy expended in its production, and the energy in the coal left in the ground after mining. Total energy output for this Alternative is estimated at 1.535 million billion Btu. Energy required for production of the coal is estimated at 52,888 billion Btu. Finally, energy left underground, and considered unrecoverable after mining is estimated at 2.3 million billion Btu.

See Appendix 10 for tract-by-tract energy balance analyses.

CULTURAL RESOURCES

The avoidance, excavation, and salvage measures would mitigate adverse impacts to cultural resources.

Loss of cultural sites from vandalism, pot-hunting, and arrowhead collecting would result from an expanded population and better access. The extent of such losses is unknown.

SPECIAL DESIGNATION AREAS

Some of the 17 areas in the Four-County region with potential for wilderness or other special designation could receive increased ORV and other dispersed recreation use because of the coal-related population increase. Resultant littering and vandalism would degrade values for which the areas are being studied. Federal agencies managing the lands (BLM and FS) may be under stress to protect these values with no foreseeable increase in funding for that purpose. However, it is very unlikely that possible degradation would affect the designation of suitability of any area due to the temporary nature of impacts resulting from dispersed recreational use.

TABLE 4-50

ANNUAL AVERAGE DAILY TRAFFIC INCREASE
DUE TO ALTERNATIVE (1990-2000)
ALTERNATIVE FOUR

Point	Location	All	Trucks
1.	U-96 South of U.S. 6	0	0
2.	U.S. 6 at Utah-Carbon County Line	174	8
3.	Gordon Creek Road	488	214
4.	U.S. 6 North of Price	584	227
5.	U.S. 6 Between Price and Wellington	37	0
14.	U-10 South of Price	374	239
15.	Wellington Loadout Road	189	189
16.	U-10 North of Huntington	185	50
17.	U-31 West of Huntington	246	108
18.	U-10 South of Huntington	291	128
19.	U-29 West of Orangeville	459	201
19a.	Castle Valley RR Loadout S of Castle Dale	0	0
20.	U-10 South of Castle Dale	77	4
21.	North Horn Mountain Mine	0	0
22.	U-10 North of Ferron	77	4
23,25.	U-10 South of Ferron, North of Emery	0	0
26.	Emery North Mine	0	0
27.	Emery Central Mine	0	0
27a.	U-10 South of Emery	0	0
27b.	Castle Valley RR Loadout South of Emery	0	0
28.	U-10 North of I-70	0	0
29.	Emery South and Dog Valley Mines	0	0
33.	I-70 East of Salina	0	0
37.	U.S. 89 South of Salina	0	0
47.	New Road, Pleasant Valley to U-31	0	0
48.	U-31 East of Fairview	0	0

Note: Castle Valley RR spur assumed built to Emery

TABLE 4-51

ANNUAL AVERAGE DAILY TRAFFIC PROJECTED FOR SELECTED YEARS
ALTERNATIVE FOUR

Point	Location	1985		1987		1990		1995		2000	
		All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks
1.	U-96 S of U.S. 6	953	171	1,075	208	1,208	248	1,258	248	1,308	252
2.	U.S. 6 at Utah-Carbon County Line	8,740	1,430	9,519	1,575	10,882	1,791	12,882	1,791	14,844	2,309
3.	Gordon Creek Road	339	139	339	139	827	353	827	353	827	353
4.	U.S. 6 N of Price	17,563	3,033	18,201	3,210	19,744	3,662	21,244	3,662	22,619	4,040
5.	U.S. 6 between Price & Wellington	11,156	1,806	16,394	2,698	25,416	3,959	39,629	3,959	43,593	5,958
6.	Soldier Cr Rd at Duchesne-Carbon Co Line	65	3	68	3	75	5	90	5	112	5
7.	Soldier Cr Rd at Soldier Cr Mine	145	14	193	17	295	23	333	23	355	25
8.	Deadman Canyon Mine	322	160	408	191	551	243	794	243	794	348
9.	Dugout Canyon Road	965	80	1,242	103	1,555	128	1,555	128	1,555	128
10.	Soldier Cr Rd at U.S. 6	1,431	301	1,855	314	2,424	394	2,682	394	2,704	501
11.	U.S. 6 W of U-123 (Sunnyside Jct)	5,356	851	5,890	906	6,256	986	7,056	986	8,140	1,206
12.	U-123 E of U.S. 6	2,656	160	2,850	168	3,056	176	3,156	176	3,256	184
13.	U.S. 6 near Carbon-Emery County Line	3,300	495	3,460	520	3,700	555	4,100	555	4,500	675
14.	U-10 S of Price	5,983	1,407	6,082	1,353	6,919	1,812	7,431	1,812	7,868	1,969
15.	Wellington Loadout Road	883	883	970	970	589	589	620	589	620	620
16.	U-10 N of Huntington	5,514	1,290	5,614	1,290	5,732	1,109	6,182	1,109	6,468	1,283
17.	U-31 W of Huntington	1,483	185	1,697	189	2,162	310	2,387	310	2,523	336
18.	U-10 S of Huntington	3,883	979	4,024	983	4,338	919	4,835	919	5,217	1,019
19.	U-29 W of Orangeville	2,103	559	3,190	597	3,871	812	4,001	812	4,019	817
19a.	Castle Valley RR Loadout S of Castle Dale	834	834	1,500	1,500	2,101	2,101	2,101	2,101	2,101	2,101
20.	U-10 S of Castle Dale	1,250	150	1,460	210	1,840	296	2,393	296	2,779	359
21.	North Horn Mountain Mine	-	-	-	-	-	-	-	-	-	-
22.	U-10 N of Ferron	1,250	150	1,460	210	1,840	296	2,393	296	2,779	359
23.	U-10 S of Ferron, N of Emery	1,050	126	1,226	181	1,491	259	2,055	259	2,409	314
26.	Emery North Mine	-	-	-	-	-	-	-	-	-	-
27.	Emery Central Mine	-	-	-	-	-	-	-	-	-	-

(Continued)

TABLE 4-51 (Concluded)

Point	Location	1985		1987		1990		1995		2000	
		All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks
27a.	U-10 S of Emery	930	112	1,090	131	1,481	193	2,133	299	2,542	348
27b.	Castle Valley RR Loadout S of Emery	-	-	-	-	799	799	799	799	799	799
28.	U-10 N of I-70	930	112	1,090	131	1,675	345	1,927	403	2,366	452
29.	Emery South & Dog Valley Mines	70	10	70	10	70	10	70	10	70	10
30.	U-72 near Sevier-Wayne County Line	37	1	40	2	45	2	55	2	66	2
31.	U-72 S of I-70	270	184	368	185	442	185	454	185	454	185
32.	Spring Canyon Road at I-70	1,085	591	1,085	591	949	283	961	348	961	348
33.	I-70 E of Salina	5,075	1,520	5,047	1,412	4,755	928	4,338	993	4,462	1,030
34.	U.S. 89 S of Richfield	5,143	771	5,538	830	5,770	866	5,770	866	5,599	840
35.	U.S. 89 N of Richfield	6,800	1,020	7,738	1,161	7,835	1,175	6,800	1,020	6,121	918
36.	U.S. 89 N of Aurora	7,835	1,175	8,711	1,307	8,800	1,320	7,835	1,175	6,645	997
37.	U.S. 89 S of Salina	3,175	1,135	2,866	828	2,683	571	2,438	636	2,553	621
38.	U.S. 89 near Sanpete-Sevier County Line	5,828	1,170	6,132	1,113	6,000	720	6,000	720	6,390	1,041
39.	U-28 N of Gunnison	3,848	873	3,822	777	3,500	420	3,500	420	3,818	730
40.	U.S. 89 N of Gunnison	1,870	75	1,874	75	1,980	79	2,250	90	2,570	103
41.	U.S. 89 N of Manti	2,875	115	2,518	101	2,635	105	3,500	140	4,973	199
42.	Public Road E of Ephraim	285	11	317	12	380	15	510	20	665	26
43.	U.S. 89 N of Ephraim	2,255	90	2,277	91	2,415	97	2,745	110	3,127	125
44.	U.S. 89 S of Mt. Pleasant	1,645	66	1,574	63	1,660	66	2,000	80	2,475	99
45.	U.S. 89 N of Mt. Pleasant	3,770	151	3,859	154	4,000	160	4,225	169	4,432	177
46.	U-31 at Sanpete-Emery County Line	540	22	627	25	725	29	840	34	992	38
47.	New Road, Pleasant Valley to U-31	1,067	43	1,216	48	1,535	61	2,228	89	3,075	123
48.	U-31 E of Fairview	1,607	64	1,843	73	2,260	90	3,068	123	3,997	161
49.	U.S. 89 N of Fairview	2,040	82	2,029	81	2,150	86	2,485	100	2,898	117

Note: Castle Valley Railroad assumed built to Emery by 1990

ENVIRONMENTAL CONSEQUENCES

VISUAL RESOURCES

Impacts to visual resources in the Gordon Creek, Meetinghouse, and Cottonwood tracts would be the same as identified in Alternative One. In summary, the disturbance and facilities associated with underground mining of the three tracts, where located both on and off the tracts, would not be highly visible nor conflict with VRM objectives. Reclamation would be effective in reestablishing the present scenic quality of the three tracts upon completion of the mining operations.

The average visitor would probably note little change in the region's overall scenic character from development of the tracts.

RECREATION

By the year 2000, mining activity and mining-related population growth would increase the local demand (users originating from within the Four-County region) for both dispersed and developed recreation opportunities by approximately 4 percent from 1980 figures. Tables 4-52 and 4-53 show the anticipated increases in demand for hunting, fishing, and ORV activity respectively, during the life of the mining operations. Increased demand for dispersed activities, as well as increased use of developed recreation sites and urban facilities, would result in impacts similar to those identified for Alternative One, but less in extent and intensity. The extent cannot be quantified.

In summary, the additional competition for fish and game would lead to less hunter and fisherman success or restricted harvest. Increased ORV use would increase ORV conflicts with other recreational uses. Overuse of developed campgrounds, picnic areas, playfields, swimming pools, and golf courses would result in continued deterioration of existing facilities, user dissatisfaction, and additional recreation pressures on undeveloped areas. Federal, State and local governments would be under stress with limited funds to provide recreation facilities to meet minimum standards recommended by the Utah Outdoor Recreation Agency (SCORP, 1978).

Development of the tracts and of homesites would displace dispersed recreational use from as much as 225 acres in 1987, 271 acres in 1990, 288 acres in 1995, and 297 acres in the year 2000. Loss of recreational opportunities would be minimal. Impacts to recreational traffic on the Huntington Canyon road would be similar to those identified in Alternative One, but less in extent and intensity (i.e., increase in danger, stress, and visitor dissatisfaction).

UNAVOIDABLE ADVERSE IMPACTS

Local and short-term degradation of air quality would occur near access roads associated with the proposed mines. Increased emission of all NAAQS pollutants would occur as a result of the increased population in the region.

Soil, vegetation, and wildlife productivity on 297 acres would be lost for the life of the mines. Approximately 92.2 million tons of coal would not be recovered using current mining techniques. Changes in aquifers and points of surface water discharge due to potential subsidence on 7,744 acres could not be avoided. Consumptive use of water would increase 312 acre-feet annually, and sewage effluent discharge would increase 288 acre-feet. The increased salt load in tributaries of the Colorado River would be 117 tons annually. The conversion of cropland for urban use and the retirement of irrigated lands to provide water for mining and community use would result in loss of crop production on 87 acres. Surface disturbance associated with mining would decrease the deer population by 22 deer annually and road construction affecting riparian habitat would displace four moose. Increased traffic would cause deer highway mortalities to increase by 22 deer annually.

The unavoidable adverse socioeconomic impacts of this alternative would include: (1) a worsening of the local inflation rate, which would be particularly detrimental to persons living on low or fixed incomes; (2) addition of 949 new jobs and competition for labor, with the relatively high wages paid in mining and construction making it difficult for other sectors to hire and retain qualified employees; (3) increased capital and operating layouts by local governments; and (4) an increased population of 2,282 and some loss of small-town atmosphere and cultural homogeneity in the affected communities, particularly Castle Dale, Ferron, and Orangeville.

Moderate increases in traffic (100 to 200 vpd) along U-10 from Castle Dale northward, with a somewhat greater increase on the Gordon Creek road would be unavoidable. Vehicle accidents would increase by 25 accidents annually.

Vandalism and illegal artifact collecting would increase as a result of the increased population in the area. Recreation demand would increase by 4 percent.

TABLE 4-52

PROJECTED INCREASE IN LOCAL HUNTER AND FISHERMAN DEMAND
ALTERNATIVE FOUR

Year	Coal-Related Population	Projected Annual Increase In Numbers					Increased Demand For Fish	Overall Percent In- crease from 1980
		Deer Hunters	Elk Hunters	Upland Game/Water- fowl Hunters	Fishermen			
1987	998	174	17	84	447	9,700	1.6	
1990	1,812	317	31	154	815	17,686	2.9	
1995	2,124	372	36	181	956	20,745	3.3	
2000	2,282	399	39	194	1,027	22,286	3.6	

Note: Projections were made assuming that the percentage of Utah's population that currently hunts or fishes would remain the same, and that the Utah percentage can be applied to the Four-County area. Approximately 17.5 percent of Utah's population hunt deer, 1.7 percent hunt elk, and 8.5 percent hunt upland game or waterfowl. Approximately 53 percent of Utah's population under the age of 12 and 42 percent of the population over the age of 12 fish. Approximately 27 percent of Utah's population is under 12 and 73 percent is over 12 in age (Thayne and Hudson, 1978).

TABLE 4-53

PROJECTED INCREASE IN LOCAL OFF-ROAD VEHICLE DEMAND WITHIN THE FOUR-COUNTY REGION
ALTERNATIVE FOUR

Year	Projected Coal- Related Popula- tion Increase	Project Increase		Overall Percent Increase from 1980
		in Pickup and Four-wheel Drive Numbers	Projected In- crease in Motorcycle Numbers	
1987	998	248	66	1.6
1990	1,812	453	123	2.9
1995	2,124	531	144	3.3
2000	2,282	571	155	3.6

Note: Projections were made assuming that the percentage of the population in the Four-County region that owns off-road vehicles would remain the same (6.8 percent of the population currently owns motorcycles, and 25 percent of the population currently owns four-wheel drive vehicles or light pickups) (Scorp, 1978)

ENVIRONMENTAL CONSEQUENCES

THE RELATIONSHIP BETWEEN THE SHORT-TERM USE OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Housing development associated with coal production in the region would permanently occupy 127 acres resulting in a long-term loss of soil, vegetation, and wildlife productivity on those acres. Mining coal at a 40-percent recovery rate would render 92.2 million tons of coal unrecoverable by present technology. Changes in aquifers or points of surface water discharge would cause a long-term change in local surface water distribution and ground water storage potential. Increased salt loading (117 tons annually) and consumptive use of water (288 acre-feet annually), attributable to the increased population, would continue into the long term.

Implementation of this Alternative would have a positive long-term impact on productivity through: (1) an increase in the size of the labor force, (2) infrastructure improvements useful for commercial and industrial development, and (3) increased income and buying power which would contribute to the development of a larger and more diversified trade and services sector. This Alternative would also have one potential negative impact on productivity, i.e., an increased vulnerability to economic disruptions caused by fluctuations in the coal industry.

IRRETRIEVABLE OR IRREVERSIBLE COMMITMENT OF RESOURCES

Air quality degradation resulting from increased population would be irreversible. The loss of soil, vegetation, and wildlife productivity on 297 acres for the life of the mines would be irretrievable. On lands committed to urbanization and not reclaimed (127 acres), the loss would be irreversible. Wildlife lost to disturbance of habitat on highway mortality would be irretrievable.

The 61.5 million tons of coal that would be mined would be irretrievable, and the 92.2 million tons of coal left in the ground would be unrecoverable by present technology. Water used for mining and community use (312 acre-feet annually) would be irretrievable, and any change in aquifers or surface distribution due to subsidence would be irreversible. The demand for 288 acre-feet of culinary water annually and the increased salt loading (117 tons annually) associated with the increased population would be irreversible. The 64 acres of irrigated

croplands converted to community use would be irreversibly lost and lost crop production on those lands plus 23 acres of land retired from change of water use would be irretrievable.

The growth in population of 2,282 persons expected to result from this level of coal development would be irreversible except at considerable human and economic cost. The commitment of capital, physical resources and labor to build 691 housing units and infrastructure required to support the additional population, commerce, and industry would be an irretrievable impact.

Haulage of coal to existing loadouts, commuting from local communities, and services to the mines from Price would result in the consumption of about 0.9 million gallons of petroleum fuels per year. Lives and money lost because of increased traffic accidents would be irretrievable. Artifacts lost to vandalism or illegal collecting would be irretrievable. Loss of context of sites through salvage or disturbance would be irreversible.

Alternative Five

INTRODUCTION

Alternative Five would involve no leasing or production of coal from any of the 11 tracts described in this statement. Development of the Hollberg PRLA, as analyzed in Alternative One, could proceed without competitive coal leasing, and is considered part of this Alternative. Present and projected coal production would continue thereby resulting in an annual production rate of 24 million tons per year by 1990. This production level was analyzed in the Final Environmental Statement, Development of Coal Resources in Central Utah (DOI, GS, 1979). This analysis is also used as the baseline for the projection of impacts from additional coal leasing in the area as proposed in the four previous alternatives. The following is a summary of the analysis as contained in the previously mentioned final EIS. For a more detailed discussion of impacts, refer to that EIS.

AIR QUALITY

The projected air quality impacts from existing mines, future mining developments not associated with leasing the tracts considered in this EIS, towns, roadways, and major point sources were estimated. The predicted annual TSP concentrations

for the year 2000 are shown in Figure 4-2. The interaction of emissions from clustered mines and haul roads is expected to generate TSP levels within several kilometers of the mines and roads which may exceed the NAAQS. This situation is expected to occur near the cluster of mines west of Helper, northwest of Castle Dale and Orangeville, and in the southwest corner of Carbon County. Annual average concentrations near the mines and haul roads in these areas are expected to be near 100 micrograms per cubic meter including a background level of 38 micrograms per cubic meter (Radian, 1981). These high values of TSP concentrations, exceeding the NAAQS, were predicted assuming only watering to control dust from unpaved haul and access roads which are the major contributors to TSP levels. The Utah Air Quality Bureau has published draft fugitive dust regulations that, when promulgated and enforced, may suppress TSP levels such that the NAAQS would not be violated.

Population and transportation growth are expected to cause TSP concentrations to increase 15 micrograms per cubic meter above background levels near Price and Helper and 5 micrograms per cubic meter near Castle Dale and Orangeville. Annual average nitrogen dioxide concentrations are presented in Figure 4-5 and sulfur dioxide levels are shown in Figure 4-6. Rural levels of nitrogen dioxide and sulfur dioxide are projected to be below the NAAQS, while within several hundred meters of the towns the concentrations of nitrogen dioxide and sulfur dioxide would be higher, it is expected that the NAAQS would still be met (Radian 1981).

SOILS

Soils would be temporarily disturbed on 2,924 acres as a result of mining and related activities, including community development, and about 650 acres, half of the community development, may lose productivity permanently because of occupation by structures or hard surface. Enforcement of existing regulations would preclude significant adverse impacts pertaining to soil erosion and reduction in soil productivity on reclaimed areas. Reclamation of soils disturbed by off-road recreation vehicles would not be the responsibility of the mining companies so the disturbance would constitute an adverse environmental impact where ORVs are used indiscriminantly. After reclamation, many of the sites that were disturbed for mining would have erosion rates less than the present due to slope modification, erosion control structures, and revegetation.

WATER RESOURCES

About 5,900 acre-feet of water probably would be diverted over the long term from agricultural to public water supply. The additional 945 acre-feet per year required for mining would be a short-term commitment but may be long term if the level of mining remains as high or higher than the projected level. At this level of use, the quantity involved would not be a significant adverse impact. Mining operations in or below saturated beds would cause local water-level declines and change the magnitude and direction of local ground-water flow patterns. The amount of ground water and saturated beds affected, however, would be small. The area affected by mining would be about one-half of 1 percent of the region. As the deeper saturated beds would not be affected, the mines would impact an insignificant percentage of the total saturated strata. Water levels in some places would recover within a few years after mining ceases; in other places, such as those where water is contained in thin saturated sandstone beds, water levels might never recover. The flow of some springs might decrease.

Sewage effluent returned to the water system from the increased population would add approximately 1,392 tons of salt. Even with this additional loading, the water should still be usable for some downstream irrigation.

GEOLOGY, TOPOGRAPHY, PALEONTOLOGY, MINERAL RESOURCES

Some modifications of the land surface and drainage patterns within the central Utah coal region would be unavoidable. Following mining and reclamation, traces of some excavations, waste-rock piles, and sludge and settling ponds would remain, but would become less noticeable with each year because of reclamation. During mining, and for a short but undeterminable time (probably 3 to 5 years) afterward, some of the ground surface overlaying the mines could subside as much as 10 feet, and as much as 39,000 acres could be subject to potential subsidence. Federal mining regulations provide for monitoring subsidence and limiting its effect in sensitive areas.

Subsidence, where it does occur, would be accompanied by shallow to deep open fractures, sink-holes, and compressional upbucklings of surface rocks. The cracks would partially fill and heal with soil over time.

ENVIRONMENTAL CONSEQUENCES

Mining-induced tremors, with magnitude as great as 4.5 would increase with mining activity. The tremors would be hazardous to mine workings and ancillary facilities, but damage is not expected to be significant to susceptible structures beyond individual mine areas. Underground hazards to miners, including cave-ins, bumps, squeezes, flooding, and dangerous concentrations of methane, are in part unavoidable. About 4.7 fatalities and 317 nonfatal accidents would be expected per year owing to coal mining at proposed new mines.

About 382 million tons of coal would be left in place and may not be recoverable. Uncontrolled, and uncontrollable coal-bed fires are in part unavoidable. This impact is not quantifiable nor predictable and significance cannot, therefore, be determined. Unavoidable destruction, disturbance, and removal of paleontological resources, both exposed and unexposed, would occur. The potential significance of this impact cannot be meaningfully assessed. A beneficial impact of development would be the exposure of fossils for scientific collection and examination if a paleontologist is present to do so.

VEGETATION

The loss of vegetation that would result from development of coal mines and associated housing necessary to produce 24 million tons per year by 1990 is shown by vegetation type and percent in Table 4-54.

Additional housing that would be needed by the year 2000 would add 192 acres to the total disturbance. Thus, the total loss of vegetation that would occur in 2000 would be 3,116 acres. Of this amount, 1,600 acres would be reclaimed following completion of mining. The 1,516 acres that would be occupied for housing would be committed to urbanization, and vegetation production on these acres would be permanently lost.

No unique or rare vegetation types or plant associations would be affected by coal development. In terms of total vegetation resources in the region, the loss of vegetation would not be significant. Successful reclamation of 1,600 acres would increase vegetation production on those acres by about 40 percent.

No threatened or endangered plant species in the region would be directly impacted by proposed coal developments. Inadvertent impacts (loss of individual plants) could result from housing development, off-road vehicle activities, or unlawful collecting of these species.

WILDLIFE

The temporary loss of 1,624 acres of wildlife habitat resulting from construction and operation of proposed coal mines and ancillary facilities would occur. Permanent loss of about 1,300 acres (1,516 acres by the year 2000) of wildlife habitat that would be occupied by houses and community facilities is unavoidable. Loss of wildlife would result from loss of habitat and increased human disturbance. Elk habitat on 353 acres of land occupied by surface facilities would be lost, and elk use on about 9,400 acres would be reduced due to human disturbance. Deer habitat on 1,404 acres would be lost due to construction of surface facilities and deer use on 7,256 acres would be reduced because of human disturbance. Carrying capacity for 260 deer would be lost annually. Any loss of the endangered bald eagle or peregrine falcon or other birds of national interest is not quantifiable but would be significant. Direct impacts on wildlife would include deaths resulting from construction and operation of the proposed mines, highway mortality, illegal killing, and deaths from wire strikes. Deer highway mortalities would increase by 95 deer annually because of increased traffic in the region. Long-term alteration of migration routes and use patterns would be unavoidable. Impacts to fisheries would be slight under reasonable enforcement of existing laws and regulations. However, accidental releases of materials toxic to fish and other aquatic organisms might occur.

LAND USE

A total of 1,300 acres (1,516 acres by the year 2000) surrounding or within existing communities would be converted from existing uses to housing or other higher community uses. About 800 acres of agricultural land, less than 0.3 percent of the agricultural land in the seven counties in the region might be converted to community use or retired from production to supply community water needs. The loss of grazing capacity would be about 4,170 AUMs over the life of the proposed mines and 11,700 AUMs per year due to community development.

SOCIOECONOMICS

The major impacts at the projected level would result from a rapid regional population increase from 55,000 in 1975 to 70,000 to 75,000 in 1990. Population in Emery County would almost double

TABLE 4-54

TOTAL CUMULATIVE IMPACTS ON VEGETATION
ALTERNATIVE FIVE

Vegetation Types	Area Impacted 1990 ^a Acres	Percent	Total Impact 2000 ^b Acres
Agricultural	650	22	746
Riparian	13	-	13
Grassland	220	8	220
Sagebrush-Grass	1,178	40	1,226
Pinyon-Juniper Woodland	700	24	748
Mountain Meadow	20	1	20
Aspen	58	2	58
Conifer Aspen	85	3	85
Total	2,924	100	3,116

Source: Final Environmental Statement Central Utah Coal (GS, 1979)

^a Projected impacts that would result from mining coal at the rate of 24 Million tons per year by 1990

^b Population increase by the year 2000 would result in the need for additional housing. About 192 acres would be required to fill this need. These acres would come from the following vegetation types: Agricultural-96 acres, Sagebrush-Grass-48 acres, and Pinyon-Juniper Woodland-48 acres.

ENVIRONMENTAL CONSEQUENCES

and that in Carbon County would increase by 50 percent. Sevier, Wayne, Piute, and Sanpete would have about 10 percent growth. Housing needs would parallel the population growth. Social impact would be most adverse to those 65 and older, about 10 percent of the regional population. This segment typically is supported by fixed incomes, and not likely to take advantage of expanded job opportunities, so they will be adversely affected by the rising prices anticipated to accrue from strong economic expansion. Competition for labor would adversely affect existing businesses; however, this impact would be lessened by the additional revenues that would accrue from economic expansion. The net effect of expanded coal mining on related occupations would be 182 direct supporting jobs for every 1,000 jobs in coal mining. The mining workforce in the region would increase to 7,430 by the year 1990.

Rapid growth will place temporary financial pressure on local governments and the quality and quantity of local services such as water supply, sewage, and solid waste disposal, health care, social services, police and fire protection, recreation facilities, and education. In addition, lasting cultural changes must be expected in Emery and perhaps Sevier and Wayne Counties.

TRANSPORTATION

More intensive use of transportation facilities is a necessary part of resource development. The projected annual average daily traffic on highways in the region is shown in Table 4-55. Taking into consideration the historical trends in western coal development, the addition of significant volumes of highway traffic would result in accelerated deterioration of the regional highway system and increased levels of accidents, fuel consumption, air pollution, noise, and congestion. The construction or reconstruction of 49 miles of roads would be required to provide mine access. Upgrading of the major highway network to meet increased traffic levels in general, especially the expansion of State road-10, may require additional rights-of-way. The degree to which this action would result in increased rail operations with associated adverse impacts is dependent on the, as yet, undecided market of the coal produced.

CULTURAL RESOURCES

Salvage excavation of threatened archaeological or historic sites may be required. Data would be preserved, but sites or portions of sites would be lost.

Some loss would occur for buried sites encountered during dirtmoving operations even if they were recognized early. Changes in setting of sites, either by the introduction of project activities and facilities or by moving certain things to avoid impacts, would degrade archaeological and historic values. Vandalism impacts would occur due to an increased population and easier accessibility.

Positive impacts would also result from coal development. Valuable information has been gathered and other surveys could be necessary prior to any disturbance. The additional surveys would result in the accumulation of data that would otherwise not have been available until the future, or which may have been lost. Any salvage excavation that is required will result in the preservation of data and material (including some that might otherwise be lost to vandalism), although *in situ* value is lost.

SPECIAL DESIGNATION AREAS

The proposed new coal mines and transportation routes do not intrude directly onto wilderness or roadless areas of the National Forest System or National Parks. A complete analysis of direct impacts on roadless areas on public lands is not possible because of: (1) the conceptual nature of much of the utility and transportation systems, and (2) the incomplete status of a roadless inventory program for the purpose of formulating guidelines for identifying the size, location, and characteristics of areas having roadless and wilderness values. All existing and potential roadless and wilderness areas would be subject, however, to the indirect impact of more intensive use by the increased population at the projected level of coal development. This usage would tend to degrade the natural characteristics of these areas. On a regional basis, the impact is not expected to be significant.

VISUAL RESOURCES

More urbanization would occur in existing communities; improved and extended access roads and secondary ancillary facilities would be needed. In some cases the visual character of smaller, outlying communities would be changed from rural-ranching to one of more urbanization. Some secondary visual resource degradation would be caused by noise and dust from increased industrial activities, and by indiscriminant increases in ORV use, littering, and vandalism. In addition, road construction and utility line construction would introduce strong axis lines which would change the natural landscape character. To some individuals, this would

TABLE 4-55

ANNUAL AVERAGE DAILY TRAFFIC PROJECTED FOR SELECTED YEARS
ALTERNATIVE FIVE

Point	Location	1985		1987		1990		1995		2000	
		All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks
1.	U-96 S of U.S. 6	953	171	1,075	208	1,208	248	1,258	250	1,308	250
2.	U.S. 6 at Utah-Carbon County Line	8,740	1,430	9,519	1,575	10,708	1,783	12,708	2,083	14,670	2,303
3.	Gordon Creek Road	339	139	339	139	339	139	339	139	339	139
4.	U.S. 6 N of Price	17,563	3,033	18,201	3,210	19,160	3,435	20,660	3,660	22,035	3,813
5.	U.S. 6 between Price & Wellington	11,156	1,806	16,394	2,698	25,379	3,959	39,592	6,102	43,556	5,956
6.	Soldier Cr Rd at Duchesne-Carbon Co Line	65	3	68	3	75	5	90	4	112	5
7.	Soldier Cr Rd at Soldier Cr Mine	145	14	193	17	295	23	333	24	355	25
8.	Deadman Canyon Mine	322	160	408	191	551	243	794	348	794	348
9.	Dugout Canyon Road	965	80	1,242	103	1,555	128	1,555	128	1,555	128
10.	Soldier Cr Rd at U.S. 6	1,431	301	1,855	314	2,424	394	2,682	500	2,704	500
11.	U.S. 6 W of U-123 (Sunnyside Jct)	5,356	851	5,890	906	6,256	986	7,056	1,106	8,140	1,200
12.	U-123 E of U.S. 6	2,656	160	2,850	168	3,056	176	3,156	180	3,256	180
13.	U.S. 6 near Carbon-Emery County Line	3,300	495	3,460	520	3,700	555	4,100	615	4,500	670
14.	U-10 S of Price	5,983	1,407	6,082	1,353	6,545	1,573	7,057	1,667	7,494	1,730
15.	Wellington Loadout Road	883	883	970	970	400	400	431	431	431	431
16.	U-10 N of Huntington	5,514	1,290	5,614	1,290	5,547	1,059	5,997	1,192	6,283	1,230
17.	U-31 W of Huntington	1,483	185	1,697	189	1,916	202	2,141	216	2,277	220
18.	U-10 S of Huntington	3,883	979	4,024	983	4,047	791	4,544	838	4,926	890
19.	U-29 W of Orangeville	2,103	559	3,190	597	3,412	611	3,542	616	3,560	610
19a.	Castle Valley RR Loadout S of Castle Dale	834	834	1,500	1,500	2,101	2,101	2,101	2,101	2,101	2,101
20.	U-10 S of Castle Dale	1,250	150	1,460	210	1,763	292	2,316	342	2,702	350
21.	North Horn Mountain Mine	-	-	-	-	-	-	-	-	-	-
22.	U-10 N of Ferron	1,250	150	1,460	210	1,763	292	2,316	342	2,702	350
23.	U-10 S of Ferron, N of Emery	1,050	126	1,226	181	1,491	259	2,055	304	2,409	310
26.	Emery North Mine	-	-	-	-	-	-	-	-	-	-
27.	Emery Central Mine	-	-	-	-	-	-	-	-	-	-

(Continued)

TABLE 4-55 (Concluded)

Point	Location	1985		1987		1990		1995		2000	
		All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks
27a.	U-10 S of Emery	930	112	1,090	131	3,028	131	1,698	299	2,542	34
27b.	Castle Valley RR Loadout S of Emery	-	-	-	-	799	-	799	799	799	79
28.	U-10 N of I-70	930	112	1,090	131	1,675	131	345	403	2,366	45
29.	Emery South & Dog Valley Mines	70	10	70	10	70	10	10	10	70	1
30.	U-72 near Sevier-Wayne County Line	37	1	40	2	45	2	2	2	66	66
31.	U-72 S of I-70	270	184	368	185	442	185	185	185	454	185
32.	Spring Canyon Road at I-70	1,085	591	1,085	591	949	283	283	348	961	34
33.	I-70 E of Salina	5,075	1,520	5,047	1,412	4,755	928	4,338	993	4,462	1,03
34.	U.S. 89 S of Richfield	5,143	771	5,538	830	5,770	866	5,770	866	5,599	84
35.	U.S. 89 N of Richfield	6,800	1,020	7,738	1,161	7,835	1,175	6,800	1,020	6,121	91
36.	U.S. 89 N of Aurora	7,835	1,175	8,711	1,307	8,800	1,320	7,835	1,175	6,645	99
37.	U.S. 89 S of Salina	3,175	1,135	2,866	828	2,683	571	2,438	636	2,553	62
38.	U.S. 89 near Sanpete-Sevier County Line	5,828	1,170	6,132	1,113	6,000	720	6,000	720	6,390	1,04
39.	U-28 N of Gunnison	3,848	873	3,822	777	3,500	420	3,500	420	3,818	73
40.	U.S. 89 N of Gunnison	1,870	75	1,874	75	1,980	79	2,250	90	2,570	10
41.	U.S. 89 N of Manti	2,875	115	2,518	101	2,635	105	3,500	140	4,973	19
42.	Public Road E of Ephraim	285	11	317	12	380	15	510	20	665	2
43.	U.S. 89 N of Ephraim	2,255	90	2,277	91	2,415	97	2,745	110	3,127	12
44.	U.S. 89 S of Mt. Pleasant	1,645	66	1,574	63	1,660	66	2,000	80	2,475	9
45.	U.S. 89 N of Mt. Pleasant	3,770	151	3,859	154	4,000	160	4,225	169	4,432	17
46.	U-31 at Sanpete-Emery County Line	540	22	627	25	725	29	840	34	992	3
47.	New Road, Pleasant Valley to U-31	1,067	43	1,216	48	1,535	61	2,228	89	3,075	12
48.	U-31 E of Fairview	1,607	64	1,843	73	2,260	90	3,068	123	3,997	16
49.	U.S. 89 N of Fairview	2,040	82	2,029	81	2,150	86	2,485	100	2,898	11

Note: Castle Valley Railroad assumed built to Emery by 1990

ENVIRONMENTAL CONSEQUENCES

detract from the enjoyment of viewing the landscape; to others, new roads would provide additional access to scenic enjoyment.

RECREATION

Recreation resource use would increase about 10 percent as a result of increases in population. Increases in traffic and use of recreation sites would reduce recreational enjoyment, and over-use of natural and man-made recreational resources could result in deterioration of the resources and reduced opportunity for recreational pursuits. Aesthetic values would decrease locally because of plant sites, ancillary facilities, and coal haul systems and generally because of increased vandalism, littering, and ORV use.

PROPOSED UTAH POWER AND LIGHT EXCHANGE

Introduction

Two alternatives have been identified. Alternative One considers consummation of the exchange in full. However, it must be recognized that the exchange would be based on equal coal values which have not yet been determined. Therefore, the land amounts subject to exchange could vary. Alternative Two considers No Action, in which case it has been assumed that the PRLAs on the Kaiparowits Plateau would result in Federal coal leases that would be developed in accordance with existing laws and regulations. A general analysis of impacts is presented because UP&L has not developed specific information on developing the PRLAs. An analysis of coal development on the Kaiparowits Plateau, including the PRLAs, was recently completed by Environmental Research and Technology, Inc. (ERT, 1980). The reader is referred to this document for further information since it was used as a primary source of data for this analysis. The terms PRLA and Kaiparowits Plateau are used interchangeably throughout this analysis.

Alternative One (Full Exchange of the PRLAs)

If UP&L exchanged its PRLAs for coal lands on the Wasatch Plateau, environmental and socioeconomic impacts associated with development of the PRLAs would not occur. The environmental and socioeconomic setting would remain as described in Chapter 3. Opportunities for growth and development in an economically depressed area would be foregone. The economic trend, especially in Escalante would continue downward. The four communities of Tropic, Henrieville, Cannonville, and Escalante would continue to experience a decline in their combined population from 1,459 in 1978 to 1,095 in 1987. Thereafter an upward trend would again resume reaching 1,357 in 2000.

Infrastructural and social strains resulting from rapid growth would not occur. However, the long-term demographic and economic stagnation in the area would continue. The size of the local population would continue to dwindle and the average age of the population would increase as the younger residents leave the area in search of better social and economic opportunities elsewhere. Personal incomes would continue to be low, almost 15 percent below the Statewide average. Local business volume would remain correspondingly low.

An increase in housing vacancies would be expected. This in turn would probably result in a decline of home values and rents. Local elementary and secondary schools would continue to have substantial overcapacity in room and facilities.

Expenditures for establishment of local police departments, acquisition of additional firefighting equipment, expansion of water supplies, and construction of sewage treatment facilities would not be necessary.

Implementation of the UP&L exchange would allow residents of Cannonville, Escalante, Henrieville, and Tropic to avoid the erosion of their small-town, rural way of life and community homogeneity which would result from large scale population growth associated with development of the Kaiparowits PRLAs. On the other hand, residents would lose the potential advantages of development such as job opportunities, better public services and facilities, entertainment, and cultural opportunities.

The environmental and socioeconomic impacts that would result from development of the selected lands on the Wasatch Plateau have been analyzed in Alternative Three (Coal Leasing Program) of this statement.

ENVIRONMENTAL CONSEQUENCES

Alternative Two (No Action on Exchange and Development of the PRLAs on the Kaiparowits Plateau by UP&L)

AIR QUALITY

Direct air quality effects arising from mining and transportation would be from increased fugitive dust levels and air quality changes due to increased population. In the relatively undeveloped southern Utah region, the major pollutant would be suspended particulate matter with current and projected impacts from gaseous pollutants a minor contributor. The Kaiparowits Coal Development and Transportation Study (ERT 1980) considered a mid-level production of 15 million tons per year from the North Kaiparowits Area (which would include the UP&L PRLA area) and a high level production of 30 million tons per year from North Kaiparowits. Unmitigated TSP mine emissions would exceed Class I increments and the NAAQS locally. Eighty-eight percent mitigation (including chemical stabilization of haul roads, enclosure of coal storage and handling operations etc.) would be necessary to meet air quality standards at the North Kaiparowits area. With 88-percent mitigation, visibility could still be affected. Visual range, for example, viewing from Bryce Canyon toward Navajo Mountain would be reduced approximately 12 percent (from the present 124 miles to 110 miles).

No studies have been performed specifically for the PRLA; therefore it is uncertain what contribution the PRLA would have to this total estimated impact. However it would be equal to or less than that indicated. More precise quantification of potential air quality impacts requires air quality modeling based on specific mining and reclamation plans. Lease stipulations for BACT would be identified by BLM to ensure compliance with Federal and State air quality regulations. Air quality control strategies in addition to reduction of direct mining operation emissions would require enforcement measures and cooperation among Federal, State, local agencies, and industry.

SOILS

The construction of mine facilities (buildings, haul roads, storage sites, sediment ponds, portals, powerlines and telephone lines) and housing and support facilities as a result of mine development, would cumulatively disturb 951 acres by the end of mine life. The disturbance of 600 acres would be of

a temporary nature since the area would be reclaimed. The loss of productivity on 351 acres would be permanent due to the construction of housing and support facilities for future population increases in the region.

Soil erosion would occur where surface disturbing activities occur. Soil loss through erosion is dependent on the soil physical characteristics, degree of slope, length of slope, climatic conditions during soil exposure, and the effectiveness of erosion control measures. Because these variables are so great, soil loss estimates can be quite variable. No attempt was made to quantify soil losses in the Kaiparowits area, because detailed soils data are not available. Stockpiled topsoil would be subjected to wind and water erosion, causing additional soil losses.

Other impacts to soil as a result of removal, handling, and stockpiling include the loss of fertility by the introduction of inferior subsoils and the biological death of soil micro-organisms (Environmental Protection Agency, 1974). The overall effect would be a loss in soil productivity for the period from disturbance until reclamation was successful.

WATER RESOURCES

Surface Water

Mining of the Garfield deposit would have little effect on the surface water resources either onsite or in adjacent areas. Impacts include (1) reduction in stream flow of the Escalante and Paria Rivers resulting from increased consumptive use in the towns of Escalante, Cannonville, Tropic, and Henrieville; (2) potential for increased salinity and pollution of the Paria and Escalante Rivers resulting from mine related population increase and (3) effects of land subsidence on surface drainage.

Pumping from deep wells in the Navajo Sandstone on the lease would have little effect on the base flow of perennial streams in the area for many years because of thick beds of shale, siltstone, and other material of low permeability overlaying the Navajo Sandstone. However, the cone of depression caused by pumping would deepen and expand until sufficient natural discharge is intercepted to sustain the pumping.

The use or diversion of water from springs and seeps or from shallow wells on the site would have no effect on stream discharge because spring discharge currently is utilized by riparian vegetation or is evaporated. It never reaches the Escalante River

ENVIRONMENTAL CONSEQUENCES

to contribute to stream flow except during periods of flash flooding.

The estimated increase of consumptive use attributable to mining would reach maximum 10 years after mine operation began. Assuming that the average use of water is 225 gallons a day per person, water requirements resulting from mine-related population growth in Escalante Valley would increase by about 510 acre-feet per year by the year 2000 and about 924 acre-feet in the Paria River basin. Assuming that 112.5 gallons per day per person are required for sanitary purposes and returned as effluent, the resulting consumptive use would reduce current yield on watersheds by less than 1 percent or about 255 acre-feet per year in the Escalante Valley and 462 acre-feet per year in the Paria River Valley.

The extent to which ground water discharges from septic tanks to the adjacent stream channels would ultimately determine the extent of pollution to the streams resulting from the increased population. By assuming a worst-case condition of all sewage effluent entering the stream, a maximum impact to water quality can be calculated. Assuming that 112.5 gallons per day per person of sewage effluent with a dissolved solids concentration of 200 to 300 mg/L greater than presently occurs reaches the rivers, the increased salt load would be about 104 tons per year in the Escalante River and 189 tons per year in the Paria River. Although the resulting effect on the salinity at Imperial Dam on the Colorado River would be undetectable, an increase in the salinity of the Colorado River is a major concern to a number of State and Federal agencies as well as lower Colorado Basin water users.

The result of septic tank discharges reaching streams would be an increase in the biological oxygen demand, fecal coliforms, suspended solids, nitrates, nitrites, chlorine, ammonia, and orthophosphates below the point of discharge that would adversely impact the aquatic biology. The effects would be most pronounced near the source of pollution and diminish progressively downstream. Because of downstream diversion for irrigation, it is doubtful that the nutrient content in municipal waste resulting from mine-related increase in population would ever reach the Colorado River.

Ground Water

Impacts on ground water from mining the Garfield coal deposits would have both local and regional effects on the ground water system. Local impacts would result from disturbance of perched aquifers in the base area causing: (1) interruption of

the natural perched ground water flow system in, above, and adjacent to the mined areas, and (2) changes in the chemical quality of the perched ground water in areas affected by subsidence.

Regional impacts would result from the lowering of the hydraulic head in the Navajo Sandstone by pumping four deep wells to supply operating needs. Water in the Navajo Sandstone occurs under artesian conditions at the lease site and consequently the impacts from pumping would spread rapidly and cover wide areas. Although there are no known water supplies currently developed in the Navajo Sandstone that would be impacted, natural discharge from the Navajo Sandstone would be eventually diminished.

The coal beds occur in the zone of aeration thousands of feet above the regional water table; therefore hydrologic impacts resulting directly from mining would be local in nature and limited by the extent of the perched reservoir. Pumping water from the mines would reduce ground water storage and lower the water level in the affected reservoirs. The impacted area would expand as mining progressed.

Collapsed sedimentary formations in the mine roof following the retreat of longwall mining would ultimately cause the overlying formations to sag and fracture. Effects would be negligible during early years of mining but would increase as mining progressed. The maximum effect would not occur until mine abandonment. Subsidence and the resultant fracturing of the overlying rocks would permit the downward movement of water into the mines. As a result water perched hundreds of feet above the mining level would begin to drain causing a lowering of the water level in all the overlying affected reservoirs. Discharge from these sources would decline according to the degree natural discharge of springs and seeps is affected by mine drainage. Data are not available to project the extent of such a discharge.

Changes in chemical quality would not interfere with any existing water supplies or affect the water for industrial uses in the mines. Mixing of water could degrade water quality in the deeper aquifers within and immediately adjacent to the mined areas but no existing water supplies would be affected.

Mining would have no direct impacts on the regional ground water system. However, four wells are proposed to provide a total of 380,000 gallons per day (427 acre-feet per year) from deep wells developed in the Navajo Sandstone when the full production is reached. Sustained pumping from each of the four wells at a rate of about 66 gallons per minute would cause a water level decline of less than 28 feet in the vicinity of each well after 40

ENVIRONMENTAL CONSEQUENCES

years of pumping (depending on well construction, pumping rate, etc.).

GEOLOGY, TOPOGRAPHY, PALEONTOLOGY, MINERAL RESOURCES

Topography may be altered on portions of the PRLAs by subsidence. The surface area affected by subsidence would range from 90 to 130 percent of the area actually mined (GS, 1979). Dunrud (1976) reports that maximum subsidence would be from 50 to 90 percent of the thickness of the coal that is mined depending on depth of coal beds and type of overlaying material. Subsidence is expressed on the surface by open and closed fractures, buckled and bulged bedrock, sinkholes, and other depressions. Mining beneath cliffs or in steep canyons could result in rockfalls and small landslides.

Approximately 775 million tons of coal would not be recovered using current mining techniques. The unrecovered portion represents approximately 60 percent of the total in-place coal resource.

Potential oil and gas resources in the area occur stratigraphically below the coal-bearing formations. While the resource itself would not be damaged, surface and subsurface changes resulting from mining could hinder subsequent exploration and location of oil and gas development related facilities.

Mining activities could result in the inadvertent loss of plant, invertebrate, and vertebrate fossil materials. However, fossils not previously available for study could be exposed and scientific knowledge increased. The probability of encountering scientifically significant fossils is low (ERT, 1980).

VEGETATION

The proposed development of coal on the PRLA tracts would disturb a total of approximately 951 acres of vegetation by the year 2000. The acres of vegetation that would be lost are shown by year and type in Table 4-56. The vegetation types most affected would be Pinyon-Juniper Woodland and Sagebrush-Grass. The disturbance and loss of vegetation production would result from development of onsite facilities (270 acres), offsite facilities (330 acres), and housing (351 acres) for the increased population.

Loss of vegetation production would begin in 1985, as a result of removal of vegetation for development of portal facilities, conveyors, railroad

loadout, topsoil stockpiles, access roads, utility lines, and urban development. Required reclamation would follow the closure of mines after completion of mining; therefore, loss of vegetation production on 270 acres would be temporary for the life of the mines (40 years). Lands disturbed for roads and housing would not be reclaimed, and loss of vegetation production on 681 acres would be permanent. An additional 41 acres of irrigated agricultural land would be retired because of conversion of irrigation water to community use.

The acreage lost to housing development would be in the following vegetation types: Agriculture 50 percent (176 acres), Pinyon-Juniper Woodland 25 percent (88 acres), and Desert Shrub 25 percent (87 acres). These lands would be in or adjacent to existing communities in Garfield County.

It is expected that reclamation attempts on most disturbed sites would be effective. Adequate soil depths and annual average rainfall ranging from 12 to 15 inches would allow restoration of vegetation production to meet or exceed present levels. Depending upon the post mining use desired, reclamation could result in changes of vegetation types from Pinyon-Juniper Woodland and Sagebrush-Grass to Grassland. Usable forage production on such areas would probably be higher than present levels (Phillips, 1976).

No threatened or endangered plant species have been identified in the area. Stipulations required for approval of a mining plan would provide for a survey for threatened or endangered plant species. Such a survey, plus required avoidance of such plants, would prevent adverse impacts to any threatened or endangered plants as a result of mining development on the tracts.

WILDLIFE

The disturbance of 270 acres by mine development would not significantly impact any known wildlife populations. Some cougar home ranges could be altered, affecting the 12-year cougar predation study. This rocky Pinyon-Juniper vegetation type is sparsely inhabited and post mining rehabilitation could actually improve the productivity of the area. The presence of human activity at these mines could adversely affect the raptor nesting concentration area immediately west of the leases. Careful consideration to design and programming of the mine development would be required to avoid undue disturbances and harassment to this nesting area.

The 33 miles of road in Alvey Wash and Right Hand Collet Canyons, altering 330 surface acres,

TABLE 4-56

TOTAL CUMULATIVE IMPACTS ON VEGETATION
ALTERNATIVE TWO

Vegetation Types	Impacts Onsite ^a (acres)				Impacts Offsite ^b (acres)				TOTAL ^c
	1987	1990	1995	2000	1987	1990	1995	2000	
Riparian	-	-	-	-	17	17	17	17	17
Grassland	29	42	54	54	16	16	16	16	70
Sagebrush Grass	58	84	108	108	116	116	116	116	224
Pinyon-Juniper Woodland	43	63	81	81	165	165	165	165	246
Non Productive	15	21	27	27	16	16	16	16	43
Total	145	210	270	270	330	330	330	330	600

^aIncludes mining operation and onsite facilities

^bIncludes offsite facilities (roads, powerlines, etc.)

^cTotal disturbance by year 2000 (housing development would require an additional 351 acres bringing total vegetation disturbance to 951 acres)

ENVIRONMENTAL CONSEQUENCES

could have significant impacts on the riparian habitats of these desert canyons. The roads would be 50-foot wide with gravel surface supporting heavy truck and commuter traffic. The initial surface disturbance, noise, dust, and continual human presence, would eliminate all raptor nesting and reduce chukar, deer, and other wildlife use of watering sites, a critical factor in this arid climate. The end result would be reduced wildlife species populations that depend upon these canyons for their water needs.

The 138-kV powerline running southwest from the leases would not be a significant impact to wildlife. Bird migration routes are unknown in this area so the impact to migrating birds cannot be estimated. Hazards to raptors would be minimal and some benefits may accrue from poles used as perches in the open country away from roads.

Conversion of cropland to urban use would affect less than 1 percent of this habitat type in Garfield County. Locally significant cropland losses could occur around Tropic and Escalante reducing dove and cottontail populations.

Demand would increase for hunting and other recreation related to wildlife from a greatly increased local population. Legal hunting and harvest would be regulated by appropriate regulations and by limits, but illegal hunting would increase. In Carbon and Emery Counties, where energy developments spawned a 48- percent population increase between 1977 and 1979, citations for violations of wildlife have increased 250 percent over the same period (personal communication, Dalton, UDWR, 1980).

Population increases around Escalante and Tropic would be over 400 percent by 2000. This potential for increases in illegal killing could affect the growth of the introduced elk herd on the Aquarius Plateau, the recovery of the deer herd from its present low point, and the continuation of a viable raptor population in the canyon country. The most significant impacts to raptors would be caused by increased population. Illegal shooting and highway mortality would increase, and little could be done to eliminate these impacts (ERT, 1980). Raptors have been protected by law for several years; however, significant man-caused losses still occur. This trend probably would continue. The temporary elimination of small mammals and reptiles due to occupation of habitat by structures would eliminate raptor use on affected areas. After reclamation, the areas may be enhanced for some prey species, and raptors adapted to hunting open country broken by clumps of retained trees would be benefitted. Also affected would be the upland game populations adjacent to the communities.

Increased recreation population would also probably fish out the native trout populations in streams in this area requiring additional stocking to maintain a fisheries. The increased demand for improved access could lead to upgrading of existing backroads and additional roads opening up many areas. This generally leads to a decline in the sensitive wildlife species and fished out or hunted out areas. Specifically the Aquarius Plateau and Griffin Top, with its many small fisheries and elk habitat, could be susceptible to degradation from improved access. Extended access south into the Kaiparowits Plateau could conceivably adversely affect the establishment of the proposed desert bighorn sheep herd on the southern Kaiparowits Plateau.

LAND USE

An estimated 951 acres would change from livestock grazing and irrigated pasture and cropland to community development and mining use by the year 2000. Of this, 270 acres would be disturbed for the life of the mines and 681 acres would change from irrigated farmland and other lands vacant of constructed facilities, to roads and expanded community infrastructure, mainly housing.

About 176 acres of the 351 that would be permanently converted for community development would come from irrigated lands. This would cause a loss of pasture, hay, and other livestock feedcrops such as small grains and corn. Additional permanent reduction of livestock pasture and feedcrops would be caused by the retirement of another 41 acres of irrigated land to meet the water requirements of expanded communities. The permanent loss of irrigated cropland production would occur on a total of 217 acres although the retired acreage might be included in a rest-rotation farming system that would maintain it as productive irrigated farmland.

Water supply for mining-related uses would be obtained by drilling deep wells into the Navajo Sandstone aquifer. Therefore, it is assumed that no retirement of irrigated land in the area would be necessary to provide mining water. The 217 acres of irrigated lands that would be converted or retired amount to only about 1 percent of the irrigated acreage in Garfield County. The significance of the loss is not amount of acres lost but, rather: (1) the lost acreage would be among the most productive in the county; (2) lost acreage would be concentrated near communities impacting their local economy, particularly Escalante and Tropic; and (3) the loss of crops from the 217 acres would fall almost exclusively on the production of livestock and result in a diminished role of the presently important livestock industry in the county economy. The loss of

ENVIRONMENTAL CONSEQUENCES

productivity from the 217 acres is significant also in that the good quality acreage lost would be from a finite resource base which cannot be appreciably expanded. Table 4-57 shows the acreage impacts to the county and selected community relationships of land converted to community use, and irrigated cropland retired to provide community water.

A maximum of 200 AUMs per year would be lost. The actual number of AUMs lost would depend on where facilities were placed and where and to what extent subsidence would occur, and the effects on several livestock watering features in the area including several springs. As with irrigated acreage loss, the 200 AUMs are a minute portion of the total available within the county. The significance of the loss rests on the fact that it would be an additional increment of impact to the livestock industry which is the major recipient of other land use impacts that would result from development of the PRLAs. Reclamation of disturbed lands on the two affected allotments could actually result in improved range.

SOCIOECONOMICS

Economic and Demographic Impacts

Within Garfield County, direct socioeconomic impacts would be felt primarily in the communities of Cannonville, Escalante, Henrieville, and Tropic. If the PRLAs were developed, the combined population would rise to 1,725 in 1987, 3,248 in 1990, 6,469 in 1995, and 7,679 in 2000 (an increase of approximately 425 percent between 1978 and 2000). Consequently, these four communities would experience infrastructural and social strains implied by the projected rapid population growth.

Direct employment generated by development of the PRLAs would reach 350 workers (including 150 mine construction workers) in 1987; 1,050 (including 150 construction workers) in 1990; 2,500 in 1995; and 2,900 in 2000. These figures do not include secondary employment in trade, services, etc. However, this omission should not cause significant distortions in the analysis, since the bulk of the secondary employment would be concentrated outside the study area in trade centers such as Panguitch, Kanab (Kane County), and St. George (Washington County). However, most of the new jobs would be filled by new in-migrants rather than existing residents. Underground coal mining requires specialized job skills possessed by relatively few area residents who, therefore, generally would be limited to ancillary jobs such as driving coal trucks.

Development of PRLAs would lead to a significant increase in average income and purchasing power which, together with the limited supply of such necessities as housing, would exert strong upward pressure on the local rate of inflation. Wage competition from the mining and construction sectors would also bid up labor costs, making it more difficult and expensive for local employers in other sectors to hire and retain qualified workers, and possibly driving some out of business.

Infrastructure

Development of the PRLAs would require the four area communities to provide housing for up to 2,900 additional households by 2000. Such an increase would be beyond the present capacity of the local prefabricated housing industry and building contractors. It would necessarily result in a great expansion in the number of mobile homes, placing severe strains both on the local communities in planning and financing the provision of needed public services, and on workers and their families forced to live in "aluminum ghettos." New elementary and secondary schools in both Escalante and Tropic would need to be constructed in order to accommodate the increased population.

Increased health care needs would require doubling the number of hospital beds in Garfield County and recruiting additional doctors, nurses and dentists. In addition, provision of certain health care services (e.g. long-term nursing care, radiological services), would become economically feasible given the projected population associated with development of the PRLAs.

Establishment of local police departments, acquisition of additional firefighting equipment, expansion of water supplies, and construction of centralized sewage treatment facilities would be necessary.

Social Impacts

Residents of Cannonville, Escalante, Henrieville, and Tropic would experience an erosion of their small-town rural way of life and community homogeneity which would result from large-scale population growth associated with development of the PRLAs. Social problems such as alcoholism, drug abuse, divorce, violent crime, and mental illness would increase. On the other hand, residents would lose the potential advantages of development such as job opportunities, better public services and facilities, entertainment, and cultural opportunities if development did not occur.

TABLE 4-57

ACREAGE CONVERTED TO COMMUNITY DEVELOPMENT, IRRIGATED CROPLAND CONVERTED TO COMMUNITY DEVELOPMENT, AND IRRIGATED CROPLAND RETIRED TO PROVIDE COMMUNITY WATER
UP&L EXCHANGE-ALTERNATIVE TWO

Location	1987			1990			1995			2000		
	Base	Alt. 2	Alt. 2	Base	Alt. 2	Alt. 2	Base	Alt. 2	Alt. 2	Base	Alt. 2	Alt. 2
	Total Acreage Converted ^a	Irrigated Acreage Converted	Irrigated Acreage Retired	Total Acreage Converted	Irrigated Acreage Converted	Irrigated Acreage Retired	Total Acreage Converted	Irrigated Acreage Converted	Irrigated Acreage Retired	Total Acreage Converted	Irrigated Acreage Converted	Irrigated Acreage Retired
Garfield County	46	35	23	18	5	4	58	115	29	57	7	13
Cannonville	0	4	0	2	0	0	0	13	0	6	0	1
Escalante	0	11	0	6	0	1	0	37	0	18	0	4
Henrieville	1	4	0	2	0	0	2	13	1	6	0	1
Panguitch	15	4	8	2	2	0	21	12	10	6	2	1
Tropic	1	8	0	4	0	1	2	26	1	13	1	3
Garfield County	78	289	39	144	9	33	100	351	50	176	12	41
Cannonville	0	32	0	16	0	4	1	39	0	19	0	4
Escalante	1	92	0	46	0	11	2	112	1	56	0	13
Henrieville	3	32	2	16	1	4	5	39	2	19	0	4
Panguitch	31	29	16	14	12	3	45	35	23	18	5	4
Tropic	4	66	2	33	2	8	6	81	3	40	1	9

^aAssumes one-half of total acreage required for community development would come from irrigated cropland.

TRANSPORTATION

In the Garfield County area direct mine-related commuter and service truck traffic would amount to about 5,200 vehicles per day. By 2000, vehicles resulting from direct, mine-related usage (including commuters) would be traveling 58 million miles annually. The distribution of direct mine traffic and that due to population increases from mining development is shown in Table 4-58.

Accumulated traffic (baseline, plus that due to mining development) is shown in Table 4-59. Although traffic volumes would increase markedly over present and projected baseline levels, by the year 2000 none of the affected highways would reach the crowded category except for U.S. 89 south of Panguitch at the very end of the study period. The traffic accident rate would remain about the same as in the central Utah region.

Increased maintenance would be needed, but the increase in maintenance would not necessarily be in proportion to the increase in traffic.

Energy Requirements and Conservation Potential

In the northern Kaiparowits Plateau area, direct commuting and service traffic to the mines would add about 5,200 vpd to the traffic base, consuming some 4.25 million gallons of fuel per year by 2000 and in the process wearing out 360 cars and trucks per year, on the average.

CULTURAL RESOURCES

Development of the proposed alternative would result in indirect and possibly direct impacts to pre-historic and historic sites.

The degree and quantity of direct impacts to sites cannot be determined until intensive inventories are conducted on surface disturbance areas. Surface disturbances associated with the construction of mine portals, access roads, conveyors, etc. could result in damage to sites when encountered if facilities could not be relocated. Some buried sites, lacking surface indications, could also be irretrievably lost. In most cases, scientific values would be salvaged from sites prior to construction and mining. Some archaeological data would be lost for future scientific use.

Indirect impacts would result from greater accessibility and local population increases. Recreational

activities of two types, those intentional, illegal activities associated with artifact collection, and treasure hunting and unintentional recreational use (hiking, hunting, ORV) would cause irreplaceable, unmitigatable site damage. Both scientific and aesthetic site values would be lost as a result of these indirect impacts. Sites located on the proposed development area and in a large influence zone would be more susceptible to indirect impacts.

SPECIAL DESIGNATION AREAS

Mining activities and the construction of ancillary facilities on the PRLAs would impair wilderness character and, therefore, wilderness designation suitability within those portions of BLM Roadless Units UT-040-075, UT-040-076 and UT-040-078 where development would occur. Because wilderness suitability would be impaired, mining and construction would not be allowed within the roadless units as long as they are undergoing wilderness review (see Chapter 2, Mitigation Section).

Some of the 28 areas in the region with potential for wilderness or other special designation could receive additional ORV and/or other dispersed recreational use because of the coal-related population increase. Resultant littering and vandalism would degrade values for which the areas are being studied. Federal agencies managing the lands (NPS, BLM, and FS) may be under stress to protect these values with no foreseeable increase in funding for that purpose. However, it is very unlikely that possible degradation would affect the designation of suitability of any area due to the temporary nature of impacts resulting from dispersed recreational use.

VISUAL RESOURCES

The visual modification that would result from underground mining and associated developments would occur largely in areas already disturbed by mineral exploration and livestock developments. The overall scenic character of the tract areas would change from natural to industrial during the life of the mining operation. Mining activities and disturbance would be highly visible to an unknown number of recreationists using the Alvey Wash road for access onto the Kaiparowits Plateau, and would be considered a visually degrading intrusion to many and an item of interest to others during the life of the mining operation. No outstanding or unique scenic qualities would be lost, nor would mining development conflict with VRM objectives for the area. Reclamation would be effective in reestablishing present scenic quality and character.

TABLE 4-58

PROJECTED TRAFFIC, ADDITIONAL TRAFFIC DUE TO MINING ACTIVITY
 TRAFFIC AT THE NORTH END OF THE KAIPAROWITS PLATEAU
 UP&L EXCHANGE - ALTERNATIVE TWO

Location	1985		1987		1990		1995		2000	
	Total	Trucks	Total	Trucks	Total	Trucks	Total	Trucks	Total	Trucks
U-12 in Boulder	0	0	21	2	69	7	169	20	195	25
U-12 SW of Boulder	0	0	19	3	65	8	166	20	200	24
U-12 in Escalante	188	103	570	162	1,143	240	2,468	379	2,845	444
U-12 W of Escalante	243	97	754	150	1,453	220	2,738	344	3,557	401
U-12 E of Henrieville	243	97	781	155	1,543	233	3,255	377	3,831	442
U-12 W of Henrieville	214	97	649	152	1,263	226	2,730	358	3,107	418
U-12 SE of Cannonville	214	97	652	153	1,273	227	2,756	363	3,139	425
U-12 NW of Cannonville	185	97	534	151	1,037	225	2,232	360	2,553	421
U-12 SE of Tropic	185	97	551	154	1,094	234	2,383	380	2,737	446
U-12 NW of Tropic	124	97	308	151	627	226	1,374	365	1,616	428
U-12 at Bryce Canyon	124	97	392	160	937	257	2,245	451	2,681	533
U-12 at U.S. 89	124	97	384	159	2,169	253	2,164	440	2,582	521
U.S. 89 N of Hatch	32	29	120	51	301	89	689	160	826	189
U.S. 89 S of Panguitch	92	68	479	150	1,279	305	3,050	622	3,669	747
U.S. 89 in Panguitch	92	68	365	131	883	237	2,019	448	2,403	533

TABLE 4-59
TOTAL PROJECTED TRAFFIC, INCLUDING ADDITIONAL TRAFFIC DUE TO MINING ACTIVITY
AT THE NORTH END OF THE KAIPAROWITS PLATEAU
UP&L EXCHANGE - ALTERNATIVE TWO

Location	1985		1987		1990		1995		2000	
	Total	Trucks	Total	Trucks	Total	Trucks	Total	Trucks	Total	Trucks
U-12 in Boulder	140	16	177	20	232	26	341	40	376	46
U-12 SW of Boulder	135	16	163	20	218	26	331	40	386	46
U-12 in Escalante	751	152	1,167	214	1,777	295	3,163	439	3,618	511
U-12 W of Escalante	567	142	1,099	198	1,820	271	3,142	400	4,010	464
U-12 E of Henrieville	797	175	1,370	238	2,169	322	4,045	475	4,605	551
U-12 W of Henrieville	656	159	1,119	217	1,762	295	3,278	434	3,721	504
U-12 SE of Cannonville	684	164	1,152	224	1,803	303	3,339	446	3,792	518
U-12 NW of Cannonville	657	164	1,036	223	1,570	302	2,618	444	3,209	515
U-12 SE of Tropic	825	187	1,272	250	1,817	335	3,178	492	3,627	571
U-12 NW of Tropic	764	164	989	223	1,348	302	2,167	448	2,504	521
U-12 at Bryce Canyon	1,668	254	2,034	327	2,677	434	4,158	646	4,823	751
U-12 at U.S. 89	1,583	243	1,937	314	2,553	418	3,972	621	4,607	723
U.S. 89 N of Hatch	1,735	245	1,935	281	2,221	332	2,806	428	3,211	491
U.S. 89 S of Panguitch	1,822	362	2,315	462	3,230	636	5,183	984	6,033	1,148
U.S. 89 in Panguitch	4,409	803	4,966	914	5,749	1,066	7,384	1,361	8,446	1,562

ENVIRONMENTAL CONSEQUENCES

RECREATION

The mining-related population, when at its highest level from the years 1997 through 2000, would increase the demand for both dispersed and developed recreation opportunities in the region by approximately 160 percent from 1980 use figures.

Table 4-60 shows the anticipated increase in local demand for hunting and fishing during the selective mining operation years. The additional competition for available game and fish would lead to less hunter and fisherman success. To maintain present hunting success it could be necessary to restrict animal harvests, thereby reducing hunting opportunities. To maintain present fishing success, stocking activities would have to be increased by the Utah Division of Wildlife Resources. UDWR has no foreseeable increase in funds for this purpose.

Table 4-61 shows the anticipated increase in local demand for ORV activities during selected mining operation years. Although Garfield County has adequate miles of primitive dirt roads to absorb the ORV demand, the increase would conflict with other recreational uses, reducing the overall opportunity for dispersed recreation and reducing the quality of the recreational experience to some visitors.

Developed recreation sites in the region would receive increased use by the new population, which would intensify present overcrowding, causing user dissatisfaction and deterioration of the environment and facilities through vandalism and littering. This overcrowded condition would cause additional recreational pressures on undeveloped, dispersed areas. Federal and State governments would be under stress to provide adequate maintenance for existing developed sites and to construct adequate new sites, while there is no foreseeable increase in funding for these purposes. Overcrowded conditions of recreation facilities in the towns would intensify, resulting in their deterioration and in user dissatisfaction. Stress would be placed on local governments (again, with limited funds) to provide recreation facilities (e.g., playing fields, swimming pools, tennis courts, golf courses) to meet minimum standards recommended by the Utah Outdoor Recreation Agency (SCORP, 1978).

Development of the PRLAs and of homesites would displace ORV use from as much as 951 acres. Because surrounding areas offer comparable or better opportunities and access to these surrounding areas would not be eliminated, the recreational opportunity lost would not be significant, even when the increase in recreational demand is considered. The upgrading of the Alvey Wash and Right Hand Collet Canyon roads would improve

recreational access into the Kaiparowits Plateau area. Visual and audio impacts from mining would reduce the quality of the recreational experience of some people using the Alvey Wash road for access onto the Kaiparowits Plateau. Other visitors would find the mining operation to be an interesting addition to their recreation experience.

UNAVOIDABLE ADVERSE IMPACTS

The loss of soil and vegetation production on 951 acres would be unavoidable for the life of the mines. The disturbance on 270 acres would eventually be reclaimed but the loss of 681 acres would be permanent due to construction of housing and support facilities. An unquantified amount of soil would be lost as a result of erosion. Mining of coal on the PRLAs would result in 775 million tons of coal left underground and unrecoverable by present technology. Changes in aquifers due to mining and subsidence could not be avoided. Consumptive use of water in the area would increase by 255 acre-feet in Escalante Valley and 462 acre-feet in the Paria River basin. The loss of wildlife due to occupation of habitat, illegal killing or highway mortality would be unavoidable.

About 176 acres converted for community development would come from irrigated lands, resulting in loss of pasture, hay, small grains, and corn. An additional 41 acres of irrigated land would be retired to meet water requirements of the growing communities. A maximum of 200 AUMs per year would be lost.

Local communities would experience erosion of their small-town, rural way of life and community homogeneity which would result from large-scale population growth. The local inflation rate would be increased. Traffic resulting from development of the PRLAs would be consuming approximately 4.5 million gallons of fuel per year by 2000.

Inadvertent destruction or disturbance of undetected cultural resources and losses through illegal collection or vandalism could not be avoided. Demand for both dispersed and developed recreation opportunities would increase by approximately 160 percent by 2000 resulting in overutilization and crowding of existing recreation facilities and reduced hunter and fisherman success.

TABLE 4-60

PROJECTED LOCAL INCREASE IN HUNTER AND FISHERMAN DEMAND IN GARFIELD COUNTY
UP&L EXCHANGE - ALTERNATIVE TWO

Year	Projected Annual Increase In Numbers				Overall Percent Increase from 1980
	Coal-Related Population	Deer Hunters	Elk Hunters	Upland Game Hunters	
1987	630	110	11	54	16
1990	2,068	362	35	176	52
1995	5,200	910	88	442	132
2000	6,322	1,106	108	537	160
				Fishermen	
				284	
				931	
				1,053	
				2,845	
				Increased Demand for Fish	
				14,203	
				46,622	
				117,215	
				125,436	

Note: Projections were made assuming that the percentage of Utah's population that currently hunts or fishes would remain the same, and that the Utah percentage can be applied to Garfield County area. Approximately 17.5 percent of Utah's population hunt deer, 1.7 percent hunt elk, and 8.5 percent hunt upland game or waterfowl. Approximately 53 percent of Utah's population under the age of 12 and 42 percent of the population over the age of 12 fish. Approximately 27 percent of Utah's population is under 12 and 73 percent is over 12 in age (Thayne and Hudson, 1978).

TABLE 4-61

PROJECTED LOCAL INCREASE IN OFF-ROAD VEHICLE DEMAND WITHIN GARFIELD COUNTY
UP&L EXCHANGE - ALTERNATIVE TWO

Year	Projected Coal-Related Population Increase	Projected Increase in Pickup and Wheel Drive	Projected Increase in Four-cycle Numbers	Overall Percent Increase from 1980
1987	630	221	42	16
1990	2,068	724	141	52
1995	5,200	1,820	354	132
2000	6,322	2,213	430	160

Note: Projections were made assuming that the percentage of the population in Garfield County that owns off-road vehicles would remain the same (6.8 percent of the population currently owns motorcycles, and 35 percent of the population currently owns four-wheel drive vehicles or light pickups) (Scorp, 1978).

ENVIRONMENTAL CONSEQUENCES

THE RELATIONSHIP BETWEEN THE SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Increased population associated with mining development would result in a long-term decrease in air quality in the area; however, NAAQS would not be exceeded.

Short-term use of the environment for coal production would result in a long-term loss of soil and vegetation productivity on 681 acres permanently occupied by roads and housing. The extraction of 512 million tons of coal would render the remaining unmined 775 million tons unrecoverable over the long-term. The loss of crop production on 217 acres occupied by housing or retired due to conversion of water use would be a long-term loss in productivity.

Development of the PRLAs would lead to a significant increase in average income and purchasing power. This, together with the limited supply of necessities such as housing, would exert strong upward pressure on the local rate of inflation over the life of the mines. Wage competition from the mining and construction sectors would bid up labor costs, making it difficult for local employers to hire and retain qualified workers.

Any loss of cultural resources would result in a long-term loss of scientific knowledge and interpretive values. The development of recreational facilities as a result of demand by the increased population would be a long-term increase in capacity of recreation developments in the area.

IRRETRIEVABLE OR IRREVERSIBLE COMMITMENT OF RESOURCES

Emissions attributable to population growth in the area would cause an irreversible deterioration in air quality. Soil and vegetation productivity on 951 acres would be irretrievably lost for the life of the mines; of that amount, 681 acres occupied by roads and housing would be permanently lost. Soil lost to wind and water erosion would be irretrievable.

The 512 million tons of coal mined would be irretrievable and the 775 million tons of coal left in the ground would be irreversibly unrecoverable by present technology. Increased water consumption for mining and community needs would be irretrievable. Any changes in aquifers, ground water storage po-

tential, or point of discharge due to subsidence would be irreversible.

Any wildlife losses through displacement from habitat, traffic mortality, or illegal killing would be irretrievable. The loss of 200 AUMs annually would be irretrievable.

Growth in population of over 400 percent (7,679 people by 2000) would be irreversible. Likewise the commitment of capital, physical resources, and labor to build an additional 2,900 housing units and infrastructure that would be required to support the growth in population, commerce, and industry would be an irretrievable impact. The loss of small-town atmosphere resulting from coal development would be irreversible.

The annual consumption of 4.5 million gallons of fuel by 2000 would be irretrievable. Lives and money lost as a result of an increase in traffic accidents due to the increased traffic would be irretrievable.

The loss of cultural resources in context would be irretrievable and any loss of interpretive values would be irreversible.

CHAPTER 5

SUMMARY OF INDIVIDUAL TRACTS

INTRODUCTION

This chapter presents a summary of the significant unavoidable impacts expected to occur on individual tracts being considered for leasing after mitigating measures have been applied. The only alternative available for each individual tract is lease or not lease. However, coal resource data are still being obtained by GS and tract boundaries are subject to modification.

TUCKER CANYON

This tract is 161.4 acres in size. The surface is privately owned. Coal would be mined by underground methods from two beds. Using current mining technology, approximately 860,000 tons of coal or 40 percent of the total in-place resource would be recovered during the projected 20-year mine life. Approximately 1,280,000 tons would be left underground. Both the coal mined and the coal left behind would represent an irretrievable commitment of the resource.

Thirty-four acres of land would be required for facilities and haulage roads. This acreage would be reclaimed following completion of mining activities. Mine facilities would be visible to some 100,000 visitors annually due to its close proximity to Scofield Reservoir, a popular recreation area. The workings would also be visible from portions of a new subdivision. An undetermined amount of noise resulting from mining operations and resultant truck traffic would be noticeable by recreationists, residents of the subdivision and the community of Scofield. Increased truck traffic (42 trips per day) through Scofield would result in traffic congestion and human safety concerns. The operation would provide 15 permanent jobs and 20 temporary construction jobs.

MILLER CREEK

This tract is 2,000 acres in size. The surface is privately owned. Coal would be mined by underground methods from two beds. Using current mining technology, 17,320,000 tons of coal, or 40 percent of the total in-place resource, would be recovered during the projected 40-year mine life. Approximately 25,980,000 tons would remain under-

ground. Both the coal mined and the coal left behind would represent an irretrievable commitment of the resource.

About 60 acres would be required for surface facilities and haulage roads. This acreage would be reclaimed following completion of mining activities. The operation would provide permanent jobs for about 133 persons and temporary construction jobs for an additional 20 people. Housing would be difficult to obtain especially if other tracts in the area are developed.

GORDON CREEK

This tract is 4,280 acres in size. The surface is privately owned. Coal would be mined by underground methods from three beds. Using current mining technology, approximately 25,960,000 tons of coal, or 40 percent of the resource, would be recovered over the projected 40-year mine life, while 38,940,000 tons would remain underground. Both the coal mined and left would be irretrievably committed. About 4,280 acres would be susceptible to subsidence. Beaver and Gordon Creeks originate on the tract and could suffer dewatering for short sections. Riparian areas on and in the vicinity of the tract are critical moose winter habitat. Projected coal truck traffic (189 round trips per day) would cause additional congestion on an already heavily utilized highway near Price, Utah.

Ninety acres would be required for surface facilities and haulage roads. This acreage would be reclaimed following completion of mining activities.

Approximately 180 permanent employees would be required for mine operation. An additional 20 to 30 temporary construction employees would also be required. Housing requirements for these employees and their families could only be met by constructing new homes in the Price-Helper area. As a result, approximately 64 acres would change from agriculture and non-use to community development.

SLAUGHTERHOUSE CANYON

This tract is 440 acres in size, and the surface is privately owned. The tract contains a demonstrated reserve of 5.55 million tons. The coal would be recovered by underground mining. Annual production

SUMMARY OF INDIVIDUAL TRACTS

would be about 215,000 tons over 8 years representing a 31-percent recovery rate. The low recovery rate would result from the need to leave otherwise minable coal in place to protect the escarpment and support shallow overburden. The upper O'Connor seam would be mined first followed by mining of the lower O'Connor seam.

Total surface disturbance from all activities associated with development of the tract would be 47 acres. Construction of surface facilities would disturb about 15 acres and a 3.2-mile access road (necessary if mined independent of adjacent leases) would disturb about 32 acres. If the adjacent lease holder obtains the tract, a 0.5 to 0.75-mile access road would be constructed. Potential soil loss due to wind and water erosion has not been quantified but would be irretrievable; however, reclamation potential for this area is good.

About 60 workers would be needed during full-scale operation. Mine operations would be preceded by 1 to 2 years of construction employing about eight workers.

About 3.3 acre-feet of water would be needed yearly for dust control and other mine operations and would probably be hauled from Pleasant Valley Creek. Potable water would probably be hauled to the mine or a well drilled.

The area is habitat for big game, bear, and mountain lion. Mining activities would force these species from the area. Riparian areas near the tract are critical moose winter range. Nearby human activity, while not actually destroying riparian areas, may force the moose to leave.

A 3-inch natural gas pipeline crosses the tract and would require stipulations for protection from surface disturbance or possible subsidence if the lease is developed.

MEETINGHOUSE CANYON

This tract is 1,063 acres in size. The surface is National Forest land. Coal would be mined by underground methods from two beds. Using current mining technology, some 12,400,000 tons of coal or 40 percent of the total resource would be recovered over the projected 40-year mine life. Approximately 18,600,000 tons would remain underground. Both the coal mined and left behind would be irretrievably committed.

About 40 acres would be required for surface facilities and haulage roads. This acreage would be reclaimed following completion of mining activities. Coal-related traffic in Meetinghouse Canyon would significantly increase and some congestion would

be expected. Ranchers would experience increased difficulty in moving livestock to and from grazing areas on the Wasatch Plateau. Development of the tract would result in 85 permanent jobs and 15 temporary construction jobs. Housing in the small towns nearest the tract would be difficult to obtain.

RILDA CANYON

This tract is 640 acres in size. The surface is National Forest land. Due to a lack of access, this tract could only be developed in conjunction with adjacent leases. No surface disturbance with the possible exception of subsidence would occur on the tract. Surface facilities would be located to the north in Rilda Canyon. Two companies could mine the tract and both have indicated that they intend to develop their existing leases, whether or not they obtain the tract. Some 7,800,000 tons of coal, representing a 40-percent recovery rate would be obtained from the tract. About 11,700,000 tons would be left underground.

Offsite developments would require 63 acres for surface facilities and haulage roads. A portion of these developments would occur within a municipal watershed area for several small Emery County communities. Possible impacts to the watershed and water quality are being analyzed by the companies and negotiations for mitigation are underway. Inclusion of the tract in a mining operation would result in 55 permanent jobs and 10 temporary construction jobs.

COTTONWOOD

This tract is 2,400 acres in size. The surface is Federal land managed by the Forest Service and BLM. Coal would be mined by underground methods from two beds. Using current mining technology, some 23,120,000 tons of coal or 40 percent of the total resource would be recovered over the projected 40-year mine life. Approximately 34,680,000 tons would remain underground. Both the coal mined and left behind would be irretrievably committed. Subsidence could occur on all or any part of 2,400 acres. Two springs and an ephemeral lake could be affected and possibly dewatered affecting both livestock and wildlife.

Forty acres would be required for surface facilities and haulage roads. This acreage would be reclaimed following completion of mining activities. One hundred forty-five to 165 permanent employees would be required. An additional 30 to 40 temporary employees would be required for construc-

SUMMARY OF INDIVIDUAL TRACTS

tion work. Housing requirements for these employees and their families could only be met by constructing new homes in the Emery County area. As a result, 45 acres of irrigated farmland adjacent to the communities would be permanently lost to community development.

NORTH HORN MOUNTAIN

This is the largest tract being considered for leasing. Annual production would be more than double that of any other tract. It encompasses 21,043 acres of National Forest land. Coal would be mined by underground methods from two beds. Using current mining technology, 98,600,000 tons of coal or 40 percent of the total in-place resource would be recovered during the projected 40-year mine life. Approximately 147,900,000 tons would remain underground. Both the coal mined and the coal left underground would represent an irretrievable commitment of the resource.

One hundred forty-five acres would be required for surface facilities and haulage roads. This acreage would be reclaimed following completion of mining activities.

Scientifically important fossilized bones characteristic of Cretaceous through Paleocene ages are found in the North Horn Formation and some amount would be destroyed by mining activities. Important fossils from the Blackhawk Formation would also be destroyed. However, it is not believed that a significant portion of these fossils would be lost as they are found in other areas of the region. Mining activities would also expose fossils for scientific study that would otherwise be unrecoverable.

Numerous pre-historic cultural sites have been located on the tract. Through inventories and avoidance, most of these sites could be protected. However, some buried sites could be damaged or destroyed, resulting in an irretrievable loss of potential scientific data. Information concerning past cultures would increase from study of discovered and salvaged artifacts.

Seven hundred fifteen employees would be required on a permanent basis and an additional 125 temporary construction workers would be required. It would be extremely difficult for the small communities in Emery County to meet the housing and services requirements of the employees and their families. By the year 2000 approximately 208 acres of land would be changed from agriculture and non-use to community development. The situation would be further exacerbated if other tracts in the area are leased. This change would be permanent.

EMERY NORTH

This tract is 2,161 acres in size. The surface is private land, and public land administered by BLM. Coal would be mined by a combination of surface and underground methods. Using current mining technology, 24,020,000 tons of coal or about 63 percent of the total in-place resource would be recovered during the projected 40-year mine life. Approximately 12,180,000 tons would not be recovered. Both the coal mined and the coal left behind would represent an irretrievable commitment of the resource. Surface mining during the first 20 years of the lease operation would disturb a total of 1,109 acres with a maximum of 259 acres disturbed at any one time. Chapter Two presents a reclamation schedule for this tract.

About 110 acres of irrigated cropland would be removed from production until reclaimed following surface mining, resulting in temporary loss of crops and habitat for small wildlife, especially pheasants and cottontail rabbits.

About 61 AUMs per year would be lost for a total of 1,220 for the 20-year surface mining period. Additional AUMs would be lost until vegetation could be adequately reestablished on lands disturbed in the last few years of surface mining. Post-mining increase of AUMs may occur if increased forage production on reclaimed acreage were attained.

Surface mining could result in a lowering of the water table in the vicinity of the tract.

Underground mining during the last 20 years of mine operation would result in potential subsidence up to 10 feet on 1,161 acres.

The tract and surrounding area is rich in pre-historic cultural sites of scientific value, some of which could be damaged or destroyed wherever disturbance would occur. Some sites and artifacts would also be discovered as concentrated inventories would be conducted wherever surface disturbance would be planned.

Surface mining and associated development would severely modify and dominate the landscape, changing the scenic qualities from a natural to an industrial character. Surface mining operations would be visible from Highway 10 and from the community of Emery, Utah. Approximately 60 permanent employees would be needed for the 20 years of surface mining. Permanent employees required for the 20 years of underground mining would be 120. Temporary employees needed for construction of surface mine facilities would be 15. Twenty-five to 30 would be required for construction of underground facilities. Housing for these workers and their families would be in short supply

SUMMARY OF INDIVIDUAL TRACTS

and the Emery County communities would be hard pressed to provide adequate homes and services.

EMERY CENTRAL

This tract is 2,968 acres in size. The surface is public land managed by BLM. Coal would be surface mined from two beds. Using current mining technology, 39,030,000 tons of coal or 90 percent of the total in-place resource would be recovered during the projected 40-year mine life. Approximately 4,337,000 tons would not be recovered. Both the coal mined and the coal left behind would represent an irretrievable commitment of the resource.

Surface mining and support facilities would disturb a total of 1,995 acres over the mine life. The maximum unreclaimed disturbed acreage at any one time would be 414 acres. A reclamation schedule for this tract is presented in Chapter Two.

About 71 AUMs would be lost annually for a total of 2,840 for the mine life. Additional AUMs would be lost until vegetation could be adequately reestablished on lands disturbed in the last few years of mining. Post-mining AUMs would increase on the revegetated acreage if increased forage production could be attained.

There are many pre-historical cultural sites on the tract, some of which could be destroyed by surface disturbance associated with mining. Some recovery of artifacts would occur and would add to the information base concerning the pre-historic cultures. Other values would be irretrievably lost.

The landscape would be modified from a natural character to industrial.

One hundred permanent employees would be required for mine operation. An additional 50 to 60 temporary employees would be required for construction of surface facilities. Emery County communities would be hard pressed to accommodate these workers and their families with homes and services.

EMERY SOUTH

This tract is 749 acres in size. The surface is public land administered by BLM. Coal would be mined by underground methods from two beds. Using current mining technology 5,360,000 tons of coal or 46 percent of the total in-place resource would be recovered during the projected 40-year mine life. Approximately 6,170,000 tons would remain underground. Both the coal mined and the coal left behind would represent an irretrievable

commitment of the resource. Thirty-five acres would be required for surface facilities and haulage roads. This acreage would be reclaimed following completion of mining activities.

A candidate endangered species *Townsendia aprica* is located on the tract. However, a No Surface Disturbance stipulation where the plant is located should protect it.

Thirty-seven permanent employees and 15 to 20 temporary construction employees would be required.

COMMENTS AND RESPONSES

The Uinta-Southwestern Utah environmental impact statement team has reviewed 25 letters, and transcripts of testimony from 14 persons recorded at four public hearings during the comment period on the Draft EIS.

This section contains reproductions of all letters received in comment on the Draft EIS, substantive excerpts from oral testimony given at the public hearings, and reproductions of written exhibits presented at those hearings. Specific comments on the Draft EIS are bracketed and BLM responses are adjacent to the comments.

As required by Council of Environmental Quality Regulations, all comments from letters and hearing testimony were responded to by EIS team specialists. Where comments warranted changes in the content of the EIS or presented new information, the text of the Final EIS was revised accordingly.

LETTER COMMENTS AND RESPONSES

The following section presents reproductions of all letters received during the Draft EIS comment period. Letters are numbered in the order they were received. Specific comments are bracketed, with BLM responses adjacent.

Letter

1. Utah International Incorporated
2. North Emery Water Users Association
3. Utah Wildlife Federation
4. John Wiener
5. John Wiener
6. Federal Highway Administration, Region 8 Utah Division
7. Valley Camp Coal Company
8. Ron Dutton
9. Mountain Fuel Resources
10. Water and Power Resources Service
11. Martin Schweizer
12. Donald L. Schein
13. A. F. King
14. Getty Oil Company
15. Rex Wells
16. Sierra Club, Utah Chapter
17. State of Utah
18. Southern California Edison Company
19. Forest Service, U.S. Department of Agriculture
20. Office of Surface Mining
21. Soil Conservation Service
22. National Park Service
23. U.S. Fish and Wildlife Service
24. Environmental Protection Agency
25. Department of Energy

UTAH INTERNATIONAL INC.

POST OFFICE BOX 13-79 • SALT LAKE CITY, UTAH 84115
STREET ADDRESS • 20 WEST 2950 SOUTH • (801) 487-9641

1

DATE: November 21, 1980
TO: Ronald Bolander, EIS Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111

FROM: Donald R. Olsen, Senior Geologist
Utah International Inc.
20 W. 2950 So.
Salt Lake City, Utah 84115

SUBJECT: Comments on the Uinta-Southwest Utah Draft
Environmental Impact Statement, prepared for
presentation at the Salt Palace on November 21,
1980 at 7:00 PM

My comments are primarily directed to the leasing alternatives offered on pages 45 through 53 of the EIS document.

We certainly do not begrudge Utah Power & Light Co. being adequately compensated for their PRLA's in the Kaiparowits area if the company is not allowed to develop them because of various government decisions. We believe they should be compensated. But we wish to question the wisdom of the proposed land exchange listed as alternative three in the Draft EIS.

We wish to note the significance of trading the Meetinghouse Canyon, Cottonwood and North Horn Mountain tracts as a group to U.P.& L. The result of this action would give one company virtual control of roughly 60 miles of outcrop along the east side of the Wasatch Plateau from within Huntington Canyon on the north, to the south side of North Horn Mountain. Control of the outcrop and the associated lease areas, along with properties already controlled by U.P.& L. would give almost exclusive control of all coal from the outcrop west to Joe's Valley to one company.

Put in another way, U.P.& L. would have the principal right, without competitive bidding, to a strip of federal coal land 17 miles long, averaging 13 miles wide; an area of 220 square miles, more than 6 townships, or plus 140,000 acres.

The principal exceptions to total control are the operations at Trail Mountain, and two small tracts north of Trail Mountain, belonging to Peabody (?). We do not feel that these exceptions will greatly alter U.P.& L.'s position of control.

Few if any companies would feel that they were in a position to bid competitively for the land west of U.P.& L.'s present and traded lands because of the high expense of access to the deep, underground coal. We must assume, however that some companies would be interested in a chance to acquire some of the federal coal in question, but the suggested trade would effectively eliminate that opportunity.

UTAH INTERNATIONAL INC.
SALT LAKE CITY, UTAH

Page 2

We would suggest that North Horn Mountain be eliminated from this trade. The Cottonwood and Meetinghouse Canyon tracts will fit logically into the present U.P.& L. holdings and still allow them access to a large amount of coal between Huntington Canyon and Joe's Valley.

In the interest of free enterprise operating in an atmosphere of open competition, we wish to protest Alternative Three on page 53 of the EIS involving the exchange of land as proposed.

We would offer support for (1) a modified Alternative Three which excludes North Horn Mountain from the trade, and includes North Horn and other tracts listed in alternative two for competitive bidding, or (2) a plan that would allow U.P.& L. to develop their PRLA's in the Kaiparowits, plus open, competitive bidding for the Wasatch Plateau tracts, as in Alternative Two of the EIS. The second alternative is our preferred alternative.

Donald R. Olsen

Donald R. Olsen

cc: O.S. Fullerton
J.J. Reiff
R.O. Wheaton
M.J. Young

Utah International Inc., Salt Lake City, Utah

Response 1-1

The DEIS addresses the environmental impacts that would result from consummation of the exchange or rejection of the exchange and issuance of the PRLAs in the Kaiparowits region. A decision will be made by the Secretary of the Interior concerning the proposed UP&L exchange.

Response 1-2

The North Horn Mountain area has been specifically identified as an exchange tract in the agreement signed by the government and UP&L. However, the North Horn Mountain tract is included in Alternative Two and would be available for competitive leasing should the exchange not be consummated.

As noted in the EIS, the Secretary of the Interior has the option to choose an alternative intermediate to any of the specific alternatives discussed in the EIS.

2

Mr. Ron Bolander
Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, UTAH 84111

November 21, 1980

Dear Mr. Bolander,

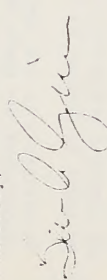
The North Emery Water Users Association would like to take this opportunity to comment on the Uinta-Southwestern Utah - Draft Environmental Impact Statement - Coal.

Our comments are related to Northwest Carbon Corporations' plans to develop a coal mine in Rilda Canyon.

Enclosed you will find copies of two letters, one addressed to the Office of Surface Mining Region V and one addressed to Larry Miez with the Bureau of Public Water Supplies, Utah State Division of Health. We feel these letters explain the situation and our concerns.

We would appreciate your review of this situation.

Sincerely,



Ben A. Grimes
Vice President
North Emery Water Users Association

BAG/jhs

Enclosures

North Emery Water Users Association
P.O. Box 418
Elmo, UTAH 84521

October 27, 1980

Office of Surface Mining
Region V
Brooks Towers
1020 15th Street
Denver, COLORADO 80202

Dear Sirs,

Having been directed by the Board of Directors of the North Emery Water Users Association, we would like to put the Board and ourselves on record concerning the proposed Underground Coal Mine in Rilda Canyon to be operated by Northwest Carbon Corporation.

The mine would be located in Emery County, Utah with portals in the Northwest Quarter of the Southwest Quarter of Section 28, Township 16 South, Range 7 East, Salt Lake Base and Meridian.

North Emery Water Users Association is a non-profit Association providing culinary and domestic livestock water to 632 families living in the North portion of Emery County. The source of water for the system comes from underground springs located in Rilda Canyon and in Huntington Canyon. The water coming from Rilda Canyon originates from three spring locations. Two of these springs are located in the bottom of the Main Canyon with the third spring in a smaller side canyon to the South approximately 1000 feet. See Attachment A - Location Map.

North Emery Water Users Association in no way wishes to oppose the development of a coal mine in Rilda Canyon. Quite the contrary, we welcome the opening of a new mine in the area; new jobs will be available to some of our members of our Association. We feel the new mine will be beneficial to our area.

We recognize Northwest Carbon Corporation's right to mine the natural resource that is available. We recognize their right to construct facilities in Rilda Canyon to accomplish that mining. We also recognize the right that 632 families have to a steady, uncontaminated source of water. That source of water was developed some 6 years ago by the Association.

We would like to express the concerns that we have in relationship to the

mine development.

1. Rilda Canyon is a narrow, very steep walled canyon.
Any facilities constructed to support a coal mine i.e. Bathhouse, Warehouse, Coal Loading Facilities, Septic Tanks, Drain Fields, Offices, etc. would have to be placed in the little space available; the bottom of the canyon. The placement of these facilities could have a serious impact if not a disastrous impact on our water supply in Rilda Canyon.

2. Close proximity of springs and coal mine facilities.

Our springs are located adjacent to the Old Helco Mine Portals, the same area that the new portals will be opened. Two of the springs are about 100 feet lower in elevation than the coal seam and both within 1000 feet of the new portals. The lowest of the two springs is within 300 feet of the portals. The third spring is in the side canyon to the South of the portals and at approximately the same elevation.

3. Legal Requirements of Coal Mine Operator

We hope that Northwest Carbon is cognizant of the State and Federal Regulations namely:

Federal Regulations:

- 30 CFR 717.17 Protection of the Hydrologic System
- 30 CFR 717.17(h) Groundwater Systems
- 30 CFR 717.17(i) Water Rights and Replacement
- 30 CFR 783.17 Alternative Water Supply Information

Utah State Regulations:

- UMC 817.41 Hydrologic Balance
- UMC 817.54 Water Rights and Replacement
- UMC 784.14 Reclamation Plan: Protection of Hydrologic Balance
- UMC 783 Underground Coal Mining Permit Applications - Requirements for Information on Environmental Resources.
- Sub-parts 783.2, 783.4, 783.11, 783.13, 783.15, and 783.17 Alternative Water Supply Information

4. Access Road

Our transmission line runs down the existing road in the bottom of

Rilda Canyon. Construction of a Mine Access Road over the top of our transmission line could seriously damage the pipe. The pipeline was not installed with a permanent all-weather road design consideration. In the wintertime, when the snow is kept off of the road, frost will penetrate deeper than usual into the soil thus presenting a freezing problem to our pipeline. During high flow periods this normally would not be a problem but late winter and early spring are the lowest flow periods for springs and that period of time is normally the coldest period of the year.

5. Hydrologic Monitoring Program

According to the Federal and State Regulations mentioned previously, the Coal Mining Company is required to monitor ground water. The Manti-LaSal National Forest Supervisor's Office is also backing this Program. We are aware of the need to monitor the ground water and we are not opposed to Northwest Carbon taking whatever measures are necessary to accomplish that end. Our concerns are centered around our springs and the collection pipes that are in the ground in such close proximity to the proposed mine and supporting facilities. The spring areas are extremely sensitive and nothing should be done to damage or diminish the water source.

Very little is known about the affects a coal mine may have on underground water. We agree that quantitative data needs to be gathered. We believe that an intensive study needs to be made of the spring areas before any drilling is done anywhere near those springs.

Six hundred and thirty two families depend on the water from the Rilda Canyon Springs for their livelihood. Everybody concerned must be absolutely sure that any drilling program or other water monitoring measures will not damage the quantity or quality of the water from those springs or the quantity or quality of the source supplying water to those springs.

6. Alternative Water Supply Information

Federal Regulation 30 CFR 783.17 and State Regulation UMC 783.17 - Underground Mining Permit Applications - Minimum Requirements for Information on Environmental Resources. Alternative Water Supply Information. States: "The application shall identify the extent to which the proposed underground mining activities may proximately result in contamination, diminution, or interruption of an underground or surface source of water within the proposed mine plan or adjacent area for domestic, agricultural, industrial, or other legitimate use. If contamination, diminution, or interruption may

result, then the description shall identify the alternative sources of water supply that could be developed to replace the existing sources".

We are concerned with several items here: (A) The most immediate concern would be the affects that a drilling program near our springs would have on the quantity or quality of the water. (B) Sentence two in the Regulation (783.17) is an admirable statement, one that on the surface would seem to protect the water user but, taking a closer look at the problem we think is in order at this time. The most pressing concern relates to Item (A) above; how would Northwest Carbon Corporation provide an immediate source of water to replace the Riida Canyon Springs in the event of problems arising from a drilling program or any other disturbance, surface or sub-surface. The regulations state that alternative sources of water supply that could be developed to replace the existing sources shall be identified and described. Northwest Carbon Corporation initially contacted North Emery Water Users Association earlier this year in relation to our springs. Northwest indicated to us that they were studying alternative sources of water.

If, for example, a water treatment plant is chosen as an alternative method of supplying water, how long would it take to have it on-line supplying water to North Emery? We believe that approximately two years would be needed to (1) Design, (2) Acquire Property, (3) Supply Power, (4) Secure Water Rights. What would our water users do for a supply of water in the interim period of time between disruption, or contamination and implementation of an alternative water supply? Northwest seems to be committed to a production schedule that is rapidly approaching. We understand Northwest Carbon's production schedule problem but we feel that a thorough investigation of the entire mine development near our springs needs to be done. We believe that State and Federal Regulations mandate that water users be protected from mine development.

Another concern that we have relates to the Old Helco Mine Refuse Pile that lies just above our lowest spring. Undoubtedly O.S.M. and D.O.G.M. will require Northwest Carbon to reclaim the Refuse Pile. In doing so Northwest must protect two things: (1) our spring and transmission line (2) the natural stream that flows at the base of the pile.

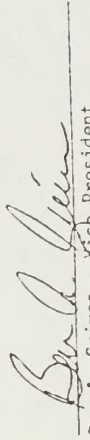
We express again the only reason for our concerns is the water supply that provides life giving sustenance to the 632 families on the North Emery System.

We are confident that our concerns will be considered by everyone involved.

Thank you for your considerations.

Sincerely,


Dan M. Wells - President


Ben A. Grimes - Vice President

Enclosures

CC: Cleon Feight - D.O.G.M.
Dr. V. Hansen
Utah State Health Department
Utah State Engineer-Water Right Division
Bill Booley - Manti-LaSal National Forest
Red Christensen - Manti-LaSal National Forest
Gerrold Storey - Utah State Division of Health

North Emery Water Users Association
P.O. Box 418
Elmo, UTAH 84521

October 27, 1980

Larry Miez
Bureau of Public Water Supplies
Utah State Division of Health
150 West North Temple
P.O. Box 2500
Salt Lake City, UTAH 84110

Dear Sirs,

North Emery Water Users Association would like to take this opportunity to inform the Department of Health of the developments concerning our springs in Rilda Canyon.

Please refer to the enclosed copy of a letter to Don Crane of the Office of Surface Mining for a complete coverage of our concerns.


Of special concern at this point in time is Northwest Carbon's Hydrologic Monitoring Program. They want to drill a number of holes in close proximity to our spring collection pipes. The drill holes will be used to install piezometers to monitor the direction of ground water flow. Some of the holes will be located very close to our collection pipes and in our opinion may interrupt or contaminate our water supply.

We have no firm knowledge of the direction of flow of the source of ground water supplying our springs. If the source is flowing horizontally on top of an impermeable layer, drill holes could create a sieve thus draining the water before it gets to our collection pipes. Northwest Carbon Corporation wants to drill the water monitoring holes this fall to start gathering base data. This creates an urgency for further study of the situation.

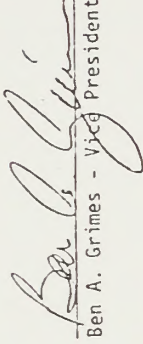
The entire mine development in Rilda Canyon needs to be studied as it relates to our springs and transmission lines.

We feel that the Health Department has the authority to investigate this matter. We would appreciate your help and advice in this matter as rapidly as possible since Northwest Carbon Corporation is in a rush to start their drilling program.

Sincerely,



Dan M. Wells - President



Ben A. Grimes - Vice President

Enclosures

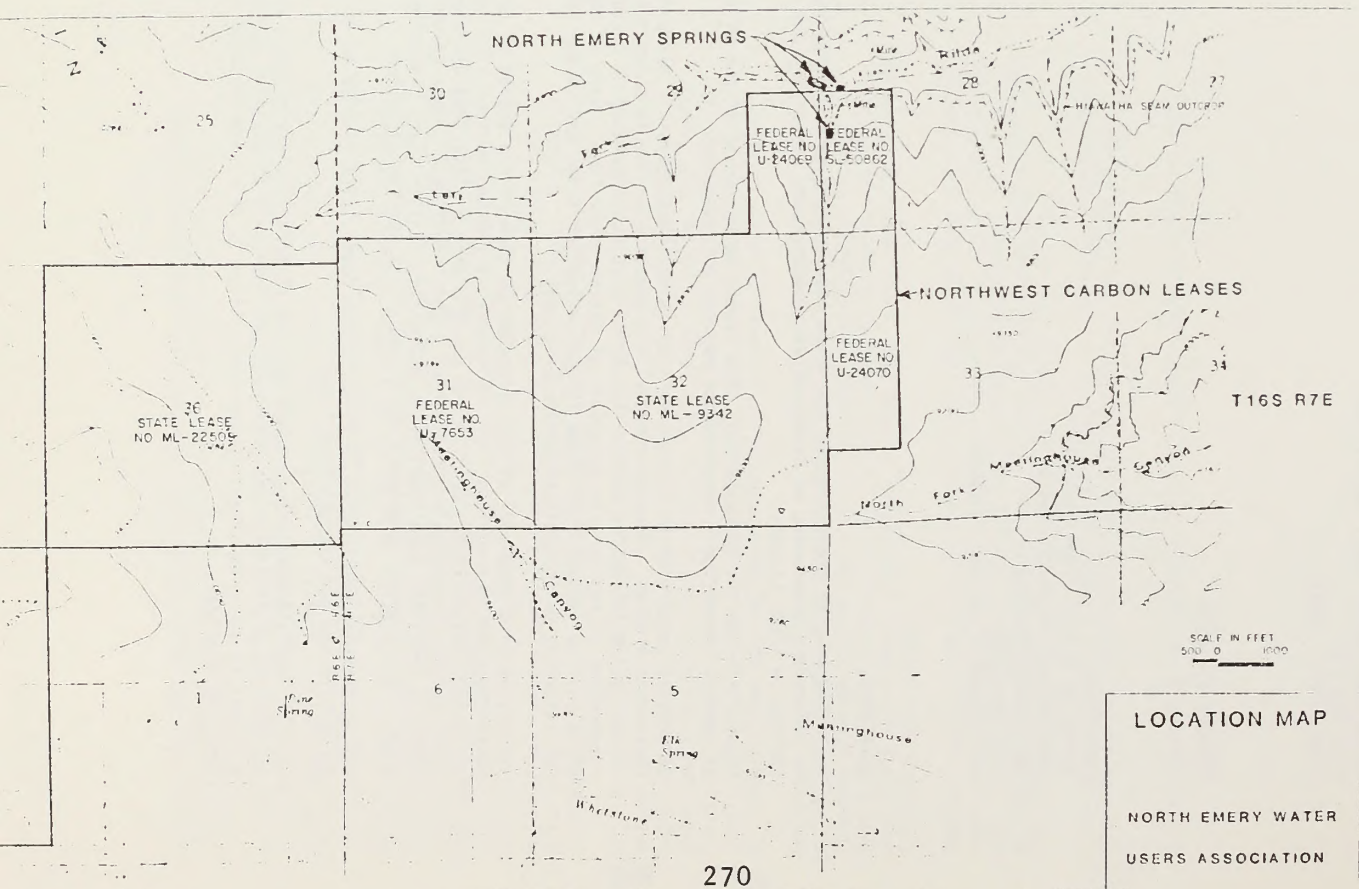
cc: Don Crane - O.S.M.
Cleon Feight - D.O.G.M.
Bill Boiley - Manti-LaSal National Forest
Dr. V. Hansen
Gerrold Storey - Utah State Division of Health

Larry Miez
Bureau of Public Water Supplies
Utah State Division of Health
October 27, 1980
Page 2

North Emery Water Users Association, Elmo, Utah

Response 2-1

We are aware of your letters to OSM and the Utah State Division of Health which reflect concerns for your culinary water source in Rilda Canyon. This is discussed on page 83 of the DEIS. Office of Surface Mining Regulations entitled Part 816 - Permanent Program Performance Standards - Surface Mining Activities provide for protection of property and investment rights. Subparts 816.41 thru 816.57 of the regulations are designed to protect water source in both quantity and quality. Sub-part 816.54 will protect water rights. Page 62 of the DEIS contains a mitigation measure for water supply. The approval process for a mining plan by OSM will allow for additional consideration of your concerns and incorporation of additional appropriate mitigating measures.



UTAH WILDLIFE FEDERATION

Affiliated with the National Wildlife Federation

P.O. Box 15636
Salt Lake City, Utah 84115



3

November 17, 1980

Utah Wildlife Federation, Salt Lake City, Utah

Response 3-1

A mitigation measure has been added to the FEIS that would prohibit the blocking or altering of the elk migration route off East Mountain and North Horn Mountain. The presence of a coal conveyor on this seldom-used winter range would not cause significant adverse impact to elk movement.

Mr. Ron Bolland, Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111

Dear Sir:

We have reviewed the Draft Uintah-Southwestern Utah, Regional Coal Environmental Impact Statement and we submit these comments.

- a. We agree that alternative two should be the preferred alternative. It includes the higher quality ranking coal tracts and appears to offer the minimum amount of environmental damage to water quality and wildlife habitat.
- b. However, we are concerned about the elk migration route off East Mountains and North Horn Mountain. Elk migration could be restricted 40 years by the placement of mine portals in Killpack or Rock Canyons. Also, we are concerned about the impact of a proposed mine mile long conveyor belt would have on elk migration from the summer range to the winter range. Further consideration should be given to solve the elk migration problem on the North Horn Tract.

1

Sincerely,

Sheldon Eppich
President

sb

4

JOHN D. WIENER
ATTORNEY AT LAW
PHONE 307-742-0317
250 NORTH FOURTH
LARAMIE, WYOMING 82070

November 23, 1980

Mr. Ron Bolander
Team Leader - Coal Leasing EIS
Bureau of Land Management
136 East South Temple
Salt Lake City, UT 84111

Dear Mr. Bolander:

As you may know, the BLM will not make public any extensive comments on coal leasing, as illustrated by the recent Green River-Ham's Fork episode, in which only 17 of 132 pages of detailed comments were acknowledged. My purpose in writing comments is not to naively hope to affect political decisions, but rather to inform the public of the other side of the story, insofar as it can be established through research and reasoning. Given BLM's new policy, therefore, the only worth in seriously researched and detailed comments is as groundwork for litigation.

In the briefest possible way, then, three outstanding characteristics of the EIS are herewith noted.

- 1) Timing. By timing the EIS so as to write it before the UP&L grants are made, the EIS is as minimally effective as possible. Also aiding this policy of minimization is the refusal to process PRLAs until after political leasing is accomplished.
- 2) Land Use Planning and Tract Selection. Emery North is certainly BLM working at its best - is there anything right with it? No less important is the fact that you did find one (of seven) tracts on the Wasatch Plateau which is not critical winter range. Impressive.
- 3) Mapping. The map showing location of Utah is certainly a masterpiece of BLM informativeness; only a crank would want to know where existing mines, leases, and PRLAs are in the region, compared with the proposed tracts. Especially amusing is fig. 2-1, which omits Broad Canyon, Swisher Coal Co. and Valley Camp operations, which are referred to on p. 17.

It seems possible that many little misleading items and mistakes would have been found by a proofreader; I suggest you get someone in the office to check for details like Broad Canyon, which probably was left off the map when you pasted two pieces of maps together, instead of starting with a fresh one.

Best wishes,
John Wiener
John Wiener

John D. Wiener, Laramie, Wyoming

Response 4-1

The National Environmental Policy Act requires that an EIS be prepared prior to any major Federal action. The proposed exchange is considered to be a major Federal action.

Anticipated environmental impacts are identified, analyzed and will be considered in the decision making process. The DEIS includes an environmental assessment of alternatives involving approval and denial of the proposed exchange. It has never been assumed that the exchange would be allowed. All PRLAs must be processed by December, 1984. If development occurs, the coal produced could count against the regional leasing target.

Response 4-2

The unsuitability criteria identified in the coal management regulations were applied to the tracts, to determine which were suitable for further consideration for coal leasing. Having met these requirements the tracts were then delineated by the tract delineation team led by the Geological Survey for inclusion in this DEIS. Criteria used as delineating tracts were: (1) expressions of interest by industry and others and (2) availability of sufficient coal data. Geological Survey determined that the Emery North tract met these criteria.

Response 4-3

Figure 2-1 has been corrected to include Broad Canyon, Swisher Coal Company and the Valley Camp Corporation operations.

A regional map showing existing leases, PRLAs and tracts offered for new leasing in Utah has been added to the FEIS.

5

Dec 2 '80

Mr. Ron Polander
Coal Leasing MIS Team Leader
Utah State Office
Bureau of Land Management
136 East South Temple
Salt Lake City, UT Bill

Dear Ron;

In keeping with my new policy of letting you do your own homework, I will simply ask a few questions about something on my mind. First,

1. Would the increased drilling your staff projects in the Colorado River be a reiteration of the same Colorado River as would be degraded by the coal mining and the Oil Shale activity in Colorado, in the Green River - Kant's Fork Federal coal leasing region? Second, if this is the same river, then how can it start with 11X mg/l salinity in both the GR-HF and U-SW U EISs?

2. Third, if Utah coal leasing will add some salt, and Colorado and Wyoming coal leasing will add some more salt, how far over the 879 mg/l "standard" will the river get? How much of a violation will result from just coal leasing?

3. Fourth, if the GR-HF EIS was correct in claiming that there is no economic benefit in avoiding violations of the standard, then why do the Mexican and Californian farmers who use the water get so upset? Don't they believe that massive over-leasing is more important than the best agricultural land in North America? Don't they believe WAPSS? (p. 196 et seq, GR-HF EIS).

Thank you,
John Wiener
John Wiener

John Wiener, Laramie, Wyoming

Response 5-1

The same Colorado River would be impacted by coal leasing activities in Colorado and Utah, and oil shale activities in Colorado. However, the Colorado River system consists of different subbasins and headwaters. The Green River-Hams Fork Region and the Uinta-Southwestern Utah Region are located in different subbasins. These subbasins are individual contributors of salt to the Colorado River. Therefore it is logical to use the same mg/L salinity baseline for analysts purposes in both regions.

Response 5-2

It has not been demonstrated that the 879 mg/L "standard" would in fact be exceeded. Even considering a "worst case" analysis, no more than 0.09 mg/L would be added to the Colorado River system as a result of leasing additional coal in the Uinta-Southwestern Utah Region. Combined with the Green River-Hams Fork Region the salt content would be increased to 0.97 mg/L.

While it has not been determined that the 0.97 mg/L increase does constitute violation, it is believed that the total amount is small enough that a violation of salinity standards would not occur.

Response 5-3

The statement you are referring to in the Green River-Hams Fork EIS cannot be found. These EISs are circulated to EPA and the Water and Power Resources Service who are the regulatory agencies for Salinity Control on the Colorado River System. They determine the significance of cumulative impacts to the Colorado River System.

6

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

REGION EIGHT
Utah Division
P.O. Box 11563
Salt Lake City, UT 84147



December 4, 1980

IN REPLY, REFER TO:
HBR-UT

Mr. Ron Bolland, Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, UT 84111

Dear Mr. Bolland:

Reference is made to the Uinta-Southwestern Utah Draft Environmental Impact Statement which has been forwarded for review and comment.

While only a cursory review has been made, it appears that the statement does not provide any indication as to whether or not the additional road user taxes that will accrue as a result of the increased coal production will offset the accompanying additional wear and tear of the highway system. It is suggested that a section be added to address the economics of how the highway system will be maintained or improved.

We appreciate the opportunity to comment on this draft statement.

Sincerely yours,

George W. Bohn
Division Administrator

U.S. Department of Transportation, Federal Highway Administration,
Salt Lake City, Utah

Response 6-1

The anticipated inadequacy of present funding formulas to meet the increased needs for maintenance and upgrading due to anticipated coal development was discussed under Transportation Section for each alternative. BLM asked the Utah Department of Transportation to amplify the information presented in the Draft EIS; the following letter is their reply. This information has been added to the Transportation Section for Alternatives One through Four.



Director
William D. Hurley, P.E.
Assistant Director
C.V. Anderson, P.E.

Transportation Commission
J. LAVINCO
V. HARRIS
WAINES WINTERS
V. CHAMBERLAIN
JAMES L. STORER
CHARLES C. CLAYBROUGH
RONALD A. FEENEY
SECRETARY

UTAH DEPARTMENT OF TRANSPORTATION

State Office Building
Salt Lake City, Utah 84114

December 15, 1980

Mr. Don Hook
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111

Dear Mr. Hook:

This is in response to your telephone conversation with Mr. Ken Riddle, of my staff, on December 3, 1980.

The increased travel projected under the four alternatives would generate from \$67,500 to \$144,000 in increased fuel revenues annually. This revenue would be sufficient to apply only a minimum surface rehabilitation treatment to one mile of highway each year where many hundreds of miles are affected.

Utah's highways have usually been constructed to accommodate traffic for 10 years after they were built. Nearly all of the highways impacted by the proposed coal development are approaching or have already exceeded the 10 year design traffic volume. Significant traffic increases will only exacerbate an already serious deficiency in the financial resources required to maintain, let alone improve, the affected highways. With many of the highways in a precarious condition, the increased travel (with a high percentage of trucks) would precipitate the deterioration of many highways. Immediate attention would be required just to retain a tolerable level of service. Without additional financing by a factor somewhere between fifty and one hundred times the previously mentioned revenue, the impacted roads will be adversely affected. Even then, it is assumed that such amounts would be made available each year over the life of the impact and that the onset of development would occur slowly.

If you should have any questions, please contact us.

Sincerely,

L. R. Jester
L. R. Jester, P.E.
Engineer for Transportation Planning

THE VALLEY CAMP COAL COMPANY



Scofield Route

Helper, Utah 84526

W. M. HAYNER, JR.
PRESIDENT, WESTERN DIVISION

5 December 1980

GENERAL OFFICES
D. BOYD
OIL CITY, PA. 16301

Mr. Ron Bolander, Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111

RE: Draft Uinta-Southwestern Utah Regional
Coal Environmental Impact Statement

Dear Mr. Bolander:

We have reviewed the Draft Uinta-Southwestern Utah Regional Coal Environmental Impact Statement, and have the following comments to offer:

Valley Camp's area of interest in the proposed lease sale contemplated centers around the Gordon Creek and Miller Creek delineated tracts. Our previous comments in regard to our interests have been included in our letters of October 25, 1979, February 11, 1980, July 21, 1980, and in the record by our oral presentations at Leasing Team meetings.

In our letter of July 21, 1980, we indicated our concerns in the delineation of boundaries of the Miller Creek and Gordon Creek tracts. We reiterate that we feel strongly that the Miller Creek-Gordon Creek tracts, from an economic mining standpoint, must be considered as a whole; as these tracts, considered as a whole, can be accessed for mining either from the eastern Gordon Creek side, or the western Pleasant Valley side. In our letter of February 11, we proposed that the Gordon Creek western boundary be extended to the west to afford opportunity of development from the west so that competitive bidding on the tract be made available to operators with holdings on the west. The Team adopted this proposal, with certain conditions, at the April 3, 1980 meeting. However, instead of extension of the Gordon Creek western boundary, a separate Miller Creek tract was delineated for the area of concern. In our letter of July 21, 1980, we expressed our concern that the Miller Creek tract could not be economically developed with the limited reserves included therein, and proposed an approximately equal division of the combined Gordon Creek-Miller Creek reserves to assure maximum economic recovery of both reserves. We proposed a boundary between the two tracts along the eastern boundary of the W₁ of Sections 11, 14 and 23, T13S, R7E, S4M. With the drilling this past summer by both the USGS and Arco, we understand that substantial additional reserves might now be demonstrated, particularly to the north and east of the Gordon Creek tract. Also, we understand that drilling has resulted in a

Mr. Ron Bolander
5 December 1980
Page 2

reduction of reserves to the south of the tracts. Our previously proposed internal boundary, and the external boundaries of the tracts should accordingly be adjusted to afford an equal division of the reserves to optimize the recovery of the resource.

Conclusions reached from your Draft Environmental Impact Statement support maximizing the size of the Miller Creek tract to mitigate the overall impact of development of the Gordon Creek and Miller Creek tracts. The most salient feature in comparative development of the two tracts is the fact that development from the Pleasant Valley (western) side would afford direct loading of coal for shipment on rail facilities at the mine portals. Development from the Gordon Creek (eastern) side requires truck transport of the coal of up to 25 miles on existing roads. Deer traffic mortality alone for the Gordon Creek tract (eastern) development is projected at 14 per year, compared to 4 per year for Miller Creek (western) development. The ratio of mine production energy output to petroleum energy input for the Gordon Creek tract is indicated at 82.17, while the ratio of the Miller Creek tract is indicated at 85.01. Considering the necessary highway truck transport of the Gordon Creek (eastern) production, we feel that these values are in error, or the truck fuel has not been included in Gordon Creek values.

Your Draft EIS does not appear to take account of new state highway construction from Pleasant Valley connecting with State Highway 31 in Sanpete County, authorized by the 1979 Legislature, and planned for construction in 1981. This highway will provide access of Sanpete residents to Pleasant Valley, being only 25 miles from Fairview to present Pleasant Valley operations, versus a 50 mile distance from Price. Nor does your Draft EIS appear to contemplate employment of Utah County residents in the projected mining operations. Approximately 50% of present Pleasant Valley mine employees reside in Sanpete and Utah Counties. With construction of the new highway connection in 1981, the ratio of Sanpete employees will be substantially increased as present Pleasant Valley mine operations intend to shift recruitment activities almost altogether to Sanpete County. We do not foresee substantial residential development of Pleasant Valley, even with opportunity for local employment.

Maximized development of the Gordon Creek-Miller Creek tracts from the Pleasant Valley side, with employment of Sanpete County residents, is viewed as mitigating adverse impact of development of these tracts, with a favorable reduction of employment and infrastructure demand on the Price-Helper, Carbon County area, and favorable expansion of opportunity of employment, per capita income and infrastructure to Sanpete County. Your Draft EIS does not appear to properly reflect the effect on Sanpete County, even without maximizing development of the Gordon Creek-Miller Creek tracts from Pleasant Valley.

A possible mitigating factor not considered in the Draft EIS for development of all tracts contemplated would be the voluntary economic analysis by mine operators and public authority of mass transit transportation of

2

3

4

5

6

employees to and from work. The present Pleasant Valley operator has recently instituted a trial contract carrier bus service for its employees, with origins in the Spanish Fork-Payson, Utah County, area; and Price, Carbon County. Mass transit of mine employees is viewed as a substantial reduction in adverse socio-economic impact and potential beneficial impact to mine productivity and unquestioned overall economy of energy input-output, to the general public benefit.

With consideration of the above comments, we feel that the Draft EIS has been well prepared and properly reflects the impact of development of the tracts considered.

Yours very truly,

W. H. Haynes, Jr.

W. H. Haynes, Jr.

w

Copy to: Representative Ray Nielson

The Valley Camp Coal Company, Helper, Utah

Response 7-1

The area, including the proposed Gordon Creek and Miller Creek lease tracts, is a highly complex geologic area which has been confounded by considerable amount of faulting that affects the coal seams in this area. The Geological Survey has investigated this problem and developed logical proposals for divisions of the tracts to permit the most efficient mining of the area. The Regional Coal Team accepted Geological Survey's proposal for division of this area. The tract boundaries have been adjusted and are described in the FEIS. Generally, the new tract configuration relates closely to the adjustment recommended.

Response 7-2

The Miller Creek tract has been substantially enlarged. Coal resources on the tract also increased from 26.7 million tons to 43.3 million tons of which 17.32 million tons would be recovered at a 40 percent recovery rate.

The development scenario for Miller Creek was discussed on pages 17 and 18 of the DEIS. The enlargement of the tract would increase production from the west side in Pleasant Valley. Subsequent impacts are analyzed in the FEIS.

Response 7-3

The ratio for the Gordon Creek tract of total energy produced to petroleum energy used in direct operations, as shown in the DEIS, is 20,150 billion Btu divided by 75.5 or 267.0. The same figure for the Miller Creek tract with production from a portal in Broad Canyon and a much shorter truck haul than for Gordon Creek is a ratio of 6,250 divided by 14.9, or 419 which shows considerably lower consumption. Direct operational petroleum consumption for both operations also includes fuel needed to transport employees and supplies to the mine, fuel needed for surface and underground equipment, hydraulic fluid, lubricants, explosives, petrochemicals, etc. If production is from the Utah No. 2 portal rather than a Broad Canyon portal petroleum consumption would be much less as no coal truck loading and haulage would be needed.

The overall ratios of energy produced divided by total petroleum used are as shown above and indicate (85.01 and 82.17) nearly as high a proportion of petroleum used at Miller Creek as at Gordon Creek. The overall figures include more infrastructure consumption than direct consumption. Infrastructure consumption includes all petroleum burned in cars, homes, etc. by mine workers, capital equipment and mine supply workers, and people who support them in their communities.

The fact that the Miller Creek tract has been enlarged should not substantially alter the ratios discussed above.

Response 7-4

The proposed new highway from Pleasant Valley to Sanpete Valley was taken into account, and is keyed to Point 47 on the transportation base map, Fig. 3-11, p. 109 of the DEIS. Projected ADT for the various alternatives, incremental and cumulative, is shown in Tables 4-11 and 4-12, 4-24 and 4-25, 4-37 and 4-38, and 4-50 and 4-51, of the DEIS. The actual proportion of Pleasant Valley traffic projected to use the new road conforms to Utah Department of Transportation projections.

Response 7-5

Employment of Utah and Sanpete County residents for existing and approved mines has been considered through incorporation of data from the Central Utah EIS into the baseline. That EIS allocated workforce to both counties for McKinnon mines 1 and 2 and for Belina No. 2 and O'Connor mines. Alternatives One and Two of the Uinta-Southwestern Utah DEIS allocate workforce from Sanpete County to Slaughterhouse Canyon, Tucker Canyon, and Miller Creek tracts based on the influence of the new highway from Fairview. The employment of Utah County residents and subsequent population increase in Utah County would be insignificant in relation to current population growth and infrastructure capability.

Response 7-6

The Gordon Creek tract was not analyzed on the basis of Pleasant Valley access because the more practical access is considered to be from the east side. To obtain access from the west side an operator would not only cross a substantial geologic fault but would also be required to mine through the entire Miller Creek tract. The effects of development of the Miller Creek tract on Sanpete County are included in the DEIS. See response to previous comment (7-5 of this letter) on incorporation of Sanpete County in the baseline coal development assumption. For further information see response 7-2 of this letter.

Response 7-7

The potential role of bus transport or even vanpooling of commuting miners is discussed under Energy Requirements and Conservation Potential relating to the various alternatives (pages 151, 182 and 200 of the DEIS). The text has been revised to include your example.

December 5, 1980

8

Letter to Mr. Bolander

Page Two

Mr. Ron Bolander
Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111

Dear Mr. Bolander:

I have had an opportunity to review the Uinta-Southwestern Utah Draft Environmental Impact Statement - Coal, and the socioeconomic technical report provided by the socioeconomic contractor. For the most part, I find that the document is a concise and comprehensive statement dealing with the potential impacts of increased energy development in the study region.

I am, however, concerned that there are a number of apparent inconsistencies in the sections of the document dealing with the employment requirements and the associated socioeconomic impacts. I feel that it will be difficult for the resource management agencies and the general public to accurately consider and assess the various alternatives given these apparent data problems. I have provided several examples of the types of problems contained in the draft statement.

Example #1:

Table 2-25, Pg. 54 shows that once all of the mines become operational (1987-End of Life) a maximum of 1,058 permanent employees would be directly employed under alternative #3. However, Table 4-33, Pg. 193, also described as representing alternative #3, shows that a total of 1,541 additional employees would work in the mining sector as a result of the proposed actions. Since population growth is typically considered to be a function of increased employment, this is a serious discrepancy. Please clarify.

Example #2:

A review of the contractor's socioeconomic support document, dated May 16, 1980, shows several discrepancies with the data presented in the draft statement. For example, for alternative #1, the technical report indicates that 3,290 additional employees would be expected in the region by the year 2000. The associated population increase under the same scenario would be 7,807 persons. The draft ES states that under alternative #1, 4,217 additional employees would be needed, resulting in a population increase of 7,123 persons. Were the definitions of the alternatives changed? Also, how can the additional 927 employees estimated in the draft ES lead to an anticipated population increase of 684 fewer people? Both of these results are referenced to the UPED model. However, unless the alternatives were redefined, or the coefficients of the UPED model were respecified, I do not believe that both results could have been generated by the UPED model.

Finally, given that much of the socioeconomic assessment is driven by changes in employment and/or population, the above discrepancies would indicate that the socioeconomic section need to be reconsidered and clarified to insure that the public and the various governmental agencies are provided consistent and reliable data on which to base their decisions.

I hope that these comments will prove to be useful in the preparation of the final statement. Thank you for the opportunity to provide comments on the draft ES.

Sincerely,

Ron Dutton

cc: Mr. R. Weaver, University of Utah, Bureau of Business and Economic Research (UPED Model)

Ron Dutton Letter

Response 8-1

The figures reported in Table 4-33, page 193, were found to be in error. Similar errors were found in relation to Alternatives One and Two, and are corrected in the EIS. The corrections have been made and incorporated into the FEIS.

Response 8-2

Between May 16, 1980 and the publication of the DEIS several changes were made in Alternatives One through Four, which necessitated changes in the impact analysis. This required an interpolation and/or extrapolation of the results reported in the May 16, 1980 technical report (which were projected using the UPED Model). However, we did find an error in the reported employment and population figures for Alternative One. The DEIS should have stated that Alternative One would have generated an additional 3,410 jobs, resulting in a population increase of 8,115 persons. The errors have been corrected in the FEIS. Similar errors were found in relation to Alternatives Two and Three, and are corrected in the FEIS.

Response 8-3

The above mentioned inconsistencies have been corrected in the FEIS. See also responses 8-1 and 8-2 above.

9



MOUNTAIN FUEL RESOURCES, INC.

SUITE 1540 - 36 SOUTH STATE STREET, SALT LAKE CITY, UTAH 84111
PHONE (801) 531-6285

December 5, 1980

Mr. Ron Bolander, Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111

Re: Uintah-Southwestern Utah Regional Coal
Draft Environmental Impact Statement

Dear Mr. Bolander:

We have reviewed the referenced DEIS and offer the following comments:

1 - Your ranking of the Emery North and Emery Central tracts as "medium-low" apparently was without regard to their potential as coal sources for our proposed plant to convert coal to synthetic fuels. Although the coal quality is lower than Wasatch Plateau coal; i.e., contains more sulfur, it is well-suited to the coal conversion process and the sulfur can readily be separated and converted to the elemental form as a part of the overall process. Furthermore, the plant is to be sited near these tracts so long-distance coal transportation would not be required as indicated in your DEIS. We would rank these tracts "high" as potential coal sources for our proposed plant.

2 - In your ranking rationale for the Emery Central tract you state that surface owner consent would be required for mining. Since BLM is the surface owner of this tract, the reason for this statement is not clear.

3 - Both the proximity of the Emery tracts to our proposed plant and the fact that much of the coal could be surface-mined could contribute to lower synthetic fuel production costs than we might otherwise incur if coal were to be purchased from the Wasatch Plateau tracts.

4 - In connection with the UP&L exchange, we would support the idea of issue bidding rights of equal value to the PRLA's, with these rights to be used as script for bonus bids in competitive lease sales.

5 - In view of the projected coal requirements and schedule for our Emery Coal Conversion Project, we would strongly recommend that BLM follow Alternative One for new federal coal leasing in this area.

Very truly yours,

Ralph L. Coates

RALPH L. COATES
Manager
Emery Coal Conversion Project

RLC:mt

cc: C. F. Coleman
C. M. Heiner
E. J. Murphy

Mountain Fuel Resources, Inc.

Response 9-1
The various tracts being considered for leasing were ranked in terms of coal economics, environmental impacts and socio and economic impacts. Based on these factors, the Regional Coal Team voted to rank the Emery North and Emery Central tracts medium-low. However, the Secretary of the Interior retains the discretion to include the Emery tracts or any other tracts not included in the RCTs preferred alternative in his final leasing decisions for this sale. No final information is available concerning the time frame for development of the Emery Coal Gasification Project. When more specific information becomes available, the need for leasing to meet synthetic fuel production using coal from the Emery coal field can be more closely analyzed.

Response 9-2
The text has been revised to delete this reference.

Response 9-3
See response 9-1 above.



United States Department of the Interior

WATER AND POWER RESOURCES SERVICE

UPPER COLORADO REGIONAL OFFICE

P.O. BOX 11568

SALT LAKE CITY, UTAH 84147

10

DATE: UC-150
770./120.1

U.S.D.I., Water and Power Resources Service, Salt Lake City, Utah

Response 10-1

The exact tract boundaries are still subject to change as stated on page S-6 of the DEIS; however, as shown in Figure 2-9, the North Horn Mountain tract does extend to within 1 mile of Joes Valley Reservoir. The subsidence referred to would result from the extraction of underground coal, not the draining of aquifers; however, subsidence could fracture and drain some aquifers.

No impacts to Joes Valley Dam and Reservoir from subsidence were predicted because the distance from potential mining areas and the angle of subsidence effect extending from coal extraction at up to 2,000-foot depths would not result in any direct impacts. Also, the existing fault between the proposed mining area and the reservoir would probably intercept or deflect any subsidence-caused fracturing.

The protection of Joes Valley Dam and Reservoir would be addressed prior to approval of a mining plan and actual mining, appropriate stipulations would be compiled with to assure that protection.

Response 10-2

Accelerated deterioration of the regional highway system is noted on page 227 and is not consistently mentioned elsewhere because the accelerated deterioration would be a baseline condition, carrying across all the alternatives. Additional incremental development would add to it, but only slightly. Consideration could be given to upgrading the road around the west side of the reservoir, but this option was beyond the scope of the EIS.

Memorandum

To: State Director, Bureau of Land Management, 136 East South Temple, Salt Lake City, Utah 84111, Attention: Mr. Ron Bolander, Team Leader

From: Regional Director
Water and Power Resources Service

Subject: Review of the Draft Environmental Statement for the Uinta-Southwestern Utah Coal Region (DES 80-68)

We have reviewed the above document for the Water and Power Resources Service, and find that the proposed coal development project could impact Water and Power Resources Service lands in Carbon and Emery Counties.

The mining operation on North Horn Mountain appears to extend to within one mile of the southeastern shore of Joes Valley Reservoir. The draft environmental statement refers to possible subsidence occurring because of changes in aquifers. We therefore feel that a seismic analysis related to the potential impacts of how subsidence could affect the safety of Joes Valley Dam should be included in the final environmental statement.

Highway 96, which crosses Scofield Dam, would service the Slaughterhouse Canyon, Gordon Creek, Miller Creek, and Tucker Canyon areas creating increased coal production associated traffic. There is already existing heavy traffic connected with coal production in the area. The added traffic would accelerate the current deteriorating condition of the road and the Scofield Reservoir spillway bridge.

F. Phillip Stange

cc: Director, Office of Environmental Project Review, Office of the Secretary, Department of the Interior, Washington, D. C. 20240
Commissioner, Attention: 150

11

Martin Schweizer, Salt Lake City, Utah

Martin Schweizer
322 Hubbard Ave.
Salt Lake City, UT 84111

December 6, 1980

Mr. Ron Bolander, Team Leader
Bureau of Land Management
156 East South Temple
Salt Lake City, UT 84111

Dear Mr. Bolander:

I would like to comment on the draft EIS on the proposed coal leasing and development in the Uintah - North western Utah region.

I am pleased that the BLM did not select the alternative (#1) for maximum development. The surface mining activities and deletions would cause economic impacts result in an unfavorable scenario. I am frankly puzzled by the logic in selection of alternative two, potential large level production of 467 million tons. The only statement I could find in the DEIS occurred on p. 50 where it is stated that this alternative is preferred "because it would allow flexibility in meeting the leasing target". The leasing target is 322 million tons; is it alternative three with projected production of 236 million tons a bit closer to the mark? Why is #2 more "flexible"? It seems to me BLM should proceed more cautiously in attempts to expedite the "target figures" since the demand forecasts are likely to be high in light of the trends toward lower energy consumption; people are consuming - economically they have to; furthermore, there is an awareness that Americans have no right to consume a disproportionate share of the world's resources.

It was not clear that USA's in the leasing areas would or would not be directly impacted by the mining activities. Unfortunately, intrusions as a result of greater population probably will occur.

In sum, it seems to me that leasing option #3, being about 12 million tons greater than DOE's target figure is preferable to BLM's choice which is 145 million tons greater. The latter volume seems to "miss" the target!

Sincerely,
Martin Schweizer

Response 11-1
Selection of Alternative Two provides flexibility to meet potential future needs for coal leasing in the near term. For example, if the proposed UP&L exchange is consummated, under Alternative Two tracts would still be available for competitive leasing. Furthermore, annual production levels under Alternative Two would actually be about 1 million tons per year lower than under the Secretary of the Interior's leasing target of 322 million tons of in-place coal based on the RCT's revised assumption as to mine life duration. Lastly, the Secretary of the Interior has the authority to select an alternative intermediate to those discussed in the EIS.

Response 11-2
The DEIS indicates on pages 111 and 112 that portions of the proposed Emery North and Central tracts and the Hollberg PRLA are located within BLM Roadless Inventory Unit UT-060-012. On page 124 the DEIS indicates that portions of the Utah Power and Light PRLAs are located within BLM Roadless Inventory Units UT-040-075, UT-040-076 and UT-040-078. None of these Roadless Inventory Units have been designated as WSAs, but all are presently under wilderness review.

Because mining development would impair wilderness suitability (as identified on pages 155 and 241 of the DEIS), leasing and surface disturbance would not be allowed on those portions of the PRLAs and tracts that are under wilderness review. (See the mitigating measure to this effect on page 61 of the DEIS. The mitigating measure has been revised in the final text to clarify its application to the Utah Power and Light PRLAs as well as its application to the Emery North and Central tracts and the Hollberg PRLA.) Other changes in the FEIS resulted from inclusion of findings from the "BLM Intensive Wilderness Inventory, Final Decision on Wilderness Study Areas, Utah, November 1980".

Impacts that would occur to all areas under wilderness review within the Four-County region from coal-related population increases were addressed in the DEIS on pages 155, 182, 200, 221, 230 and 241.

December 6, 1990

12

THE MIDDLE
SIP KANSAS AVE.
MT. PROSPECT, ILLINOIS

Dr. Tom Bolander, Tom Bolander
Superior of Lead Mine Grant
146 West South Temple
Salt Lake City, Utah 84111

Dear Mr. Bolander:

Thank you for sending us a review copy of the Draft Mine-
Rehabilitation Regional Coal Environmental Impact Statement.
I am a physical geographer who has done theis research on
the Colorado Plateau regarding the impacts of energy development
on national parks. I have several comments on the draft EIS.

Under Environmental Consequences, Alternative One, Water Quality,
you state that underground mining would not affect the quality
of ground water. While underground mining probably does not
alter the quality of both surface and ground waters such as
strip mining, it certainly has the potential to significantly
change water quality proximate to the mine as well as downlope.
This should be noted and elaborated on.

Throughout the discussion of impacts on paleontological resources,
the draft suggests that while mining would, primarily destroy
any scientifically-significant fossils, it would also tend
to expose some thin mining. This is a misleading comment.
In the history of mine mining, very few significant fossils
have been discovered as a result of mining. To be sure,
plants, but the loss associated with large-scale mines can't
be dismissed. In fact, where significant fossils, especially
large fossils are found, mining should be prohibited. Miners
will not stop their activities if they see some unusual "rocks"
tumble out of a mine face, in the dark tunnels for underground.

In the discussion about impacts of all alternatives on special
design thin areas, the draft assigns the personnel of the
responsible Federal agency can mitigate those impacts thru
management practices. Rubbish! Staffing levels are frozen and
are likely to remain so for some time. All resource patrol teams
of thousands of acres per person. Mine Steward has not proven
effective in dealing with the problems already at hand, let
alone a whole new onslaught of ailments of the throw away society.

In Environmental Consequences of Alternative Five, Biology, the
draft for the first time tells of "Crimera...lewisii...flooding...
events...associated with mining. It is curious that in the
four previous alternatives, all of which process to a lot more
mining than alternative five, these hazards associated with
underground mining are not discussed. This leads the reader
to think the EIS is deliberately leaving the reader to accept
Alternative Two, the proposed course of action. Tak, tak.

In the Glossary, the definition of "COLLUSION" is incorrect.
There are fresh-water springs as well, some of which are
Endangered Species. "Minerals" means salt-water.

Thank you for your consideration on the opportunity to comment.
Derek Schein

David L. Schein, Mt. Prospect, Illinois

Response 12-1

Chapter 4 of the DEIS contains the evaluation of the impacts on the water resource. Starting on page 129 the narrative and table explain the expected impacts, including potential changes in water quality. These regulations in regard to the water budget, quality and ownership require stringent protective measures.

Response 12-2

A sentence in the section you refer to has been changed to read "A beneficial impact of development would be the exposure of fossils for scientific collection and examination if a paleontologist is present to do so". Reasonable places to look for fossils would be in spoil piles and inactive portions of the mine, not areas being actively mined (safety and economics). In the areas being mined important fossils would undoubtedly be destroyed, but the fossils are also expected to occur outside tract boundaries.

Response 12-3

The text has been revised to allow for a "worst case" analysis assuming that Federal agencies have limited funds with which to protect these lands.

Response 12-4

The text has been revised to include mining hazards and accident rates for all alternatives.

Response 12-5

The definition has been corrected.

A. F. King
1544 1st St. W.
Dickinson, ND 58601

MR. RON BOLANDER
Bureau of Land Management
130 East South Temple
SALT LAKE CITY, UTAH 84111

Dear Mr. Bolander:

After reviewing the United Southwestern DEIS, I have the following comments to make. All comments pertain to the proposed Utah Power and Light Exchange.

The major concern regarding the exchange is the discussion on page 14 which essentially states that coal development may well occur on the Kaiparowits Plateau even if the Utah Power and Light PLTA's are exchanged. In light of the strong concerns and issues raised during the mid-1970's, BLM should realize that the general public is not in vast agreement that Kaiparowits coal should be mined. I would venture to guess that even with today's energy problems, many Americans feel that places such as the Kaiparowits Plateau should be one of the last coal fields to be mined (see the recent public survey done by the President's Council on Environmental Quality). Many other coal areas with

[more minimal impacts and less public sentiment exist.

Following are comments pertaining to specific portions of the DEIS.

1. It is stated in Chapter I that the unsuitability criteria have been applied. However, in Chapter III under Cultural Resources, it is stated that the cultural resource inventories are incomplete for the proposed Kaiparowits Plateau Lease Area. If these inventories are not complete, unsuitability criteria #7 could not have been adequately applied.
2. In Chapter III various air quality monitoring programs are listed. However, no mention of the National Park Service Air Quality Monitoring program that has been in effect since the spring of 1978. This program is ongoing in all the national parks surrounding the proposed action area. I view with skepticism any statements regarding degradation of Class I air sheds ~~to~~ when the NPS monitoring program is not even mentioned.
3. In Chapter III under Vegetation, it is stated that range land "improvement" programs such as chaining and reseeding with crested wheatgrass prairie that reclamation could be achieved. This is an oversimplification of reclamation and something that the Office of Surface Mining, and not some range conservationist, should determine.
- 4

4. Several inconsistencies appear in the Socioeconomic

assessment. In Chapter III, it states that GARFIELD

County employment has increased 20% since 1973 and that

total personal income has an annual increase of 13%. However,

in Chapter IV, it is stated that the economic trend would

continue downward if development would not occur.

In several places under Socioeconomics, statements were

made on the benefits Garfield County would receive from

coal development especially in terms of providing more job

opportunities and allowing young people to remain in the

community. However, in Chapter III it states that "most

of the new jobs would be filled by new in-migrants

rather than existing residents. Underground coal mining

requires specialized job skills possessed by relatively

few area residents who therefore, generally would be

limited to ancillary jobs such as driving coal trucks.

I wonder if there will be enough coal trucks to go around.

Finally, the Socioeconomics does a pretty good job of addressing

community services and facilities that would need to be created

or improved if coal development occurs. However, no mention

is made on where the local governments will get the money to

provide these needed services in a timely manner. With the

small tax base which currently exists in Garfield County, it

would be next to impossible for the governmental entities to

provide these ~~needed~~ services in a timely fashion.

5. In Chapter IV under Geology, Topography, it is stated that subsidence would range from 40 to 150 percent of the area mined and that the depth of subsidence would be 50 to 90 percent of the coal seams. Considering the fact that Utah Power and Light has over 18,000 acres of coal land, the topography would be more than "slightly altered."

This subsidence problem is not mentioned at all under Chapter III Visual Resources. It is stated that "reclamation would be effective in reestablishing present scenic quality and character". This seems rather doubtful with over 18,000 acres being affected by subsidence.

6. Under Chapter III Recreation, the impacts due to the very substantial population increase on the surrounding National Parks is lightly touched on. However, it is not discussed in the depth required for this potential major problem. No discussion is made of an increase in park crime such as theft, drunk and disorderly conduct, unauthorized ORV use, illegal hunting etc. that so often accompanies a population increase due to energy development.

7. These types of problems plus the problem of overcrowding could significantly reduce the quality of the park visitor recreation experience. It could also make it very difficult if not impossible for the National Park Service to follow its Congressional mandate of preserving park features in an unimpaired state

The National Park Service monitoring network includes visibility stations at Dinosaur National Monument, Canyonlands National Park, Capitol Reef National Park, and Bryce Canyon National Park, with data collected since 1978. The BLM study, with a data base beginning in 1976, is sited at Cedar Mountain, in the center of the Castle Valley area addressed in Chapter 3. The Cedar Mountain data were considered to be more appropriate to use as a determination of baseline visibility for the area.

Visibility data from the National Park Service network has been added for the Capitol Reef and Canyonlands National Park (Chapter 3, Air Quality). In addition, information from visibility modeling performed to study possible impacts to Capitol Reef and Canyonlands has been added to the FEIS (Chapter 4, Air Quality).

Response 13-4

The statement you cite could not be located in Chapter 3 of the DEIS, and there is no mention of chaining, reseeding, or created wheatgrass in the Vegetation section. Potential success of reclamation attempts in the Emery coal field is discussed under the Reclamation Potential section, and is based on research specific to those sites.

Response 13-5

Chapter 3 discusses the employment and income situation for Garfield County in total. Chapter 4 identified a downward economic trend only in the communities of Tropic, Henrieville, Cannonville, and Escalante.

Response 13-6

Job opportunities resulting from coal development but not directly related to mining activities would be available in retail and wholesale trade, professional services such as teaching, medicine, law, and government, finance, and banking, construction, transportation, communications, and others. In the area of direct mine-related jobs, local people could work as mechanics, maintenance people, secretaries, and surface equipment operators, as well as some miners.

Response 13-7

The increased demands for funds (through increased infrastructure needs) are balanced by local and external sources of revenue that are available to local counties, communities, and school districts. Unfortunately, data were not available to permit projections of the revenue-generating capabilities of local government entities in the EIS area. Specifically, projections of new capital investment by commercial and industrial firms moving into the area or expanding present facilities could not be obtained. This new capital investment would be the basis for growth in assessed valuation and a resulting increase in property tax revenues.

Another source of local revenue is Federal mineral royalty payments, 50 percent of which are distributed to the States where they originated and, through State formulas, to local governments. In Utah approximately two-thirds of this money goes into the Community Impact account. This money is then allocated to counties and communities by the Community Impact Board for specific projects. The other one-third of the mineral royalty monies are used primarily for water system improvements for impacted communities.

Providing the needed facilities in a timely fashion could also be addressed by tax laws, such as allowing companies the pre-payment of property taxes in order to finance the needed infrastructure.

FOR THE ENJOYMENT OF FUTURE GENERATIONS. THE SIGNIFICANCE AND MAGNITUDE OF THESE POTENTIAL IMPACTS WARRANTS A MUCH MORE THOROUGH DETAILED ANALYSIS. CHAN THAT WHICH IS INCLUDED IN THE DEIS.

I SINCERELY HOPE THAT THESE COMMENTS ARE TAKEN IN THE LIGHT OF BEING CONSTRUCTIVE CRITICISMS SINCE THE BLM IS A PUBLIC AGENCY, ITS WORK SHOULD ADEQUATELY ADDRESS PUBLIC CONCERNS. IT IS HOPED THAT THESE COMMENTS WILL CONTRIBUTE TO THE GOAL AND ENABLE BLM TO MAKE DECISIONS THAT ARE TRULY IN THE BEST INTEREST OF ALL AMERICANS.

I APPRECIATE THE OPPORTUNITY TO COMMENT AND HOPE THAT MY CONCERNS ARE ADDRESSED IN YOUR FINAL EIS.

Sincerely,
A. F. King

A.F. King, Dickinson, N.D.

Response 13-1

The discussion of coal development on the Kaiparowits Plateau in the DEIS is limited to possible development of Utah Power and Light's PRLAs. The situation you refer to is discussed in the exchange agreement which is located in the appendix of this document. If coal values favor the PRLAs, the possibility exists that even if the exchange were consummated sufficient PRLA lands could remain so that development of them would be possible. The DEIS analyzes development of the PRLAs on pages 231 through 244.

Response 13-2

Unsuitability criterion number 7 was applied to the lands within the Kaiparowits Known Recoverable Coal Resource Area (which includes Utah Power and Lights PRLAs) using a Class II cultural resources inventory that was conducted in 1977-78. On the basis of that survey and after consultation with the Utah State Historic Preservation Officer it was determined that no listed or nominated National Register properties are known to exist on the PRLAs.

A more detailed cultural resource inventory is scheduled for completion in August 1981. If that survey indicates that sites exist that are eligible for inclusion to the list, requirements of 43 CFR Part 800 would be followed.

Response 13-8

The reference is to the degree of alteration and the number of acres disturbed not the number of acres leased. In areas that have undergone similar mining, the changes in topography due to subsidence are not readily apparent.

Response 13-9

Visual resource impacts resulting from subsidence were not noted in the DEIS because they are anticipated to be minor. Although slumping and subsidence have occurred in localized areas in the region due to historical underground mining, the disturbance is not visually evident and has not affected the landscape character. It is doubtful that future subsidence or slumping would noticeably affect visual resources. As a part of mining plan approval, OSM requires the establishment of a monitoring system that would measure surface effects such as subsidence.

Response 13-10

The text has been revised to assure that impacts to Bryce Canyon National Park, Capitol Reef National Park and Glen Canyon National Recreation Area from coal-related population increases are clearly analyzed in the section concerning the Utah Power and Light PRLAs. We believe that with these additions the depth of analysis is sufficient. National Park Service lands are already receiving intense visitor use which originates for the most part outside the Four-County region. Impacts from the additional visitation of the coal-related population, except as related to Special Designation Areas and Developed Recreation Sites as specified, are anticipated to be minor.

Getty

14

Getty Oil Company | 3810 Wilshire Boulevard, Los Angeles, California 90010 • Telephone (213) 387-1511

J. D. Spaulding, Coal Department Manager, Minerals Division

December 9, 1980

Mr. Ron Bolander, Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111

Re: Comments to Uinta - Southwestern Utah Draft
Environmental Impact Statement - Coal

Dear Sir:

Getty Oil Company has reviewed the draft Environmental Impact Statement (EIS) on the Uinta Southwestern Utah coal leasing program. Initially we would like to compliment the Bureau of Land Management EIS team for the excellent report which was prepared in a very short time frame. We believe they have examined all available alternatives in a very thorough manner. We are encouraged to note that the Federal Coal Leasing Program is finally being implemented in a timely manner. It is long overdue and it comes at a time when the country is faced with a severe energy crisis occasioned by a decreasing energy supply. Implementation and the continuation of this leasing program will enable the country to meet its national energy goals.

After reviewing the various alternatives set forth in the draft EIS, Getty Oil Company supports the adoption of either alternative one or alternative two. We support the adoption of these alternatives for basically two reasons:

(1) These alternatives give the greatest recognition to increased production required to meet energy self-sufficiency. To illustrate this point, your attention is directed to the 1990 coal leasing goals which are set forth in the letter of March 14, 1980, from the Director, Bureau of Land Management to the Secretary of the Interior, and the letter of December 11, 1979, from the Deputy Assistant Attorney General, Antitrust Division to the Chairman of the Regional Coal Team, both appearing in the Appendix 1 to the EIS.

(2) These alternatives provide for a competitive bidding process which comports with the intent of the Federal Coal

Leasing Program. Competitive bidding is in the interest of the public in that it would:

- (a) lower market prices for coal,
- (b) increase revenues to the state and federal governments.

Overall, there is much less risk involved if the maximum amount of coal is leased rather than the minimum. The coal industry is one of the few remaining industries in which the demand for the product actually determines the price of that product. For competition to continue, adequate resources must be available for lease.

The other resources will be protected also, because of the environmentally sound manner in which today's mines are developed. The emphasis on underground mining in Utah assures that only a minimum quantity of land is removed from the pre-mining use regime.

As a general principle we believe that more, rather than fewer, coal leases should be issued subject always to state and national acreage limitations per each lessee. So long as coal leases do not preclude production of other hard minerals on the same lands, which rarely occurs, the coal leases bring revenue to the federal treasury where none would otherwise be forthcoming, all without impinging on other uses of the land. Moreover, the greater the number of leases issued in such manner, the greater the opportunity for competition among potential coal producers.

Getty Oil Company opposes the adoption of alternatives three, four, and five for the following reasons:

1. Alternative three is opposed because this alternative does not provide for competitive bidding. In addition, the implementation would delay coal leasing programs by at least six months.
2. We oppose alternative four because this alternative will not provide sufficient reserves to meet stated Leasing targets. For example, the 171.3mm tons in place reserves indicated for alternative four is less than 1/2 of the 422mm leasing target. In addition, these tracts are of limited competitive interest.

3. Alternative five is totally unacceptable because no coal would be leased, consequently the federal leasing program would not get off the ground. This program is unrealistic and the economic consequences are unacceptable to the public. It represents a continuation of the objectionable condition which this new program was designed to resolve. It is not a desirable alternative program.

Specifically, we oppose the adoption of alternative three because we believe that the North Horn Mountain Federal Tract should be designated as a competitive bid tract. North Horn Mountain is a large tonnage tract, the only large tract being tentatively offered for competitive bid which would permit true competition between all interested companies, since the other tracts offer only limited competition by being contiguous to present holdings of one or two companies. If North Horn Mountain Federal Tract is not offered for competitive bid, there would be few tracts of interest to the broadest spectrum of industry. By having the subject tract come up for competitive bid, competition in bidding would be assured by the presence in bidding by a number of interested companies, and accordingly, the Federal Government could anticipate larger bonus bids and above-the-minimum fair market value.

Our objections to alternatives four and five are similar. Alternative four establishes a very low leasing target and will not result in expanded production. The reserves in Cottonwood and Meetinghouse Canyons and in the Gordon Creek tract would only be of real interest to the contiguous landholders.

Alternative five is opposed because it will not lead to additional coal production. Furthermore, the estimates contained in the FIS are in error. The assumption that the Hollberg PRLA, if it is processed, will satisfy a real demand for coal is somewhat deceiving. If a strong market exists for a lower quality coal, such as that found on the Hollberg PRLA tract, Consolidation Coal Company's Emery mine would be booming. An annual production rate of 24mm tons of "marketable" coal by 1990 will not be possible without additional leasing of quality coal. This may lead to a shortfall in production, which will drive the price of coal upward.

Getty

Mr. Ron Bolander

4

December 9, 1980

In summary, Getty Oil Company urges the adoption of either alternatives one or two. Both alternatives would assure the North Horn Mountain tract being placed on a competitive bid basis, which is the only one of the proposed tracts which would attract several bidders. Not only would these alternatives be fairer to all the coal producers, but it would also provide more jobs for private industry, and an increase in annual earnings which would benefit several areas within Emery County. That would be of considerable help to the State of Utah.

We have additional comments on two subjects addressed in the EIS:

Processing of Preference Right Lease Applications

Getty Oil Company has no pending PRLA's, but justice and fairness demand that existing PRLA's be granted where pre-1976 requirements have been met. For nearly a decade no coal leases have been issued, and this hiatus needs to be corrected. However, issuing qualifying PRLA's will not solve national goals for plentiful coal production in the coming decades.

NEPA does not apply to the issuance of pending PRLA's, since SMCRA and other federal acts mandate that no mining operations can be initiated without approval of mining plans, etc. After ten years of delay, there is no valid reason for further delay in issuing PRLA's which meet the pre-1976 requirements. The 1976 Act should not be applied retroactively to pending PRLA's.

The National Coal Production Goal and the D.O.E. Levels of Leasing

The D.O.E. leasing target levels have always been too low, mainly for the reason that the parameters used in determining those levels are not realistic today. This is best indicated in the letter of Donald L. Flexnor, Deputy Assistant Attorney General, Antitrust Division, United States Department of Justice addressed to Mr. Edward F. Spang, Nevada State Director, B.L.M., Chairman of the Regional Coal Team, which appears in APPENDIX 1, Pages A1-11 through A1-13 of the E.I.S.

We feel that this is an opportune time for Getty Oil Company to make a statement to the Department of Interior urging an upward revision of their coal leasing levels at least two or three times higher than D.O.E.'s present production goals. Leasing should also be geared to a ten year demand; i.e., 1990. Also, the assumptions or parameters for determining levels should be based on the latest oil prices and their projections as well as the latest nuclear powerplant construction plans, as well as making allowance for synthetic fuels.

2

287

Getty

Mr. Ron Bolander

5

December 9, 1980

We note, for example, that the EIS utilizes the terms "resource" and "reserve" in discussing the availability of coal in the proposed federal tracts. In all alternatives, "reserve" (recoverable) is less than half of "resources" (in-place); in fact, closer to 40%. Therein lies a weakness in D.O.E. and Interior's levels of desired leasing because the "resource" figure is the figure quoted in regional leasing targets and this conveys a message to the public that this amount of coal will be mined and available over the years on the market place. The "resource" figures lend a false impression.

Mandated government production targets, even on the broadest national scale, must remain flexible to accommodate free market forces. Oversupplies, or undersupplies, of a costly commodity like coal must be avoided to stabilize prices, costs and demand. Coal producers depend for their success upon a demonstrated ability to predict markets and to adjust to changing conditions.

We would like to thank the Bureau of Land Management for the opportunity to provide both verbal and written comments on the EIS. We appreciate your consideration.

J. D. Spaulding
J.D. Spaulding
Coal Department Manager

CC: J.F. Ronan, Jr.
Helge Laursen
Mark Adkins

3

Response 14-1

The OEIS makes no assumption as to whether or not the Hollberg PRLA will satisfy a demand for coal. The OEIS merely considers the environmental consequences of this action. Before the PRLA is issued, the company will have to make final showing that it will meet commercial quantities before the lease is issued. It is recognized that the economics of the coal in this area will dictate somewhat when or if development of the resource will take place, even if the leases are issued.

The baseline production rate of 24 million tons per year by 1990 was taken from the Final ES on Development of Coal Resources in Central Utah which assumes production from leases already issued and from private mines. The ES concludes "Coal reserves under lease by operating companies and under consideration in this statement are ample for 40-50 years at the projected level of 24 MTY." Failure to develop the coal as described in that ES would lead to a shortfall in production as you described.

Response 14-2

The Code of Federal Regulations (CFR), Subpart 3430.3-2 states that after an applicant has completed an initial showing as required under CFR 3430.2, the authorized officer shall conduct an environmental analysis of the proposed preference right lease area and prepare an environmental assessment or environmental impact statement on the application.

CFR 3430.3-1 requires the Department of the Interior to complete the processing of all preference right lease applications by December 1, 1984.

Response 14-3

The OOE has primary responsibility for setting production goals and bases its estimates for each production region on detailed studies of future coal needs in 39 consumption districts. Preliminary estimates received from DOE in October 1980 are overall about 5 percent below those made in April 1979. However, in the Uinta-Southwestern Utah Coal Region they have increased more than three-fold with the new 1990 mid range being about 60 million tons per year production compared to the 17.3 million tons per year forecast in 1979. The OOI Secretarial Issue Document on the final leasing target for this region will present an analysis of these goals and their relationship to coal developed by mines dependent on Federal leasing by the year 1990.

Response 14-4

In calculating the leasing target, an assumption was made as to the average percent of recoverable coal. The calculation recognizes that only a certain percent of the in-place coal would be recovered. To realize the contribution potential lease tracts could make to the market, each tract is listed in terms of both resources/recoverable reserves, and annual production in tons.

Mr. Ben B. Bender
Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111

Dear Mr. B. Bender:

Following are my comments on the Uinta-Southwestern Utah
Wright Environmental Impact Statement: I am limiting my
comments to the Reference area since I do not have enough
about the Wested Plateau area to evaluate the statement.

On page 121, you mention "Lake" Creek. This must be an error
since the only Lake Creek I know of is located on the southern
end of the 57.5 mile Mountain and is not a perennial stream.

On page 123, you mention a seven barrow in school enrollment
in Escalante. The high school has shown a decrease due to the
fluctuations in class size, but the elementary school has increased
by about twenty students since my wife began working there
nearly three years ago. The elementary school is also near or at
full capacity. An increase of population from my major development
would require a new school or an addition to the present school.

Also on page 123, you describe a "routinely paved road" between
Escalante and Utah Highway 24. The only portion that is paved is from
the northern boundary of the Dixie National Forest near Brown to
Highway 24.

In the Visual Resources section on page 124, you mention the
Shimmy Rock State Park. I assume you are referring to the Ketchikan
Basin State Reserve south of Cannonville. You should also mention
the Capitol Reef National Park and Glen Canyon National Recreation
Area.

In the discussion on recreation on page 125, you do not
mention backcountry use in the Escalante area. The Escalante
River is nationally known for its backcountry opportunities. It
also changes with the use of 1976 data for Table 3-26. This data
is four years old and probably does not reflect current conditions.
Data for 1979 should have been available at the time the draft
was written.

Table 3-25 uses preliminary census estimates. I feel actual

was late should be used in the final statement.

In the discussion on economic and demographic impacts on page 236, I disagree that not including secondary employment will not significantly affect the employment analysis. Because of the distance involved, I feel a significant percentage of secondary services would locate within the study area, especially in Escalante. Panguitch and Cedar City would be the communities outside of the study area that would benefit from the development.

Sincerely,
Rex Wells

Rex Wells, Escalante, Utah

Response 15-1

Lake Creek has been deleted in the reference to fish-producing tributaries to the Escalante River.

Response 15-2

On page 238 the DEIS acknowledged that new elementary and secondary schools would be needed in Escalante and Tropic to accommodate the increased enrollment.

The statement on page 123 has been clarified since it only pertains to the high school in Escalante.

Response 15-3

The text has been revised to correct this statement.

Response 15-4

The reference to Chimney Rock State Park was in error and has been replaced in the text with Kodachrome Basin State Reserve. The text has also been revised to include reference to Capital Reef National Park and Glen Canyon National Recreation Area.

Response 15-5

The fact that the Escalante River is known nationally for its backpacking opportunities has been added to the text.

The 1976 data used in Table 3-26 were taken from the Southern Utah Regional Coal Environmental Statement prepared by GS in 1979. That document has been used as a major source for baseline data in this EIS because of its tiering applicability. In response to your comment, the table has been revised to reflect the most current data available. Although numbers used in the analysis have changed as a result of the table revision, actual impacts are the same as identified in the DEIS.

Response 15-6

The 1978 data were the most recent available when the Southern Utah Regional Coal EIS was initiated in 1978. The most current census data would be from the 1980 census, which has not been officially released.

Response 15-7

Unless the economy of the area is able to diversify it is doubtful that investments will be made to develop any significant service centers. A few service facilities will develop but they should be insignificant. The major service centers are expected to be Panguitch and Cedar City.

SIERRA CLUB Utah Chapter

2130 East 900 South
Salt Lake City, Utah 84108
December 9, 1980

(301) 583-7261



ARDES MTL. PARK by Karen Vendell

Mr. Ron Bolander
Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111

RE: Draft Environmental Statement for the Uinta Southwestern Utah Coal Region

Dear Mr. Bolander:

Enclosed are copies of the Utah Chapter Sierra Club comments concerning the Draft Environmental Statement for the Uinta Southwestern Utah Coal Region. The comments were prepared by Alan Miller, on behalf of the Utah Chapter Sierra Club. Please direct future correspondence to:

Alan W. Miller
1272 Harrison
Salt Lake City, Utah 84102
(801) 467-0544

Additionally, the Utah Chapter Sierra Club does not support transfer of the Utah Power and Light preference lease rights application. We do not support this transfer because of the discrepancy in coal values, favoritism to Utah Power and Light and the precedent setting nature of the transfer.

Please feel free to contact either Alan or myself for details.

Sincerely,
Brian Beard

Brian Beard
Chapter Chairman
Utah Chapter Sierra Club

enclosure

cc with enclosure:
Anthony Ruckel
Brant Calkin

Dear Mr. Bolander:

I would like to thank you for our meeting of December 1st, 1980, during which we discussed various problems having to do with the "Uinta-Southwestern Utah Draft Environmental Impact Statement." This letter will attempt to clarify and expand some of my thoughts on that day, and I would like to have it included in the final EIS. I hope that my remarks might, in some small way, make a constructive contribution to future draft EIS's having to do with coal leasing.

It seems that the most important idea I have come away with is that this EIS does not give the reader the information needed to make an intelligible choice between the alternatives outlined. This means that conservationists like myself, who badly want to be heard on such significant matters as Federal coal leasing, are unable to respond in a rational way. The central difficulty, as I see it, is that the leasing targets are not explained in a satisfactory way.

For example, the Regional Coal Team's (RCT) recommendation for a 322 million ton leasing target appears to be based upon a blurring of the distinction between "demand" and "production," and this makes the reader dubious about the worth of the recommendation. On page A1-7 of the EIS, the "Uinta Leasing Target Analysis" claims that it is clear the Intermountain Power Plant (IPP) demand for 9 million tons annually was not included in the 1990 production goal of 17.3. According to the analysis, this omission can be rectified simply by adding 9 to the 17.3, giving an upwardly revised 1990 production goal of 26.3. In my mind, this is a little like adding apples and oranges to get more apples. One just cannot get a new and correct production figure solely by adding a recently identified demand together with the old production figure. What the analysis assumes, in effect, is (1) that current demand and current production are roughly equal, and, more importantly, (2) that the IPP demand will not in any way be part of the previously projected demand. Unfortunately, it is easy for the reader to have serious misgivings about these two assumptions. It is apparently true, as you mentioned, that some stock piling of coal is already occurring, which cast doubt on the first. And it seems a bit far-fetched to take for granted that the total IPP output represents new demand, i.e., that none of the energy to be consumed by IPP customers was already calculated in the original projected demand figure.

This is not to say that the 322 leasing target might not be justified by some other means, but only that the EIS gives the impression, at least, that accurate production revisions can be calculated solely by adding the demand from new power plants to the old production goal figures. This ignores the possibility that some consumption of energy marketed by these new plants could be consumption already calculated in the projected demand, in some other way. If the "Uinta Leasing Target Analysis," as it is shown in the EIS, actually was the only basis for the 322 recommendation, then conservationists have good reason to be horrified. If other considerations were also taken into account, still they are excluded from the EIS, and the reader does not know what to make of the analysis, or whether the 322 recommendation was warranted.

Sierra Club, Utah Chapter

Response 16-1

The points raised are valid. Methodology for calculating the leasing target will be reviewed prior to the Secretary's decision. Your points will be considered in that review.

Response 16-2

The target of 322 million tons refers to in-place coal. As explained in the revised text in Chapter 1, the target is now being expressed in terms of annual production as well. This latter concept allows more precision in selecting tracts to help meet the DOE annual production goals. The DOI leasing target for the EIS study area, as expressed in terms of annual production, is 5.5 million tons. Table 2-23 in the O/EIS shows that Alternative One would give an annual production exceeding this figure. Table 2-24 through 2-27 show that Alternative Two, with 4.5 million tons annually, along with the 0.5 million tons annual production from the Hollberg PRLA, comes closest to the target. Note that other factors, such as the results of the Regional Coal Team's tract ranking decisions, contributed to the selection of the preferred alternative.

Response 16-3

If the UP&L exchange is not consummated, these tracts would be available for competitive leasing in this sale. Regardless of the disposition, therefore, total acres available for leasing remains the same. The amount of acreage leased would be decided before the final disposition of the Hollberg PRLAs.

The reader has even more difficulty with the 466 leasing target listed as the preferred alternative in the EIS. It is somewhat of a shock to realize that just as recently as 1979 we had a leasing target of 109, and that this has been raised by 357 in just two short years. More importantly, the EIS does almost nothing to explain why 466 should be looked at as preferred. As near as I can tell, the best attempt at explanation is given on page 50, where it reads "This is the Preferred Alternative because it would allow flexibility in meeting the leasing target. It also offers clearly competitive potential leases as well as tracts that would benefit existing operation. All underground tracts that have high or medium ranking are included in this Alternative." From what I can make of it, this explanation raises at least as many questions as it answers for the average reader. And as I indicated earlier, it is difficult to make a rational judgement about the various levels of environmental impact unless one knows the strength of the reasons for the preferred leasing target. The UP&L exchange, and the Hollberg PRLA, do nothing to help matters here either. It is never clear just how the disposition of these two items will effect the actual amount of acreage leased.

What is needed here, at least to start with, is the information you gave me during our meeting. As I remember, this information indicated (1) that small tracts needed to be included for small business, (2) that disposition of the UP&L exchange and the Hollberg PRLA would effect the amount of acreage leased, possibly reducing it, and that this was one of the reasons for wanting flexibility, and (3) that the 466 also represented the RCT's anticipation of an upswing in production goal figures from the Department of Energy. It also helped some to know that you thought a major weakness of the EIS was that it did not outline alternative ways to meet the 322 leasing target. (What this means, I trust, is that the 466 represents an increase for the sole purpose of acquiring flexibility in meeting the 322 leasing target, but I am not at all sure of that.)

I might sum up my critical remarks about the EIS by saying that it tends to make paranoid conservationists suspicious that what is going on here is some mental sleight-of-hand simply to boost the production of coal regardless of need (after all, one can always sell the surplus to Japan). And it is frustrating, too, since many conservationists would really like to make intelligent responses to EIS documents, not just knee-jerk protests over environmental damage.

The Final EIS could be vastly improved, in my opinion, by fixing up whatever is wrong with the "Ultimate Leasing Target Analysis," and by adding a section in Chapter I, under "Purpose and Need," that gives the reader solid information about the considerations that were involved in suggesting a 466 leasing target even though only a 322 target has been approved by the Secretary. It would also be very helpful to give a rough idea of the various ways disposition of the UP&L exchange, and the Hollberg PRLA, might effect amount of acreage leased. While I realize that these improvements will not help readers who wanted to make comments, I still think they are desirable. Fixing up this EIS should tend to help get improvements incorporated into future draft EIS's on Federal coal leasing, and this would be a substantive and constructive thing to have happen.

Alan Miller

Alan Miller
Utah Chapter Sierra Club

17



STATE OF UTAH
OFFICE OF THE GOVERNOR
SALT LAKE CITY

84114 December 8, 1980

SCOTT M. MATHESON
GOVERNOR

Mr. Ron Bolander, Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111

Dear Mr. Bolander:

This letter and its attachments (3) constitute the response and comments of the State of Utah on the Uinta-Southwest Draft Environmental Impact Statement (DEIS) for coal leasing.

It is appropriate at this point to outline a portion of the State's policy with regard to coal leasing. That policy generally discourages concentrated coal leasing and development so that its resultant impacts are not extreme to our environment, our social and economic structures, our transportation systems or other services to our population. On a statewide basis, our goal is to maximize the total net benefit to that population.

As you know, the State has continued to support the preferred alternative of this round of leasing during the preparation of the EIS. The Coal Leasing Task Force has recommended that the preferred alternative continue to be supported since it is the alternative most in concert with our coal leasing policy.

It is demonstrated through the analyses of the DEIS that Utah's coal can be leased and that the impacts of that leasing can be dealt with systematically and scientifically.

Several state agencies have provided to the Task Force their technical comments with respect to their specific expertise or responsibilities. Those comments are attached and with this letter constitute the Utah position on the DEIS. Should you have questions or require further discussion on these comments, please contact Ron Daniels, Chairman of the Coal Leasing Task Force.

Sincerely,

Scott M. Matheson
Governor

SMM/rwd
Attachments



SCOTT M. MATHESON
GOVERNOR

November 3, 1980

Mr. Ron Bolander, Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111

Dear Mr. Bolander:

As with the previous environmental impact statements on Utah Coal, the Uinta - Southwestern Utah Draft fails to deal effectively with the area of Paleontological Sensitivity.

Paleontology is not a new word for the B.L.M. vocabulary, so I am disappointed to see this quantity repeatedly overlooked by the Bureau.

At considerable expense my office has made available to the Bureau and numerous other Federal and State agencies guidelines for dealing with paleontological values in Utah. Further, the State and Salt Lake District B.L.M. offices have supported ongoing paleontological inventories.

The overall problem is succinctly stated on page 161 where it is written that, "Due to the lack of data on location of paleontological sites in the area and the scientific or educational value of fossils contained therein, the extent of the impact cannot be determined." A statement like this suggests very strongly that: (1) The areas of concern have not been surveyed and (2) Professional paleontologists have not been consulted in these studies.

The rest of the paleontological comments in the study can be termed trite and/or inadequate.

I suggest in the strongest possible way that the matter of Paleontological Sensitivity be dealt with professionally in your E.I.S. or include a preliminary disclaimer indicating that the Bureau does not regard paleontological impacts as important considerations.

Sincerely,

James H. Madsen Jr.
James H. Madsen Jr.
State Paleontologist

JHM:rb

Division of
State History
UTAH STATE HISTORICAL SOCIETY

MELVIN I. SMITH, DIRECTOR
307 WEST 2ND SOUTH
SALT LAKE CITY, UTAH 84101
TELEPHONE 801/333-5155

STATE OF UTAH
DEPARTMENT OF COMMUNITY AND
ECONOMIC DEVELOPMENT



State History Board: Milton C. Abrams, Chairman • Teron H. Luke • Ted J. Warner • Elizabeth Montague • Thomas G. Alexander
Dale G. Dayton • Wayne K. Hinton • Helen Z. Paganolas • David S. Monson • Elizabeth Griffin • William D. Owens

STATE OF UTAH
 DEPARTMENT OF HEALTH
 DIVISION OF ENVIRONMENTAL HEALTH
 150 West North Temple, P.O. Box 2500, Salt Lake City, Utah 84110



Scott M. Matheson
 Governor

James O. Maxin, M.D., Dr.P.H.
 Executive Director
 801-533-6111

- DIVISIONS**
- Community Health Services
 - Family Health Services
 - Health Care Financing and Standards
- OFFICES**
- Administrative Services
 - Health Planning and Policy Development
 - Medical Services
 - State Health Laboratory

Alvin E. Pickers Director
 Room 426 801-533-612

533-6108

October 28, 1980

Mr. Ron Bolander, Team Leader
 Bureau of Land Management
 136 East South Temple
 Salt Lake City, UT 84111

Re: Comments on Uinta-Southwestern
 Utah Coal Draft EIS

Dear Mr. Bolander:

The Bureau of Air Quality has the following comments concerning the Uinta-Southwestern Utah Draft Environmental Impact Statement (DEIS). Many of our comments apply throughout the air quality portions of the DEIS, but are referenced only once.

- 4 [1. (Table 3-1, Page 73) This table should include the source of the data and indications of the time period over which the data was collected.
- 5 [2. (Page 128) It is stated that high TSP concentrations exceeding the NAAQS could occur near unpaved haul roads. The State of Utah is committed to the maintenance of air quality standards and will insure through application of BACT that the NAAQS are not exceeded. Fugitive Dust Regulations have been drafted and should be promulgated within 3-4 months.
- 6 [3. (Page 128) If no modeling was done, how were the impacts derived?
- 7 [4. (Page 128) Secondary emissions caused by increasing population activities are not subject to PSD and do not consume increment.

page 2
 Ron Bolander
 10/28/80

8 [5. (Page 224) How were the quantitative concentration estimates derived? An increase of 25 micrograms per cubic meter for annual average TSP near Price would likely cause a violation of the primary NAAQS. Such an estimate appears to be an order of magnitude high for the No Action Alternative.

Sincerely,

[Handwritten signature]
 Brent L. Bradford
 Director
 Bureau of Air Quality
 61081
[Handwritten note: Approved by [unclear]]

DHG:il



DIVISION OF WILDLIFE RESOURCES
1596 West North Temple/Salt Lake City, Utah 84116/801 533 9333

DOUGLAS F. DAY
Director

December 1, 1980

Mr. Ron Daniels, Chairman
Coal Leasing Task Force
Division of Oil, Gas and Mining
1598 West North Temple
Salt Lake City, Utah 84116



UTAH DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Dear Ron:

We have reviewed the document, "Uinta - Southwestern Utah Draft Environmental Impact Statement, Coal" and find we have many concerns related to this program. Our comments follow, by chapter.

Chapter 3 - Description of the Environment

The area of discussion relative to wildlife within the Draft appears to center on an area much smaller in size than the four-county "Impact area". A map showing the area being discussed should be provided or expand the discussion to the entire "impact area". The discussion fails to recognize the qualitative ranking of wildlife use areas that has been developed.

Page 92, Paragraph 1. The Uinta-Southwestern Utah Coal "Region" encompasses all of the life zones described for the Intermountain West--Lower Sonoran, Upper Sonoran, Transition, Canadian, Hudsonian and the Alpine life zones. The region includes well over one-half of Utah and about one-fourth of Colorado. The "impact area" encompasses all of those life zones except the Lower Sonoran and Alpine. It is important to note that the descriptor "cold desert" is recognized as an ecological association rather than a life zone. Also, the term "high mountain forest" is an ambiguous habitat descriptor which generally could include the three life zones (Canadian, Hudsonian and Alpine) that are components of the montane ecological association.

In addition to the number of amphibians, reptiles, birds and mammals identified by the Draft, as many as 25 species of fish probably inhabit the impact area.

Page 92, Paragraph 2. Deer management areas represent individual deer herds. Herd unit numbers or number of herds that could be impacted should be identified.

All of the deer range could support more deer; not just portions of the range.

GOVERNOR
SHEILA WATKINSON

DEPT. OF NATURAL RESOURCES
Gordon E. Hammon
Exec. Director

WILDLIFE BOARD
Roy L. Young - Chairman
Lewis C. Smith L. S. Sabers
Warren T. Harward Chris P. Jacobs

Mr. Ron Daniels
December 1, 1980
Page 2

14 Although energy developments and urbanization have encroached upon critical and high priority winter ranges, they are not the major factor limiting expansion of deer herds. Dispersed recreation is a severe and uncontrollable impact with a potential that can exceed the degradation of habitats from developments. Additionally, and most importantly, during the last ten years climatic factors such as severe droughts and severe winters have represented the most pronounced impacts on big game in the Southeastern and Southern Regions.

15 Herbage production on most winter ranges, except during drought periods, has been satisfactory. However, overobligation of forage to domestic livestock on some winter ranges has degraded forage condition for wintering big game and compounded the ill effects of winter weather on big game animals.

16 Page 92, Paragraph 4. The "impact area" would include at least four distributions of elk--Manti, Fishlake, Avintaquin and Range Creek herds.

17 Elk summer range would best be characterized as most habitat types within the montane ecological association and not just the aspen and aspen-conifer types.

18 Elk on East Mountain and North Horn Mountain seldom migrate off their respective mountains for winter; such movement is usually temporary and associated with man-caused disturbance. They usually utilize bench areas above the cliff zone of the Wasatch Plateau that have been described as critical and high priority winter ranges. Those winter ranges are located within the submontane and montane (Transition and Canadian life zones) ecological associations.

19 Although Figures 3-8 identifies a bighorn sheep use area, there is no discussion in the narrative. Both desert bighorn and Rocky Mountain bighorn sheep inhabit the impact area. Additional transplants into the impact area are planned.

20 Page 92, Paragraph 6. The most recent calculations by Utah Division of Wildlife Resources' biologists (August 1980) would estimate carrying capacity of the 981,130 acres of habitat use area for moose in southeastern Utah at 487 animals. Additional animals could be supported in the Central Region.

21 Page 92, Paragraph 9. The four-county "impact area" provides various qualities of habitat use areas for a multitude of sage grouse populations, e.g., Emma Park and Whitmore Park area, Range Creek area, Scofield area, Gooseberry area, East Mountain area, Gordon Creek area, Joe's Valley-Horn Mountain area and Wildcat Knolls area. The Draft only vaguely discusses a portion of two of these sage grouse use areas; a map would be helpful.

22 Page 92, Paragraph 11. It is unclear why the Draft specifically discusses the unmanaged wetland southeast of the Emery North Tract. A multitude of similar unique habitats exist throughout the impact area.

23 Page 96, Paragraph 1. Although no raptor aeries are known on the planned lease tracts, it is important to identify that no inventories of these areas have been conducted.

Page 96, Paragraph 4. The American peregrine falcon is a yearlong resident of the impact area and the Arctic peregrine falcon is a winter resident (November 15 through March 15). There is an active peregrine aerie in the San Rafael Desert near the traditional aerie which is located along the San Rafael River. The new aerie produced and fledged two young birds during 1979. The traditional aerie has not been utilized since 1970. It is believed that the increase in outdoor recreators exceeded the tolerance limit of birds on the traditional aerie at that time resulting in abandonment of the site.

24

Page 96, Paragraph 5. The Division has maintained an active vigilance relative to bald eagle use of Carbon and Emery Counties up to the present. Bald eagles are a winter resident and not merely a visitor. High priority concentration areas for wintering bald eagles exist in the Desert Lake area, Scofield area, Joe's Valley area, Gordon Creek area, Huntington Lake area, Desolation-Grey Canyon area and Green River town area. There are two known roost trees that have been ranked as being critical to bald eagles. Without doubt other such roost trees exist, but to date they have not been inventoried.

25

Page 118, Water Resources. We are concerned that while Rock Creek is an intermittent stream, it is also a vital water source for the newly transplanted (11/80) desert bighorn sheep that were placed in the lower part of the drainage. Springs and seeps that feed into the Rock Creek drainage will be vital to this fledgling herd and must be protected.

26

Page 121, Wildlife. We note that while desert bighorn sheep were isolated on the east side of the Colorado River, the Utah DWR has recently successfully transplanted desert bighorns in the Moody Canyon area of the Glen Canyon National Recreation area and is currently doing the same in the Rock Creek drainage this winter.

27

Continuing on this page, we read that mountain lions are mentioned but not the extremely important cougar predation 12-year study which is being conducted near Escalante. Development of Kaiparowitz coal could definitely impact this study.

28

Waterfowl use is mentioned on the Aquarius Plateau only. A considerable number of waterfowl migrate through the Escalante area in the spring and fall and make use of all available waters. The Escalante River and its drainages are heavily used as are the intermittent streams, stock ponds and other water development on the Kaiparowitz Plateau.

29

Reference is also made to the 1978 Hoffman raptor nesting report done for the Bureau of Land Management concerning the Escalante resource area. This report is not a complete one and should be used only to show the diversity of raptors present and not as a complete list of important raptor areas on the Kaiparowitz. For example, the report states that while only four golden eagle nests were found, 12 separate pairs of adults were seen. Mr. Hoffman very correctly states in his report that since he was limited in his survey by only being able to go to areas by vehicle or foot that many areas in this study were checked in a cursory manner and that future raptor surveys must use a helicopter to be efficient. We regret that this report did not mention the very important winter migrant, bald eagles, that frequent the Escalante area from November to April each year.

30

Also on page 121, we note the reference to peregrine falcons but virtually no detail on the numerous bald eagle sightings, not just from Garfield county but from the Escalante area itself. Bald eagles migrate into this area around November each year and leave around April. Roost trees have not been adequately identified nor have hunting areas which likely include the Kaiparowitz Plateau.

31

Also on page 121, in the right column, paragraph 1. We note in the second sentence that the word "increases" should be changed to "progresses."

32

At the end of the section on wildlife, we feel that the statement on reservoirs and lakes is rather incomplete. Numerous water sources exist on the Kaiparowitz Plateau for livestock and wildlife. While these may be small, approximately 1 acre in size, they are vital for life to the animals that use them and must be carefully considered when planning for coal development.

33

Page 123, Transportation Facilities. The statement is in error when it states that the Boulder/Grover highway is paved. This road is currently under contracts and proposals to grade and gravel it but paving will probably not be finished for at least five years.

34

Chapter 4 - Environmental Consequences
(Note that these comments, where needed, must be carried from alternative to alternative and into the "unavoidable", "short and long term", "irretrievable-irreversible" sections)

Alternative 1

Page 136, Paragraph 6. The loss of 198 acres of cropland would not cause 110 pheasants to be displaced, rather it would result in a permanent reduction of the local pheasant population by an average of that number of birds. Croplands are of critical value to pheasants and other wildlife forms dependent upon agricultural habitats, thus any loss of croplands will result in a direct reduction in the carrying capacity of the area.

35

Due to the arid nature of the local area, the maximal use of irrigable lands and previous losses of pheasant habitat due to municipal expansion and other demands on the available irrigation water, local agricultural habitats have been significantly decreased. Additional losses of small tracts of agricultural habitat may, in themselves, be viewed as insignificant, but cumulatively they are additive to past losses and are significant.

36

Page 136, Paragraph 7. Since another 182 acres will be retired from agricultural uses due to change of use for water, the number of pheasants permanently lost will nearly double the 110 pheasants identified for conversion of cropland into municipal land. When agricultural lands in this region of Utah are no longer irrigated they soon take on a vegetative character similar in make-up to the surrounding native vegetation of the cold desert ecological association. Even weeds will not grow unless they are watered due to the nature of the soil and climatological characteristics of the area.

37

38 Page 136, Paragraph 9. This statement implies that mobile species will not be impacted because they are able to relocate to other similar sites. While this may apply to some individuals, the fact remains that losses of habitat due to subsidence ultimately will be reflected as reductions in carrying capacity for affected species.

39 Page 137, Paragraph 8. Change 2,000 moose to 487 moose to correspond to current DMR management goals. This adjustment needs to be carried to all sections of the EIS that deal with moose numbers.

40 Page 139, Paragraph 1. Fugitive dust and other larger particles of coal have historically and continue to be deposited in local riverine systems. The impacts of coal on aquatic resources are many and varied. Siltation by coal dust is a serious threat especially in view of increased coal haulage. Heavy metal problems may also be realized through increased loading of aquatic systems with coal particles.

41 Note that two miles of Huntington Creek was recently impacted by cement poisoning.

42 Page 139, Paragraph 3; Page 157, Paragraph 1. The Division of Resources would not allow any waters to become "fished out". Increased fishing pressure will likely result in more restrictive management programs that will negatively affect participation in this sport by individual fishermen. Additionally, the acceptable fishing success rate will likely have to be lowered due to financial and physical limitations for fish production in the state's hatchery system.

43 Page 157, Paragraph 7; Page 159, Paragraph 7; Page 160, Paragraph 3. Adjust to reflect comments provided for page 136, paragraph 6 and 7.

Alternative 2, Alternative 3, Alternative 4

Page 168, Paragraph 3; Page 187, Paragraph 7; Page 208, Paragraph 6. Adjust to reflect similar comments provided for management of pheasants in Alternative 1 (page 136, paragraph 6 and 7).

Page 168, Paragraph 4; Page 187, Paragraph 8; Page 205, Paragraph 7. Adjust to reflect similar comments provided for management of mobile wildlife species in Alternative 1 (page 136, paragraph 9).

Page 168, Paragraph 9; Page 190, Paragraph 1, Page 208, Paragraph 8. Include discussion relative to comments provided for page 139, paragraph 1.

44 Page 232, Water Resources. We note again that the importance of springs and seeps for wildlife are ignored. Paragraph 3 implies that these water resources only grow a little riparian vegetation. The importance of this riparian vegetation in a desert environment where highly diverse but low level populations exist should be reemphasized. Many vertebrate species will cease to exist on the Kaiparowitz Plateau if a number of these little clumps of riparian vegetation are eliminated by mining activities.

45 Also in the second paragraph in this section the statement on pumping from the Navajo sandstone is incomplete. Studies around the Alton coal fields are showing that cones of depression from pumping water may have "little effect . . . for many years. . ." but when you consider the long-term of say, 40 years, then the cone of depression may reach 12 feet at 12 miles. (Reference: USDI, Southern Utah Petition Evaluation Document, page III-13).

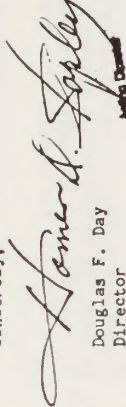
46 Page 235, Wildlife. We note that increased human activity and developments would definitely affect raptor populations in the Kaiparowitz Plateau area. Also, small power lines can be constructed in such a way as to avoid almost all raptor losses due to electrocutions (see "Suggested Practices for Raptor Protection on Power Lines," Edison Electric Institute, June 1975). Illegal shooting of raptors on power poles can also be greatly reduced by building new power lines away from heavily traveled roads as much as possible.

47 Page 236, End of Wildlife Section. It mentions the desert bighorn sheep transplant on the south end of the Kaiparowitz Plateau. While it is true that these sheep require remote, inaccessible areas, planning for developments can take these requirements into account and greatly reduce any impacts to these animals as well as the current successful transplant population nearby in the Moody Canyon area.

48 In summary, we find that, while this DES has identified broad areas of concern with impacts to wildlife, much detailed work remains to be done to adequately identify wildlife concerns so that should development occur, impacts to wildlife populations can be minimized and unavoidable impacts mitigated.

We appreciate the opportunity to review and comment on this document.

Sincerely,


Douglas F. Day
Director

State of Utah

Response 17-1

A mitigating measure has been added and a literature search to identify formations and possible paleontological resources that may be encountered during coal development in the region has been completed to better identify possible impacts and ensure adequate protection of paleontological resources. The text has also been changed in the appropriate sections to portray possible impacts and the results of the application of mitigating measures.

The areas of the proposed lease tracts have not been surveyed for paleontological resources since the exact location and extent of surface disturbance is not known. Following consultation with the State paleontologist, a literature search was conducted to identify the probability of fossil occurrence in the region, and mitigation measures proposed to protect these resources. After mine plans are submitted for approval, and prior to surface disturbance, the appropriate mitigating measures would be applied on a site specific basis.

Response 17-2

See response to comment 17-1

Response 17-3

See response to comment 17-1

Response 17-4
The data source and time period information have been added to the appropriate tables in the FEIS.

Response 17-5
The appropriate text changes have been made in the FEIS to reflect the position of the State of Utah Air Quality Bureau.

Response 17-6
As indicated on page 128 of the DEIS the impacts were predicted based on the analysis made of similar mine type, production level, acres of disturbed surface, wind speed, etc. done by Pedco, Radian, and Aerovironment for the Green River-Hams Fork EIS (DOI 1980). This analysis was considered as a first approximation and has been refined and strengthened by addition of specific analyses done for BLM by Radian Corporation. These analyses are shown in the FEIS.

Response 17-7
The text has been corrected.

Response 17-8
The TSP value is taken from a study by Aerovironment (1977) for the Development of Coal Resources in Central Utah (DOI 1979) and considered existing pollutant sources in addition to new projected scenario sources which the EIS considered. Alternative Five considered this scenario as the no action baseline.

Response 17-9
The discussion was intended to describe only those habitats or species that would be significantly impacted. This follows CEQ Regulations to refrain from using encyclopedic descriptions. Therefore, it is not deemed necessary to expand the discussion to include a larger geographic area. DWR's qualitative ranking of wildlife use areas was indirectly used in the development of information on wildlife in projected heavy impact areas.

Response 17-10
The text has been revised to incorporate the use of life zones.

Response 17-11
The text has been revised to include reference to presence of 25 species of fish in the region.

Response 17-12
The text has been revised to include herd unit numbers.

Response 17-13
The text has been revised to clarify this statement.

Response 17-14
The text has been revised to incorporate this comment.

Response 17-15
Over obligation of forage for domestic livestock in the area has not been documented. Some over use may have occurred where drought has limited forage production.

Response 17-16
Impacts are identified only for the Manti and Fishlake herds; consequently only those areas were described.

Response 17-17
The Aspen and Aspen-Conifer types as described in this EIS represent the vegetation types in the Montane ecological association.

Response 17-18
The text has been revised to better describe elk winter range in this area.

Response 17-19
Bighorn sheep use areas were deleted from map because no impacts were predicted. Planned transplants would not involve anticipated heavy impact areas and therefore would not be impacted by development associated with the proposed leasing action.

Response 17-20
The text has been revised to incorporate this revised estimate.

Response 17-21
The EIS discusses only sage grouse populations that would be impacted by additional leasing, namely the North Horn Mountain, Gordon Creek, and Miller Creek tracts. Because there are only three areas involved, a map depicting locations is not deemed necessary.

Response 17-22
The area was visited by BLM, U.S. Fish and Wildlife Service, and Corps of Engineers personnel on a joint field trip. After examining the area it was concluded that coal leasing would not affect the wetland. Documentation of the trip is on file at BLMs Utah State Office. Other similar habitats in the area were not analyzed because they also would not be affected.

Response 17-23
The text has been revised to incorporate this information.

Response 17-24
The text has been revised to include this information.

Response 17-25
Visitors are defined as species that nest elsewhere. The word "resident," as defined by some authorities, means the bird is found throughout the year.

None of the concentration areas or roost trees identified would be impacted by the proposed action. Therefore, they were not further identified in the description of the environment.

Response 17-26
Your concern for water resources in the Rock Creek area are appreciated. However, no impacts to springs and seeps associated with the Rock Creek drainage were identified.

Response 17-27
The text has been revised to include this information.

Response 17-28
The text has been revised to include references to this study.

Response 17-29
The Aquarius Plateau has the only meaningful and permanent waterfowl habitat in the area. The Escalante River and stock ponds receive only casual use. However, the text has been changed to include a sentence on waterfowl on the Escalante River, its drainages, other intermittent streams, stock ponds, etc.

Response 17-30

Our reference to Hoffman's report does not state the study was all encompassing, only some of his conclusions were used in the FEIS.

The text has been revised to include a reference to the Escalante River drainage as a wintering area for bald eagles.

Response 17-31

See response to comment 17-30

Response 17-32

This change has been made in the text.

Response 17-33

The statement referred to addresses fisheries; therefore, other waters on the Kaiparowits Plateau were not included. A general discussion of water sources on the Plateau is included in the Water Resources section.

Response 17-34

The text has been revised to correct this statement.

Response 17-35

The importance of this habitat and the irreversible loss of it is noted in the paragraph referred to. If other land is cleared and developed for agriculture "displaced" pheasants may not be permanently lost. The number of pheasants displaced was included to show the relationship of the habitat loss to number of birds that would be affected. It does not account for annual reproduction or total loss that could occur during the life of the mines.

Response 17-36

This is a good point; however, in this EIS only the cumulative impacts of alternative leasing programs are analyzed. Cumulative impacts of major actions in the area could be roughly calculated by adding the losses of habitat as described in all EISs that include this area. Non-federal development in the area and existing federal leases are considered in the baseline of the FEIS.

Response 17-37

After further investigation this statement was verified. The paragraph has been deleted and acreage and pheasant loss figures adjusted.

Response 17-38

The paragraph as contained in the DEIS was re-examined and we believe it adequately explains the possible loss or reduced utilization (reduced carrying capacity) of the habitat.

Response 17-39

The text has been revised to incorporate the correct figure.

Response 17-40

The text has been revised to include reference to coal sediments.

Response 17-41

The text has been revised to indicate 2 miles of the creek were affected.

Response 17-42

A definition of the term "fished out" has been added to the Glossary.

Response 17-43

The text has been revised, where appropriate, to include these comments.

Response 17-44

The Water Resources section deals only with quantity and quality of water. The possible loss of riparian vegetation (17 acres) is stated in Table 4-56 of the DEIS. The importance of these watering areas to wildlife is stated on page 235 of the DEIS.

Response 17-45

Development of the Alton coal field as discussed in the Allen-Warner Valley FEIS would require substantially more water than development of the PRLAs. Nearly 50 acre-feet of water would be required daily to develop the Alton coal field (BLM, 1980) while about 1.2 acre-feet daily would be necessary to develop the PRLAs. As a result, the cone of depression would not be expected to reach 12 feet at 12 miles. Studies in the area have not been completed which draw conclusions regarding long-term impacts of this increased water use. Therefore only general statements and conclusions are discussed in the EIS. However, prior to development of the PRLAs, Utah Power and Light would be required to sufficiently analyze the water resource and mitigate any water loss.

Response 17-46

These are standard procedures that would be stipulated in approved mine plans.

Response 17-47

Site specific mitigation for any bighorn sheep populations that could be affected would be included as part of an approved mining plan for the area.

Response 17-48

The intent of this regional coal EIS is to identify cumulative regional impacts. Since mining plans have not been prepared or submitted, detailed analysis of proposals is not possible. Upon submission of mining plans for approval, detailed analysis will occur and site specific mitigating measures stipulated.



Southern California Edison Company

P. O. B. X. 800
2244 WALNUT GROVE AVENUE
ROSEMEAD, CALIFORNIA 91770

CHARLES B. MCCARTHY
MANAGER, FULL PROJECTS

December 5, 1980

Mr. Ron Bolander, Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111

Subject: Draft Uintah - Southwestern Utah Region
Coal Draft Environmental Impact Statement

Dear Mr. Bolander:

We have reviewed the subject document as it relates to our involvement in the development of a coal based synthetic fuel plant in the Emery Utah area. As such, we would like to have the Emery North and the Emery Central tracts included within the preferred alternative. The reasoning for including these tracts is that:

1. This coal, while containing higher amounts of sulfur, is well suited as a feedstock for a coal conversion process which can readily recover and reduce, to elemental form, the sulfur contained within the coal.
2. These coal sources are in the immediate area of the proposed conversion facility which would lessen the environmental impact and cost of transporting other coal feedstock from additional sources.
3. Much of the coal from the Emery North Tract (13,560,000 tons) could be recovered by surface mining techniques which would provide coal to meet the future feedstock demand at a lower cost.

In view of the above stated reasons we are recommending that the Emery North and the Emery Central tracts be included within the preferred alternative.

Sincerely,
Charles B. McCarthy

WRG:es

Southern California Edison Company, Rosemead, California

Response 18-1

Modification of Alternative Two was discussed by the Regional Coal Team at its December 16, 1980 meeting. The RCT voted to retain the alternatives as described in the DEIS.

Your comment has been noted and will be considered in the decision making process. As stated on page 9 of the DEIS, the Secretary of the Interior has the option to select an alternative intermediate to any of the specific alternatives discussed in the EIS.

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
324 25th Street
Ogden, UT 84401

19

1950

DEC 2 1950




Mr. Ron Bolander
Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111

Dear Ron:

Enclosed are the Region's comments relative to the Uinta-Southwestern Utah Draft Environmental Impact Statement Coal. Our comments consist of the enclosed worksheets and pencil notations in the text of the enclosed report.

A few additional remarks are as follows:

1. Chapter 1, Table 1-1, pages 6-8. It would be helpful if surface ownership of the tracts were listed along with the alternative(s) to which each tract has been assigned.
2. In view of the recommendation not to proceed with the Utah Power and Light exchange, the text relating to the exchange should be modified accordingly.
3. The socioeconomic sections have a negative connotation. This might be improved if the recent past situation of these communities was discussed.


RICHARD K. GRISWOLD
Director
Planning and Budget

Enclosures (2)

cc:
M

Table of Contents - somewhat confusing.

- 4 Chapter 3 - Description of the Environment. On page 115 there is an unexplained break when discussion of the Kaiparowitz Plateau starts. At this point the INTRODUCTION starts again.
- 5 On page xii all page numbers should have a prefix. "List of Preparers" is listed as page 1; it should be LP-1, etc.
Pages S1 and S2
Description of alternatives are not consistent with later description.
Example - Alternative 1 should state that UP&L exchange is approved and 3 tracts are not available for leasing.
Alternative 2 should state that UP&L exchange is not approved.
These tracts would not be affected for competitive sale until they have been eliminated from consideration for exchange. Does this statement hold true only for this alternative or for all alternatives? This is not our understanding or our agreement. We agreed to go forth with competitive leasing, but not to withdraw these tracts.
- 6 Page 12
UP&L to receive bidding rights of equal value. Is this something new?
- 7 Page 50
Statement (2) says our objective of alternative 3 is to lease sufficient tonnage to meet 322 million ton target. This does not make sense. Alternative 3 on page S-2 says the purpose is to consider the UP&L exchange.
- 8 Page 59
Does not consider traffic increase on Highway 30 in alternatives 1 and 2.
- 9 Page 61
Mitigation Measures
#3 - The people who do archeology work on Forest Lands for private industry have to be on a list approved by Forest Service (all Forest Service tracts).
#5 and #6 - The lessee on Forest Land is required to have a subsidence and hydrologic monitoring plan approved by the Forest Service. Wildlife needs to be added to #5 (all Forest Service tracts).
#17 - What is the relationship of coal fires to road location and stream pollution?
- 10

The following mitigation measures should also be added to the list:

1. The lessees are required to maintain dust suppression standards as required by local, state, and federal agencies (all Forest Service tracts).
2. The lessee will be required to maintain a mine development and operation of a size that is compatible with the physical environment. The limited area available for mine facilities at the coal outcrop, steep topography, adverse winter weather, and physical limitations on the size and design of the access road, are factors which will determine the ultimate mine size (all Forest Service tracts).
3. If removal of timber is required for clearing of construction sites, etc., such timber shall be removed in accordance with Federal agency regulations (all Forest Service tracts).
4. Any current land surface improvements on the tract will need to be protected and/or maintained by the lessee. The continuance of current land uses on the tract must be guaranteed for post mining uses by the lessee (all Forest Service tracts).
5. Floodplains will be determined prior to approval of mine plan. The occupation of channels and floodplains shall be allowed only if no suitable alternative is available (all Forest Service tracts).
6. Mining must be done in such a manner that escarpments will be protected (all Forest Service tracts).
7. Ventilation facilities, if constructed on escarpments or on the surface, will require site specific evaluations and approval (all Forest Service tracts).
8. Topsoils will be stockpiled for reclamation (all Forest Service tracts).
9. Mitigation has not been determined for oil, gas and coal conflicts. Early recognition of and plans to alleviate conflicts, on the part of lessees and agencies, should be made (all Forest Service tracts).
10. The watershed treatment furrows and trenches on North Horn will be repaired by lessee if effectiveness is disturbed or damaged by effects of mining.
11. Mine water discharges will comply with Federal and State laws and regulations (all Forest Service tracts).
12. Maintain sage grouse habitats and elk winter range on Horn Mountain by assuring responsibility for making available future water sources equal to those presently existing.

13. Visual Quality Objectives will be considered in the selection and design of mine sites, road locations, and other facility locations (all Forest Service tracts).

14. Recreation sites will be preserved (all Forest Service tracts).

15. An acceptable cattle driveway must be provided in Rock Canyon.

16. Mining will be coordinated with existing permitted uses and will be done in such a manner that these uses will not be adversely affected (all Forest Service tracts).

17. The integrity of the elk migration route or routes from North Horn will be maintained.

Page 67

The explanation of UP&L Exchange Alternative (3) indicates that only 3 tracts are being considered for exchange. Agreement is much more extensive than this. It allows for other lands to be acquired in Stage II and III of the agreement.

UP&L can use bidding rights as script for bonus bids in competitive lease sales.

I can not find any reference to this in the Agreement.

Page 74

"Soil condition is not a limiting factor for reclamation potential on the Wasatch Plateau. Soils data indicate sufficient topsoil volumes are present for revegetation except on some steep slopes, rocky areas, and escarpments." This statement should be compatible with comments pertaining to page 129. There is enough soils data available to determine topsoil suitability. Then why cannot erosion be estimated? Mines are most likely to be located on steep, often rocky slopes. These are the sites where revegetation problems would occur.

Page 83

Rilda Canyon should be added to those tracts that supply drinking water or are in municipal water sheds.

Page 85

The chance of finding significant fossils in the Mancos Sh, Star Point Sandstone, Castlegate Sandstone, Price River and Flagstaff Limestone is small.

Page 89

The Blue Gate and Tununk may be very fossiliferous in places. The fossils are also expected to occur outside the tract boundaries.

12

13

14

15

16

17	<p><u>Page 112</u> Why is Cottonwood Tract not mentioned?</p> <p><u>Page 114</u> State Highway 31 is correct, not U.S. 31.</p> <p><u>Page 116</u> Does not mention Forks of Huntington Canyon or Ferron Reservoir campground.</p> <p><u>Page 117</u> Approximate percentage of the area covered by each soil association should be given. An alternative would be to display a soils map.</p> <p><u>Page 129</u> Breakdown of soil components of each association has not been done using a logical system, or mixing textures, temperature regimes, parent materials, and organic matter contents does not make it clear to the reader just what the soil differences are.</p> <p>"No attempt was made to quantify soil losses on the Wasatch Plateau, because detailed soils data are not available. Soil losses are expected to be low since runoff is medium to low and sediment production is moderately low for most areas."</p> <p>Quantification of soil losses is difficult when dealing with a regional EIS due to the site specific nature of areas that would be disturbed by mining activities. To make these estimates, one would have to make assumptions on where the most likely sites would be for mine locations, facilities, and exploration activities. This can be done with reasonable accuracy.</p> <p>The reason for not making erosion estimates on the Wasatch Plateau is stated as "because detailed soils data are not available." The Manti-LaSal National Forest has hundreds of soil descriptions on the Wasatch Plateau. We have a Soil Resource Inventory for the Ferron-Price Planning Unit, an Order 3 soil survey of the Muddy Creek Watershed, an Order 2 soil survey of the Straight Canyon Barometer Watershed, and many Order 1 and Order 2 soil inventories on specific project areas. The Forest Soil Scientist was never contacted in regard to available soils information. The Forest Service has enough soils information to make reasonable estimates of soil loss.</p> <p>"Soil losses are expected to be low since runoff is medium to low and sediment production is moderately low for most areas" is misleading. A typical mine location on the Wasatch Plateau is in steeply sloping canyons or along the Eastern Clifflands. Rocky surfaces and vegetative cover,</p>
18	<p><u>Page 133</u> where adequate soil exists, provide natural protection from erosion on these slopes, however, if these sites are disturbed, the potential for erosion and sediment production is high. Assuming that soil losses would be low because the natural sediment production is moderately low is an inadequate analysis. The cover factor is of prime importance for these interpretations.</p>
19	<p><u>Page 134</u> "Significant plant fossils... could be destroyed" - change to... probably would be destroyed. "most likely would not occur" - change to... could also occur.</p>
20	<p><u>Page 134</u> The use of native species for reclamation has the highest potential for reclamation success?</p> <p>Studies on Manti-LaSal National Forest showed an increase in production of air dry forage of 403 lbs/ac following chaining and seeding of Pinyon-Juniper sites.</p> <p>These sites were not seeded with native grasses. However, native grasses present on the site do increase after treatment, but usually do not dominate the sites or make up the major portion of the forage produced.</p> <p>The primary objective should be stabilization and rehabilitation, as the native species will eventually return.</p>
21	<p><u>Page 134</u> (and other places where vegetation is discussed) Need to recognize that the sequence of events is: subsidence, dewatering and vegetative conversion. This is especially critical to riparian habitat. Riparian habitat is estimated to be less than 1 percent of total vegetation, but critical to 40 percent of the wildlife.</p> <p><u>Page 151</u> Needs to recognize impacts to U-30 from development in Rilda Canyon.</p> <p><u>Page 156</u> The statement about conveyors and transmission lines concerning Rilda Canyon is false.</p> <p>Visual - Portal sites in Deer Creek, Rilda, and Meetinghouse Canyons will meet visual quality objectives; however, conveyor or coal slurry lines, if visually evident in Unit A-5, will not meet visual quality objectives.</p>
22	<p><u>Page 133</u> where adequate soil exists, provide natural protection from erosion on these slopes, however, if these sites are disturbed, the potential for erosion and sediment production is high. Assuming that soil losses would be low because the natural sediment production is moderately low is an inadequate analysis. The cover factor is of prime importance for these interpretations.</p>
23	<p><u>Page 134</u> The use of native species for reclamation has the highest potential for reclamation success?</p> <p>Studies on Manti-LaSal National Forest showed an increase in production of air dry forage of 403 lbs/ac following chaining and seeding of Pinyon-Juniper sites.</p> <p>These sites were not seeded with native grasses. However, native grasses present on the site do increase after treatment, but usually do not dominate the sites or make up the major portion of the forage produced.</p> <p>The primary objective should be stabilization and rehabilitation, as the native species will eventually return.</p>
24	<p><u>Page 134</u> (and other places where vegetation is discussed) Need to recognize that the sequence of events is: subsidence, dewatering and vegetative conversion. This is especially critical to riparian habitat. Riparian habitat is estimated to be less than 1 percent of total vegetation, but critical to 40 percent of the wildlife.</p>
25	<p><u>Page 151</u> Needs to recognize impacts to U-30 from development in Rilda Canyon.</p> <p><u>Page 156</u> The statement about conveyors and transmission lines concerning Rilda Canyon is false.</p>
26	<p>Visual - Portal sites in Deer Creek, Rilda, and Meetinghouse Canyons will meet visual quality objectives; however, conveyor or coal slurry lines, if visually evident in Unit A-5, will not meet visual quality objectives.</p>

27

Page 159

Should add a paleontology section.

Page 178

Traffic increases due to additional leasing will reduce the level of service afforded by the existing Forest highway system. In most cases the present level of service is at stable flow with reduced speed, due to the percentage of truck traffic and limited passing opportunities. The level of service will approach unstable flow or forced flow at decrease speed with the additional traffic. Accident rates will increase due to the additional at grade intersection and increased congestion.

28

The service level on Highway 31 would be the first to be impacted. The section below the Forest boundary is carrying the design or desirable traffic flow now. The design and desirable service level is 1100 vehicles per day, while the 1978 traffic count was 1130 vehicles per day. Under the alternatives recommended, traffic could increase 2668 vehicles per day or approximately 58% of the maximum capacity of 5500 vehicles per day.

Additional development of existing lease and additional leasing, within the Forest boundary served by Highway 31, is expected. The percentage of truck traffic is expected to increase as is overall traffic from this development. The total traffic could reach or exceed the maximum capacity of the existing road.

Page 182

Visual resources has the same problem as page 156.

29

Page 205

"The loss of productivity on 127 acres would be permanent due to occupation by housing and support facilities for future populations in the region."

30

This is a typical statement on soil impacts related to housing and support facilities. This does not compare with the statement on page 224 which says that "... about 650 acres, half of the community development, may lose productivity permanently because of occupation by structures or hard surface? Is one-half of the area needed for community development? This is based on the promise that lawns, gardens, trees, and shrubs will be established on some of the lands disturbed for community development.

Page 225

"If a paleontologist is present to do so," should be added to paragraph four.

31

Page 246

32

Under "MEETINGHOUSE" and "KILDA" reference is made to "National Forest Service land." This should be either National Forest land, National Forest land administered by the Forest Service, or public land administered by the Forest Service.

ABB-1

33

EMRIA should be, Energy Minerals Rehabilitation Inventory and Analysis.

General Comments

34

1. Public comments indicate that the socio-economic sections should be reconsidered and reevaluated. Southeastern Utah Coal Develops 1980 prepared by the Southeastern Utah Association of Governments should be looked at.

2. There are several major problems associated with leasing the North Horn Tract.

A. Time of Leasing - Due to the failure of the Geological Survey to complete the drilling program during the past two years, a large portion of the area cannot be defined as required. In spite of the high priority assigned to this area, only three of the 13 holes were completed. The fact insisted upon by the Forest Service is to consider the North Horn area in total. We feel it is essential to complete the drilling, estimate the mineable coal amount and area, and determine logical mining unit(s) and conceptual mine plan(s) which fully consider and include environmental, economic, and other necessary factors. Completing this total process is even more essential because we now recognize that mineable coal exists in the South Horn area. There will be some delay from the projected lease date of 1981, it could be from one to several years from now. When the above mentioned requirements are met, the North Horn area will be available for leasing, be it one. The Forest Service requests that this be incorporated into the DEIS. It will also affect Alternative 1, 2 and 3.

35

B. Utah Power and Light Exchange - There is recent information which suggests that the proposed exchange will most likely not take place. This would eliminate Alternative 3 which was specifically set up to handle the exchange. In light of this recent development, Alternative 3 should be reevaluated to determine if it should be included in the DEIS.

36

Response 19-1

The surface ownership is identified in the narrative discussion for each tract instead of being duplicated in Table 1-1. The assignment of tracts to alternatives is shown in Table 2-22.

Response 19-2

The current status of the UP&L exchange is included in this FEIS; however, no final decision has been made by the Department of the Interior on this exchange at the time of printing. (The recommendation mentioned is that of GS, based on the evaluation of the offered and selected lands.) A decision on the proposed exchange will be made by December 1, 1981.

Response 19-3

The past situation of the impacted communities and counties is discussed in Chapter 3 of the DEIS. Positive benefits of additional leasing such as increased employment, annual earnings, and services are discussed in Chapter 4.

Response 19-4

The heading Kaiparowits Plateau introduces the section on the affected environment for the Kaiparowits Plateau. The Introduction was purposely placed to provide needed introductory material before describing the affected environment. Text and Table of Contents have been revised to indicate a sub-heading for the Wasatch Plateau.

Response 19-5

The intent on page xii is to show the total number of pages for each set of documents in the appendix.

Response 19-6

Design of the coal leasing alternatives (Alternatives Dne through Four) is not dependent upon approval or denial of the proposed UP&L exchange. The three tracts identified for exchange will not be available for competitive leasing until the exchange issue has been decided.

Response 19-7

This is one of three possible scenarios available for implementing the proposed exchange as provided for in 43 CFR 3435.1.

Response 19-8

As stated on page 5D, Alternative Three was structured to satisfy two basic objectives: (1) to consider those tracts that have been identified for the proposed UP&L exchange, and (2) to lease sufficient tonnages of coal to meet the 322 million ton leasing target. As stated on page S-2 this alternative considers impacts associated with the tracts included in the exchange. However, it is assumed that impacts associated with implementation of Alternative Three would be similar whether or not it is considered as a part of the exchange.

Response 19-9

This reference is not clear. No U.S. or State Highway 3D is mentioned in the text. Current highway maps of the area do not show a Highway 3D.

Response 19-1D

The text has been revised, where appropriate, to correct the mitigation measures.

Response 19-11

The suggested mitigating measures, where appropriate to the proposed action, have been added to the Mitigating Measures section. The mitigating measures listed were not intended to include those general items covered by law, regulations, or standard operating procedures.

Response 19-12

The UP&L exchange agreement provides for processing of the exchange in various phases. Phase 1 is to consider the potential for an exchange of rights involving three tracts on the Wasatch Plateau. If for some reason the coal in these tracts did not satisfy the rights and the values of such held by UP&L in the Kaiparowits Plateau, subsequent phases would be considered. The information on values (that we are aware of to this point in time) indicates that no additional land would have to be considered to satisfy the value of coal rights held by UP&L in the Kaiparowits Plateau so the later phases would not become a factor.

The possibility of satisfying the exchange through coal lease bidding rights is mentioned as one of three possible scenarios for implementation of the exchange. This is mentioned on page 67 of the DEIS.

Response 19-13

Data from general soils maps indicate that sufficient topsoil volumes are present for revegetation in most areas in the Wasatch Plateau. The statement did not say that the present topsoil is suitable for revegetation. However, present vegetation indicates that the soil is suited chemically and physically for plant growth.

As stated in paragraph 4, page 129 of the DEIS "Soil loss through erosion is dependent on the soil's physical characteristics, degree of slope, length of slope, climatic conditions during soil exposure and the effectiveness of erosion control measures." At this point in time, we have no idea where portals or surface facilities would be placed or what erosion control measures might be implemented.

Portals may have to be placed on steep, rocky slopes but the major surface facilities could be placed on more level areas.

Response 19-14

The text has been revised to include Riilda Canyon.

Response 19-15

The text has been revised as suggested.

Response 19-16

The text has been revised as suggested.

Response 19-17

The Cottonwood tract was inadvertently omitted. The text has been revised to include Cottonwood tract under Visual Resources, Description of the Environment.

Response 19-18

The text has been revised to incorporate the proper title of the highway.

Response 19-19

These campgrounds were inadvertently omitted. The text has been revised to include them.

Response 19-2D

Data for the Kaiparowits Plateau area were compiled from a general soils map of Utah and a Bureau of Land Management watershed inventory. This general information, coupled with the lack of site specific mining plans, does not permit prediction of impacts to soil components or associations. Therefore, a description of soil differences as you suggested is not warranted.

Response 19-21

The Manti-LaSal Forest Supervisor's Office supplied the BLM with Site Specific EAs for the tracts located on the Forest. The soils data in these documents were used in the analysis in the DEIS, and provided little more information than what was found on the general soils map. Because of this, it was felt that this was the extent of available data. It was an oversight that the Forest Soil Scientist was not contacted, but again this was due to the data that were found in the site specific EAs.

Even with the soils information which the Forest Service has, reasonable estimates of soil loss are not possible because mine sites and support facility locations are not known.

The comment "assuming that soil losses would be low because the natural sediment production is moderately low is an inadequate analysis", is a valid comment and the text has been changed.

Response 19-22

The text has been revised as suggested.

Response 19-23

The statement referred to is based on research done on the Emery tracts which include harsh sites with low precipitation and poor topsoil. The value of introduced grasses is recognized and several wheatgrass species were tested as part of the EMRIA research. Reclamation potential of the various areas is discussed on page 91 of the DEIS.

Response 19-24

The loss of riparian vegetation on-and off-tract as shown in Table 4-2 of the DEIS is related to disturbance for mining facilities, roads, and urban development. The effects of subsidence, including dewatering and loss of riparian vegetation, are not well documented; therefore, no loss of riparian vegetation due to subsidence was predicted. The importance of riparian habitat to wildlife is recognized in the DEIS.

Response 19-25

Current highway maps of the area do not show a U-30. However, the EIS addresses impacts resulting from increased traffic on a regional basis. Tables 4-12 and 4-25 in the DEIS also depict anticipated annual average daily traffic that would result from implementation of Alternatives One and Two which contain the Rilda Canyon tract.

Response 19-26

None of the alternatives as proposed would locate any ancillary facilities within the A-5 portion of Huntington Canyon (Unit A-5 is a visual corridor through Huntington Canyon that consists of the area visible from State Highway 31). Therefore, the analysis given in the DEIS that development of the Rilda Canyon tract would not significantly impact visual resource values is correct.

Response 19-27

The text has been revised to indicate long-term effects on paleontological resources.

Response 19-28

Paragraphs one and three of this comment have been edited and placed in the text. The figures used in the DEIS regarding travel on Highway 31 west of Huntington (Tables 4-11, 4-24, 4-37, and 4-50) were developed in close cooperation with the Utah Department of Transportation. These figures while different than the ones you use can be documented and are used in the FEIS.

Response 19-29

See Response 19-26 above.

Response 19-30

The analysis on page 205 of the DEIS assumes loss of natural or agricultural productivity for lands occupied for housing or support facilities. The statement on page 224 is part of a summary of impacts from the EIS prepared by GS for coal development in the Central Region of Utah. Their assumption was that half of all lands used for community development would be occupied by structures or hard surface.

Response 19-31

The text has been revised as suggested.

Response 19-32

The text has been revised to state "National Forest land".

Response 19-33

The text has been revised.

Response 19-34

A meeting was held on December 11, 1980 with representatives of the Southeastern Utah ADG and the Emery County Commission to consider their comments and determine ways to improve the socioeconomic analysis. Numerous other socioeconomic comments have been submitted and responded to. Text changes, where appropriate, were made for specific comments.

Response 19-35

Due to various problems associated with the GS drilling program on the North Horn Mountain area, the entire program was not completed in the field season of 1980 as was previously planned. The progress that was made will lend itself considerably towards completing the program in the 1981 field season. The Regional Coal Team in their meeting of December 16, 1980, recognized this problem and took steps in preliminary lease sale scheduling to delay tract offering until February, 1982. The tract offered for lease will be within the parameter of those assumptions made in the DEIS. For this reason, we do not anticipate any need to adjust the ranking of the North Horn tract or its inclusion in the various alternatives.

Response 19-36

No decision had been made relative to the proposed UP&L exchange at the time this FEIS was printed. Therefore, we see no need to make any adjustments in Alternative Three. This alternative describes a potential level of development which could be satisfied either through competitive leasing or by consummation of the exchange or a combination of both.



United States Department of the Interior
 OFFICE OF SURFACE MINING
 Reclamation and Enforcement
 WASHINGTON, D.C. 20240

20

DEC. 1980

Memorandum

To: Director, Bureau of Land Management

From: Director, Office of Surface Mining

Subject: Review of Draft Uinta-Southwestern Utah Regional Coal Environmental Impact Statement

The Office of Surface Mining has reviewed the above document and we have the attached specific comments for transmittal to your Salt Lake City office for consideration in preparing the final environmental statement.

Enclosures

Chapter 1:

- 1 Page 1 - A statement reflecting the present coal production in the area as well as the existing coal tonnage on existing, undeveloped leases would be appropriate to "The Need for Leasing in the Region" section. This would enable a more accurate assessment of the actual leasing for the region.
- 2 Page 5 - There is a need for a clear base map with proposed lease tract boundaries overlaid in order to accurately assess the various alternatives. It would be best if such a map was provided in each alternative discussion showing only those tracts proposed in that alternative.
- 3 Page 10 - There should be a map and discussion of approved and pending mines in the area in relation to new proposed leasing. This map should also depict existing, undeveloped leases.

Chapter 2:

- 4 Page 13 - How do the alternatives relate to existing production in terms of meeting production goals?

Chapter 3:

- 5 Page 77 - A statement addressing possible alluvial valley floor (AVF) status of Muddy Creek may be necessary. There are 180 acres of irrigated croplands on the Emery North tract, of which 110 acres would be disturbed by surface mining. Has Muddy Creek been evaluated for AVF status?
- 6 Page 77 - The serious deficiency in spring and seep data on the Wasatch Plateau decreases the accuracy of impact assessment not only for winter resources but for other resources, such as wildlife, as well.
- 7 Page 85 - Does the Blackhawk formation in the Slaughterhouse Canyon tract contain known significant paleontological resources? What is the data base for fossils; i.e., literature, percentage inventory?
- 8 Page 89 - The restricted threatened and endangered plants section should have some discussion of Astragalus subincanus var. basalticus, A. chloodeus, and possibly Scierocactus wrightii to indicate that these species have been considered.
- 9 Pages 94,95,97 - The maps on these pages are very hard to decipher. Certain species' ranges are not clearly visible and one cannot determine where important ranges are for particular species.
- 10 Page 99 - The lack of reference to native fisheries should be corrected. Game fish do not occupy a higher or more important slot than native fish. In fact, sports fishery information may be more or just as appropriate under recreation while the wildlife section is incomplete without a discussion of native fisheries.

- 11 Page 110 - The final EIS should reference the "BLM Intensive Wilderness Inventory, Final Decision on Wilderness Study Areas, Utah, November, 1980".
- 12 Pages 71 - 126 - Does the description of the existing environment include the present impacts of existing mines?
- Chapter 4:
- 13 Pages 127 - 244 - Have the potential impacts of mines pending approval been factored into either this or the preceding chapter?
- 14 Page 128 - Are there, in fact, any air emission permits available to new mine developers? If not, how does this affect the probability of new mining?
- 15 Page 132 - The statement that no impact would occur to the regional groundwater system needs some explanation to clearly illustrate that the development of, and production by, 14 existing, 10 pending, and up to 11 new mines will not cumulatively create regional impacts.
- 16 Page 132 - It seems probable that subsidence could cause waters of different aquifers to co-mingle. This possibility should be discussed.
- 17 Page 133 - If 288.3 million tons of unrecoverable coal in the Wasatch Plateau represents 50% of the total coal resource, that resource equals 576.6 million tons; if it represents 10%, then the total coal resource equals 2883.0 million tons; neither figure matching that given on page 85 of an in-place resource of 468.9 million tons of which only 87.5 million tons are recoverable. This error is repeated for the Emery Coal Field and throughout each alternative. Furthermore, the table (3-9) depicting coal resources is unclear and could use footnotes defining such terms as "Reserves".
- 18 Page 133 - The statement "Significant disturbance to other scientifically important fossils . . . would most likely not occur." should be supported with some explanation.
- 19 Page 139 - Although a one percent loss of irrigated cropland may not be significant as a single event, in combination with other losses the significance may increase dramatically. Have these and other impacts been considered cumulatively?
- 20 Pages 130 - 157 - Is it realistic to consider an increase in consumptive use of 1,159 acre-feet by the year 2000? Is this water uncommitted?
- 21 Page 160 - If the statement that "The growth in population . . . would be irreversible." is based on the assumption that this population will be sustained indefinitely through second-round leasing, this should be stated as an assumption. If it is not so based, then the statement would seem to be incorrect.
- 22 Page 168 - The potential losses and disturbance to elk and moose seem significant enough to warrant specific mitigations. These mitigations should cover all relevant alternatives.
- 23 Page 178 - Adding 800 people to the small town of Huntington (population 2,363) represents a 34 percent increase. This would seem to be a significant increase and could cause serious impacts.
- Response 20-1
Data reflecting coal tonnage on existing, undeveloped leases have not been determined. However, it is known that as of September 30, 1979 there are 201 Federal leases in the State of Utah totaling 7,720.28 million tons of in-place reserves. Of this amount, 267.25 million tons are considered recoverable by surface methods and 2,977.62 million tons are recoverable by underground methods. For the entire Uinta-Southwestern Utah Coal Region, the figures are 262 leases totaling 9,714.71 million tons of in-place reserves, of which 279.58 million tons would be recovered by surface methods and 3,759.35 million tons by underground methods (USD, 1979). This information has been added to the text.
- The need for leasing was based on the leasing target developed by the Regional Coal Team. The basis for and methodology used to develop the target is presented in Appendix 1. The specific figures suggested for inclusion are found on page A1-7 of the DEIS.
- Response 20-2
A new base map has been prepared and included in the FEIS. It depicts existing leases, PRLAs, proposed lease tracts, and existing mines.
- Response 20-3
A map has been added in the FEIS that shows existing Federal leases, PRLAs and proposed lease tracts. The relation of proposed lease tracts to existing operations is discussed in the description of the alternatives.
- Response 20-4
Most of the required production increase is expected to come from existing leases and fee land. The preferred alternative, if adopted, would meet about 4.5 of the estimated 5.5 million tons per year shortfall. The remainder could be met by future lease sales including tracts outside the area included in this EIS.
- Response 20-5
The Muddy Creek was evaluated by BLM for both alluvial valley floor and floodplain status in the area where the Emery North tract is crossed. A floodplain has been identified and appropriate protective stipulations developed. It was determined that no alluvial valley floors exist in the area of the tract. The text has been revised to include a negative declaration for alluvial valley floors.
- Response 20-6
Page 83 of the DEIS refers to an intensive spring survey completed in the East Mountain area by GS and Utah Power and Light personnel in 1979. One hundred and two springs were located, measured, and mapped. The remainder of the Wasatch Plateau has been inventoried in a much more general manner. This information is available at the Forest Service office in Price, Utah. It is believed sufficient data are available to support the analysis contained in this EIS.
- Response 20-7
There has not been a thorough and extensive paleontological survey conducted on the Blackhawk Formation; however, there have been some independent studies which indicate what type and kind of fossils are expected to be found in the Blackhawk Formation. References were included on page 85 of the DEIS. There is no reason to believe the fossil content of this formation in the Slaughterhouse Canyon tract is different from the rest of the Blackhawk Formation on the other tracts.
- Response 20-8
All threatened or endangered plants thought to exist in the area were considered. No officially listed or candidate (see definition on page 91 of the DEIS) species were found on the tracts other than the candidate endangered species *Townsendia aprica* which was found in the area of the Emery South tract. Consideration was given to *Astragalus subcinereus* var. *basaltecus*, *A. choodeas* and *Sclerocactus wrightii*, none of which would be impacted by any of the alternatives.

Response 20-19
The text makes these points: (1) less than 1 percent of irrigated cropland would be lost; (2) this would be mainly high quality cropland; (3) high quality cropland is only a small percentage of total cropland. This builds a case for the small amount of lost land to be a significant loss because of its quality and scarcity.

Cumulative impacts of coal leasing plus baseline development may be obtained by combining the impacts of the alternative being considered to the impacts identified in Alternative Five which is a projected baseline without additional Federal coal leasing. In the case of cropland loss (converted and retired) Table 4-5 shows for the year 2000 a baseline loss of 577 acres in Carbon and Emery Counties and an additional loss from the high level leasing alternative (Alternative One) of 302 acres for a "cumulative" total of 879 acres or about 1-3 percent of the two-county total irrigated cropland.

Response 20-20
All the water is committed as is stated on page 83 of the DEIS. The willingness of people to sell or lease their water rights to the coal industry and municipalities would determine what would happen. However, sufficient water is in the area to accommodate the anticipated increased consumptive use.

Response 20-21
For analysis purposes assumptions were made (page 127 of DEIS) to facilitate prediction of impacts. Since impacts beyond the life of the mine are not analyzed, such an assumption is not warranted. However, based on the potential for additional mining and industrial growth in the region, the population growth associated with this proposal would not be reversed.

Response 20-22
The Forest Service has proposed mitigation measures to protect elk winter range on Horn Mountain and elk migration routes from North Horn Mountain (see Letter Comment 19-9). These measures would probably become stipulations on those leases where the Forest Service is the surface manager.

The Utah Division of Wildlife Resources has adjusted their figures on moose range (reduced from 983,000 acres to 981,130 acres) and potential population for the area (2,000 to 487). In the light of these changes, the displacement of moose predicted in this EIS may not be significant in the near future. When mine plans are submitted for approval, site specific mitigating measures could be stipulated to eliminate or minimize impacts to riparian habitat utilized by moose.

Response 20-23
The population increase of 800 as shown on page 178 was an error, and the text has been revised. The figure should have been 416 as shown in Table 4-21, page 175. This would mean a 24-percent increase over the 1978 population in Huntington. This would translate to an annual growth rate of 1 percent between 1978 and 2000.

Response 20-9
The maps referred to have been revised to make them more legible.

Response 20-10
The text has been revised to include native fish.

Response 20-11
The FEIS has been revised to incorporate the November 1980 decision on Wilderness Study Areas (WSAs) in Utah. It should be noted, however, that the actual number of WSAs in the Four-County region and in Garfield County will not be final until all official protests and appeals have been resolved.

Response 20-12
The Description of the Existing Environment includes mines currently in production. Chapter 4, Environmental Consequences, Alternative Five, discusses impacts of current mining operations and those planned on existing leases through the year 1990.

Response 20-13
See response 20-12 above.

Response 20-14
PSD permits for major emitting facilities are presently issued on a first come-first served basis by EPA. Suspended particulates from fugitive dusts related to surface mining facilities do not fall under the PSD regulations. It is doubtful that SO₂ and TSP emissions from underground mine operations would be sufficient to fall into a major emitting category. Construction permits are also issued by the State Air Quality Bureau on a first come-first served basis. The construction permit would require best available control technology and insure that secondary NAAQS are complied with. Therefore, it does not appear that either of these processes would affect the probability of new mining.

Response 20-15
The EIS concludes that water use by existing or proposed mines along with the leases discussed is low when compared to water demands that would result from increased populations living in nearby communities. It is not believed that the amount of water used by these mines would affect the regional water table because of the low use of water anticipated to support new mine development and no evidence of regional impacts from existing mining in the area.

Response 20-16
On page 132 of the DEIS, co-mingling of water is referenced by the statement "perched water would probably drain through the rubble down to the working level of the mine."

Response 20-17
The text has been changed to correct the inconsistencies you mention. The 282.9 (not 288.3) million tons of unrecoverable coal in the Wasatch Plateau represents approximately 60 percent of the total resource meaning that some 187.8 million tons would actually be recovered. No surface mining would occur on tracts located in the Wasatch Plateau KRCRA.

Coal tonnages listed for the three Emery tracts have been reevaluated and adjusted. The definitions for "demonstrated reserve base" and "inferred resources" are listed in the Glossary.

Response 20-18
The sentence has been changed from "would most likely not occur" to "could also occur".



United States
Department of
Agriculture

Soil
Conservation
Service

4012 Federal Building
125 South State Street
Salt Lake City, UT 84138

21

December 8, 1980

Mr. Ron Bolander, Team Leader
Bureau of Land Management
136 E. South Temple
Salt Lake City, UT 84111

Dear Mr. Bolander:

My staff has reviewed the Uinta-Southwestern Utah Coal Region Draft Environmental Impact Statement. Most of the areas where SCS has interest and/or expertise have been adequately addressed. We submit the following comments to assist you in preparing the Final Environmental Impact Statement:

1. There is no indication of whether any of the farmland is prime which will be taken out of production by loss of the irrigation water supply or urban expansion due to coal development.
2. Consideration should be given to revegetating lands which loose their irrigation water supply with native species which can survive without irrigation. Otherwise serious erosion may occur on these lands.
3. There should be some indication of methods that will be used to control erosion during disturbance. The reclamation following disturbance is adequately addressed.

We appreciate the opportunity to review and comment on this Final Environmental Impact Statement.

George D. McMILLAN
GEORGE D. MCMILLAN
State Conservationist

U.S.D.A., Soil Conservation Service, Salt Lake City, Utah

Response 21-1

The text has been revised to state that some prime farmland could be included in the retired and converted acreage. Where and how much prime land could be included cannot be identified since it would be possible to avoid such acreage with wise planning.

Response 21-2

Concerning agriculture lands retired due to lack of water the text has been revised to include: Acreage retired for lack of irrigation water could be retained as productive agricultural land by using a rest-rotation pattern that would grow irrigated crops on a bi-yearly basis, alternating with acreage for which water is available.

Since these are private lands the future use and care of the affected lands would be at the discretion of the individual landowners.

Response 21-3

Mitigating measures that would become stipulations for granting of leases include measures to control erosion during disturbance (see Mitigating Measures 7, 10, and 18). See also Erosion and Sediment section page 132 of the DEIS for regulations pertaining to erosion on disturbed areas. Specific erosion control methods would be part of the mine plan submitted prior to mine development and will be in accordance with all applicable State and Federal regulations.





United States Department of the Interior
 NATIONAL PARK SERVICE
 ROCKY MOUNTAIN REGIONAL OFFICE

655 Park Street
 P.O. Box 25287
 Denver, Colorado 80225

22

IN REPLY REFER TO

L7621 (NR)PC

DED 0 1300

Memorandum

To: Team Leader, Utah State Office, Bureau of Land Management,
 Salt Lake City, Utah

From: Associate Regional Director, Planning and Resource Preservation,
 Rocky Mountain Region

Subject: Review of Draft Uinta-Southwestern Utah Coal Environmental Impact
 Statement (DEIS)

We have reviewed the subject document and offer the following comments.

1 The National Park Service supports the Bureau of Land Management's preferred alternative two. However, there is little justification provided for that choice in the DEIS. We recommend that the reasons for choosing alternative two should be presented and expanded clearly.

2 Map presentation is weak. The only regional map (page 5) does not show the proposed lease tracts and the detailed maps (Figures 1-4, 2-1, 2-6, 2-9 and 2-12) do not provide a basis for locating the tracts on the regional map.

3 The air quality impact section is also weak. As the report states, no modeling was performed to estimate impacts. Rather, approximations from other studies were used (page 128). However, the DEIS does not present the numbers which were estimated using these approximations. It is not appropriate to use only data from previous studies without an explanation of why those studies are applicable here. This section deserves more detailed analysis and discussion.

4 No real analysis of the impact on visibility in Class I areas such as Capitol Reef National Park or Canyonlands National Park has been performed. We recommend a more detailed discussion of the regional air quality effects of this proposal with the existing and future proposals for mine and coal treatment/use in the area.

The inclusion of the Utah Power and Light Company preferential rights exchange complicates the environmental statement. Two alternatives on the Utah Power and Light PRLA allow for either exchange or no exchange which requires a



5 description of the Kaiparowits Plateau area under environmental consequences if the no exchange alternative is chosen. The no exchange alternative would grant tacit environmental approval for development of the Kaiparowits lenses. This conflicts with the original premise of the Regional Coal Team, which was to restrict the 1981 leasing to the Wasatch Plateau-Emery area.

6 Page 2, right-hand column - The Office of Surface Mining should be listed as represented on the Regional Coal Team.

7 Page 67, right-hand column - Decision on Utah Power and Light exchange must be made by December 1, 1981. This will impact the leasing process which is to be initiated in July, 1981.

8 Page 231, right-hand column - Challenge the statement that visibility would not be significantly impaired in any Class I area by Utah Power and Light's operation in Kaiparowits. As an 18 MTY portion of a total 84 MTY production, visibility would definitely be affected in Class I areas.

9 The Emery-South lease area was originally proposed for surface mining but now is shown for underground mining only.

We appreciate having the opportunity to review and comment on this document.

Richard A. Strait
 Richard A. Strait

U.S.D.I., National Park Service, Denver, Colorado

Response 22-1

As discussed on page 50, of the DEIS, Alternative Two is preferred because it would allow flexibility in meeting the established leasing target. It also offers clearly competitive potential leases as well as tracts that would benefit existing operations. The text in Chapter 1 has been expanded to fully discuss the target and its relationship to the alternatives.

Response 22-2

A regional base map has been prepared and included in the FEIS. The map depicts existing Federal leases, PRLAs and the proposed lease tracts in Utah.

Response 22-3

As indicated on page 128, the DEIS related the analysis made of similar mine type, production levels, areas of disturbed surface, wind speeds, etc. in studies done by Pedco, Radian Corp., and Aerovironment for the Green-River Hams Fork EIS (001 1980). It is true that this type of analysis is less than desirable and was considered as a first approximation. The FEIS has refined and strengthened the analysis by addition of specific analyses done for 8LM by Radian Corp.

Response 22-4

A more detailed discussion of regional air quality effects on air quality and visibility impacts to Canyonslands and Capitol Reef National Park has been included in the FEIS using analyses that have been completed since the DEIS. The vistas studied were selected after consultation with the NPS air quality group in Denver.

Response 22-5

This statement is generally true; however, the intent of the Federal Coal Management Program is concerned with the competitive leasing of coal whereas the processing and issuance of PRLAs is just one part of the overall program and is not necessarily the consideration under an activity planning effort for competitive coal leasing. The Federal Coal Regulations state that as a matter of policy, the Department of the Interior shall complete processing of all preference right lease applications by December 1, 1984. Furthermore, failure to consummate the proposed UP&L exchange would not necessarily lead to approval of Utah Power and Light's PRLAs on the Kaiparowits Plateau. Processing of the PRLAs would be conducted in accordance with existing laws and regulations.

Response 22-6

The text has been changed to include the Office of Surface Mining (OSM) as being represented on the team as an ex-officio member.

Response 22-7

The decision on the UP&L exchange must be made by December 1, 1981 according to the agreement signed by the parties involved (Appendix 2). It is hoped that a decision on the exchange can be made before that time to allow the lease sales, if any, to proceed on the three tracts involved if the exchange is not consummated.

Response 22-8

To 8LM's knowledge, there are no studies which give evidence that visibility in Class I areas would definitely be affected from the development of an 18-MTY operation by UP&L on the Kaiparowits Plateau. The PRLA is part of the 84 MTY scenario addressed in the Kaiparowits Coal Development and Transportation Study (ERT August 1980). The study did identify that with 88 percent mitigation, visual range would be reduced to 177 km (110 miles) for the Bryce Point to Havajo Mountain Vista with no effect on other vistas in the study area. It is not certain what contribution the PRLA would have to this total impact but it was assumed to be small. The text has been modified to reflect this uncertainty.

Response 22-9

The Emery South tract is located within the boundaries of a BLM designated scenic corridor along Interstate-70. Surface mining operations would not meet BLM's visual management objectives within this corridor. To avoid visual conflicts within the corridor, the Geological Survey determined that the coal could be economically mined from the tract by underground methods, although the amount of coal recovered would be approximately 5 million tons less.

23



United States Department of the Interior

FISH AND WILDLIFE SERVICE
AREA OFFICE, COLORADO-UTAH
1311 FEDERAL BUILDING
125 SOUTH STATE STREET
SALT LAKE CITY, UTAH 84143

December 11, 1980

IN REPLY REFER TO:

MEMORANDUM

TO: Director, Bureau of Land Management
Salt Lake City, Utah
Attention: Ron Bolland, Team Leader

FROM: Area Manager, Fish and Wildlife Service
Salt Lake City, Utah

SUBJECT: Draft Uinta-Southwestern Utah Regional Coal Environmental Impact
Statement--Fish and Wildlife Service Review and Comments

Since the Fish and Wildlife Service was a direct participant in the preparation of this statement, the presentation of fish and wildlife resource information and evaluation of potential impacts by the proposed action have been addressed to our satisfaction.

We have one reaction to the overall statement. One of the Service's greatest concerns is the continuing additive impacts of growth and development upon the base wildlife resource. It is difficult to extract from the document a clear indication that there was an assumed base impact from ongoing and planned coal mining operations and that the proposed action would further reduce the base fish and wildlife resource available. The general public and decision-makers should be well aware that past, present and future decisions by those individuals can result in an impact grouping that can seriously reduce the ability of those resources to provide for desired human utilization.

U.S.D.I., Fish and Wildlife Service, Salt Lake City, Utah

Response 23-1

The concern over cumulative impacts of past, present, and future actions is a valid one. Your comment is noted and will be considered in the decision-making process. The predicted base impact from ongoing and planned coal mining operations (baseline) is presented in Alternative Five. Impacts from other projects initiated since the passage of NEPA are documented in other EISs. The primary reason for this EIS is to clearly analyze the cumulative impacts that would result from the various alternatives so the decision makers can evaluate the implications of approval or denial of these proposed leasing actions.

24

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
1860 LINCOLN STREET
DENVER, COLORADO 80295
DEC 24 1980



Ref: 8W-EE

Mr. Ron Bolander
Team Leader,
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111

Dear Mr. Bolander:

The Region VIII Office of the Environmental Protection Agency has reviewed the draft Uinta-Southwestern Utah Regional Coal Environmental Impact Statement and offers the following comments. EPA would prefer BLM select Alternative 3 to lease three new tracts near Price, Utah and approve the Hollberg PRLA. Additional analysis is necessary to verify whether possible loss of water supplies and effects of toxic heavy metals will be as minimal as BLM now predicts. EPA recommends that other leasing be delayed pending a revision of the EIS to thoroughly evaluate these issues.

Adverse effects and disruption of water supplies may result from underground mining in this area of fault-controlled geology. Although specific monitoring plans and mitigation can and should be developed during the mining plan stage, EPA believes a more thorough investigation at this time might affect lease boundary determinations. BLM recognizes that tract boundaries are still subject to change based on additional exploratory drilling and surveys. Since it is not desirable to lease major fault areas, such detailed work at this point could avoid future problems by avoiding leasing where water supply conflicts exist. This is particularly needed for the proposed Cottonwood Canyon, Gordon Creek, Miller Creek, Tucker Canyon and Rilda Canyon lease tracts. EPA is also concerned about possible disruption of the saline Mancos Shale above the coal on the Hollberg PRLA.

Current water quality along the Wasatch Mountains shows high levels of toxic metals, particularly mercury, selenium and arsenic. EPA has recently published criteria recommending permissible pollutant concentrations for these elements and other toxic substances to protect freshwater aquatic life and human health. (See "Publication of Criteria Summaries for 65 Consent Decree Toxic Pollutants", Federal Register, November 28, 1980, copy enclosed).

Some segments of these streams contain toxic concentrations in excess of these recommendations. Because past, current and future mining activities are possible sources of such metal toxics, an evaluation of any public health risk is warranted. An evaluation of possible mining effects on water quality could include mass balance transport estimates and soil and overburden elutriate tests in an effort to predict the fate of these heavy metals. It is likely such information will be incomplete given the general state of the art in this field, therefore an analysis of potential risks as described in the CEQ regulations under 40 CFR Part 1502.22 would suffice.

EPA commends BLM's proposal to require a lease stipulation that roads be located at least one quarter mile from perennial streams to avoid pollution from accidental spills, fugitive dust or coal fires. EPA suggests this requirement include ephemeral streams and that any variance to this only be granted where such separation can not be achieved due to the topography. If a smaller buffer zone is allowed, best management practices such as berms should be constructed.

Due to the lower quality coal at Emery North and Central, difficulties of surface mine reclamation, disruption of the hydrology and floodplain of Muddy Creek, the presence of Mancos Shale above the coal seams and other environmental consequences, EPA agrees with BLM that the Emery lease tracts are not desirable lease areas. Because Slaughterhouse Canyon is such a small reserve and possible mountaintop removal is both aesthetically displeasing and might create sedimentation problems within the Scofield Reservoir drainage, we agree with BLM that this area should not be leased. EPA also suggests that consideration be given to withholding lease approval at this time for the Tucker Canyon tract since it is adjacent to recreational development and visible from Scofield Reservoir. The extremely small size of this reserve indicates it could not significantly assist in meeting DOE coal lease targets in any event.

Based upon the criteria EPA has established to rate draft EIS's, EPA rates the selection of Alternative 3 in Category LO-2. Due to possible water quality concerns, EPA rates the selection of the preferred Alternative 2 in category ER-2. This means EPA has no objection to the selection of Alternative 3 and requests some additional information regarding those tracts. If BLM selects Alternative 2 as proposed, then EPA maintains environmental reservations pending the outcome of the additional water quality studies as requested.

Please contact Weston Wilson of my staff at FTS 327-4831 in order to arrange a meeting to discuss these matters.

Sincerely yours,

Robert L. Williams
Regional Administrator

Enclosure



United States Department of the Interior
HERITAGE CONSERVATION AND RECREATION SERVICE

MID-CONTINENT REGION
POST OFFICE BOX 25387
DENVER FEDERAL CENTER
DENVER, COLORADO 80225

25

IN REPLY REFER TO:

DES-80/68

DEC 3 0 1980

U.S. Environmental Protection Agency, Region VIII, Denver, Colorado

Response 24-1

A basic assumption in the evaluation of impacts is that the action would comply with existing laws and regulations. SMCRAs of 1977 part 817 Permanent Program Performance Standards require surface and ground water monitoring (§817.52) and water right replacement (§817.54). Compliance with the existing laws and regulations would avoid or mitigate any problems that develop. However, BLM and GS recognize the need to avoid possible conflicts and have initiated a proposal for ground water modeling in the area. If funded, the study will require over \$500,000 in funding and 3 to 4 years to complete.

The Hollberg PRLA would be an underground mine, therefore, surface disturbance of the Mancos Shale would be much less than if the area were surface mined. Thirty-two acres would be permanently occupied by surface facilities. An additional 77 would be temporarily disturbed. This acreage would be reclaimed as stipulated in a mining plan. It is not believed that measurable amounts of salt would enter any streams.

Response 24-2

Because water quality analyses were performed during the summer of 1979, the new Water Quality Criteria you mention were not available. The subject criteria would be considered in a review of mining plans. It is assumed that SMCRAs and subsequent regulations requiring monitoring and studies would be complied with and water quality in the area would remain at acceptable levels. These requirements would be a part of the mining plan for a given lease.

Assuming that all laws and regulations associated with water quality are adhered to, it has been concluded in the FEIS that trace elements would not pose health problems. It is recognized that accidents could occur, requiring clean up and monitoring as stipulated by State of Utah regulations. A paragraph discussing trace elements has been added to the Environmental Consequences section of the text.

Response 24-3

The perennial streams around on or near the coal tracts are First Order streams at the heads of watersheds. Ephemeral side drainages in the area are of such small nature that they could be considered overland flow. Berms could be required, if needed, based on mining plan review.

Response 24-4

Information obtained from GS subsequent to the OEIS has resulted in increased demonstrated in-place reserves on the Slaughterhouse Canyon tract from 2,190,000 tons of coal to 5,550,000 tons. The tract is now identified as best suited for underground mining. This would eliminate nearly all visual impact and sedimentation concerns that existed with formerly proposed surface mining. EPA's suggestion that Tucker Canyon tract be withheld from lease approval at this time will be included in the Secretarial Issue Document (SIO) submitted to the Secretary of Interior. EPA's opinion that Emery North and Emery Central tracts are not desirable lease tracts will also be included in the SIO.

To: State Director, BLM, Utah
Attention: Ron Bolander, Team Leader
From: Assistant Regional Director, Land Use Coordination
Subject: Review of the Uinta-Southwestern Utah Coal Region
Draft Environmental Impact Statement

Cultural resources are not renewable, and protection of these resources is becoming increasingly important because of the major projects (such as, coal mining, hydroelectric projects, and the MX Missile) being planned for Utah and neighboring states. For this reason, impacts from coal development in the Uinta-Southwestern Utah area should not be considered in isolation, and every effort to avoid all adverse impacts should be made.

Approximately 5 to 10 percent of the area has been intensively evaluated for cultural resources. This evaluation has shown a high potential for cultural resources in some areas being considered for development. Based on the low percentage of area currently evaluated and the high potential for cultural resources, BLM should conduct further surveys and evaluation of cultural resources under National Register criteria for compliance with the National Historic Preservation Act of 1966, as amended. Further, protection of all important cultural resources is required by the National Environmental Policy Act of 1969. Adequate identification and evaluation of cultural resources should be completed prior to a decision on an alternative.

Robert J. Arkins
Robert J. Arkins

U.S.O.I., Heritage Conservation and Recreation Service, Mid-Continent Region,
Denver, Colorado

Response 25-1

The identification and evaluation of all cultural resources prior to a decision on an alternative would be costly and impractical. Some 37,000 acres would need to be intensively surveyed and many identified cultural resource sites test excavated. Therefore, to insure compliance with pertinent laws, a Coal Programmatic Memorandum of Agreement was developed between the President's Advisory Council on Historic Preservation, OSM, BLM and the State Historic Preservation Officer. This agreement outlines protection procedures which would be instituted for all potential National Register sites prior to development of any of the proposed alternatives. See the Mitigating Measures section of the FEIS for additional measures designed to protect cultural resources.

PUBLIC HEARING COMMENTS AND RESPONSES

Public hearings were held during the Draft EIS comment period as follows: Escalante, Utah (November 18, 1980); Castle Dale, Utah (November 19, 1980); Price, Utah (November 20, 1980); Salt Lake City, Utah (November 21, 1980). Speakers at the public hearings are listed in order of appearance. Verbatim transcripts were made at each hearing and are available for review at the BLM Utah State Office. The transcripts are not reproduced here in their entirety, but substantive comments are excerpted and BLM responses are adjacent.

Some speakers presented typed copies of their oral comments or letters during the hearings. These copies and letters are included as exhibits associated with the public hearings. The exhibits are located after the respective oral comments from each hearing. Where letters were received that reiterated oral testimony, the reader is referred to the preceding Letter Comments and Responses section for the BLM response.

ESCALANTE PUBLIC HEARING

SPEAKER

1. Wallace R. Woolsey
2. Robert L. Gouling, Principal Escalante High School
3. Dale Marsh, Mayor Escalante
4. Dell LaFever, Garfield County Commission
5. Wayne H. Banks, Escalante Community Council

Exhibit 1 - Letter from Concerned Citizens of Escalante, Utah
(Responses required)

Comments and Responses follow

1. Woolsey, Escalante Testimony

EH Comment 1-1

I feel that I'm completely against the transfer of these leases.

EH Response 1-1

Your comment has been noted and will be considered in the decision making process.

EH Comment 1-2

Now, I specifically call your attention to about three items. Number one, it would be, in my opinion, incompetent for a group of people to allow leases to be moved from an area that is not overpopulated into an area that is already congested. Problems will be created by overpopulation. To allow these leases to go into the Emery County area, Castle Dale and that area up there, would just further complicate the living conditions of that area. I think it's ridiculous that this should be allowed to happen.

EH Response 1-2

The socio-economic impacts associated with development of the three tracts were identified in the proposed UP&L exchange discussed on pages 185 through 205 of the DEIS. These impacts will be considered in future decisions on coal development in the area of concern.

EH Comment 1-3

Number two, in this area, in the Escalante area, these leases would present to us an increase of population. For instance, in our school -- this is about to be closed for lack of pupils -- we could accommodate probably several hundred in our school without even any improvement; not counting the community situation. So, it could be improved.

EH Response 1-3

The current situation with Escalante High School was noted on page 123 of the DEIS. The impacts on the Garfield County area were discussed on page 231 of the DEIS. The impacts on the local school system and community if the PRLAs were developed were discussed on pages 236 through 238.

EH Comment 1-4

I think that these two items alone should allow a basis for the exchange of these lease holds not to happen. I question the law that allows these to be moved in the first place.

EH Response 1-4

Consideration of the proposed exchange was made possible in October of 1978 when Congress amended the Mineral Leasing Act of 1920. Following this an agreement between UP&L, BLM, and FS was prepared on how to proceed with consideration of the exchange. A copy of that agreement is located in the appendix of both the DEIS and the FEIS.

2. Goulding, Escalante Testimony

EH Comment 2-1

That is to reiterate something that Mr. Woolsey indicated earlier, that we do face some reductions, at least in the pupil population in our high school, over the next couple of years due to the imbalance of retired folks in our community versus the young couples with school-age children.

I am for anything that we can do to help develop our Escalante area and bring some industry, some development, any type of work that would help us build the population in our area. We could, as Mr. Woolsey indicated, use another hundred students here without making any improvements at all. If we were to have more than a hundred students, obviously the population would have to be such that we could bond for a new building or some new facilities, and so forth, to take care of that increased influx of students.

We have a little bit of background information regarding the student population here. Two years ago we had a student population of 104. I'm talking about seventh grade through twelfth grade. This year our enrollment was 75, exactly 75 in the seventh through twelfth grades. I have a projected enrollment for the year 1972 of 60 students, seventh through twelfth.

EH Response 2-1

Declining school enrollments in the Garfield School District (particularly in Escalante) were pointed out in the DEIS on page 123. Mr. Henry Jolley, Superintendent of Schools for Garfield County, in a personal communication on August 18, 1980, estimated that the District has been losing pupils at the rate of 2 to 3 percent per year.

EH Comment 2-2

So, as you can see we're losing students at a rather rapid rate. With losses of students, obviously we lose teachers. With the loss of teachers, you lose quality of education; you lose the experiences that the students from the larger areas are granted, shall we say, the education that we just are not able to give with five teachers or four teachers, or whatever the case may be. At the end of this school year we will automatically lose one teacher, one full-time teacher. I don't know how many of you are aware of that, but that's due to the loss of students.

Our State funds the students for the teachers by the number of students you have in the school, and when you lose the students you lose a teacher.

EH Response 2-2

The text on page 123 was expanded to recognize that student enrollment decline causes reduction in school funds appropriations.

3. Dale Marsh, Mayor of Escalante, Escalante Testimony

EH Comment 3-1

I'm mayor of Escalante and I would like to say that the majority of the people are opposed to any transfers of the Utah Power & Light coal leases out of the area because we think these things should be utilized in our own area and to further develop the communities that are surrounding; because this coal development will not only improve our communities, but there are also about five or six communities close enough that it would also utilize employment and have things that would better their conditions also.

EH Response 3-1

Your comments have been noted and will be considered in the decision making process. The impacts to Escalante and surrounding communities resulting from development of the PRLAs have been analyzed. This analysis is found on pages 236 through 238 in the DEIS.

EH Comment 3-2

I would like to point out some of the things that could happen in our socioeconomics that would improve the conditions, that would point out the way that we are ready for any type or goals that would come to our area.

Water: The Town of Escalante has been approved by the FHA for a loan to upgrade the current culinary water system. We have just completed taking in new springs, new houses; but now we have a loan to entirely upgrade the entire town's water system where we could handle any current growth in population.

We also have plans that are already under way, and the engineering companies have already established the plans for a new sewer.

The New Escalante Irrigation Company is currently under negotiation with the Water Resources to put the entire irrigation distribution system into a gravity-flow system. This will enable a 50-percent conservation of the water use. This surplus water could, then, be put to other uses.

The Pine Creek Irrigation Company, with the help of Water Resources, is currently seeking to develop their entire system from the source to maximum efficiency, thus generating hydroelectric power through this new system that they're looking forward to.

EH Response 3-2

On page 123 of the DEIS it was pointed out that all communities in Garfield County either have or are constructing an adequate water system. The need for a centralized sewage treatment facility was discussed on page 238 of the DEIS.

The text has been revised to identify the FHA loan, the Escalante Irrigation Company negotiations and the Pine Creek Irrigation Company proposal.

EH Comment 3-3

Land: Several hundred acres of land now exist within and adjacent to the Town of Escalante city limits. This acreage has never been used for agriculture purposes. Ideally it could be used for future residential development without any land now being used for agriculture.

EH Response 3-3

The DEIS portrays a "worst case" situation for use of agricultural land based on the following:

1. It is assumed that one-half of community growth would occur on non-agricultural lands such as those described above;
2. Whether limited or plentiful, agricultural lands tend to be desirable lands for housing development;
3. There are no legal constraints that assure that agricultural lands would not be converted to community use.

EH Comment 3-4

Schools: Rob just gave you that. It's a well-known fact that our local schools are suffering from lack of enrollment.

EH Response 3-4

See comment 2-1 above for the Escalante public hearing.

4. LaFever, Escalante Testimony

EH Comment 4-1

Garfield County Commission is definitely against trading coal leases. Reason number one would be that once these coal leases were traded, we're afraid that will be the end of it, and we're desperate for some kind of development in Garfield County.

EH Response 4-1

Your comment has been noted and will be considered in the decision making process. The current economic status of Garfield is discussed on page 123 of the DEIS.

5. Wayne H. Banks, Escalante Testimony

EH Comment 5-1

I'm Wayne H. Banks, and I represent the Escalante Community Council, and I just want to reiterate what Mr. Woolsey and what Mr. Goulding have said, that the community council itself is violently against the transfer of those coal leases for the reasons stated.

EH Response 5-1

Your comment has been noted and will be considered in the decision making process.

ESCALANTE HEARING EXHIBIT NO. 1

Mr. Ronald Bolander
136 East South Temple
Salt Lake City, Utah 84111

Concerned Citizens of Escalante, Exhibit

Dear Sirs:

The citizens of the Town of Escalante have solutions to the problems pointed out by your study.

- 1. Water: (a) The Town of Escalante has been approved by F.W.A. for a loan to upgrade the current culinary water system.
- (b) The New Escalante Irrigation Company is currently under negotiation with the Water Resources to put the entire irrigation distribution system into a gravity pull system. This will enable a 50% conservation of the water use. This surplus water could then be put to other uses.
- (c) The Pine Creek Irrigation Company with the help of Water Resources is currently seeking to develop their entire system from the source to maximum efficiency, thus generating hydro-electric power.

- 2. Land: (a) Several hundred acres of land now exist within and adjacent to the Town of Escalante city limits. This acreage has never been used for agriculture purposes. Ideally it could be used for future residential development, without using any land now being used for agriculture.

- 3. Schools: (a) It is a well known fact that our local schools are suffering from lack of enrollment. Our high school alone could handle 100 new students, without ~~immediately~~ increasing class room space.

To conclude, The Town of Escalante has been denied any of the normal advantages that have been afforded in other areas where coal and energy development are occurring.

Our citizens need and want adequate medical and dental facilities; adequate shopping; adequate cultural development; adequate employment; adequate recreational facilities; but most important an adequate future opportunity for our youth.

Concerned Citizens of Escalante, Utah

Comment E1-1

Water: The new Escalante Irrigation Company is currently under negotiation with the Water Resources to put the entire irrigation distribution system into a gravity flow system. This will enable a 50% conservation of the water use. This surplus water could then be put to other uses.

Response E1-1

See response EH 3-2 of Escalante public hearing.

Comment E1-2

Land: Several hundred acres of land now exist within and adjacent to the Town of Escalante city limits. This acreage has never been used for agriculture purposes. Ideally it could be used for future residential development, without using any land now being used for agriculture.

Response E1-2

Refer to Escalante Hearing Response EH 3-3 above.

Comment E1-3

Schools: It is a well known fact that our local schools are suffering from lack of enrollment. Our high school alone could handle 100 new students immediately without increasing class room space.

Response E1-3

The availability of classroom space in Garfield County and Escalante is discussed on page 123 of the DEIS.

1. E. S. Crawford, Castle Dale Hearing Testimony

CDH Comment 1-1

I have requested, as you know, in the past that any leasing that's done in this area, we would like to have you lease other areas in lieu of those that you have underneath us at the present time.

CDH Response 1-1

It is assumed that this comment is referring to the East Mountain area on the Manti National Forest. At this time, the Federal Government is not proposing any leasing in the East Mountain area where the private surface is underlain by Federal coal. The tracts in the vicinity that are being proposed for lease include Cottonwood Canyon and Meetinghouse Canyon and involve all Federal surface within the Manti National Forest or on public lands managed by the BLM.

CDH Comment 1-2

That being the case, I would just like to say again that I would object to any additional leasing that is taking place until all these provisions protecting property rights and water rights have been initiated and placed in force so the public and private property owners can be properly protected.

CDH Response 1-2

See Response to Castle Dale hearing comment 1-1.

CDH Comment 1-3

I would like to submit that this area is already overimpacted. I'm particularly concerned about the Cottonwood Canyon Portal. As you know, when you held hearings just a little over a year ago on Units 3 and 4, many of the people here tonight and myself testified to the fact that we were very concerned about access through that canyon and future use of the road itself. However, not three months after that hearing an illegal entry was made into the Cottonwood Canyon and is being maintained illegally at the present time.

CDH Response 1-3

Existing impacts to Emery County in lieu of additional leasing are discussed in Chapter 3 (Existing Environment) and Alternative Five of Chapter 4 (Environmental Consequences) of the DEIS. This DEIS does not consider the possibility of an additional portal and associated facilities in Cottonwood Canyon because it appears that Grimes Wash is the most likely location. Another reason is the access problem in Cottonwood Canyon.

CDH Comment 1-4

We would hope that you would take our concerns and our expressions when we come to these meetings and express ourselves more to heart and maybe adhere to some of the things that we are trying to bring out in these hearings.

CDH Response 1-4

The comments and concerns expressed have been noted and in many instances resulted in text revisions in the FEIS. This corrected information will be used in the decision making process and is useful in verifying or updating our data and analyses.

2. Richard E. Walker, Castle Dale Hearing Testimony

CDH Comment 2-1

The major comment which we are concerned with is the repeated use of 1977-78 data to support major recommendations. The data used as population estimates, attitude surveys, status of infrastructure assessments, et cetera, is outdated and as a result it gives false representations of the situation. It appears that much of the information was derived from the Central Utah Coal Environmental Impact Statement of 1978, which is outdated.

CDH Response 2-1

Data for 1978 were used since this was the most recent year for which complete data were available. Baseline population estimates and population impacts were projected with the UPED model. The Southeastern and Six-County Association of Governments assisted in this effort. Most of the information on infrastructure assessments was obtained from local officials such as City Manager, City Recorders, Mayors, etc. Some information was obtained from Utah Community Economics Facts, published by the Utah Industrial Development Division.

CASTLE DALE PUBLIC HEARING

SPEAKER

1. E. S. Crawford
2. Richard E. Walker, Southeastern Utah Assn. of Local Governments
3. Rue P. Ware, Emery County Commission
4. Dan S. Hunter, Emery County Commission

Exhibit 1 - Southeastern Utah Association of Local Governments
(Response attached)

Exhibit 2 - Emery County Board of Commissioners
(Response attached)

Comments and Responses follow

Obviously the preparers should have defined the needs in 1980 terms for planning purposes. Helper, Price and Wellington do not manage waste water treatment systems; it is managed by the Price River Water Improvement District, which in 1980 terms is still several years away from upgrading their plant. The Emery town and Scofield areas are left out of the assessment and will need definite upgrading of their facilities.

CDH Response 2-4

We have incorporated the clarification regarding waste water treatment systems in Helper, Price, Wellington and Emery into the FEIS.

Scofield cannot grow significantly because of permanent sewage disposal problems. Therefore population was not allocated to Scofield and growth is not expected as a result of new leasing of coal.

CDH Comment 2-5

Another important outdated assessment appears on Page 115. Residents are dissatisfied with their recreation facilities. A recent Southeastern Utah Association of Local Governments' attitudes survey in 1980 indicates that a full 86 percent of the citizens feel that area recreation facilities are poor. Also 56 percent of the residents said that recreation facilities should be either first or second priorities for spending of tax dollars.

CDH Response 2-5

The FEIS has been revised to incorporate your concerns. The inference made in the DEIS that residents of the Four-County impact area appear to be satisfied with local recreational facilities was derived from generalized application of data in the Centaur Associates study. In that study, no additional recreational needs were identified by residents of Price, Helper, Wellington and many of the Sevier-Sanpete towns. The generalized application was in error however, especially when applied to Emery County. The residents of towns in Emery County as well as residents of Salina and Gunnison indicated a need for additional facilities. The FEIS incorporates data from the Southeastern Utah Association of Local Government's study, and also lists additional facility needs identified by some towns in the Centaur Associates study.

CDH Comment 2-6

Also on page 102 the assessment of mobile homes versus the housing stock is not representative of the 1980-81 situation. In a recently completed (1980) housing study by the AOG mobile homes constituted 33% of the housing stock in Castle Dale and 50% in Huntington relative to the 51.7 and 58.3 in the study.

CDH Response 2-6

See the response to comment 2-1, Castle Dale Hearing, concerning data year.

CDH Comment 2-7

Many of the statements assume that the impacts from coal mining have been fully investigated. This is a dangerous assumption in that many questions remain concerning the effect of coal mining on interrupted water sheds both surface and ground waters. In the Huntington, Cottonwood, Scofield/Price, Ferron and Muddy Creek watershed the water has extremely important downstream uses, mainly culinary, which must be protected at a higher level than most other waters. As an added factor the mining will occur high in the water shed and will be difficult to control, especially if the consequences have not been adequately defined.

CDH Response 2-7

It has not been assumed that all impacts of coal mining on watersheds and aquifers have been fully investigated. However, we have attempted to utilize all available data to make the necessary predictions of what the results of leasing would be.

Since 1976 BLM has contracted with the GS to do several hydrological studies in the Bookcliff, Wasatch Plateau, and Emery coal fields. These studies are to evaluate the impacts coal mining would have upon the water resources. Reports published to date are: (1) Three-Dimensional Digital Computer Model of the Ferron Sandstone Aquifer near Emery, Utah; (2) Preliminary Hydrologic Evaluation of the North Horn Mountain Coal Resource Area, Utah; (3) EMRIA Report No. 16 Reclaimability Analysis of the Emery Coalfield, Emery County, Utah; (4) Utah Basin-Data Release No. 31 and 32, Wasatch Plateau-Book Cliffs Coal-fields Area, Utah. Reports that are to be published in the en-

CDH Comment 2-2
The population projections are fundamental in the planning efforts surrounding these proposals. It is our conclusion, after reviewing the population projections in the document, that the numbers used for the base numbers are quite conservative relative to the latest numbers which the AOG is using. The Utah State Planning Coordinators Office under special contract with EPA has produced numbers for waste water treatment planning, and the intent is to standardize numbers for all state and federal planning needs. These numbers are based on the UPED Model with some economic data from the local level built in. Even these numbers are conservative, but they are consistently higher than the EIS' baseline. There is a new "high-development scenario" being computerized recently. A copy of the original numbers is included for referencing. Disaggregations are by the AOG. The impacts from these developments will be more substantial if these new numbers are plugged into the models.

CDH Response 2-2

The baseline population projections contained in the DEIS and the baseline population projections developed by the Utah State Planning Coordinators Office are not directly comparable. While both baselines were developed using the UPED model, they were for different geographic areas. The baseline estimates developed by the Office of the State Planning Coordinator were developed for the entire Southeastern Multi-County Planning District (Carbon, Emery, Grand, and San Juan Counties). The baseline was projected for the entire MCD and then disaggregated to the four counties by the Office of the State Planning Coordinator. The disaggregations were based on how each of the four counties grew relative to each other during the years 1970 through 1979. These relative growth trends were extended into the future to disaggregate the MCD projections to the four counties.

The baseline population projections used in the DEIS were developed by the University of Utah also using the UPED Model. The baseline was developed for 16 sub-areas within Carbon, Emery, Sanpete and Sevier Counties. The driving force behind the baseline was assumed employment changes expected to occur in the Four-County area in the absence of further Federal coal leasing. This baseline was developed with the assistance of the Southeastern and Six-County Association of Governments. It should be emphasized that Grand and San Juan Counties were not included in the baseline developed for the DEIS.

The disaggregation from the 16 sub-areas to individual communities was done by the Southeastern Association of Governments for Carbon and Emery Counties, and the Six-County Association of Governments for Sanpete and Sevier Counties.

It should be emphasized that a baseline estimate is not a prediction of the future but an attempt to depict the direction current trends are likely to take with no new major events or changes included.

While a baseline estimate is needed to determine the relative significance of projected impacts, any baseline is somewhat outdated shortly after it is developed because more knowledge about future events is being accumulated continuously. The text notes that uncertainties exist in projecting baseline and expected impacts may or may not occur. Therefore, for local planning needs the actual impacts of a particular alternative are more important because these are the figures that can be added to an updated baseline in the future.

CDH Comment 2-3

Examples of problems with infrastructure status can be seen on Page 102. It states that current levels of police protection is insufficient in all communities except Castle Dale. However, in 1980 Castle Dale disbanded its police force and depends upon the county sheriff just like the other communities.

CDH Response 2-3

The text has been revised to delete the reference to Castle Dale.

CDH Comment 2-4

The following statement appears verbatim on Page 102: "By 1978, additional waste water treatment capacity was or shortly would be required in Helper, Price, Wellington, Ferron, Huntington and Salina."

Anticipated impacts to the watersheds you mention are noted in the EIS. Finally, Chapter 2 lists mitigating measures designed to protect aquifers and watersheds. Other rules and regulations are designed to protect these resources and would be considered during development of a mining plan.

COH Comment 2-8

Waste water is classified as sewage from mining efforts. Some sewage flow is generated by mining; however, it is negligible when compared with water affected by mining either discharged or interrupted by the mining operation and should be dealt with separately in the document.

COH Response 2-8

Mining effluent, sewage from mining facilities and increased municipal sewage due to increased population, have been totaled together to obtain the cumulative impacts to water quality resulting from the implementation of any of the coal leasing alternatives.

COH Comment 2-9

One other general comment is the repeated use of the statement that agricultural land would be permanently lost due to water conversion. This should not be the case if the water sources are managed carefully. It appears, according to our information, that there is enough water available to have communities, agriculture and industry if all users will participate in operating water use and require land use planning practices all to preserve the resources of this area. It can be documented that approximately 60 percent of the water diverted for agriculture is lost either from excess seepage in canals or through inefficient on-farm irrigation practices. Some of the 60 percent is rediverted; however, it appears that significant savings could result if canals were lined and alternative irrigation were developed. This problem should be addressed in the EIS instead of just accepting the loss of farm lands. The lining of canals should have water quality improvements as well.

COH Response 2-9

The text has been revised to indicate that means of reducing loss of agricultural land may be available. However, the analysis has not been changed because:

- (1) It presents the "worst case" situation where there are no assurances that the worst case would not occur;
- (2) All water is appropriated and holders cannot be forced to employ methods of conservation;
- (3) Carbon and Emery County planners cited in the OEIS concur that good quality agricultural land is being subdivided and retired and this action is expected to continue.

COH Comment 2-10

On Page S-2, the assessment of Air Quality relates decreases of air quality to increased population.

This increase will be complicated when related to increased industrial coal burning in associated power plants, et cetera.

COH Response 2-10

It is true that decreases in air quality from mining of coal and related increased population activities would be compounded by whatever coal conversion activities (powerplants, gasification plants, etc.) would occur. The OEIS considered only additional leasing impacts superimposed on the Central Utah Coal EIS (001 1979) as a baseline. The emission sources included Huntington 1 and 2 and Hunter 1, 2, 3, and 4 powerplants and the construction of the Castle Valley Railroad.

COH Comment 2-11

Also on Page S-2, the change of water quality can occur in ways other than simple subsidence. It will be necessary to evaluate the effect of the mining operation on ground water and surface waters before leasing, during mining and after mining during subsidence. The effect of subsidence should be studied.

COH Response 2-11

Monitoring and studies designed to evaluate the effects of the mining operations on ground and surface waters are found in Chapter 2, Mitigating Measures, of the FEIS.

COH Comment 2-12

Also on S-2. How do sewage flows affect salinity? Mine discharge generally is not classified as sewage.

COH Response 2-12

Sewage flows and mine discharge have been combined so that the cumulative total of dissolved solids could be shown. The figures for salinity shown in Tables 4-1, 4-15, 4-2B, and 4-41 of the OEIS represents these cumulative totals.

COH Comment 2-13

Page S-3. The temporary deterioration of services would also be felt in Scofield and Wellington. Scofield seems to be neglected extensively in this document. Even if just 25 or 30 miners moved into Scofield, the impact will be devastating. There are five other mines which are going to be established in Pleasant Valley.

COH Response 2-13

Population growth in Wellington is discussed in the Environmental Consequences section of Chapter 4. General impacts predicted for Carbon County apply to Garfield and Wellington. See response to Comment 2-4 above concerning Scofield.

COH Comment 2-14

Page 13. The Tucker Canyon tract is very close to the expanding Mountain Home Subdivision near Scofield Reservoir. It will be necessary to evaluate the effects of this coal mining on the values of a recreational subdivision.

COH Response 2-14

Impacts that would occur to the Mountain Home subdivision from mining of the adjacent Tucker Canyon tract have been analyzed to the extent possible within the scope of this EIS (see OEIS, Visual Resources, pages 112, 156 and 182). Generalized measures to reduce these impacts have been identified (see OEIS, page 62, Mitigating Measures 7, 8, 9, 10, 13, and 18), and would be applied should the tract be leased.

Prior to approval by OSM of any mining plan for the tract, an environmental assessment would be prepared to evaluate site specific effects of the mining activity proposed in the plan. Site specific impacts and mitigating measures that were not identified in the EIS due to the lack of a mining plan would be considered in the environmental assessment.

COH Comment 2-15

Chapter 2. It would be of great interest to the AOG and everyone else to know of the criteria used to determine the alternatives. Why are the Emery tracts only considered in Alternative No. 1? If the Mountain Fuel gasification plant goes in, shouldn't these coal sources be utilized?

COH Response 2-15

The criteria for development of the leasing alternatives were discussed at the various Regional Coal Team meetings, are documented in the minutes and are listed on page 2 of the OEIS. The Emery tracts were ranked lower and consequently not placed in the preferred alternative due to the presence of lower quality coal and the fact that two of the tracts would be surface mined. No definite plans have been provided to BLM concerning the Mountain Fuel gasification plant.

COH Comment 2-16

Page 74. Soils often have been implicated with limiting reclamation. The Emery tracts especially will be influenced by Mancos Shale. Range improvement efforts have been generally unsuccessful due to the low organic content of the soils, especially when compounded by low precipitation levels.

COH Response 2-16

Difficulties in reclaiming areas of the Emery tracts are noted on page 74, Table 3-2, and page 91 of the DEIS. Research conducted on the Emery tracts has shown that with proper treatments, areas of Mancos Shale derived soils can be restored to their pre-disturbance productivity or improved upon.

COH Comment 2-17

Page 77. Water quality in the area have not really been quantified despite the 208 program and associated federal and state monitoring efforts. The effect of high and low flows should not be important in the discussion. What is important is the effect of coal mining on low flows. Most planning should be done on the seven-day, ten-year low flows, and resultant waste load allocations for industry determined on these flows.

COH Response 2-17

It is true low flows should be used because they generally give the worst case situation. That data and analyses were included in the OEIS. However, it is also important to have the whole spectrum of flows to give an overall indication of impacts. The effects of high flows are therefore important. In the case of the analysis presented in the EIS, data on high flows are presented because that data are available and are included to give a complete presentation.

COH Comment 2-18

The discussion on trace elements shows a discrepancy between the 208 and Forest Service monitoring data. The time frame for monitoring needs to be addressed. The 208 occurred in '75-'76, a dry period. If the Forest Service data was collected in '77-'79, these years were generally wetter and the effect of mining less pronounced. The Wilberg Mine also may not be representative for mining throughout the district.

COH Response 2-18

There is a discrepancy between the 208 and Forest Service monitoring data on trace elements. We have used the Forest Service data because they appear to be more in line with other observations in the area. The time frame was the same for both studies. The data were collected in 1975-1976.

The Wilberg Mine is considered to be representative of the Rilda, Meet-ingham, Cottonwood, and North Horn Mountain tracts because they involve the Blind Canyon and Hiawatha coal seams the same as the Wilberg Mine. The geologic formation sandwiching the coal seams are the same and essentially have the same water-holding characteristics. The quality of coal is similar, as are the anticipated mining methods.

COH Comment 2-19

Page 83. The effect of mining on ground water within the plateau is generally undocumented.

COH Response 2-19

See comment 2-7 above. These documented sources of information are included in the EIS.

COH Comment 2-20

Page 85. What effect does geologic makeup have on water movement?

COH Response 2-20

On page 84 of the OEIS, figure 3-3, the water-bearing properties of the geologic formations and their effect on water movement are shown.

COH Comment 2-21

Page 102. In Castle Dale mobile homes make up 33 percent of the housing stock in 1980.

In Huntington the mobile home count is 51 percent in 1980.

COH Response 2-21

Year 1978 data have been consistently used in the OEIS since it is the most recent year for which complete data are available. Some 1980 data are becoming available, but 1978 data will continue to be cited for the sake of a consistent comparable data year.

COH Comment 2-22

Scotfield is completely left out of this infrastructure assessment. It has limited police protection, a poor fire protection system due to a poor water system. The septic tank system is marginal with essentially no increased potential.

COH Response 2-22

See response to comment 2-4 above.

COH Comment 2-23

Castle Dale does not have its own police force.

COH Response 2-23

The text was revised to omit reference to a Castle Dale police force.

COH Comment 2-24

Page 107. In land use planning the pace of growth is only one aspect. Emery County needs to get involved with comprehensive planning more than simply controlling the pace of growth. What was the source of the "local residents' subjective responses" interviews in 1979?

COH Response 2-24

During the fall of 1979 a series of unstructured key-informant interviews were conducted and analyzed by Drs. Bruce Chadwick, Stanley Albrecht, and Howard Bahr of Brigham Young University as part of a subcontract for Centaur Associates (Centaur, 1980). Respondents were asked to identify those aspects of their environment they liked best, as a basis for rating their subjective sense of well-being.

COH Comment 2-25

Page 115. In what ways have RV use been provided for? Most Emery County citizens are not satisfied with recreation facilities. We refer back to the previous comments made on the assumption, the series of assumptions.

COH Response 2-25

The OEIS states that "The region provides adequately for presently occurring off-road vehicle activity". The statement infers that needs of off-road vehicle users in the Four-County Region are being met because of adequate roads, trails and use areas as identified in the 1978 Draft Utah SCORP. Because of the confusion that has been generated from this statement it has been dropped from the text. For response to the comment that most Emery County citizens are not satisfied with recreation facilities, refer to Castle Dale Hearing Response 2-5.

COH Comment 2-26

Page 127, Assumption No. 5. It should not be assumed that agricultural lands retired would not be reclaimed after having been retired to provide community water needs. With wise planning, there would be enough to go around. Assumption No. 6. With wise planning, agriculture lands would be developed last.

Assumption No. 7. Water needs should be attained from irrigation water saved through wise management.

COH Response 2-26

See response to comment number 2-9 above.

COH Comment 2-27

Page 129. What is the justification for the statement on soil wash due to runoff? Sediment is of extreme importance in the Muddy, Ferron and Price drainages.

COH Response 2-27

See comment/response 19-13 and 19-21 of Forest Service letter. Also text has been changed to read: No attempt was made to quantify soil losses on the Wasatch Plateau because information was not available as to where mine or support facilities might be located. Soil losses are expected to be low if reasonable care in site selection is taken and erosion control measures are implemented.

CDH Comment 2-28

Data from Wilberg Mine is not necessarily representative. Page 130. Each mine should be evaluated separately. The data for 1979 is from a wet year. If normal, lower flows occur in the next few years, the concentrations will be higher.

Based on available data the following statement is premature: "It seems unlikely, therefore that mine discharge would require special treatment."

CDH Response 2-28

See response to comment 2-18 above.

OSM regulations require monitoring of each tract so each tract will be evaluated. It is true that 1979 was a wet year but it is very valuable in several ways. First it is the only one of the few years where we had comparable data, and secondly because of the wetness we now know what to expect in a "flushing action" of a high water year. Based on the information listed above, we are confident with the statement concerning mine discharge not requiring special treatment.

CDH Comment 2-29

The brief statement on water quality is certainly untrue based on data in the EIS and other associated data. The effect of mining on ground water has never been adequately evaluated.

CDH Response 2-29

Based on data and analysis presented in the DEIS and documented reports mentioned in response to comment 2-7 above, we believe the statement remains valid. However, there may be some unknown impacts that were not covered in the analysis or reports. In that situation, requirements of monitoring would provide the opportunity for gathering additional information and implementing further mitigation.

CDH Comment 2-30

That the conversion of agricultural land is unavoidable should not be a foregone conclusion. We should be able to minimize this situation by planning with this objective in mind. Areal master plans in Emery County and Carbon County still say agricultural lands should be preserved.

CDH Response 2-30

See response to comment number 2-9 above.

CDH Comment 2-31

Subsidence isn't the only way that water quality is effected, and I seem to sense that in the discussion of water quality that it was intimated that subsidence was the only way that water quality would be effected.

CDH Response 2-31

It is recognized that subsidence is not the only way water quality would be affected. Chapter 3 (Description of the Environment) and Chapter 4 (Environmental Consequences) discuss other ways water quality would be affected. The biggest effect on water quantity would be increased municipal sewage due to population increases (page 130 of DEIS).

CDH Comment 2-32

The overall economic development plan which is produced by the Association of Governments every year is just right off the press now, and it gives production levels, anticipated production levels, from all the mines in the area I believe through -- well, at five-year increments for about 15 years, I believe, 15 or 20 years.

CDH Response 2-32

The subject plan was provided to BLM and was used for some of the information presented in the FEIS.

3. Rue P. Ware, Castile Dale Hearing Testimony

CDH Comment 3-1

On Page 28 reference is made to the Cottonwood tract. If you would look at Page 28 with me for just a moment. I'm in the third paragraph in the right column. "The tract could be developed from UP&L's existing Wilberg Mine or from new facilities in Grimes Wash if mined by an independent operator."

If the tract is mined by UP&L from the Wilberg mine, additional surface facilities will be limited to ventilation openings. Are we assuming that there would be no portal in the Cottonwood Canyon area from the Cottonwood tract?

CDH Response 3-1

The assumption was made in the DEIS that portal facilities would be located in Grimes Wash or the coal would be removed through UP&L's existing facilities at the Wilberg Mine. No portal facilities were considered for Cottonwood Canyon.

CDH Comment 3-2

I would suggest that the Final Statement reflect, perhaps, what needs to happen to U-1D should that railroad not become a reality, and that that be given some serious early thought.

CDH Response 3-2

This point was a matter of concern, as indicated by accompanying tables 1 through 6, which shows incremental traffic increases and total traffic projected if the Castile Valley Railroad were not built, based on trucking most of the produced coal to existing loadouts at Wellington, Mohrland, and Salina, and the rest used internally (Huntington and Hunter power plants). These tables may be compared with Tables 4-11, 4-12, 4-24, 4-25, 4-37, 4-38, 4-49, 4-5D, and 4-55. In addition to traffic increases and additional road up-grading and maintenance, there would be substantially increased capital investment in trucks, an increase in the amount of fuel used, and additional employment of persons to drive and maintain the trucks.

However, in establishing the premises on which this EIS was based, it was determined that the high cost of trucking coal over long distances was likely to preclude development of some mines and stultify expansion of others, in effect leading to the conclusion that the Castile Valley Railroad Spur was needed in order to keep the delivered price of the Wasatch Plateau and Emery coals within a competitive range.

CDH Comment 3-3

We hereby request that the local officials be provided with all other available information and that this information be passed on to the local officials as early as possible.

CDH Response 3-3

Information used in the preparation of the EIS has been referenced as to source and is available for public use. Additional opportunity for public notification and input will occur as the environmental process continues.

CDH Comment 3-4

I am, too. I would reference Page 102. Some of the facts as shown on this page are now incorrect. I suggest that the 1978 facts are now outdated and need to be current, if possible.

CDH Response 3-4

See response to comment 2-2.

CDH Comment 3-5

I would reference Chapter 3, Page 115. "Description of the environment," subtopic "Recreation." The first paragraph explains that the recreation associated with the out-of-doors, hunting, fishing, et cetera -- it states the area provides adequately for these activities.

I submit to you that these forms of recreation in Emery County are now overused. These forms of recreation and others need to be expanded for the expanding population. I suggest that the Final Statement show what would be needed in those particular areas to provide for the expanded population.

Table 1
1990 INCREMENTAL TRAFFIC WITHOUT CASTLE VALLEY RAILROAD

Point	Location	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5	
		All Trucks	Trucks	All Trucks	Trucks	All Trucks	Trucks	All Trucks	Trucks	All Trucks	Trucks
1.	US-6 S of US-6	133	51	133	51	133	51	133	51	133	51
2.	US-6 at Utah-Carbon County Line	438	67	438	67	438	67	438	67	438	67
3.	Cordon Creek Road	491	214	491	214	491	214	491	214	491	214
4.	US-6 N of Price	882	286	882	286	882	286	882	286	882	286
5.	US-6, Price to Wellington	113	0	113	0	113	0	113	0	113	0
14.	Wellington Loadout Road	1,302	482	1,049	390	803	190	555	136	174	239
15.	US-5 S of Price	1,044	1,044	1,044	1,044	855	855	284	284	165	165
16.	US-10 N of Huntington	1,968	1,148	1,715	1,056	1,017	280	245	245	107	107
17.	US-10 S of Huntington	2,125	1,721	1,500	922	1,440	920	195	195	32	32
18.	US-10 S of Ogden Valley	459	1,201	459	201	459	201	459	201	0	0
20.	US-10 S of Castlegate	2,478	1,421	1,861	876	1,835	876	77	77	0	0
21.	North Horn Mountain Mine Road	1,939	859	1,939	859	839	0	0	0	0	0
22.	US-10 N of Ferron	1,124	562	491	17	145	17	77	77	0	0
23.	US-10 S of Ferron, N of Emery	1,124	562	491	17	145	17	77	77	0	0
24.	US-10 N of Ferron	1,124	562	491	17	145	17	77	77	0	0
25.	US-10 S of Ferron	1,124	562	491	17	145	17	77	77	0	0
26.	Emery North Mine	424	329	191	0	0	0	0	0	0	0
27.	Emery Central Mine Road	424	329	191	0	0	0	0	0	0	0
28.	US-10 N of I-70	91	16	0	0	0	0	0	0	0	0
29.	Emery South, Dog Valley Mine Road	62	46	46	0	0	0	0	0	0	0
30.	US-89 S of Salina	62	46	46	0	0	0	0	0	0	0
31.	US-89 S of Salina	62	46	46	0	0	0	0	0	0	0
32.	New Road, Pleasant Valley to U-31	0	0	0	0	0	0	0	0	0	0
33.	US-89 E of Salina	53	0	0	0	0	0	0	0	0	0
34.	US-89 E of Salina	53	0	0	0	0	0	0	0	0	0
35.	US-89 E of Salina	53	0	0	0	0	0	0	0	0	0
36.	US-89 N of Richfield	300	155	300	155	300	155	300	155	300	155
37.	US-89 N of Richfield	300	155	300	155	300	155	300	155	300	155
38.	US-89 N of Aurora	7,835	1,175	8,711	1,302	8,800	1,302	8,800	1,302	8,800	1,302
39.	US-89 S of Aurora	3,175	1,135	2,866	828	2,770	662	2,770	662	2,885	667
40.	US-89 N of Cannonville	1,828	1,170	1,322	1,322	1,808	1,808	1,808	1,808	1,808	1,808
41.	US-89 N of Cannonville	1,828	1,170	1,322	1,322	1,808	1,808	1,808	1,808	1,808	1,808
42.	US-89 N of Cannonville	1,828	1,170	1,322	1,322	1,808	1,808	1,808	1,808	1,808	1,808
43.	US-89 N of Cannonville	1,828	1,170	1,322	1,322	1,808	1,808	1,808	1,808	1,808	1,808
44.	US-89 N of Cannonville	1,828	1,170	1,322	1,322	1,808	1,808	1,808	1,808	1,808	1,808
45.	US-89 N of Cannonville	1,828	1,170	1,322	1,322	1,808	1,808	1,808	1,808	1,808	1,808
46.	US-31 at San Mateo-Emery County Line	340	22	627	25	725	29	840	34	922	38
47.	New Road, Pleasant Valley to U-31	1,607	64	1,843	73	2,130	80	2,131	123	2,430	161
48.	US-89 N of Fairview	2,640	82	2,029	81	2,130	86	2,485	100	2,898	112

Notes: Although these values were computed for 1990, they are appropriate for 1990, 1995, and 2000, since all mines are projected to be in full operation by 1990.

Table 2
Alternative Number 1
Annual Average Daily Traffic Projected for Selected Years
(Without Castle Valley Railroad)

Point	Location	1985		1987		1990		1993		2000	
		All Trucks	Trucks	All Trucks	Trucks	All Trucks	Trucks	All Trucks	Trucks	All Trucks	Trucks
1.	US-6 S of US-6	171	1,075	208	1,341	299	1,541	301	1,441	303	1,441
2.	US-6 at Utah-Carbon County Line	8,740	5,519	1,739	810	353	830	353	830	353	830
3.	US-6 N of Price Road	17,463	18,201	3,210	20,672	3,210	21,542	3,946	23,917	4,099	23,917
4.	US-6 between Price and Wellington	11,156	16,394	2,698	23,353	4,210	39,761	6,158	43,822	5,938	43,822
5.	Soldier Cr Rd @ Duchesne-Carbon Co L	65	88	126	5	5	80	4	112	20	112
6.	Soldier Cr Rd @ Duchesne-Carbon Co L	126	17	17	20	20	248	20	248	20	248
7.	Soldier Cr Rd @ Duchesne-Carbon Co L	322	160	191	551	263	794	368	794	368	794
8.	Dogout Canyon Road	965	80	1,242	103	1,551	128	1,551	128	1,551	128
9.	Soldier Cr Rd @ US-6	1,431	301	1,855	314	2,398	348	2,686	500	2,708	501
10.	Soldier Cr Rd @ US-6	1,431	301	1,855	314	2,398	348	2,686	500	2,708	501
11.	US-6 W of US-62 (Summitside Jct)	5,346	851	5,890	906	6,236	986	7,056	1,106	8,140	1,206
12.	US-6 W of US-62 (Summitside Jct)	2,658	160	2,850	168	3,056	176	3,156	180	3,256	184
13.	US-6 nr Carbon-Emery County Line	3,300	495	3,440	520	3,700	555	4,100	615	4,500	675
14.	US-10 S of Price	5,883	1,407	6,082	1,353	7,613	1,821	8,066	1,838	8,483	2,479
15.	Wellington Loadout Road	883	883	970	2,028	2,028	2,028	2,028	2,028	2,028	2,028
16.	US-10 N of Huntington	5,314	1,290	5,614	1,290	7,761	2,453	8,063	2,491	8,349	2,532
17.	US-10 N of Huntington	1,483	185	1,687	189	2,246	317	2,471	331	2,607	343
18.	US-10 S of Huntington	3,483	979	4,024	983	6,287	2,477	6,789	2,527	7,177	2,580
19.	US-10 S of Ogden Valley	1,828	1,170	1,322	1,322	1,808	1,808	1,808	1,808	1,808	1,808
20.	US-10 S of Castlegate	1,250	130	1,440	210	1,692	1,692	1,742	1,742	1,755	1,755
21.	North Horn Mountain Mine	1,550	150	1,460	210	2,688	833	2,888	833	2,874	833
22.	US-10 N of Ferron	1,050	126	1,226	181	2,208	780	2,384	815	2,938	833
23.	US-10 S of Ferron	1,050	126	1,226	181	2,208	780	2,384	815	2,938	833
24.	Emery North Mine	424	329	191	0	0	0	0	0	0	0
25.	US-10 N of I-70	91	16	0	0	0	0	0	0	0	0
26.	Emery South, Dog Valley Mine	62	46	46	0	0	0	0	0	0	0
27.	US-89 S of Salina	62	46	46	0	0	0	0	0	0	0
28.	US-89 S of Salina	62	46	46	0	0	0	0	0	0	0
29.	US-89 N of Richfield	300	155	300	155	300	155	300	155	300	155
30.	US-89 N of Richfield	300	155	300	155	300	155	300	155	300	155
31.	US-89 N of Aurora	7,835	1,175	8,711	1,302	8,800	1,302	8,800	1,302	8,800	1,302
32.	US-89 S of Aurora	3,175	1,135	2,866	828	2,770	662	2,770	662	2,885	667
33.	US-89 N of Cannonville	1,828	1,170	1,322	1,322	1,808	1,808	1,808	1,808	1,808	1,808
34.	US-89 N of Cannonville	1,828	1,170	1,322	1,322	1,808	1,808	1,808	1,808	1,808	1,808
35.	US-89 N of Cannonville	1,828	1,170	1,322	1,322	1,808	1,808	1,808	1,808	1,808	1,808
36.	US-31 at San Mateo-Emery County Line	340	22	627	25	725	29	840	34	922	38
37.	New Road, Pleasant Valley to U-31	1,607	64	1,843	73	2,130	80	2,131	123	2,430	161
38.	US-89 N of Fairview	2,640	82	2,029	81	2,130	86	2,485	100	2,898	112

Notes: This listing incorporates all the changes in alternatives and all the changes in magnitudes in various site-specific tracts up to December 18, 1980.

Table 3
Alternative Number 2
Annual Average Daily Traffic Projected for Selected Years
(Without Castia Valley Railroad)

Point	Location	1983		1987		1990		1995		2000	
		All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks
1.	US-6 S of US-6	933	171	1,075	208	1,306	283	1,406	283	1,406	283
2.	US-6 at Utah-Carbon County Line	8,740	1,430	9,519	1,575	11,093	1,878	13,093	2,198	15,055	2,332
3.	Golden Creek Road	139	339	139	339	139	830	1,859	21,656	4,077	22,859
4.	US-6 N of Price	11,156	1,806	16,384	2,698	23,747	4,158	33,233	5,548	43,816	5,958
5.	US-6 between Price and Wellington	11,156	1,806	16,384	2,698	23,747	4,158	33,233	5,548	43,816	5,958
6.	Soldier Cr Rd @ Duckhane-Carbon Co L	65	3	68	3	75	5	90	4	112	5
7.	Soldier Cr Rd @ Duckhane-Carbon Co L	165	16	170	17	195	19	244	20	308	26
8.	Duckhane Canyon Mine	945	80	1,242	103	1,551	128	1,934	158	2,408	200
9.	Soldier Cr Rd at US-4	1,431	301	1,653	314	2,088	500	2,708	501	3,418	501
10.	Soldier Cr Rd at US-4	1,431	301	1,653	314	2,088	500	2,708	501	3,418	501
11.	US-6 V of US-133 (Summit Jct)	3,356	851	3,890	906	4,526	1,106	5,374	1,346	6,422	1,616
12.	US-6 V of US-133 (Summit Jct)	3,356	851	3,890	906	4,526	1,106	5,374	1,346	6,422	1,616
13.	US-6 nr Carbon-Energy County Line	3,300	495	3,640	555	4,100	615	4,500	675	5,000	750
14.	US-6 S of Price	5,983	1,402	6,082	1,333	7,300	1,729	7,793	1,766	8,250	2,087
15.	Wellington Roadout Road	883	883	970	970	1,058	1,058	1,146	1,146	1,234	1,234
16.	US-10 N of Huntington	5,534	1,290	5,614	1,290	7,308	2,361	7,810	2,399	8,096	2,440
17.	US-10 N of Huntington	1,483	183	1,692	189	2,244	317	2,471	331	2,407	365
18.	US-10 S of Huntington	3,883	979	4,016	985	3,762	1,058	4,004	1,058	4,004	1,058
19.	US-10 S of Oradiville	1,750	150	1,640	210	3,583	1,167	4,005	1,197	4,391	1,210
20.	US-10 S of Castlegate	1,750	150	1,640	210	3,583	1,167	4,005	1,197	4,391	1,210
21.	North Horn Mountain Mine	1,750	170	1,720	181	1,670	238	1,846	285	2,000	293
22.	US-10 M of Ferron	1,750	170	1,720	181	1,670	238	1,846	285	2,000	293
23.	Hoiberg Mine	1,050	126	1,226	181	1,470	238	1,846	285	2,000	293
24.	Hoiberg Mine	1,050	126	1,226	181	1,470	238	1,846	285	2,000	293
25.	US-10 N of Emery	1,050	126	1,226	181	1,470	238	1,846	285	2,000	293
26.	Emery North Mine	-	-	-	-	-	-	-	-	-	-
27.	Emery Central Mine	-	-	-	-	-	-	-	-	-	-
28.	US-10 M of 1-70	930	112	1,090	131	1,330	160	1,732	208	2,141	237
29.	Emery South & Dog Valley Mines	70	10	70	10	70	10	70	10	70	10
30.	US-7 nr Sevier-Kayne County Line	37	1	40	2	45	2	55	2	66	2
31.	0-72 S of 1-70	270	184	340	240	442	185	634	183	826	185
32.	Spring Canyon Road @ 1-70	1,083	591	1,083	591	1,083	591	1,083	591	1,083	591
33.	1-70 E of Salem	3,075	1,721	3,336	1,850	3,720	2,040	4,155	2,250	4,620	2,400
34.	US-89 S of Richfield	6,800	1,070	7,736	1,161	8,800	1,175	10,000	1,250	11,300	1,400
35.	US-89 M of Richfield	6,800	1,070	7,736	1,161	8,800	1,175	10,000	1,250	11,300	1,400
36.	US-89 M of Armore	7,835	1,175	8,711	1,307	9,800	1,370	11,000	1,450	12,300	1,550
37.	US-89 S of Salina	3,878	613	4,227	672	4,700	750	5,100	750	5,500	750
38.	US-89 M of Gunnison	3,848	873	3,822	722	3,808	728	3,818	728	3,818	728
39.	US-89 M of Gunnison	1,870	73	1,874	73	1,980	79	2,250	90	2,570	90
40.	US-89 M of Gunnison	1,870	73	1,874	73	1,980	79	2,250	90	2,570	90
41.	US-89 M of West	2,875	115	2,318	101	2,633	103	5,500	140	4,973	199
42.	Public Road E of Ephraim	285	11	517	12	340	15	510	20	665	24
43.	US-89 M of Ephraim	2,255	90	2,277	91	2,415	92	2,783	110	3,132	115
44.	US-89 S of Mt. Pleasant	1,643	66	1,574	65	1,600	65	1,643	66	1,643	66
45.	US-89 M of Mt. Pleasant	5,770	151	5,939	154	6,400	160	6,925	169	7,452	177
46.	0-31 at San Pete-Energy County Line	540	22	627	25	725	29	840	34	922	38
47.	New Road, Pleasant Valley to 0-31	1,067	43	1,216	48	1,333	61	1,433	61	1,533	61
48.	US-11 E of Fairview	1,607	84	1,607	84	1,607	84	1,607	84	1,607	84
49.	US-89 M of Fairview	2,060	81	2,053	81	2,053	81	2,053	81	2,053	81

Note: This listing incorporates all the changes to alternatives and all the changes in magnitudes to various site-specific tracts up to Dec 18, 1980.

Table 6
Alternative Number 2
Annual Average Daily Traffic Projected for Selected Years
(Without Castia Valley Railroad)

Point	Location	1983		1987		1990		1995		2000	
		All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks
1.	US-6 S of US-6	933	171	1,075	208	1,306	283	1,406	283	1,406	283
2.	US-6 at Utah-Carbon County Line	8,740	1,430	9,519	1,575	11,093	1,878	13,093	2,198	15,055	2,332
3.	Golden Creek Road	139	339	139	339	139	830	1,859	21,656	4,077	22,859
4.	US-6 N of Price	11,156	1,806	16,384	2,698	23,747	4,158	33,233	5,548	43,816	5,958
5.	US-6 between Price and Wellington	11,156	1,806	16,384	2,698	23,747	4,158	33,233	5,548	43,816	5,958
6.	Soldier Cr Rd @ Duckhane-Carbon Co L	65	3	68	3	75	5	90	4	112	5
7.	Soldier Cr Rd @ Duckhane-Carbon Co L	165	16	170	17	195	19	244	20	308	26
8.	Duckhane Canyon Mine	945	80	1,242	103	1,551	128	1,934	158	2,408	200
9.	Soldier Cr Rd at US-4	1,431	301	1,653	314	2,088	500	2,708	501	3,418	501
10.	Soldier Cr Rd at US-4	1,431	301	1,653	314	2,088	500	2,708	501	3,418	501
11.	US-6 V of US-133 (Summit Jct)	3,356	851	3,890	906	4,526	1,106	5,374	1,346	6,422	1,616
12.	US-6 V of US-133 (Summit Jct)	3,356	851	3,890	906	4,526	1,106	5,374	1,346	6,422	1,616
13.	US-6 nr Carbon-Energy County Line	3,300	495	3,640	555	4,100	615	4,500	675	5,000	750
14.	US-6 S of Price	5,983	1,402	6,082	1,333	7,300	1,729	7,793	1,766	8,250	2,087
15.	Wellington Roadout Road	883	883	970	970	1,058	1,058	1,146	1,146	1,234	1,234
16.	US-10 N of Huntington	5,534	1,290	5,614	1,290	7,308	2,361	7,810	2,399	8,096	2,440
17.	US-10 N of Huntington	1,483	183	1,692	189	2,244	317	2,471	331	2,407	365
18.	US-10 S of Huntington	3,883	979	4,016	985	3,762	1,058	4,004	1,058	4,004	1,058
19.	US-10 S of Oradiville	1,750	150	1,640	210	3,583	1,167	4,005	1,197	4,391	1,210
20.	US-10 S of Castlegate	1,750	150	1,640	210	3,583	1,167	4,005	1,197	4,391	1,210
21.	North Horn Mountain Mine	1,750	170	1,720	181	1,670	238	1,846	285	2,000	293
22.	US-10 M of Ferron	1,750	170	1,720	181	1,670	238	1,846	285	2,000	293
23.	Hoiberg Mine	1,050	126	1,226	181	1,470	238	1,846	285	2,000	293
24.	Hoiberg Mine	1,050	126	1,226	181	1,470	238	1,846	285	2,000	293
25.	US-10 N of Emery	1,050	126	1,226	181	1,470	238	1,846	285	2,000	293
26.	Emery North Mine	-	-	-	-	-	-	-	-	-	-
27.	Emery Central Mine	-	-	-	-	-	-	-	-	-	-
28.	US-10 M of 1-70	930	112	1,090	131	1,330	160	1,732	208	2,141	237
29.	Emery South & Dog Valley Mines	70	10	70	10	70	10	70	10	70	10
30.	US-7 nr Sevier-Kayne County Line	37	1	40	2	45	2	55	2	66	2
31.	0-72 S of 1-70	270	184	340	240	442	185	634	183	826	185
32.	Spring Canyon Road @ 1-70	1,083	591	1,083	591	1,083	591	1,083	591	1,083	591
33.	1-70 E of Salem	3,075	1,721	3,336	1,850	3,720	2,040	4,155	2,250	4,620	2,400
34.	US-89 S of Richfield	6,800	1,070	7,736	1,161	8,800	1,175	10,000	1,250	11,300	1,400
35.	US-89 M of Richfield	6,800	1,070	7,736	1,161	8,800	1,175	10,000	1,250	11,300	1,400
36.	US-89 M of Armore	7,835	1,175	8,711	1,307	9,800	1,370	11,000	1,450	12,300	1,550
37.	US-89 S of Salina	3,878	613	4,227	672	4,700	750	5,100	750	5,500	750
38.	US-89 M of Gunnison	3,848	873	3,822	722	3,808	728	3,818	728	3,818	728
39.	US-89 M of Gunnison	1,870	73	1,874	73	1,980	79	2,250	90	2,570	90
40.	US-89 M of Gunnison	1,870	73	1,874	73	1,980	79	2,250	90	2,570	90
41.	US-89 M of West	2,875	115	2,318	101	2,633	103	5,500	140	4,973	199
42.	Public Road E of Ephraim	285	11	517	12	340	15	510	20	665	24
43.	US-89 M of Ephraim	2,255	90	2,277	91	2,415	92	2,783	110	3,132	115
44.	US-89 S of Mt. Pleasant	1,643	66	1,574	65	1					

Table 3
Alternative Number 4
Annual Average Daily Traffic Projected for Selected Years
(Without Castle Valley Railroad)

Point	Location	1985		1990		1995		2000	
		All	Trucks	All	Trucks	All	Trucks	All	Trucks
1.	US-6 S of US-6	953	171	1,023	208	1,208	248	1,308	252
2.	US-6 at Irish-Carbon County Line	6,740	1,330	9,319	1,535	11,991	1,783	14,663	2,313
3.	US-6 at Dog Valley Road	17,363	3,033	18,201	3,110	19,040	3,187	19,879	3,264
4.	US-6 between Price and Wellington	11,156	1,806	16,394	2,698	21,642	3,462	26,890	4,060
5.	US-6 between Price and Wellington	11,156	1,806	16,394	2,698	21,642	3,462	26,890	4,060
6.	Soldier Cr Rd @ Duchesne-Carbon Co L	65	3	68	3	75	3	80	3
7.	Soldier Cr Rd @ Soldier Cr Mine	165	16	193	17	248	20	248	20
8.	Dugout Canyon Mine	322	160	408	191	551	243	794	348
9.	Dugout Canyon Road	965	80	1,242	103	1,551	128	1,851	178
10.	Soldier Cr Rd at US-6	1,431	301	1,855	314	2,398	348	2,889	300
11.	US-6 W of US-6 (Sunnyside Jct)	5,356	851	5,890	906	6,256	986	7,056	1,106
12.	US-6 at Carbon-Energy County Line	2,656	160	2,850	168	3,056	176	3,256	184
13.	US-6 at Carbon-Energy County Line	3,300	695	3,640	520	3,700	555	4,100	615
14.	US-6 at Price	5,983	1,407	6,082	1,378	7,128	1,613	7,553	2,236
15.	Wellington Leadout Road	883	883	970	970	1,068	1,068	1,158	1,158
16.	US-10 N of Huntington	5,514	1,290	5,614	1,290	6,073	1,450	6,461	1,529
17.	US-10 N of Huntington	1,683	183	1,697	183	1,728	183	1,758	183
18.	US-10 S of Huntington	3,183	623	3,183	623	3,183	623	3,183	623
19.	US-20 N of Gravelly	2,191	647	2,610	511	3,058	692	3,542	616
20.	US-10 S of Castle	1,250	150	1,460	150	1,660	150	1,742	150
21.	North Horn Mountain Mine	1,250	150	1,460	150	1,660	150	1,742	150
22.	US-10 S of Ferron	1,050	126	1,226	181	1,470	238	1,846	283
23.	Hallberg Mine	1,050	126	1,226	181	1,470	238	1,846	283
24.	Hallberg Mine	1,050	126	1,226	181	1,470	238	1,846	283
25.	US-10 N of Emery	1,050	126	1,226	181	1,470	238	1,846	283
26.	Emery North Mine	1,050	126	1,226	181	1,470	238	1,846	283
27.	Emery Central Mine	1,050	126	1,226	181	1,470	238	1,846	283
28.	US-10 N of Ferron	1,050	126	1,226	181	1,470	238	1,846	283
29.	Emery South & Dog Valley Mines	70	10	70	10	70	10	70	10
30.	US-72 nr Sevier-Byrne County Line	57	1	40	2	45	2	45	2
31.	US-72 S of I-70	270	186	368	185	442	185	454	185
32.	Spring Canyon Road @ I-70	1,085	591	1,085	591	1,085	591	1,085	591
33.	I-70 E of Sallina	5,075	1,075	5,075	1,075	5,075	1,075	5,075	1,075
34.	US-89 S of Richfield	5,143	771	5,318	830	5,770	846	6,066	846
35.	US-89 N of Richfield	6,800	1,020	7,738	1,161	7,833	1,175	8,600	1,020
36.	US-89 N of Aurora	7,835	1,175	8,211	1,207	8,655	1,235	9,045	1,265
37.	US-89 S of Sallina	3,175	1,135	3,866	1,228	4,206	1,286	4,546	1,326
38.	US-89 nr Sevier-Sevier County Line	3,864	873	5,822	1,115	6,132	1,115	6,308	1,028
39.	US-89 W of Gunnison	1,870	25	1,874	25	1,874	25	1,874	25
40.	US-89 N of Gunnison	1,870	25	1,874	25	1,874	25	1,874	25
41.	US-89 N of Hanti	2,875	115	2,318	101	2,635	101	2,500	140
42.	Public Road E of Ephraim	2,875	115	2,318	101	2,635	101	2,500	140
43.	US-89 N of Ephraim	2,235	90	2,277	91	2,415	97	2,455	110
44.	US-89 S of Mt. Pleasant	1,645	66	1,574	65	1,660	66	2,000	80
45.	US-89 N of Mt. Pleasant	5,770	151	3,859	154	4,000	160	4,000	160
46.	US-31 at San Pete-Emery County Line	540	22	627	25	725	28	840	38
47.	New Road, Pleasant Valley to 0-31	1,067	43	1,216	48	1,355	61	1,555	61
48.	US-31 E of Fairview	1,607	64	1,843	75	2,060	81	2,060	81
49.	US-89 N of Fairview	2,040	82	2,029	81	2,150	80	2,150	80

Note: This listing incorporates all the changes in alternatives and all the changes in magnitudes in various site-specific tracts up to Dec. 18, 1980.

Table 4
Alternative Number 3
Annual Average Daily Traffic Projected for Selected Years
(Without Castle Valley Railroad)

Point	Location	1985		1990		1995		2000	
		All	Trucks	All	Trucks	All	Trucks	All	Trucks
1.	US-6 S of US-6	953	171	1,023	208	1,208	248	1,308	252
2.	US-6 at Irish-Carbon County Line	6,740	1,330	9,319	1,535	11,991	1,783	14,663	2,313
3.	US-6 at Dog Valley Road	17,363	3,033	18,201	3,110	19,040	3,187	19,879	3,264
4.	US-6 between Price and Wellington	11,156	1,806	16,394	2,698	21,642	3,462	26,890	4,060
5.	US-6 between Price and Wellington	11,156	1,806	16,394	2,698	21,642	3,462	26,890	4,060
6.	Soldier Cr Rd @ Duchesne-Carbon Co L	65	3	68	3	75	3	80	3
7.	Soldier Cr Rd @ Soldier Cr Mine	165	16	193	17	248	20	248	20
8.	Dugout Canyon Mine	322	160	408	191	551	243	794	348
9.	Dugout Canyon Road	965	80	1,242	103	1,551	128	1,851	178
10.	Soldier Cr Rd at US-6	1,431	301	1,855	314	2,398	348	2,889	300
11.	US-6 W of US-6 (Sunnyside Jct)	5,356	851	5,890	906	6,256	986	7,056	1,106
12.	US-6 at Carbon-Energy County Line	2,656	160	2,850	168	3,056	176	3,256	184
13.	US-6 at Carbon-Energy County Line	3,300	695	3,640	520	3,700	555	4,100	615
14.	US-6 at Price	5,983	1,407	6,082	1,378	7,128	1,613	7,553	2,236
15.	Wellington Leadout Road	883	883	970	970	1,068	1,068	1,158	1,158
16.	US-10 N of Huntington	5,514	1,290	5,614	1,290	6,073	1,450	6,461	1,529
17.	US-10 N of Huntington	1,683	183	1,697	183	1,728	183	1,758	183
18.	US-10 S of Huntington	3,183	623	3,183	623	3,183	623	3,183	623
19.	US-20 N of Gravelly	2,191	647	2,610	511	3,058	692	3,542	616
20.	US-10 S of Castle	1,250	150	1,460	150	1,660	150	1,742	150
21.	North Horn Mountain Mine	1,250	150	1,460	150	1,660	150	1,742	150
22.	US-10 S of Ferron	1,050	126	1,226	181	1,470	238	1,846	283
23.	Hallberg Mine	1,050	126	1,226	181	1,470	238	1,846	283
24.	Hallberg Mine	1,050	126	1,226	181	1,470	238	1,846	283
25.	US-10 N of Emery	1,050	126	1,226	181	1,470	238	1,846	283
26.	Emery North Mine	1,050	126	1,226	181	1,470	238	1,846	283
27.	Emery Central Mine	1,050	126	1,226	181	1,470	238	1,846	283
28.	US-10 N of Ferron	1,050	126	1,226	181	1,470	238	1,846	283
29.	Emery South & Dog Valley Mines	70	10	70	10	70	10	70	10
30.	US-72 nr Sevier-Byrne County Line	57	1	40	2	45	2	45	2
31.	US-72 S of I-70	270	186	368	185	442	185	454	185
32.	Spring Canyon Road @ I-70	1,085	591	1,085	591	1,085	591	1,085	591
33.	I-70 E of Sallina	5,075	1,075	5,075	1,075	5,075	1,075	5,075	1,075
34.	US-89 S of Richfield	5,143	771	5,318	830	5,770	846	6,066	846
35.	US-89 N of Richfield	6,800	1,020	7,738	1,161	7,833	1,175	8,600	1,020
36.	US-89 N of Aurora	7,835	1,175	8,211	1,207	8,655	1,235	9,045	1,265
37.	US-89 S of Sallina	3,175	1,135	3,866	1,228	4,206	1,286	4,546	1,326
38.	US-89 nr Sevier-Sevier County Line	3,864	873	5,822	1,115	6,132	1,115	6,308	1,028
39.	US-89 W of Gunnison	1,870	25	1,874	25	1,874	25	1,874	25
40.	US-89 N of Gunnison	1,870	25	1,874	25	1,874	25	1,874	25
41.	US-89 N of Hanti	2,875	115	2,318	101	2,635	101	2,500	140
42.	Public Road E of Ephraim	2,875	115	2,318	101	2,635	101	2,500	140
43.	US-89 N of Ephraim	2,235	90	2,277	91	2,415	97	2,455	110
44.	US-89 S of Mt. Pleasant	1,645	66	1,574	65	1,660	66	2,000	80
45.	US-89 N of Mt. Pleasant	5,770	151	3,859	154	4,000	160	4,000	160
46.	US-31 at San Pete-Emery County Line	540	22	627	25	725	28	840	38
47.	New Road, Pleasant Valley to 0-31	1,067	43	1,216	48	1,355	61	1,555	61
48.	US-31 E of Fairview	1,607	64	1,843	75	2,060	81	2,060	81
49.	US-89 N of Fairview	2,040	82	2,029	81	2,150	80	2,150	80

Note: This listing incorporates all the changes in alternatives and all the changes in magnitudes in various site-specific tracts up to Dec. 18, 1980.

The statement referred to does not apply to all recreational activities. It applies only to off-road vehicle activities and even then is only meant to infer that the needs of off-road vehicle users in the Four-County area are being met because of adequate roads, trails, and use areas as identified in the 1978 Draft Utah SCORP. It is not meant to imply that there are no conflicts between ORV use and other uses of the lands. Because of the confusion generated by this statement and because the statement is not necessary in order to adequately assess impacts, it has been removed from the text.

Analysis of the impacts to dispersed outdoor recreation that would occur as a result of the coal-related population increase can be found in the DEIS on pages 156, 157, 182, 200, 204, 221 and 241. Where applicable, the analysis includes measures that could be taken to expand recreation opportunities and identified limitations to those measures such as was done in the following statement taken from page 157 of the DEIS: "The additional competition for available game and fish would lead to less hunting and fishing success. To maintain present hunting success it would be necessary to restrict animal harvests, thereby reducing hunting opportunities. To maintain present fishing success, stocking activities would have to be increased by the Utah Division of Wildlife Resource, which has no foreseeable increases in funds for this purpose."

CDH Comment 3-6
Item 4. I reference Page 115, second paragraph. Emery and Carbon Counties have a limited number of picnicking facilities and camp ground facilities.

In that these areas receive an excessive amount of use, I suggest the statistics be expanded to reflect the amount of overuse, and to also show the number of additional sites required to bring the use figure to the 40-percent level as recommended by the State of Utah, and, then, to extend that figure to include the number of sites that would be required to provide for the increase in the population as estimated by the study. Let this study show what will be needed.

CDH Response 3-6
Table 3-21 of the DEIS identified the percent of overuse that each developed recreation site is now receiving. It presented the amount of data necessary for analyzing current and future impacts on existing developed sites. Expanded usage data on each site can be obtained from the Central Regional Coal Environmental Statement or from the managing agency.

The actual number of additional developed recreation sites necessary to meet demand is not presently available and will be determined by various agencies in their land use planning processes. That determination is not within the scope of this EIS.

CDH Comment 3-7
Item 5, reference Page 115. Top of the second column on the first paragraph, and I quote: "There are not enough golf courses, play fields, and swimming pools to meet standards proposed by the State of Utah; but residents of the towns appear satisfied with the existing situation."

That is a quote from a Centaur Associates' study made in 1980.

I submit to you that that is not so. Sure, right now the people are happy in Emery County if they drive to work, if the roads are passable, and if they have enough water to drink.

I suggest that we center our desires at present, our desires and interests on our absolute needs. First, we need water to drink. We need sewer systems and we need roads. If these things are in question, then recreation is not so important.

I suggest that the people of Emery County are more concerned about the necessities first, but that is not to say that they do not deserve or need adequate recreation facilities as proposed by the state standards. Therefore, I recommend that the Draft Statement be extended to include a recommendation for recreation facilities.

CDH Response 3-7
See Castle Dale Hearing, Response 2-5 above.

CDH Comment 3-8

I suggest that we not plan now or later to accept any degradation in the quality or the quantity of services offered. If we plan at this point to accept degradation of services in any way, then, I suggest that these leases not progress beyond this point.

CDH Response 3-8

The purpose of this EIS is to identify the significant impacts that would result from various levels of coal leasing. This will provide local governments with a basis for planning requirements necessary to mitigate anticipated impacts and avoid degradation of services. It also provides an opportunity to comment on the proposals. Your views and concerns have been noted and will be considered in the final decision making process.

CDH Comment 3-9

I plead with you, let's work together. I would ask that you consider a statement to the effect in the Final Draft Statement that local officials are to be informed of all proposed activities as soon as possible and with full disclosure.

CDH Response 3-9

Section 309(e) of the Federal Land Policy and Management Act requires that the Federal, State, and local governments and the public are given adequate notice and an opportunity to comment upon the formulation of standards and criteria, and to participate in the preparation and execution of plans and programs for, and the management of, the public lands.

On December 2, 1980 a cooperative agreement was signed by BLM and the Utah Association of Counties. This agreement provides that BLM will transmit information concerning its activities to the Association of Counties and the various County Commissions. This agreement will be an important aid in keeping concerned Emery County residents informed on the status of coal leasing activities discussed in this EIS.

4. Dan S. Hunter, Castle Dale Hearing Testimony

CDH Comment 4-1

An example of the deemphasis of population is shown in that the 1987 total in the development projected herein is listed at 12,168. The 1980 census for Emery County shows our county has a population of 11,455, or only 713 less than the nondevelopment alternatives for the DEIS. Surely the Team is not unaware of other developments not related to the coal properties referenced herein which would indicate a seven-year growth over the 713 individuals referenced. Such a shallow look at population tends to force one to deemphasize the total socioeconomic arena addressed herein. For comparison to the Bureau of Land Management numbers, we are indicating the Utah Process and Economic and Demographic Impact model, 1979.

CDH Response 4-1

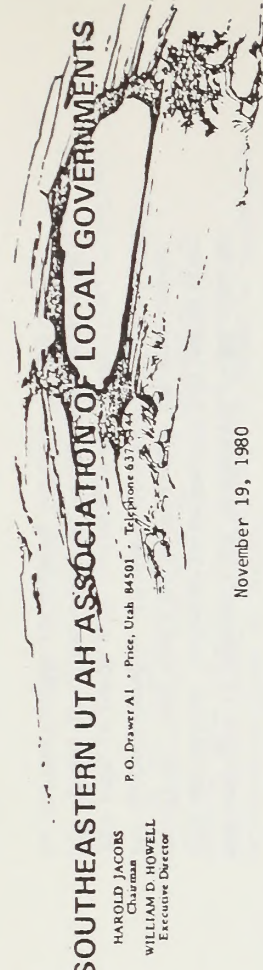
See hearing response 2-2 above.

CDH Comment 4-2

The next thing I wish to address is the Team's assessment of water treatment facilities in Emery County is incorrect. According to the Castle Valley Special Service District, Ferron, Emery, Castle Dale, and Huntington all need to upgrade their water treatment facilities. The communities are all over-subscribed with the local canal companies, and are in essence using more canal water for water treatment than their ownership of water stock dictates. This situation could cause rationing of water should annual rainfall in the Western Plateau decrease, or if the surface flows or ground water supplies should be reduced or reduced in quality as a result of mining activity.

CDH Response 4-2

On page 102 of the DEIS it states that "The availability of adequate water supplies constituted an actual or potential limit to growth in a number of communities in 1978, among them Price, Wellington, Castle Dale, Emery, Ferron, and Gunnison". The analysis goes on to point out that many communities need to upgrade their water treatment facilities.



SOUTHEASTERN UTAH ASSOCIATION OF LOCAL GOVERNMENTS

HAROLD JACOBS
Chairman
WILLIAM D. HOWELL
Executive Director

P. O. Drawer A-1 - Price, Utah 84501 Telephone 637-4744

November 19, 1980

Ron Bolander, Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111

Dear Mr. Bolander:

The large scale development of coal resources in southeast Utah will provide a complex series of problems for local governments to deal with. The surface of many of these problems have been identified in the Utah-Southwestern Utah Draft Environmental Impact Statement, of which this letter and attached statement refers.

Our initial reaction to the document is that it is very general by nature and as such provides minimal value to local planning efforts. Some of the conclusions, based on available data, cannot be made conclusively and some of the assumptions on which the study is based require more documentation.

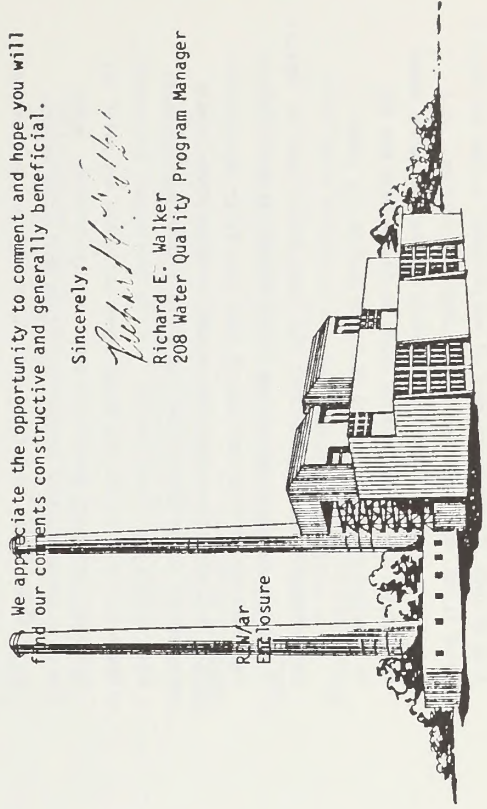
Our review is based on a community planning and environmental approach.

We appreciate the opportunity to comment and hope you will find our comments constructive and generally beneficial.

Sincerely,

Richard E. Walker

Richard E. Walker
208 Water Quality Program Manager



REGIONAL CLEARINGHOUSE

COH Comment 4-3

The document has nowhere, to our knowledge, addressed the existence or potential impact of coal development in either Cleveland or Elmo. It is this Commissioner's opinion that both of those communities will share in the impact of coal development and should be considered in projections.

COH Response 4-3

The AOG allocated population to communities within certain constraints required by the UPEO Model. Cleveland and Elmo were included in allocation of population to "other incorporated and unincorporated areas" of Emery County. Specific projected population growth was made for each community and showed only little change due to their limited support infrastructure.

COH Comment 4-4

The document also refers to off-road vehicle activity, and that area presently will occur adequately for these needs. With the high growth which will contend will occur, coupled with recent limitations of public land accessibility through the inclusion of 397,000 acres of Emery County in the Wilderness Study areas, we feel that off-road vehicle activities will be restricted and serious localized damage will occur on the areas adjacent to existing county roads.

COH Response 4-4

The fact that the Four-County region has sufficient roads, trails, and areas to meet the present needs of off-road vehicle users was identified in the 1978 Draft Utah SCORP. Impacts that would occur to resource values as a result of coal-related increase in ORV activity have been identified throughout the OEIS (see impact analysis for Recreation, Special Designation Areas, Wildlife and Cultural Resources).

It is not anticipated that restriction of ORV use areas in the Four-County region resulting from the wilderness inventory would significantly increase ORV impacts to the remaining lands. Reasons include:

1. While the lands are under wilderness review there are few restrictions on vehicular use of the areas. In most cases use of existing roads and trails would continue. Vehicular use off roads and trails could be allowed when authorized by the managing agency if it is determined that reclamation requirements for nonimpairment criteria can be met.
2. Lands that receive the greatest ORV use and therefore the greatest impact to other resource values are those lands that best meet the needs of the ORV user. Restrictions of ORV use in designated wilderness areas would not affect the popularity of other lands, since such popularity is largely based on the suitability for ORV use.
3. Off-road vehicle activity is already restricted by steep topography in many of the areas under wilderness review, and managerial restrictions resulting from wilderness designation would have little actual effect on ORV use of those areas.

COH Comment 4-5

The Commission strongly objects to the allegation inferred in the document on Page 115, Paragraph 4, that Emery County residents do not feel a need for recreational facilities which allow our residents to participate in organized recreational activities. Research conducted by the SEUAG in the Community Attitude Survey of 1980 wherein 586 residents were polled indicated that 86 percent of the respondents rated local recreational facilities as poor and as a priority for local spending for their improvement. Furthermore, 36 percent of the respondents indicated that this was their highest priority for local spending. Twenty percent more indicated that this was their second priority for local tax expenditures. The respondents, furthermore, indicated that 62 percent placed playground as a first or second priority, and 59 percent placed swimming pools as a first or second priority. Other needs identified as a first priority need by citizens were a sports program, 31 percent, and community recreation centers, 37 percent.

COH Response 4-5

See Castle Dale Hearing Response 2-4 above.

GENERAL COMMENTS

The major comment which we are concerned with is the repeated use of 1977-78 data to support major recommendations. The data used such as population estimates, attitude surveys, statis of infrastructure assessments, etc., is outdated and as a result it gives false representations of the situation. It appears that much of the information was derived from the Central Utah Coal Environmental Impact Statement of 1978, which is outdated.

The population projections are fundamental in the planning efforts surrounding these proposals. It is our conclusion after reviewing the population projections in the document that the numbers used for the base numbers are quite conservative relative to the latest numbers which the AOG is using. The Utah State Planning Coordinators office under special contract with EPA has produced numbers for waste water treatment planning and the intent is to standardize numbers for all state and federal planning needs. These numbers are based on the UPED model with some economic data from the local level built in. Even these numbers are conservative, but they are consistently higher than the EIS's baseline. There is a new "high development scenario" being computerized currently. A copy of the original numbers is included for referencing. Disaggregations are by the AOG. The impacts from these developments will be more substantial if these new numbers are plugged into the models.

Examples of problems with infrastructure statis can be seen on page 102. It states that current levels of police protection is insufficient in all communities except Castle Dale. However, in 1980 Castle Dale disbanded its police force and depends upon the County sheriff just like the other communities. The following statement appers verbatim on page 102.

General Comments
Page 2

"By 1978, additional waste water treatment capacity was or shortly would be required in Helper, Price, Wellington, Ferron, Huntington and Salina." Obviously the preparers should have defined the needs in 1980 terms for planning purposes. Helper, Price and Wellington do not manage waste water treatment systems, it is managed by the Price River Water Improvement District which in 1980 terms is still several years away from upgrading their plant. The Emery Town and Scofield areas were left out of the assessment and will need definite upgrading of their facilities. Another important outdated assessment appears on page 115. Residents are dissatisfied with their recreation facilities. A recent

SEUAG attitudes survey (1980) indicates that a full 86% of the citizens feel that areal recreation facilities are poor. Also 56% of the respondents said that recreation facilities should be either first or second priorities for the spending of tax dollars.

Also on page 102 the assessment of mobile homes versus the housing stock is not representative of the 1980-81 situation. In a recently completed (1980) housing study by the AOG mobile homes constituted 33% of the housing stock in Castle Dale and 50% in Huntington relative to the 51.7 and 58.3 in the study.

Another general comment concerns the assumed environmental impacts from the associated coal mining. Many of the statements assume that the impacts from coal mining have been fully investigated. This is a dangerous assumption in that many questions remain concerning the effect of coal mining on interrupted watersheds both surface and ground waters. In the Huntington, Cottonwood, Scofield/Price, Ferron and Muddy Creek watershed the water has extremely important downstream uses, mainly culinary, which must be protected at a higher level than most other waters.

As an added factor the mining will occur high in the watershed and will be difficult to control especially if the consequences have not been adequately defined. Waste water is classified as sewage from mining efforts. Some sewage flow is generated

General Comment-
Page 3

by mining, however, it is negligible when compared with water affected by mining either discharged or interrupted by the mining operation and should be dealt with separately in the document.

We (SEUAG Mining and Salinity Study) are finding out that in the documentation of mining effects on water systems is really in its infancy as far as defining the problem. This definition is critical if water quality is to be preserved in the region ^{IF COMMUNITIES} which we permit the level of coal development described within the document.

One other general comment is the repeated use of the statement that agricultural land would be permanently lost due to water conversion. This should not be the case if the water sources are managed carefully. It appears according to our information that there is enough water available to have communities, agriculture and industry if all users will participate in up-grading water use and require land use planning practices all to preserve

the resources of this area. It can be documented that approximately 60% of the water diverted for agriculture is lost either from excess seepage in canals or through inefficient on-farm irrigation practices. Some of the 60% is rediverted, however, it appears that significant savings could result if canals were lined and alternative irrigation were developed. This problem should be addressed in the EIS instead of just accepting the loss of farm lands. The lining of canals would have water quality improvements as well. Emery and Ferron both have unnaturally high water tables due to excessive canal seepage above town.

SPECIFIC COMMENTS

P.S-2

The assessment of Air Quality relates decreases in air quality to increased population. This increase will be complicated when related to increased industrial coal burning in associated power plants, etc.

P.S-2

The change in water quality can occur in ways other than simply subsidence. It will be necessary to evaluate the effect of the mining operation on ground water and surface waters before leasing, during mining and after mining during subsidence. The effect of subsidence should be studied.

P.S-2

How do sewage flows affect salinity? Mine discharge generally is not classified as sewage.

P.S-3

The temporary deterioration of services would also be felt in Scofield and Wellington. Scofield seems to be neglected extensively in this document. Even if just 25 or 30 miners move into Scofield the impact will be devastating. There are five (5) other mines which are going to be established in Pleasant Valley.

P.13

The Tucker Canyon Tract is very close to the expanding Mountain Home subdivision near Scofield Reservoir. It will be necessary to evaluate the effects of this coal mining on the values of a recreational subdivision.

Chapter 2

It would be of great interest to the AOG and everyone else to know of the criteria used to determine the alternatives. Why are the Emery tracts only considered in alternative number one? If the Mountain Fuel gasification plant goes in shouldn't these coal sources be utilized?

P.74

Soils often have been implicated with limiting reclamation. The Emery Tracts especially will be influenced by mancos shale. Range improvement efforts have been generally unsuccessful due to the low organic content of the soils especially when compounded by low precipitation levels.

P.77

Water quality in the area has not really ben quantified despite the 208 program and associated federal and state monitoring efforts. The effect of high and low flows should not be important in the discussion. What is important is the effect of coal

mining on low flows. Most planning should be done on the seven-day, 10 year low flows and resultant waste load allocations for industry determined on these flows.

The discussion on trace elements shows a discrepancy between the 208 and Forest Service monitoring data. The time frame for monitoring needs to be addressed. The 208 occurred in 75-76, a dry period. If the Forest Service data was collected in 77-79, these years were generally wetter and the effect of mining less pronounced. The Wilberg Mine also may not be representative for mining throughout the district.

P.83

The effect of mining on ground water within the plateau is generally undocumented.

P.85

What effect does this geologic make-up have on water movement.

P.102

In Castle Dale mobile homes make-up 33% of the housing stock in 1980.

In Huntington the mobile home count is 51% in 1980. Scofield is completely left out of this infrastructure assessment. It has limited police protection, a poor fire protection system due to a poor water system. The septic tank system is marginal with essentially no increase potential. Castle Dale does not have its own police force.

P.107

in land use planning the pace of growth is only one aspect. Emery County needs to get involved with comprehensive planning more than simply controlling the pace of growth.

What was the source of the "local residents subjective responses" interviews in 1979?

P.115

In what way have R.V. use been provided for? Most Emery County citizens are not satisfied with recreation facilities. (See previous comments)

P.127

Assumption #5

It should not be assumed that agricultural lands retired would not be reclaimed after having been retired to provide community water needs. With wise planning, there should be enough to go around.

Assumption #6

With wise planning agricultural lands would be developed last.

Assumption #7

Water needs should be obtained from irrigation water saved through wise management.

Table III
SOUTHEASTERN UTAH ASSOCIATION OF GOVERNMENTS
POPULATION PROJECTIONS
BY COUNTY AND CITY*

	1978	1980	1985	1990	1995	2000
Southeastern Utah	52,500	58,200	73,500	80,500	83,900	84,350
Carbon County	20,900	23,500	29,100	31,400	32,350	32,250
Price City	8,360	9,400	11,640	12,560	12,940	12,900
Helper	2,926	3,290	4,074	4,396	4,529	4,515
Wellington	1,254	1,410	2,328	2,512	2,588	2,580
East Carbon/Sunnyside	2,717	3,055	3,201	3,297	3,396	3,386
Pleasant Valley	209	235	582	628	628	628
Hawthorne Unincorporated	209	235	291	314	314	314
	5,225	5,875	6,984	7,693	7,955	7,927
Emery County	9,900	11,400	15,750	18,400	20,100	20,900
Emery Town	396	456	630	736	804	836
Ferron	1,287	1,482	2,362	2,760	3,015	3,135
Castle Dale	1,782	2,052	2,835	3,312	3,618	3,762
Orangeville	990	1,140	1,890	2,208	2,412	2,508
Huntington	2,277	2,622	3,150	3,312	3,618	3,762
Cleveland	594	684	945	1,110	1,206	1,254
Elmo	297	342	472	552	603	627
Green River	990	1,140	1,575	1,840	2,010	2,090
Unincorporated	1,287	1,482	1,898	2,570	2,818	2,926
Grand County	7,850	8,150	9,700	10,100	10,100	9,850
Moab	5,809	6,031	6,984	7,171	7,171	6,993
Spanish Valley	1,805	1,874	2,425	2,626	2,626	2,561
Other Unincorporated	235	245	291	303	303	296

*Disaggregated from 1979 Utah Process and Economic and Demographic Projections

P.129 What is the justification for the statement on soil loss due to runoff? Sediment is of extreme importance in the Muddy, Ferron and Price drainages.

P.130 Data from Wilberg Mine is not necessarily representative. Each mine should be evaluated separately. The data for 1979 is from a wet year. If normal, lower flows occur in the next few years the concentrations will be higher.
Based on available data the following statement is premature: "It seems unlikely, therefore that mine discharge would require special treatment."

P.133 The brief statement on water quality is certainly untrue based on data in the EIS and other associated data. The effect of mining on ground water has never been adequately evaluated.

P.157 That the conversion of agricultural land is unavoidable should not be a forgone conclusion. We should be able to minimize this situation by planning with this objective in mind.
Areal master plans still say agricultural lands should be preserved.

CDHE Response 1-1
This letter was presented orally in its entirety during the public meeting and has been responded to. See comments 2-1 through 2-31 of the Castle Dale hearing above.

A Great Future
With Coal, Gas
and Uranium



Emery County Board of Commissioners
Castle Dale, Utah 84513

D. Roger Curtis, Commission Chairman
Rue P. Ware, Commissioner
John I. Paiker, Commissioner
Glen P. Bott, Clerk

November 19, 1980

Mr. Ron Bolander
Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111

Dear Mr. Bolander:

The Draft Environmental Impact Statement for the Uinta-Southwestern Coal Region concerns largely the development of coal resources found within the jurisdiction of Emery County. The Emery County Commission feels very strongly that the wise development of these properties can be a very beneficial occurrence in Emery County, and conversely that any actions which would negatively effect our communities and socioeconomic well being, or our health, or the personal safety of the residents of Emery County must be opposed.

The communities in Emery County, without exception, rely on water sources which originate in whole or in part in the Wasatch Plateau, and any development which could in any far stretch of the imagination have a potential impact of deteriorating the quality of the surface flow or of the ground water originating in this area would require the most stringent controls and monitoring, as well as a level of planning which has not been demonstrated in the document being reviewed herein.

The DEIS being reviewed here also makes several judgmental prognostications concerning future population and demographic projections which we tend to feel somewhat de-emphasize the mining impact being discussed herein, and this in turn will reduce the levels of impact mitigating actions which are identified as being necessarily planned for the region. An example of the de-emphasis of population is shown in that the 1987 total with the development projected herein is listed at 12,168 (Table 4-7, pp145; Table 4-21, pp 174; Table 4-34, pp 194; and Table 4-47, pp 214). The 1980 census for Emery County shows our county has a population of 11,455, or only 713 less than the nondevelopment alternatives for the OEIS. Surely the Team is not unaware of other developments not related to the coal properties referenced herein which would indicate a seven-year growth over the 713 individuals

Page 2
Mr. Ron Bolander
November 19, 1980

referenced. Such a shallow look at population trends tend to force one to de-emphasize the total socioeconomic arena addressed herein. For comparison to the Bureau of Land Management numbers, we are indicating the Utah Process and Economic and Demographic Impact Model, 1979.

Table 1	1978	1980	1985	1990	1995	2000
Emery County	9,900	11,400	15,750	18,400	20,100	20,900
Emery Town	396	456	630	736	804	836
Ferron	1,287	1,482	2,362	2,760	3,015	3,135
Castle Dale	1,782	2,052	2,835	3,312	3,618	3,762
Orangeville	990	1,140	1,890	2,208	2,412	2,508
Huntington	2,277	2,622	3,150	3,312	3,618	3,762
Cleveland	594	684	945	1,110	1,206	1,254
Elmo	297	342	472	552	603	627
Green River	990	1,140	1,575	1,840	2,010	2,090
Unincorporated	1,287	1,482	1,898	2,570	2,818	2,926

The housing figures shown in your housing projections are similarly lower than present housing count data available to the Commission. Figures compiled by the Southeastern Utah Associated Local Governments indicate that the following total housing count disparities exist. For your consideration, we also are including 1980 census figures for your review.

Table 2	1977 BLM Team Figures	1980 SEUALG Team Figures	1980 Census Count
County Total	2,908	3,052	3,650
Castle Dale	505	496	614
Emery	127	175	154
Ferron	333	438	528
Huntington	643	685	755
Orangeville	275	367	399

Domestic Water Supply Systems
(In connections)

Table 3

Community	1970 Connections	Present Connections	Present Water System Capacity *	1990 Needs * *	1990 Shortage (-) Excess (+)
Emery	100	127	230	226	+ 4
Ferron	308	578	473	850	- 377
Castle Dale	252	1,093	910	1,020	- 110
Orangeville	238	365	675	680	- 5
Huntington	407	1,050	1,000	1,202	- 202
Cleveland	111	245	40	341	- 301
Elmo	71	165	20	170	- 150
Total District	1,487	3,623	3,568	4,307	-1,141

* System capacity as rated by the Utah State Health Department

** Assumes 3.25 people per water connection and uses the "Utah Process Economic and Demographic Projections", for population.

SEWAGE DISPOSAL SYSTEMS
(In population)

Community	1970 Population	Present Population *	Present Sewer System Capacity	1990 Population * *	1990 Capacity Excess (+) Shortage (-)
Emery	216	445	1,300	736	+ 564
Ferron	308	1,400	800	2,760	- 1,960
Castle Dale	252	2,135	7,000	3,312	+ 1,480
Orangeville	238	1,020	-	2,208	-
Huntington	407	3,300	3,000	3,312	- 312
Cleveland	111	600	2,025	1,108	+ 363
Elmo	71	400	-	554	-
Total District	9,300	14,125	13,990	13,990	+ 135

* Estimates from Southeastern Utah Association of Governments

** Estimates from "Utah Process Economic and Demographic Projections"

Page 3
Mr. Ron Rolander
November 19, 1980

Table 3 herein developed indicates that the figures represented as accurate in the BLM survey are 21.51% below the 1980 census figures available and furthermore, that they are actually below Southeastern Utah Associated Local Government's figures in all categories and communities.

On page 102 of the DEIS, the Team refers to available water supplies. The text does not break down by communities the present levels of shortfall in the systems. Using the Utah Process Economic and Demographic Projections, we submit the following chart of cities and their present and future availabilities of water and sewer service as prepared by the Castle Valley Special Service District.

The Team's assessment of water treatment facilities in Emery County is incorrect. According to the Castle Valley Special Service District, Ferron, Emery, Castle Dale, and Huntington all need to upgrade their water treatment facilities. The communities are all oversubscribed with the local canal companies, and are in essence using more canal water for water treatment than their ownership of water stock dictates. This situation could cause rationing of water should annual rainfall in the Wasatch Plateau decrease, or if the surface flows or groundwater supplies should be reduced or reduced in quality as a result of mining activity.

The document has nowhere to our knowledge addressed the existence or potential impact of coal development on either Cleveland or Elmo. It is this Commissioner's opinion that both of those communities will share in the impact of coal development and should be considered in projections.

On page 115 of the document, the Team refers to the Utah SCORP which we concur with in substance. The document also refers to off-road vehicle activity and that the area presently provides adequately for these needs. With the high growth which we contend will occur, coupled with recent limitations of public land accessibility through the inclusion of 397,000 acres of Emery County in the Wilderness Study areas, we feel that off-road vehicle activities will be restricted and serious localized damage will occur on the areas adjacent to existing county roads.

The Commission observes that the Team has indicated that there is a shortage of camping and picnicking sites in Emery County. We strongly recommend that any action by the Bureau to increase development in the county could be coupled with adequate planning and facilities procurement by the Bureau and the Forest Service.

The Commission strongly objects to the allegation inferred in the document on page 115, pp 4 that Emery County residents do not feel a need for recreational facilities which allow our residents to participate in organized recreational activities. Research conducted by the SEUALG in the

Page 4
Mr. Ron Polander
November 19, 1980

PRICE PUBLIC HEARING

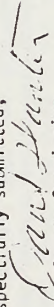
SPEAKER

1. Robert Greenberg, Four-County Community Health Center
No Exhibits presented at this hearing.
Comments and Responses follow

Community Attitude Survey of 1980 wherein 587 residents were polled indicated that 86% of the respondents rated local recreation facilities as poor and as a priority for local spending for their improvement. Furthermore, 36% of the respondents indicated that this was their highest priority for local spending. Twenty percent more indicated that this was their second priority for local tax expenditures. The respondents, furthermore, indicated that 62% placed playgrounds as a first or second priority, and 59% placed swimming pools as a first or second priority. Other needs identified as a first priority need by citizens were a sports program (31%) and community recreation centers (37%).

If the Bureau is able to assimilate the above referenced material, and the local planning research, we feel that the working documents which are forthcoming will be much more realistic and will serve as a much more accurate criteria with which to evaluate localized impacts and the current mitigations required to facilitate an orderly development of the coal resources being studied here.

Respectfully submitted,



Emery County Commission
by Dan S. Hunter
Administrative Assistant

CDHE Response 2-1
This letter was presented orally during the public meeting and has been responded to. See comments 4-1 through 4-5 of the Castle Dale hearing above.

PH Comment 1-5

We know that psychiatric disorder is significantly more common in dis-integrated communities than in integrated communities, and the EIS certainly alludes to projected disintegration of small rural communities as more coal production comes on line. You will find that reference in Leighton's study, Sterling County, 1957.

We know that in boom towns we find a great deal more depression, particularly among women. We find a great deal more alcohol problems among men. We find among children and adolescents a tremendous increase in behavioral and social maladjustment.

PH Response 1-5

Text revisions were made to identify shortfall of social services in meeting future baseline and proposed action population requirements for those services.

PH Comment 1-6

In Emery County, incidentally, the 1980 projection by the Research Group, Incorporated projects 192 marriages; also projects 89 divorces. And the ratio between those two may be a more variant indicator of the kinds of stresses that Emery County is already experiencing from the growth of the last few years.

PH Response 1-6

Text revisions were made to identify shortfall of social services in meeting future baseline and proposed action population requirements for those services.

PH Comment 1-7

We also find that in the fourteen - month period from 10/'78 to 12/'79 there were 102 referrals for family violence in Emery County. And we know that in areas there is more mental disruption supplied by a larger share of psychiatric patients than areas where there is less marital disruption.

PH Response 1-7

Text revisions were made to identify shortfall of social services in meeting future baseline and proposed action population requirements for those services.

PH Comment 1-8

We also know from Helgeson's work in 1953 that we can expect psychotics, severe types of mental illnesses, to be more common in rural areas than urban areas. We also know that liquor sales in Emery County went from \$138,000 in 1975 to over \$300,000 in 1979, and grew at a rate much faster than the increase of population over this period.

We know from personnel people at the local mines that their absentee rate is between 12 and 28 percent, and that they estimate 75 percent of that absenteeism is alcohol-related.

PH Response 1-8

Text revisions were made to identify shortfall of social services in meeting future baseline and proposed action population requirements for those services.

1. Greenberg, Price Hearing Testimony

PH Comment 1-1

The socioeconomic impact study, the projected impact on the local infrastructure analysis was left to outside consultants, in part to Centaur Associates of Washington, D.C. of whom I know nothing. There really was nothing in the EIS that told me anything about them.

PH Response 1-1

Centaur employed professional sociologists from BYU and the Six County Association of Governments to provide more localized input into its socioeconomic analysis. The Utah Process Economic and Demographic Model was used to generate information. This model was developed by the University of Utah and the State of Utah.

PH Comments 1-2

The other part of the infrastructure report and the socioeconomic impact study, as I understand it, was done by some subcontractors out of BYU who happened to use what they called an "informally structured interview format" to do that, and did not provide us with a list of who they informally interviewed.

PH Response 1-2

Under the Freedom of Information Act, the names of interviewers are confidential. The validity of the survey is based on the representative cross-section of the population interviewed; the names of those interviewed are irrelevant.

PH Comment 1-3

In case you don't know, Emery County has grown by 121 percent since 1970, and it's projected on the median scenario of the Utah population group to increase by another 83 percent by the year 2000, and this is not including the impact of the projected development.

PH Response 1-3

Text revisions were made to identify shortfall of social services in meeting future baseline and proposed action population requirements for those services.

PH Comment 1-4

In Gillette, Wyoming where we saw a 26-percent increase in the population over four years, we also saw and documented 101 percent increase in admissions to the local mental health center, a 600 percent increase in admissions to the State Mental Hospital, and extremely high average life-stress levels. You will find this reported in Robert Weisz' article in Davenport and Davenport.

PH Response 1-4

Text revisions were made to identify shortfall of social services in meeting future baseline and proposed action population requirements for those services.

PH Comment 1-9

We know that in January of this year 43 percent of the sample of Emery County residents agreed that alcohol and drug problems in the community had increased as a result of growth. We know that from the survey conducted by our local association of governments.

PH Response 1-9

Text revisions were made to identify shortfall of social services in meeting future baseline and proposed action population requirements for those services.

PH Comment 1-10

We know that in 1978 there were almost 300 referrals to the Juvenile Court in Emery County. And when I speak of referrals, we're only talking about the tip of the iceberg, because we all know that in rural areas where there are some existing court systems people are likely to know each other or know of each other. And many, many -- in fact, I would guess the vast majority of social problems are handled informally and never appear on our statistics.

PH Response 1-10

Text revisions were made to identify shortfall of social services in meeting future baseline and proposed action population requirements for those services.

PH Comment 1-11

In Carbon County this year we are expecting that there will be 260 marriages and about 124 divorces. People may be getting married quite a lot around here, but they also seem to be getting divorced quite a lot.

Almost 600 referrals of family violence in that same fourteenth-month-based period, three suicides. Carbon County liquor sales almost doubled since 1975, again increasing at a rate much faster than the population.

Since 1970 Carbon County has experienced a 49-percent population growth, and 52 percent of the Carbon County population agrees that crime and drugs have increased due to that growth.

In '79 there were four arrests for rape in the county. In the first three-quarters of 1980 there were five arrests for rape, one sexual assault, and one for incest.

In 1979 there were almost 700 referrals to the Juvenile Court in this county.

PH Response 1-11

Text revisions were made to identify shortfall of social services in meeting future baseline and proposed action population requirements for those services.

PH Comment 1-12

Finally, we know from the work of Hans Selye and a number of other psychologists that in many cases mental illness consists of, is triggered by, and we think is caused by failures of people to keep pace, to adapt to change. People who remain healthy in periods of change are those people who are able to keep pace with it. People who become ill, mentally ill, are people who cannot. They lose their equilibrium and are not able to maintain the same rate of change as the society around them.

We know that the young people, elderly people and minorities are all significantly more at risk for these kinds of problems than are other people.

PH Response 1-12

Text revisions were made to identify shortfall of social services in meeting future baseline and proposed action population requirements for those services.

PH Comment 1-13

I'm throwing a lot of statistics out. What I really mean to say is that in an otherwise rather comprehensive document the lack of this kind of analysis is a major failing.

PH Response 1-13

Text revisions were made to identify shortfall of social services in meeting future baseline and proposed action population requirements for those services.

PH Comment 1-14

It is not discussed whether there are enough social workers, psychiatrists, inpatient beds, mental health communities, psychologists. That information simply is not in the EIS.

PH Response 1-14

Text revisions were made to identify shortfall of social services in meeting future baseline and proposed action population requirements for those services.

SPEAKER

- 1. Ivan Matheson, State Senator
- 2. A. L. Foster
- 3. Joseph Ronan, Getty Oil Company
- 4. James Peacock, Cottonwood Creek Livestock Assn.
- 5. Edward S. Crawford

Exhibit 1 - Taxpayer Citizens of Garfield County (Responses attached)

Exhibit 2 - Public Comment of Getty Oil Company (No responses required)

Exhibit 3 - Affidavit - Edward S. Crawford (No response required)

Comments and Responses follow

SLCH Comment 1-1

We have considerable concern with the Environmental Impact Statements that are being issued in our area. We are rightly concerned that these impact statements do not address adequately, or do not in any way attempt to address the economic impacts on the citizens that live in those areas and the people of the State of Utah.

SLCH Response 1-1

The Uinta-Southwestern Utah Coal Region EIS contains the results of an extensive and intensive effort to address socioeconomic impacts to the citizens of Utah, particularly those in the impact area. The purpose of distributing the DEIS is to allow an opportunity for the public to provide comment and additional information.

SLCH Comment 1-2

There are coal reserves in the area down there, which is a matter of concern in this EIS that are well known and well defined and have been explored and which show to have adequate and ample economic ability to be mined and sold, and which would not give any adverse impacts environmentally to the area around that would be in any way detrimental to the values that exist there.

SLCH Response 1-2

Development of Federal coal leases is initiated through filing of mining plans with the Office of Surface Mining. At that time, they are examined specifically for environmental concerns and specific stipulations are placed on the development of those areas. Some mining plans for existing leases on the Kaiparowits Plateau have been proposed in this region, but have not been carried through to approval and development.

This EIS does not preclude development of coal mining in the southern Utah region. It does not in any way address the development of the tremendous reserves of coal that are presently under lease in that area. Under present plans additional leasing in the southern Utah coal fields will be considered in the Federal Coal Management Program.

SLCH Comment 1-3

We have some vital concern with regard to the EIS not relating to the economic problems of the area. (Garfield County)

SLCH Response 1-3

On page 123 of the DEIS the economic conditions and problems of Garfield County are discussed.

SLCH Comment 1-4

One of the other concerns we have is that in the Environmental Statement it indicates that the traffic for mining coal in that area would be a detriment as it travels over these highways.

Let me assure you that these highways have been used recently for other purposes that have not destroyed the environment, not hurt anything there, and they have been a benefit to the economic well-being.

SLCH Response 1-4

Existing highways are adequate to carry present traffic; however, the traffic projected for some portions of the present highway system would be enough to substantially increase the maintenance, rebuilding, and improvements needed to the highways.

SLCH Comment 1-5

We think that adverse impact statements such as this one that would render the area unsuitable for mining in many instances are a detriment to that process which was initially set out by the Federal Government when Utah became a state.

SLCH Response 1-5

This EIS only considers leasing of coal in the Uinta-Southwestern Utah region and in no way precludes consideration of further leasing of coal in the southern Utah coal fields or development of existing leases in the Garfield-Kane County area.

SLCH Comment 1-6

Ivan Matheson: I think the agencies in total have failed to recognize that each one has had a little impact, as you dealt with the problems.

The Hearing Officer: So, what you are saying --

Ivan Matheson: Collectively that that impact has become an impossibility for the area to live with.

Ron Bolander: So, what you are saying is the statement only deals with one little area, but when you add on another area and another area that other statements are dealing with accumulatively it starts adding up.

Ivan Matheson: That's it exactly. Tremendous adverse impact that cannot be reconciled by the people down there in offsetting an economy in any way.

SLCH Response 1-6

Actions that may be interrelated with any of the alternatives discussed in this DEIS were identified on page 12. This DEIS discusses only different levels of coal leasing and the impacts associated with either allowing or denying the proposed UP&L exchange.

2. Foster, Salt Lake City Testimony

SLCH Comment 2-1

We don't like this report. I'd like to read this for the public record: The following taxpayers and citizens of Garfield County hereby violently protest the overall exclusion of our area in the coal development in the new Federal Coal Mining Program as outlined in the DEIS report.

SLCH Response 2-1

This current Federal coal leasing effort in the Uinta-Southwestern Utah region primarily involves the leasing of coal in an area in which planning was accomplished on the Wasatch Plateau and Emery coal fields. The only exception to this is the consideration of the Utah Power & Light Exchange proposal for either consummation or denial and issuance of the preference right lease applications held by UP&L in the Kaiparowits Plateau. In subsequent future Federal coal leasing efforts, the Kaiparowits Plateau in the Southern Utah Coal Field Region will be considered for further leasing. It is anticipated that the process will begin in 1982 with potential leasing in early 1984.

Also see hearing response 1-2 above.

SLCH Comment 2-2

In effect, the DEIS report locks from development our entire area until such time as Utah Power & Light and other major corporations find it more to their interest to financially develop coal resources in our area.

The report further excludes our area from development of the three smaller coal mines we have in our area where our county could derive some \$2 million in payroll. These three mines, namely the Pollack-Davies Mine, Shakespeare Mine, and the Francine Mine could and would derive economical benefits from our county on a level that we can live with in our environment.

SLCH Response 2-2

See hearing response 1-2 above. The three existing mines are presently inactive mines both on Federal and State lands which could proceed with an active mining development once mining plans are approved by the Office of Surface Mining or the State of Utah.

SLCH Comment 2-3

We ask that the DEIS report be adjudicated to include the coal development in Garfield County to a minimum level of production of coal to five million tons per year.

SLCH Response 2-3

The southern Utah coal fields including the Kaiparowits, Alton, and Kolob areas presently have 97 Federal leases involving 4,700 acres and almost 2 billion tons of coal already under existing Federal lease. At this time, no mining of this Federal resource is taking place, although various proposals have been developed over the last 10 years. Assuming 50 percent recovery of the in-place reserves, the area already under lease could provide a logical pro-

SLCH Comment 2-4

Did you read in there where our communities, they state that we don't even have a police force? I have raised three fine children. We don't have dope problems. We don't have all the problems in our county that you do up here in the more populated areas, but we do have a police force. We do use septic tanks.

SLCH Response 2-4

The town of Escalante has one part-time police officer. The communities of Cannonville, Henrieville and Tropic rely upon the Garfield County Sheriff's Office for law enforcement.

SLCH Comment 2-5

Now, we oppose that report because it has completely left us out. I think in our county there's 3,300 people. You got more on one city block up here, but we still want to develop the resources.

We all live in the State of Utah. section 36 and 32 down there will make this statement a lot of money, if we could mine it. That would help our schools.

SLCH Response 2-5

See hearing response 2-1 above.

SLCH Comment 2-6

We haul logs on the highway. We haul oil, cattle, sheep; all kinds of traffic. We don't have many problems on Highway 12. Thank you.

SLCH Response 2-6

At the present time Utah Highway 12 can accept a moderate increase in traffic; however, at a higher level of use the mixing of coal trucks and recreational vehicles on the same road (Red Canyon) would cause inconvenience and an increased accident rate. Also, at a higher level of usage, the pounding of heavy traffic becomes proportionately more severe than the effects of weathering on the asphalt pavement. Increased maintenance and more frequent resurfacing would become necessary.

3. Ronan, Salt Lake City Testimony

No responses required.

4. Peacock, Salt Lake City Testimony

SLCH Comment 4-1

We have already a tract record on some disruption of surface water due to the underground mining and the resultant subsidence that is occurring now because of the removal of large areas of coal beneath the surface. These are concerns that we express, and I will make specific reference to the fact that where these are discussed in the Statement, it is our feeling that they are not adequately covered in the Statement.

SLCH Response 4-1

Subsidence caused by coal mining is addressed on pages 130 and 132 of the DEIS, where it is recognized that fractures and/or fissures intersecting surface waters would dewater them to some extent. However, the state of the art of predicting where the fractures would occur and the extent of impact by them is limited to generalities. Because of this we are forced to be practical in our surveys and monitoring of possible subsidence. On page 83 of the DEIS it is mentioned that 65 personnel along with Utah Power and Light Company did an intensive survey of springs on East Mountain. This survey along with monitoring as required by the Surface Mining Control and Reclamation Act of 1977 should detect changes in the hydrologic balance. Also if changes do occur, water rights would be protected. We also recommended in the Mitigation Section of the DEIS (page 62, Number 6) that the lessees do the monitoring of the Rilda Canyon tract.

SLCH Comment 4-2

With the prospect of removal by long wall mining methods, which seems to be the method either being used or contemplated being used in this area for removal of much higher proportions of the coal, the chances are disruption of aquifers that feed surface water is significant. It is not adequately addressed in this statement.

SLCH Response 4-2

See response to Salt Lake Hearing comment 4-1

SLCH Comment 4-3

If you lose the water that flows naturally, it seems highly impossible that the grazing that has been done there since the time that country was settled could be continued in the fashion that it now has been.

SLCH Response 4-3

This is in agreement with the analysis on page 142 of the DEIS.

SLCH Comment 4-4

We would like to be on record as insisting that the prior rights of ingress and egress and free movement of livestock for the ranches of Horn Mountain east and Trail Mountain and Joe's Valley area be protected.

SLCH Response 4-4

Growth and development, with or without new coal leases, will add congestion to canyon roads. The rights of livestock men to move animals through these areas would not be challenged, but the ease with which the animals would be moved may diminish. In cases where moving animals on the hoof becomes too hazardous they may have to be trucked.

SLCH Comment 4-5

Now, a second area of ingress-egress is the Cottonwood Canyon area. That would also be impacted by the area that is generally referred to as Cottonwood Canyon. It's my understanding that the leases up in Cottonwood Canyon have been withdrawn and are no longer a part of this, and only the top of East Mountain, south end of East Mountain is being considered.

SLCH Response 4-5

No leases were considered within the confines of Cottonwood Canyon itself. The proposed Cottonwood tract is located north of the canyon and the proposed North Horn Mountain tract is located south of the canyon. Also no surface facilities are assumed for Cottonwood Canyon.

SLCH Comment 4-6

If this is the case on either the coal specifically referred to here or in general in the area, we will repeat again that anytime you impact a narrow entrance canyon with the number of vehicles and truck traffic that is associated with a mining operation the size of these components mentioned here, you vastly interfere with the abilities to move cattle on and off ranches.

Now, those of you who have been in the area know Cottonwood Canyon is a narrow, steep canyon. It is utilized by the cattle that enter on the trail to Joe's Valley and part of East Mountain. We already have significant interruption into this area.

SLCH Response 4-6

Based on the conceptual mining plans used in this EIS, none of the tracts analyzed would be located in Cottonwood Canyon or use it for access to mining operations.

SLCH Comment 4-7

The purpose of my being here tonight is to officially go on record in behalf of our association as asking for the proper mitigation of the ingress-egress as well as the protection of surface water rights.

SLCH Response 4-7

A mitigating measure has been added to the FEIS that says: "An acceptable cattle driveway must be provided in Rock Canyon".

Mitigating measure number 19 in the DEIS page 62, deals with protection of surface water rights.

SLCH Comment 4-8

As these folks have said, they are taxpayers and they do want to preserve as nearly as can be the cultural and the aesthetic values that have made Emery County singular in its approach. So, in behalf of those permittees -- and there are about 65 of them that are members of this association -- we urge the panel to be very cognizant of the long-established rights of surface grazers, of those who are using the surface lands overlying the coal tracts that are being considered.

SLCH Response 4-8

The development of coal resources is controlled by numerous laws and regulations imposed by Federal, State and local agencies. These laws and regulations recognize prior rights and privileges of the surface users. These laws are summarized in Chapter 2 of the EIS.

SLCH Comment 4-9

The land owners on the surface of East Mountain by visual observation feel certain that the springs, the seeps that are there and known -- I think not really fully inventoried, if my understanding is correct -- that there has been distinct subsidence that has been pictured and is there to visibly see. And their feeling is that the water is being interrupted and interfered with on the surface of East Mountain.

SLCH Response 4-9

See response to Salt Lake Hearing comment 4-1. Our review of the subsidence occurrence in the area shows no visible evidence of subsidence to the viewer.

SLCH Comment 4-10

That is why surface users such as these grazers are concerned that once these aquifers are broken or disrupted there simply is no practical way -- you can haul water, but you dump it in one locality and put it in tanks, where a natural stream emerges and flows for a good, long ways. It waters livestock over a large area of land instead of one centralized area.

One of the problems that we have with the Forest Service now is the fact that water development has congregated livestock in a relatively small area and it creates problems of dispersement, proper utilization of the forage on the range.

SLCH Response 4-10

See the response to Salt Lake Hearing comment number 4-3.

SLCH Comment 4-11

I have made earlier statements and I have expressed a concern about the obvious increase in the amount of vehicular traffic that would be in the area. Utah Highway 29 goes up that canyon from Orangeville up over the Orangeville-Ephraim road.

SLCH Response 4-11

At this point, we have no reliable information on increases in traffic past Joe's Valley Reservoir and into Ephraim. Undoubtedly there would be some increase in traffic, but probably little increased truck traffic. The major increase in traffic (Table 4-11 of the DEIS) would be likely east of Joe's Valley Reservoir, in the Cottonwood Canyon area and into Orangeville and Castle Dale, to U-10.

NOVEMBER 20, 1980

Mr. Ron Bolander, Team Leader
Bureau of Land Management
136 East South Temple
Salt Lake City, Utah 84111

SUBJECT: Uinta-Southwestern Utah Coal Region Draft
Environmental Impact Statement (DEIS)

The following Taxpayer citizens of GARFIELD COUNTY hereby, vehemently, protest the over-all exclusion of our area in coal development, in the new Federal coal management program, as outlined in the DEIS report!

We are opposed, and have severe concerns regarding the proposed exchange of PRLAs covering Federal coal on the Kaiparowits Plateau in Garfield and Kane Counties, owned by Utah Power & Light Company, for Federal Coal in the Wasatch Plateau coal field!

In effect, the DEIS report locks from development our entire area, until such time as UP&L and other major Corporations find it more to their interests, to financially develop coal resources in our area. The report further excludes our area from development of the three smaller coal mines we have in our area, in where, our County could derive some \$10,000,000 in payroll. These three mines, namely the 'Pollock-Davies mine', 'Shakespear mine' and the 'Frandsen mine' could and would derive economical benefit to our County on a level that we can live with in our environment, and the DEIS report has completely excluded these three mine developments, to the economical detriment of GARFIELD COUNTY!

We ask that the DEIS report be adjudicated to include the coal development in GARFIELD COUNTY to a minimum level of production of coal to 5 million TPY.

Mark L. Post - Star Route - Paria, Utah 84759
Richard D. McPhilly - P.O. Box 205 - Cannonville, Utah 84716
Shirley Hatch - P.O. Box 583 - Panguitch, Utah 84759
Stan M. Straub - Star Route Panguitch, Utah 84759
Robert L. Cannon - Star Route Panguitch, Utah 84759
John M. Foster - Star Rt. Panguitch, Utah 84757

Signatures continued on other pages

1
2
3

SLCH Comment 4-12
The comments have been made both in prior testimony, and I wish to make them here. I mentioned the egress and ingress of Cottonwood Canyon is a narrow canyon. It should be known to this group that the Utah Power & Light Company, whether they are or not one of the successful bidders are holders of these tracts, did have prior negotiations to the extent that if the Cottonwood Canyon is used extensively for some type of mining operation, be it production or just a man trip type of entrance, it would almost be a necessity; it would be a necessity to develop fenced driveways away from the roads for the entrance and exit of the cattle on those ranges.

SLCH Response 4-12
No new development would be planned in Cottonwood Canyon as a result of leasing additional coal under any of the alternatives covered in this EIS. The impacts occurring in Cottonwood Canyon are from existing activity as stated on page 100 of the DEIS.

SLCH Comment 4-13
We have also a very significant interest in whether or not Highway 29 from the Grimes Wash area where the Wilberg road now comes down and goes out to the plant, whether or not from there on up to the confluence of Cottonwood and Strait Canyon, whether or not there would need to be a fenced driveway for about a four-mile area there.

SLCH Response 4-13
The need or lack of need for a fenced driveway is related directly to the existing and future situation without new coal leasing. No direct coal-related development or traffic would be added to Highway 29 above the Grimes Wash road under any of the proposed leasing alternatives. Some increased general traffic on the road would result from population growth associated with new coal leasing but this would be a small portion of the total traffic increase that will occur over the next several years.

SLCH Comment 4-14
The Trail Mountain Coal Company, which is the operating mine in Cottonwood Canyon, has greatly increased its production in the past couple years. There has been a significant amount of interference by the large trucks that come down that canyon. There is still a gravelled road. It is a steep canyon. I do not know how much tonnage they are hauling out of there.

I do only know that the Forest Service fence and cattle guard has been used for virtually decades to gather cattle in the fall and push them down against there can no longer be used because of the road being there and the trucks go on through. So, I would answer yes, there has been a significant amount of increase of traffic interference with the normal driving cattle up and down that canyon.

SLCH Response 4-14
The text has been changed to include this information.

5. Crawford, Salt Lake City Testimony

SLCH Comment 5-1
As I read the Act and the regulations, it so states that there will be no mining under streams, springs or aquifers. We have all three of these situations in our particular situation.

SLCH Response 5-1
All tracts being considered for leasing in the EIS have been evaluated according to unsuitability criteria set forth in the regulations pertaining to Coal Management, Federally owned coal, 43 CFR 3400. Many of these criteria deal with water, watersheds, etc. As a result of this screening process, no significant adverse impacts involving water resources are anticipated as a result of additional leasing.

Garfield County Protest, Salt Lake Hearing, Exhibit I

Comment E1-1

The following Taxpayer citizens of Garfield County hereby, vehemently, protest the over-all exclusion of our area in coal development, in the new Federal coal management program, as outlined in the DEIS report!

Response E1-1

See hearing response 1-2 above.

Comment E1-2

We are opposed, and have severe concerns regarding the proposed exchange of PRLAs covering Federal coal on the Kaiparowits Plateau in Garfield and Kane Counties, owned by Utah Power & Light Company, for Federal Coal in the Wasatch Plateau coal field!

Response E1-2

Your comment has been noted and will be considered in the decision making process.

Comment E1-3

In effect, the DEIS report locks from development our entire area, until such time as UP&L and other major Corporations find it more to their interests, to financially develop coal resources in our area. The report further excludes our area from development of the three smaller coal mines we have in our area, in where, our County could derive some \$10,000,000 in payroll. These three mines, namely the "Pollock-Davies mine", "Shakespear mine" and the "Frandsen mine" could and would derive economical benefit to our County on a level that we can live with in our environment, and the DEIS report has completely excluded these three mine developments, to the economical detriment of Garfield County!

We ask that the DEIS report be adjudicated to include the coal development in Garfield County to a minimum level of production of coal to 5 million TPY.

Response E1-3

See hearing responses 1-2 and 2-2 above.

PUBLIC COMMENT OF GETTY OIL COMPANY

TO

UINTA-SOUTHWESTERN UTAH DRAFT ENVIRONMENTAL
IMPACT STATEMENT AND PROPOSED COAL LEASING PROGRAM

GOOD EVENING:

I AM JOSEPH E. RONAN, JR., ATTORNEY FOR GETTY OIL COMPANY,
ROOM 1732, 3810 WILSHIRE BLVD., LOS ANGELES, CALIFORNIA 90010.

GETTY OIL COMPANY (GOC) HAS REVIEWED THE DRAFT EIS STATEMENT ON THE UINTAH SOUTHWESTERN UTAH COAL LEASING PROGRAM, INITIALLY WE WOULD LIKE TO COMPLIMENT THE BUM (EIS) TEAM FOR THEIR EXCELLENT WORK IN THE PREPARATION OF THE REPORT WHICH THEY PREPARED IN A VERY SHORT TIME FRAME. WE BELIEVE THEY HAVE EXAMINED ALL AVAILABLE ALTERNATIVES IN A VERY THOROUGH MANNER. WE ARE ENCOURAGED TO NOTE THAT THE FEDERAL COAL LEASING PROGRAM IS FINALLY BEING IMPLEMENTED IN A TIMELY MANNER, IT IS LONG OVERDUE AND IT COMES AT A TIME WHEN THE COUNTRY IS FACED WITH A SEVERE ENERGY CRISIS OCCASIONED BY A DECREASING ENERGY SUPPLY. IMPLEMENTATION AND THE CONTINUATION OF THIS LEASING PROGRAM WILL ENABLE THE COUNTRY TO MEET ITS NATIONAL ENERGY GOALS.

AFTER REVIEWING THE VARIOUS ALTERNATIVES SET FORTH IN THE DRAFT EIS, GETTY OIL COMPANY SUPPORTS THE ADOPTION OF EITHER ALTERNATIVE ONE OR ALTERNATIVE TWO, WE SUPPORT THE ADOPTION OF THESE ALTERNATIVES FOR BASICALLY TWO REASONS.

1) THESE ALTERNATIVES GIVE THE GREATEST RECOGNITION TO INCREASED PRODUCTION REQUIRED TO MEET ENERGY SELF-SUFFICIENCY. TO ILLUSTRATE THIS POINT, YOUR ATTENTION IS DIRECTED TO THE 1990 COAL PRODUCTION GOALS WHICH ARE SET FORTH IN THE LETTER OF MARCH 14, 1980 FROM THE DIRECTOR, BUREAU OF LAND MANAGEMENT TO THE SECRETARY OF THE INTERIOR APPEARING IN THE APPENDIX #1 OF THE EIS.

2) THESE ALTERNATIVES PROVIDE FOR A COMPETITIVE BIDDING PROCESS WHICH COMPORTS WITH THE INTENT OF THE FEDERAL COAL LEASING PROGRAM. COMPETITIVE BIDDING IS IN THE INTEREST OF THE PUBLIC IN THAT IT WOULD:
A) LOWER MARKET PRICES FOR COAL
B) INCREASE REVENUES TO THE STATE AND FEDERAL GOVERNMENTS.

GOC OPPOSES THE ADOPTION OF ALTERNATIVES 3, 4 AND 5 FOR THE FOLLOWING REASONS:

1) ALTERNATIVE 3 IS OPPOSED BECAUSE THIS ALTERNATIVE DOES NOT PROVIDE FOR COMPETITIVE BIDDING. IN ADDITION, THE IMPLEMENTATION WOULD DELAY COAL LEASING PROGRAMS BY AT LEAST SIX MONTHS.
2) WE OPPOSE ALTERNATIVE 4 BECAUSE THIS ALTERNATIVE WILL NOT PROVIDE SUFFICIENT RESERVES TO MEET STATED PRODUCTION TARGETS. FOR EXAMPLE, THE 171,300 TONS IN PLACE RESERVES INDICATED FOR ALTERNATIVE #4 IS LESS THAN 1/2 OF THE 422MM LEASING TARGET. IN

ADDITION, THESE TRACTS ARE OF LIMITED COMPETITIVE INTEREST.

3) ALTERNATIVE 5 IS TOTALLY UNACCEPTABLE BECAUSE NO COAL WOULD BE LEASED, CONSEQUENTLY THE FEDERAL LEASING PROGRAM WOULD NOT GET OFF THE GROUND. DEPARTMENT OF ENERGY LEVELS WOULD NOT BE MET. THUS, THERE WOULD BE NO TRACTS AVAILABLE FOR COAL PRODUCERS TO BID ON.

GOC NOTES IN THE DRAFT EIS A DISCUSSION OF PREFERENCE RIGHT LEASE APPLICATIONS (PRLA) AND WE WOULD LIKE TO TAKE THIS OPPORTUNITY TO ENDORSE THE PROMPT APPROVAL OF QUALIFIED PRLAs. WHILE GOC HAS NO PENDING PRLAs, WE FEEL THAT JUSTICE AND FAIRNESS DEMANDS THAT EXISTING PRLAs BE GRANTED WHERE PRE-1976 REQUIREMENTS HAVE BEEN MET.

IN ADDITION, GOC IS ENCOURAGED TO NOTE THAT THE DEPARTMENT OF THE INTERIOR HAS RECOGNIZED THE NEED TO GREATLY INCREASE LEASED COAL RESERVES IMMEDIATELY DUE TO CHANGING NATIONAL ENERGY DEMANDS AND AN AWARENESS OF REALISTIC DEVELOPMENTAL TIME SCHEDULES.

WE WOULD LIKE TO THANK YOU AGAIN FOR THE OPPORTUNITY TO PROVIDE THESE COMMENTS. GOC WILL BE PROVIDING ADDITIONAL COMMENTS IN WRITING PRIOR TO DECEMBER 9, 1980 DEADLINE.

SALT LAKE HEARING EXHIBIT NO. 3

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

THE PUBLIC LANDS INSTITUTE,
INC., et al.,
Plaintiffs,
-vs.-
CECIL D. ANDRUS, et al.,
Defendants.
AFFIDAVIT OF EDWARD S. CRANFORD
Civil No. 80-0555

STATE OF UTAH)
COUNTY OF SALT LAKE) ss.

I, EDWARD S. CRANFORD, being duly sworn according to law,
depose and say:

1. I reside at 1809 Yalecrest Avenue, Salt Lake City, Utah
I am co-owner, along with my brother Clay E. Crawford and
my sister, Annette Jensen (hereinafter referred to as "we" and "our"),
of the surface and minerals, except coal, in the northern one-half
of Section 21, Township 17 S., Range 7 E., S.1.M., in Emery County,
Utah. Section 21 overlies federally owned coal which has been leased
for mining by the Bureau of Land Management. Lease No. U-040151
includes the coal in the Blind Canyon and Hiawatha coal seams under-
lying Section 21. Utah Power & Light is the holder of Lease U-040151.
A true and correct copy of pages 4-6 and Figure 1 of the "Explora-
tion Permit Application" filed by Utah Power & Light which describes
the lease and fee interests in surface lands and minerals associated
with the Wilberg Mine are attached hereto, incorporated herein, and
marked Exhibit "ESC-1". A true and correct copy of "Coal Lease, Utah -
040151" is also attached hereto, incorporated herein, and marked
Exhibit "ESC-2".

2. The portion of Section 21 which we own is traversed by
Grimes Wash. The elevation of our property ranges from 9400 feet
near the northern boundary which adjoins the Manti-LaSal National
Forest, and descends to about 8600 feet at the point where Grimes
Wash flows across the eastern boundary into adjoining National
Forest land at the southeast corner of our property. Most of the

flow in that portion of Grimes Wash which crosses our property
originates as the discharge of groundwater from four springs on our
property, from the Burnt Tree Spring and Dead Cove Spring, and
other unnamed springs on the southern portion of Section 21 which
flow northward into the channel of Grimes Wash. Based upon first-
hand observation of Grimes Wash for 45 years, and information from
other persons, Grimes Wash at this high elevation is a "perennial
stream", as that term is defined at 30 C.F.R. 701.5. The U.S.
Forest Service has also concluded that Grimes Wash is perennial.

3. I have received an adjudication from the State of Utah,
Department of Natural Resources, Division of Water Rights establishing
that we are entitled to use 3.0 acre-feet of water per six-month
period of use on Section 21. A true and correct copy of said
adjudication is attached hereto, incorporated herein, and marked
Exhibit "ESC-4".

4. The Blind Canyon coal seam underlying Section 21 is in-
cluded in the area to be mined as part of the Deer Creek Mine
operated by Utah Power & Light. The mining plan for the Deer Creek
Mine was approved by the U.S. Geological Survey on January 20, 1978,
prior to the effective date of the initial regulatory program under
the Surface Mining Control and Reclamation Act of 1977 (SMCRA).
New mining plans approved prior to February 3, 1978, did not have
to demonstrate compliance with the initial regulatory requirements
under the SMCRA and did not become subject to those standards until
May 3, 1978. 30 C.F.R. 710.1(a)(3). A true and correct copy of
the Deer Creek Mine approval is attached hereto and marked Exhibit
"ESC-5".

5. The approved Deer Creek Mine plan provides for the
development of entry shafts under the northern one-half of Section
21, and the extraction of coal by longwall methods under lands
adjacent to the northern one-half of Section 21. The area to be
undermined contains springs tributary to Grimes Wash, and includes

5, 8, and 5, h. Appendices 6, a, and 8, b, are attached to the Wilberg Mine Environmental Analysis as Appendices 2(d) and 3(c), respectively, and are not repeated here.

(c) Baker, Dan R., "Subsidence Projections, East Mountain Area, Emery County, Utah" (Utah Power & Light Company, submitted to U.S.C.S. December 30, 1977). A true and correct copy is attached hereto and marked Exhibit "ESC-9".

(d) "Final Environmental Statement, Emery Power Plant" (Bureau of Land Management, U.S. DOI, undated). A true and correct copy is attached hereto and marked Exhibit "ESC-10".

(e) "Final Environmental Statement: Emery Power Plant Units 3 & 4" (Bureau of Land Management, U.S. DOI, undated). A true and correct copy is attached hereto and marked Exhibit "ESC-11".

(f) Dunrud, C. Richard, "Some Engineering Geologic Factors Controlling Coal Mine Subsidence in Utah and Colorado", Geological Survey Professional Paper 969 (U.S. G.P.O., Washington: 1976). A true and correct copy is attached hereto and marked as Exhibit "ESC-12".

9. To the best of my knowledge, the studies and analyses referenced in paragraph 8 and attached hereto contain all of the published expert opinions regarding the effects of the Deer Creek and Wilberg Mine operations on water quantity in springs and surface waters on East Mountain, Emery County, Utah, including the springs to which we hold adjudicated water rights.

10. The waters to which we hold adjudicated rights may be used for either stock grazing or domestic consumption. It is our intention to develop this property for recreational homes. The water adjudications authorize the consumption of water by nine domestic users (see Exhibit "ESC-3"). One homestead has been developed. Eight more are planned.

11. If the waters to which we hold adjudicated rights are diverted from the surface as a result of subsidence, the present uses of our land will be destroyed, and its value will be greatly diminished. In the bond setting hearing in the Seventh Judicial District Court for the County of Emery, State of Utah, held July 5, 1978, one appraisal of the property was for \$850,000.00.

EDWARD S. CRAWFORD, Individually and on behalf of co-owners Clay E. Crawford and Annette Jensen

SUBSCRIBED AND SWORN TO before me this 25th day of April, 1980.

EDWARD S. CRAWFORD, Individually and on behalf of co-owners Clay E. Crawford and Annette Jensen
Residing at Salt Lake City, Utah

My Commission Expires:

April 27, 1982

the sources of waters for which we hold adjudicated rights. Entry shaft "Third West" underlies the northern one-half of Section 21, and has already been driven.

6. The Hiawatha coal seam, which lies about 200 feet deeper than the Blind Canyon seam, also underlies Section 21 and is included in the area to be mined as part of the Wilberg Mine. The mining plan for the Wilberg Mine was approved by the U.S. Geological Survey on January 23, 1978. New mining plans approved prior to February 3, 1978, did not have to demonstrate compliance with the initial regulatory requirements under the SMRA, and did not become subject to those standards until May 3, 1978. 30 C.F.R. 710.11(a)(3). A true and correct copy of the Wilberg Mine approval is attached hereto and marked Exhibit "ESC-6".

7. The approved Wilberg Mine plan includes the development of entry shafts under the northern one-half of Section 21, and the extraction of coal by longwall methods under all of Section 21 and also under lands adjacent to Section 21. The area to be undermined contains springs tributary to Crimes Wash, and includes the sources of waters for which we hold adjudicated rights.

8. Environmental analyses and scientific studies of the Deer Creek Mine plan and Wilberg Mine plan and the area to be affected by those mines have been conducted by or on behalf of the U.S. Geological Survey and Utah Power & Light. These studies and analyses all predict that subsidence will occur as a result of each mining operation. Said studies and analyses show that the subsidence will or may cause fracturing of the overburden which result in the diversion of groundwater from shallow aquifers and surface waters from stream channels into the mine workings or other underground channels. Such diversions will diminish or disrupt the flows in streams and springs above the mine workings.

These studies and environmental analyses include:

(a) "Environmental Analysis for Mining and Reclamation Plan for the Wilberg Mine, Emery County, Utah, Utah Power and Light Company, Lessee" (United States Geological Survey, U.S. DOI, September 9, 1977). A true and correct copy of those portions of said Environmental Analysis which address hydrology, geology and subsidence is attached hereto and marked Exhibit "ESC-7". In addition to relevant text of the Environmental Analysis, also included are Appendices 1(a), 1(b), 2(c), 2(d), 6(a), and 8(u).

(b) "Environmental Analysis for Mining and Reclamation Plan Deer Creek Mine, Emery County, Utah, Utah Power & Light Company, Lessee, American Coal Company, Operator" (United States Geological Survey, U.S. DOI, December 1, 1977). A true and correct copy of those portions of said Environmental Analysis which address hydrology, geology and subsidence is attached hereto and marked Exhibit "ESC-8". In addition to relevant text of the Environmental Analysis, also included are Appendices 1(b), 1(c), 2(a), 5, 6, 5(d), 5(e), 5(f).



United States Department of the Interior

3500(141B)

BUREAU OF LAND MANAGEMENT
WASHINGTON, D.C. 20240

Memorandum

MAR 14 1980

TO: Secretary of the Interior

THROUGH: Executive Secretariat

Deputy Assistant Secretary - Land and Water Resources

MAR 18 1980

FROM: Director, Bureau of Land Management

SUBJECT: Transmittal of Uinta-Southwestern Utah Regional Coal
Team's Suggested Leasing Target

This memorandum is to request your concurrence in the leasing target voted by the Uinta-Southwestern Utah Regional Coal Team (RCT). The team also selected for your approval five levels of coal leasing to be assessed by the regional Environmental Impact Statement (EIS) for this region.

Background

The tentative leasing target for the Uinta-Southwestern Utah Region of 109 million (MM) tons included in the Secretary's decision of June 4, 1979, was calculated to achieve 1985 through 1990 production levels, with no excess capacity assumed. Since that date, several events have occurred which have altered our perception of regional production goals, targets, and capacity.

Approval of the Intermountain Power Project (IPP) was a critical factor requiring review of the tentative target. The IPP demand for 9 MM tons per year was not included in the Department of Energy (DOE) 1990 mid-level production goal of 17.3 MM tons of annual production. This is clear from the enclosed analysis (enclosure 2) and has been verified by persons from both DOE and the Department at the working staff level. Consequently, the original DOE goal had to be revised upward and the new demand resulting from the IPP was assumed to impact only the Utah portion of the region.

The Utah Power and Light (UPL) proposed preference right lease application (PRLA) exchange adds another dimension to development of the target. The three most likely tracts for the exchange are also the three tracts most highly ranked by the RCT. If the exchange takes place, approximately 280 MM tons of in-place coal would become available and should, in our opinion, be counted against the target as new coal under lease.

The RCT, at a meeting held February 5 and 6, 1980, recommended a leasing target of 322 MM tons based on the referenced analysis (see enclosure 2). At that same meeting, however, the team members from Colorado questioned the assumption that existing Colorado mines would increase production by only ten percent between now and 1990 and requested the Geological Survey (GS) make a mine-by-mine assessment of existing operations. This assessment has been made. In the judgment of GS, existing mines could produce 1.0 MM tons more per year than was assumed in the analysis. We have updated the analysis by the addition of Appendix C, which provides a sub-regional (State) disaggregation of the regional demand figures. According to this refinement there could be sufficient demand for Colorado production to absorb the 1 MM ton increase. Consequently, the mechanics of the sub-regional analysis suggests a reduction from 322 to 264 MM tons of in-place coal in the target recommended by the RCT.

Notwithstanding the sub-regional analysis, we favor maintaining a target of 322 MM tons which places the major portion of Uinta regional coal production between 1985 and 1990 in the Utah portion of the region. The UPL exchange, if approved, would more than meet a 264 MM ton target and we feel that not to have additional leasing would adversely affect the competitive production of new coal in the region. The 322 MM ton target, on the other hand, would allow for at least one additional tract to be offered to promote competition. A policy to promote a competitive coal industry, in our opinion, should be the paramount factor in establishing the target for this lease sale.

Conclusions

I request that you concur with the Regional Coal Team's suggested leasing target for the 1981 Uinta-Southwestern Utah lease sale. The amount of in-place Federal coal made available would be 322 million tons. For purposes of impact analysis, the EIS team will consider the following leasing levels in the regional EIS:

1. No new leasing, assuming half or more of the leases with mine plans pending, and which could go into production by 1986, will actually attain production to meet all demand without regard to sub-regional location of source for new IPP demand.
2. Leasing 109 MM tons to meet DOE 1990 mid-level goal as originally calculated in the tentative target.
3. Leasing target of 322 MM tons noted by the Regional Coal Team, which assumes the same conditions as level 2, plus new IPP demand in Utah and at least one additional tract to promote competition.

- 4. Leasing 410 MM tons to meet DOE 1990 mid-level goal plus new IPP demand in Utah, assuming no production from outstanding leases with approved mine plans.
- 5. Leasing 515 million tons, to meet high level DOE demand.

E. J. Hartley
Associate

3 Enclosures

- Enclosure 1. Final Coal Leasing Target
- Enclosure 2. Uinta Leasing Target Analysis
- Enclosure 3. Uinta-Southwestern Utah Coal Project

I concur:

Leslie D. Ludens
SECRETARY OF THE INTERIOR

Date:

3-28-80

Possible Leasing Target Levels

1. Alternative 1 -- Mid-level

322 MM ton, excluding UPL proposed exchange

	1990 Mid level DOE production goal	17.3
(plus)	IPP potential demand	<u>9.0</u>
	adjusted goal	26.3
(less)	Planned production from existing mines	18.3
(less)	1/2 planned production from mine with mine plans pending	<u>2.5</u>
	potential supply deficit	5.5
(times)	Federal coal ratio	.82
(divided by)	Recovery ratio	.42
(times)	Mine life	<u>30</u>
	Mid-level target	322

Reference: Uinta Leasing target analysis prepared by Allen Dickerman

2. Alternative 2 -- Mid-level

322 MM ton, including UPL proposed exchange

3. Alternative 3 -- High level

	1990 High level DOE production goal	20.6
(plus)	IPP potential	<u>9.0</u>
	adjusted goal	29.6
(less)	Planned production	18.3
(less)	1/2 planned production, etc. potential supply deficit	<u>2.5</u>
		8.8
(times)	Federal coal ratio	.82
(divided by)	Recovery	.42
(times)	Mine life	<u>30</u>
	High level target	515

Reference: Uinta Leasing target analysis prepared by Allen Dickerman

4. Alternative 4 -- Lesser level

109 MM ton

Reference: DOE tentative leasing target announced on June 4, 1979, under the Federal Coal Management Program.

5. Alternative 5 -- No new leasing



United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Nevada State Office
Room 3008 Federal Building
300 Booth Street
Reno, Nevada 89509

IN REPLY

3420

2-21

FEB 19 1980

MEMORANDUM

To: Director (100)

Through: Assistant Director, Office of Coal Management (141)

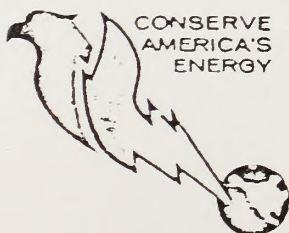
From: Chairman, Uinta-Southwestern Utah Regional Coal Team

Subject: Final Coal Leasing Target

We completed our coal leasing target hearings December 3 through 6, 1979 and set the final leasing target on February 5 and 6, 1980. We had 181 attendees at the coal leasing target hearings, but only one substantive comment which was made by the Friends of the Earth. The Friends of the Earth comments related primarily to the DOE model for production goals. Copies of the hearings transcripts have been transmitted to your office. We received 12 written comments on the coal leasing target, copies of which have been transmitted to your office. An analysis of the comments was contained in the Uinta Leasing Target Analysis, prepared by Alan Dickerman, and the Summary of Comments on Leasing Targets, prepared by John Lovell, both from the Office of Coal Management (WO-141).

After review of the summaries of the hearings and comment letters and the analysis presented by staff members of the OCM, the Regional Coal Team recommended a leasing target of 322 million tons. The analysis was contained in the revised target analysis prepared by Alan Dickerman, which was based on the DOE production goals.

The RCT members from Colorado expressed a concern that the production from existing mines in Colorado was not included in the Dickerman analysis. Mr. Dickerman is to contact Mr. Moffitt of U.S.G.S. to get these figures. However, we might assume the target of 322 million ton along with the alternative target levels in the EIS will adequately address the Colorado portion. We will look at the Colorado figure for final determination in the effects on the 322 million ton target.



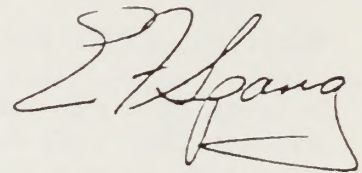
A1-5

Encl. 1-1

Save Energy and You Serve America!

Another issue which was raised during the RCT meeting, and which evoked considerable discussion was the mine life (i.e., 30 years vs. 40 years). Evidently there is an inconsistency within the Bureau on the term of the mine life, which has a significant impact on computation of leasing targets. The RCT did not make a recommendation but referred it to the managing agencies to discuss and determine the appropriate "life span" for the EIS process. However, I believe it would be advisable for the Bureau to establish a uniform and consistent mine life term for calculation of leasing targets.

In determining groupings of tracts for alternatives in the EIS, there will be at least four other target levels discussed, ranging from 515 million ton for the high level and 109 million tons for the low level. One of the levels represents the target level of 322 million tons. Other factors that may impact the leasing target levels are the UPL exchange, the PRLA's, tract delineation and SSA and will be dealt with in the analytical process of the EIS.

A handwritten signature in black ink, appearing to read "J. H. Spang". The signature is written in a cursive style with a large, sweeping initial "J" and a distinct "K" at the end.

UINTA LEASING TARGET ANALYSIS

Background

The announced Federal coal management program of June 4, 1979, also included a tentative leasing target for the Uinta region of 109 MM tons of in-place coal. This tentative target was based on Department of Energy (DOE) production goals for 1987 and the assumption there would be no excess capacity from that year forward (details of these calculations are contained in the memo attached as Appendix A).

The DOE production goals considered were:

1985 mid-level demand	14.5 MM tons (annual production)
1990 mid-level demand	17.3
1990 high level demand	20.6

Regional production from all sources in 1976 amounted to 10.1 MM tons and has been estimated at 11.6 MM tons for 1979. All leases which currently have approved mine plans are associated with the 14 mines currently in production. There are 69 leases in this category with a potential capacity of 32.2 MM tons per year. Current mine plans, however, indicate a total production rate of only 18.3 MM tons from these mines in the year 1990. Therefore any remaining capacity from approved leases cannot be relied upon to go into production, although the potential remains (see Fact Sheet, Appendix B).

It is clear that the present DOE mid-level production goals could be met from existing leases. It is equally clear, however, that the Intermountain Power Project (IPP), which would require approximately 9 MM tons of coal annually, was not included in the production goal for the Uinta region. This is so because one could add 9 MM tons to present production of 11.6 and exceed the mid-level production goal. DOE is currently in the process of reassessing the models and assumptions which generate production goals as a first step in the preparation of a new set of regional goals. A preliminary set of goals should be available for review by July 1980. The final set of goals are not expected until Fall of 1980.

Public Comment on Targets

Written comments on the announced tentative target indicated general dissatisfaction with the small size of the number. One commentator pointed out that in this region, an average new mine could be expected to produce 2 MM tons per year for 30 years, and therefore, each new tract should contain 100 to 120 MM tons of in-place coal. Two commentators thought the

tentative target too low because of the underlying assumptions used in model to generate the DOE production goals. Three commentors specifically stated the target should be between 200 and 400 MM tons. Three commentors thought the assumed 4 year lead time used in the tentative target calculations was too short and that 6 years was more appropriate, i.e. lease to meet 1989 or 1990 goals, rather than 1987 goals.

Two commentors felt that the proposed Preference Right Lease Application (PRLA) exchange should not be counted against a leasing target. An additional comment was made that neither maintenance nor bypass leases should be counted against a leasing target. Three commentors felt that any accurate projection of demand was impossible and that a conscious effort should be made to over lease. Department of Justice (DOJ) commented that coking coal should be separately identified and that the target should reflect sub-categories of 3 volatility classes. Only one commentor felt that no further leasing was needed because present leases, responding to diligence requirements, would meet DOE production goals.

Oral comments received at the public hearing on December 6, 1979, were of the same general nature as the written comments, except more questions were raised regarding assumptions used in the DOE models and in the calculations of the targets themselves.

Response to Comments

An average annual production rate of 2 MM tons per mine appears high; of the 14 mines currently producing, only 5 plan to produce at this rate or higher by 1990. As discussed in the background section, the tentative target probably is too low and, as shown below, the revised target is within the suggested range. We agree that within this region the production goal for 1990 should be given more consideration.

In general, application leases are not counted against targets except to the extent they permit continued production at present or future planned levels. However, if the exchange takes place the resulting production would be "new" coal and should properly be charged against any target. Projections of the nature required for setting leasing targets should never be viewed as predictions, but only as "targets" toward which to aim. Revision to meet changing conditions is provided for by the biannual target review.

As to components of the target, DOE did not provide the original target by any sub-classification. Disaggregating the target into separate "mini-targets" does not seem justified, given the level of accuracy such a disaggregation implies. The need for further leasing is addressed in the following section.

Revised Target Analysis

Given that the IPP potential need for 9 MM tons of coal per year was not included within the 1990 regional goal of 17.3 MM tons and assuming such a contingency should be provided for, if possible, an adjusted goal of 26.3 is taken as a point of departure. Subtracting the 1990 planned production of existing mines of 18.3 (recognizing this may be a low estimate) results in an estimated shortfall from existing mines of 8.0 MM tons. From the Fact Sheet, it can be seen that considerable planned production capacity may still exist from outstanding leases. However, much of this capacity is questionable since current expectations are that many of these leases will not go into production by mid 1986 and therefore not meet due diligence requirements. Assuming that half the capacity of leases with pending mine plans (for which diligence requirements are expected to be met) goes into production, the 8.0 shortfall reduces to 5.5 as a potential supply deficit. Using a Federal coal to total coal ratio of 82 percent (based on estimated production ratio), an average recovery ratio of 42 percent (based on recoverable reserve ratio of delineated tracts), and an average mine life of 30 years, a revised tentative target of 322 MM tons of in-place coal is suggested. The computations are as follows:

1990	Mid level DOE production goal	17.3
(plus)	IPP potential demand	9.0
	adjusted goal	<u>26.3</u>
(less)	Planned production from existing mines	18.3
(less)	1/2 planned production from mines with mine plans pending	2.5
	potential supply deficit	<u>5.5</u>
(times)	Federal coal ratio	.82
(divided by)	Recovery ratio	.42
(times)	Mine life	30
	Revised tentative target	<u>322</u>

APPENDIX B

UINTA LEASING TARGET FACT SHEET

January 21, 1980

	<u>No. Leases</u>	<u>Production or Capacity</u> (MM Tons)
1979 Production from Federal leases	39	9.5
Estimated 1979 production from non-Federal sources		6.3 (or 2.3)
1985 DOE mid-level production goal		14.5
1990 DOE mid-level production goal		17.3
<u>Leases</u>		
1990 capacity of leases currently in production	39	19.2
1990 capacity of leases with approved plans	30	13.2
1990 capacity of leases with plans pending	50	37.9
Estimated 1990 capacity of leases without plans	143	64.9
<u>Mines</u>		
1990 planned production of mines currently producing (all approved mine plans are associated with these mines)	14 (mines)	18.3
1990 planned production of mines with plans pending and diligence expected	2	4.9
1990 planned production of mines with plans pending no diligence	9	19.0
1990 capacity of other mines which could produce	3	2.6
<u>Delineated Tracts</u>		
Proposed PRLA exchange	278.9	3.7
Other tracts (site analysis complete)	141.5	3.0
Other tracts (site analysis not complete)	<u>342.0</u>	<u>3.9</u>
TOTAL	762.4	10.6

*DOE estimates 60% of total production is from Federal leases; WESCAR, Inc. submitted comments estimating total production at 11.6 implying 82% Federal coal.



United States Department of Justice

WASHINGTON, D.C. 20530

DEPUTY ASSISTANT ATTORNEY GENERAL
ANTITRUST DIVISION

11 DEC 1979

Mr. Edward F. Spang
Nevada State Director
Bureau of Land Management
Chairman, Regional Coal Team
Federal Building
Room 3008
300 Booth Street
Reno, Nevada 89509

Dear Mr. Spang:

The Secretary of the Interior ("Secretary") is required to consult with and give due consideration to the views and advice of the Attorney General at each stage in the issuance, renewal and readjustment of coal leases. 1/ One such stage is the revision of leasing targets for federal coal leasing. This letter sets forth the views and advice of the Attorney General concerning the leasing target for the Uinta-Southwestern Utah Coal Production Region. 2/

The preliminary leasing target for the Uinta-Southwestern Utah Coal Production Region was set in the Secretarial Issue Document ("SID") at 109 million tons. The 109 million ton leasing target was derived from the Department of Energy's ("DOE") medium coal production goals for 1985 and 1990. The preliminary leasing target is based on the difference between expected 1986 production of 15.1 million tons and the 1990 DOE medium demand production goal of 17.3 million tons.

The Department of Justice ("Department") has previously stated and continues to believe that this attempt to match leasing with predicted future demand is inadvisable. Predictions will sometimes underestimate demand, and when they do, substantially increased coal prices would result. Even if these predictions are substantially correct, the efficient resource allocation

1/ 30 U.S.C. §184(1)(1)(1976).

2/ The Bureau of Land Management has published a notice in the Federal Register requesting public comments on that leasing target. 44 Fed. Reg. 66256 (1979).

decisions of the marketplace would be supplanted by less efficient government decisions. To minimize these problems, the Department has advised that the leasing target be set two or three times higher than would be indicated by the DOE's production goals.

In addition, the Federal Register notice states that production within four years is assumed for some leases. This assumption is overly optimistic in light of the Department of Interior's own estimate of 6-7 years and industry estimates of more than 10 years. Accordingly, leasing should be geared not to 1986, but to 1990 demand.

Moreover, the DOE demand goals utilized as the basis for the preliminary leasing target of 17.3 million tons are based on assumptions that are no longer appropriate. For example, the leasing target contained in the SID is derived from assumptions that delivered 1985 oil prices would be \$15 a barrel and that nuclear power plants with construction permits would be built expeditiously. The SID also made no allowance for synthetic fuels. Since those goals were developed, future coal demand has been greatly stimulated. Oil prices have almost doubled; it seems unlikely that nuclear plants will be expeditiously constructed; and the President has initiated a massive synthetic fuels program that relies in substantial part on coal-based fuels. Consequently, the Department advises that the leasing target for the Uinta-Southwestern Utah Coal Region should be revised substantially upward to reflect these changes.

Finally, the Department is concerned about the leasing of coking coal. The Department's recent report to Congress identified "prime coking coal" (identified by its coking properties and levels of impurities) as a distinct product market for competitive analysis. ^{3/} The Department has also identified three distinct product markets based on volatility within the broader product market for prime coking coal. These are low, low and medium together, and high volatile prime coking coal. ^{4/}

^{3/} Department of Justice, Competition in the Coal Industry at 43 (May 1979).

^{4/} Id. at 44-66.

The preliminary leasing target for the Uinta-Southwestern Utah Coal Region and the DOE production goals upon which it is based make no special provision for leasing coking coal. Significant federal reserves of prime coking coal exist within the Uinta-Southwestern Utah Region in Pitkin and Gunnison Counties in Colorado and in Carbon County, Utah. Leasing of these reserves will be required to fill the needs of western steel plants. Separate leasing targets should be set for low and medium together, and high volatile prime coking coal. Failure to do so may erect or maintain significant barriers to new competition in those markets.

In conclusion, I reiterate the Department's conviction that increased leasing is necessary to assure adequate competition in coal markets, and recommend that the leasing target for the Uinta-Southwestern Utah Coal Region be reconsidered in light of these competitive concerns.

Sincerely yours,



Donald L. Flexner
Deputy Assistant Attorney General
Antitrust Division

APPENDIX 2

AGREEMENT

This Agreement is between the United States Department of the Interior, United States Forest Service and Utah Power & Light Company.

The parties agree that evaluation and a full examination of the need for and the possible merits and benefits which might flow from issuance of coal leases elsewhere on federal lands in Utah (lease exchange area) in exchange for Utah Power & Light Company's coal lease application numbers U-1362, U-1363, U-1375, U-5233, U-5234, U-5235, U-5236 and U-5237 (PRLA's) as contemplated by Public Law 95-554, 92 Stat. 2072, are advantageous and in the public interest.

1(a). The parties agree to proceed with reasonable diligence so that by December 31, 1981, the Department will in accordance with this Agreement, be able to issue a lease or group of leases in the lease exchange area to Utah Power & Light Company in exchange for relinquishment of the PRLA's or a portion of those PRLA's of equal value to the lease or group of leases issued by the Department.

(b) The Department will not issue a lease or leases under this Agreement unless the Department and Utah Power & Light Company agree that an exchange should take place.

(c) The lease exchange area (sometimes referred to as Phase 1) consists of 25,342.48 acres from the Wasatch Plateau region identified as "Cottonwood" (2,400 acres), "Meetinghouse Canyon" (690.2 acres) and "North Horn Mountain" (22,252.28 acres). A detailed land description is attached as Exhibit 1.

2. Utah Power & Light Company represents that it is necessary for it to acquire coal from which production can be obtained by 1985 to meet its planned needs at the Hunter Power Plant Unit No. 4 in Emery County and at the Intermountain Power Project in Millard County. Utah Power's maximum annual fuel requirements for these power plants will be about 3.5 million tons per year. The parties recognize that Utah Power in pursuing this exchange for the above purpose will forego the opportunity for an early judicial determination concerning its PRLA's.

3(a). Utah Power & Light Company agrees to submit to the Department by August 15, 1979, all available geological data, including drill logs, isopachous maps, an analysis of the chemical properties of the coal, the sulphur content and all other available relevant information needed to determine the amount of demonstrated reserves in the area covered by the PRLA's in accordance with USGS Bulletin 1450-B.

(b) Utah Power & Light Company shall submit to the Department by September 1, 1979, a proposed mining plan for the PRLA's based upon the information provided in paragraph 3(a). The mining plan shall comply with all applicable federal, state and local laws and shall contain at least the following information:

(i) a description of the type and method of coal mining operation that is proposed, the engineering techniques proposed and the equipment proposed to be used;

(ii) the anticipated time required to complete each phase of the mining operation;

(iii) cross-section maps or plans of land depicting all known coal seams and the strike and dip of the coal to be mined, the location and extent of known workings of any underground mines, the known hydrology of the coal bearing strata, the location of spoil, waste, and refuse areas and of water treatment facilities;

(iv) the location of all portals, mine openings and coal transportation systems; and

(v) detailed estimate of the cost of all phases and aspects of mining and removing the coal, and reclamation.

Utah Power & Light Company shall also submit by September 1, 1979, a copy of all transportation cost studies made by or prepared for Utah Power & Light Company relating to the PRLA area.

4(a). The Department, through the U.S. Geological Survey (USGS), shall complete all drilling and logging necessary to establish the amount of the reserves in the lease exchange area by November 15, 1979. This drilling will require approximately 23 holes to be drilled at or near the sites specified in attachment 2 to the Contract Schedule and Technical Specifications Utah Power & Light Exchange attached to the Agreement as Exhibit 2. The Department, acting through the USGS, shall direct that the drilling and logging of these holes, using best efforts, conform to the following technical specifications:

(i) all drill holes are to be bottomed at least 100 feet below the basal coal seam;

(ii) drilling activities are to be conducted 24 hours per day on a continuous basis for the completion of each drill hole except when operations on a continuous basis are prevented or interrupted by unforeseen or uncontrollable conditions. Each hole shall be geophysically probed promptly upon completion of its drilling;

(iii) drill holes are to be filled with fluid to the highest level that fluid will stand in the drill hole prior to geophysically probing; and

(iv) drill holes are to be geophysically probed in the following manner:

(1) natural gamma, s.p., gamma gamma (density), resistivity (wet and dry) and caliper logs are to be run on all holes.

(2) holes are to be logged at a speed of no greater than 5 feet per minute in the coal interval.

(3) logs are to be recorded at a scale of 1" = 5'.

(b) The U.S. Forest Service agrees to complete all environmental assessments needed for the drilling and logging to be finished by November 15, 1979. This date will be adjusted accordingly if the assessments lead to the requirement of one or more environmental impact statements.

(c) The Department, acting through the USGS, shall, in accordance with the usual open file practices, make the information obtained as a result of the drilling in the exchange area available to the public and provide a copy to the U.S. Forest Service and Utah Power & Light Company and any other person who requests a copy. Any person who complies with subparagraph (c)(1) and (2) of this section may have an observer present on site throughout the drilling program.

(1) Any person who wishes to observe all or portions of the drilling and logging may do so by filing and obtaining the approval by the USGS of an observation plan. Each plan shall acknowledge that the observing party shall be responsible for transportation to and from the drilling site, and shall expressly include a waiver of any right to hold the United States, its employees or agents liable in any way for damages as the result of injuries or accidents that may occur during the observation of the drilling and logging program.

(2) No observer shall have any right to direct the Geological Survey or its agents on the conduct of any phase of the drilling program and an observer may not interfere with any phase of the drilling and logging program.

(d) Utah Power & Light Company shall submit to the Department by March 1, 1980, reports on the exchange area in the same form, scope and substance as those required for the PRLA's in Paragraph 3(b) of this Agreement.

5(a). The Department, acting through the USGS, shall make an estimate by May 1, 1980, based on the information available as a result of

Paragraphs 3 and 4 of this Agreement and other relevant information, whether the coal in the Phase 1 of the lease exchange area is of greater, lesser or equal value to the coal in the PRLA area.

(b) This estimate shall use the Department of the Interior's "coal resource economic evaluation model" and shall take into consideration for each area:

(i) the amount of recoverable reserves calculated in accordance with USGS Bulletin 1450-B;

(ii) the rank and the sulphur, BTU, moisture and ash content of the coal;

(iii) the likely cost of mining the coal and the likely market price for the coal FOB the mine, assuming use by Utah Power & Light Company of coal from the lease exchange area at its Emery/Carbon County and Juab/Millard County sites and coal from the area of the PRLA's at Juab/Millard County sites; and

(iv) any other necessary information and assumptions.

(c) In estimating these costs and prices, the Department, acting through the USGS, shall assume: that all lease terms, including those affecting rent, royalty, diligent development and all federal, state and local taxes will be the same for both mines; that all necessary transportation to the areas involved will be available for both the coal in the PRLA area and the coal in the lease exchange area; that construction costs of mainline rail transportation will not be directly allocated to either property, although construction costs of rail spur lines will be directly allocated, that applicable transportation rates will reflect construction costs of mainline railroad transportation from each area to the assumed markets; total coal tonnages located in each region and prices which will be paid by all producers from the region; and that these transportation rates will be used to establish FOB mine prices.

(d) The assumed market for the coal involved in these estimates is Emery/Carbon County and Juab/Millard County for coal from the lease exchange area and Juab/Millard County for coal from the PRLA area.

(e) This estimate shall not be binding and is expressly subject to major modification or revision prior to a final decision whether the coal in the lease exchange area is of equal value to the coal in the PRLA area.

(f) The Department shall promptly inform the U.S. Forest Service and Utah Power & Light Company of the estimate made in Paragraph 5 of this Agreement.

6(a). If the estimate of the value of the coal in the lease exchange area exceeds or equals the value of the coal in the PRLA area, the Department shall have no further obligation to identify, drill or study any additional lands in the lease exchange area to satisfy this Agreement, unless such estimate is modified pursuant to Paragraph 5(e) above, provided that:

(i) if the estimate of the value of the coal in the lease exchange area exceeds the estimate of value of the coal in the PRLA area by more than 25 percent, after consultation with Utah Power & Light Company, the Department may delete lands from the lease exchange area;

(ii) if, according to the estimates, the value of the coal in lease exchange area is less than 50 percent of the value of the coal in the PRLA area, the Department shall immediately notify the U.S. Forest Service and Utah Power & Light Company that it will identify additional lands necessary to constitute a lease exchange area containing at least 50 percent of the value of the coal in the PRLA area. In such event, the Department, after consultation

with the U.S. Forest Service, shall select additional lands from the area available for leasing which is contiguous to the lease exchange area or contiguous to existing Utah Power & Light Company leases, within 30 days after the Department identifies the additional lands. The Department and the U.S. Forest Service shall adopt a schedule that provides for completion of any drilling in the added lands by November 15, 1980; and the Department shall adopt a schedule for completion of other necessary studies and reports, including revisions of mining plans prepared by Utah Power & Light Company by February 1, 1981;

(iii) if from the estimate it is determined that the value of the coal in the lease exchange area is equal to 50 percent of the value of the coal in the PRLA area, the Department will have no further obligation to adjust the lease exchange area.

7(a). The Department shall hold a scoping meeting on the environmental impact statement on the proposed exchange by June 1, 1980.

(b) The Department shall begin preparation of an environmental impact statement on the proposed exchange by June 1, 1980, and prepare and publish a final environmental impact statement by June 1, 1981.

(c) The U.S. Forest Service shall participate fully in the environmental impact statement process and shall take, by September 15, 1981, whatever steps are necessary to evaluate whether the exchange would be consistent with the land use plans for the affected portions of the national forest system.

8. The Department shall notify Utah Power & Light Company by December 31, 1981, whether and under what conditions it will issue leases for all or part of the lands in the lease exchange area in exchange for relinquishment of all or part of the PRLA's. Prior to notifying Utah Power & Light Company, the Department shall consult with the U.S. Forest Service and the Governor of the State of Utah.

9. If the Department and Utah Power & Light Company complete the exchange described in paragraphs 1-8 of this Agreement and if the value of the remaining recoverable reserves in the area of the PRLA's equals or exceeds the value of the coal in the lease exchange, the parties shall proceed with reasonable diligence to complete a similar process to consider whether to exchange one-half of those remaining reserves in the area of the PRLA's for additional, available lands containing reserves of equal value contiguous to the Phase I lease exchange area or contiguous to existing Utah Power & Light Company leases or elsewhere in Utah. The remaining one-half of those reserves in the area of the PRLA's shall not be considered for exchange and shall be processed in accordance with applicable laws and regulations. If, following the exchange under Phase I, the value of the remaining recoverable reserves in the area of the PRLA's is less than the value of the coal in the lease exchange, all of those remaining applications shall be processed in accordance with applicable laws and regulations.

10. This additional exchange shall be considered after December 31, 1981, in accordance with a schedule mutually agreeable to the parties.


11. If the Department and Utah Power & Light Company agree that progress toward consummating an exchange is no longer possible or desirable or if the Department has failed to comply with any of the completion dates set forth in this Agreement and its failure is not caused directly or indirectly by Utah Power & Light Company's failure to meet any of the completion dates set forth in this Agreement, Utah Power & Light Company may, after giving the Department 21 days written notice, institute an action seeking a writ of mandamus in the District Court for the District of Utah for the immediate issuance of leases for lands covered by the PRLA's. The Department agrees that upon institution of such action, it will join with Utah Power & Light Company in a joint motion to have the matter heard by the court on an expedited hearing schedule, and that

should any appeal be filed from the decision of the District Court, the parties will join in a similar motion for an expedited briefing and hearing of any appeal. Utah Power & Light Company will not institute an action for mandamus for the issuance of the PRLA's prior to the time set forth in this paragraph.

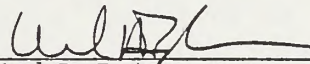
12. The Department further agrees that if Utah Power & Light Company files the action discussed in Paragraph 11 above, it will not assert that the matter is not ripe for judicial determination.

13. The Regional Forester, Intermountain Region, United States Forest Service, is responsible for implementation of this Agreement on behalf of the United States Forest Service.

14. This Agreement will take effect immediately upon execution by the President of Utah Power & Light Company, by the Secretary of the Department of Interior and by the Chief, United States Forest Service and will supersede the previous agreement which was signed by the Secretary on March 1, 1979, and by the President on March 5, 1979, after dismissal, without prejudice, of Utah Power & Light Co. v. Andrus, Civil No. C-76-136, March 5, 1979.

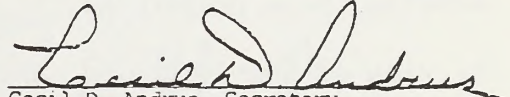


Harry Blundell, President
Utah Power & Light Company

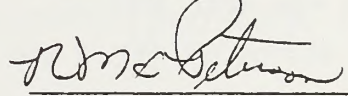
Dated: 7/30/79 Attest: 

Verl R. Topham
Assistant Secretary
Utah Power & Light Company

Dated: 7-9-79


Cecil D. Andrus, Secretary
United States Department of
the Interior

Dated: 7/11/79


R. Max Peterson, Chief
United States Forest Service



United States Department of the Interior

OFFICE OF THE SECRETARY

Building 67, Room 688
Denver Federal Center
Denver, Colorado 80225

IN REPLY
REFER TO

November 12, 1980

Mr. William D. Reese
Utah Power & Light Co.
1407 West Temple Street
P. O. Box 889
Salt Lake City, Utah 84110

Dear Bill:

The Geological Survey (GS) has completed its final evaluation of the lands involved in the proposed Garfield-Central Utah exchange.

The points you raised in your letter of August 14, 1980, in relation to the preliminary evaluation, were taken into consideration by the GS to the extent specified in my letter to you dated October 3, 1980. The GS recalculated the demonstrated reserve base and developed a new conceptual mine plan for the Garnet lands as a part of its final economic evaluation. The mine plan so developed includes both demonstrated reserves and a certain amount of inferred reserves which are contained within the larger areas of demonstrated reserves. In the view of the GS, the development of a conceptual mine plan based upon only demonstrated reserves, as the exchange agreement might be interpreted to require, is illogical when the excessive costs required to mine around areas containing any inferred reserves is considered.

The results of the GS's final evaluation show that the Garfield properties could not be developed economically based on the value thereof as determined in accordance with the parameters specified in the exchange agreement. On the other hand, the value of the Central Utah lands, when evaluated likewise in accordance with the exchange agreement, indicates that it would be economic to develop these properties.

In view of the foregoing, there is no economic justification on which to base an exchange, and the GS has so recommended to the Bureau of Land Management (BLM). You may expect to receive official notification of this finding from the BLM in the near future.

R. J. Bruning,
Special Asst. to the Secretary

cc: Deputy Division Chief, Onshore Minerals Regulation
Conservation Manager, Central Region
State Director, Utah Bureau of Land Management



United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

December 2, 1980

Mr. Harry Blundell, President
Utah Power & Light Company
P. O. Box 899
Salt Lake City, Utah 84110

Dear Mr. Blundell:

As you have already been informed, the U. S. Geological Survey has completed its analysis of the proposed coal exchange which Utah Power and Light Company and the Department agreed to consider.

The Bureau of Land Management and the Department have not had an opportunity to review the U.S.G.S. evaluation and determine how that evaluation affects the agreement signed between your company and the Department. An exchange of such magnitude poses numerous questions, some of which may not be sufficiently considered within the rigorous procedural limitations incorporated in the agreement.

It is my belief that the matter will best be resolved through an evaluation of the agreement, and a review of the procedures used to attempt to carry out the agreement. Because of the complexity of the issues involved, there is not time for the Department to conduct an adequate review in the few weeks remaining of our Administration. I have, therefore, directed that the Bureau of Land Management's review of the U.S.G.S. evaluation await the beginning of the new Administration, so the Department can give the issues the attention they deserve. I would encourage you to contact my successor at the earliest possible opportunity to develop a timetable for completing the review.

Sincerely,

Guy R. Martin
Assistant Secretary, Land
and Water Resources

APPENDIX 3

MAJOR PLANT COMMUNITIES AND TYPICAL SPECIES
OCCURRING IN CENTRAL UTAH

Vegetation Type	Major Vegetation Species	
Riparian	Fremont poplar Sandbar willow Kentucky bluegrass Greasewood Saltcedar	Populus fremontii Salix exigua Poa pratensis Sarcobatus vermiculatus Tamarix pentandra
Grassland	Squirreltail grass Sandberg bluegrass Sticky rabbitbrush	Sitanion hystrix Poa secunda Chrysothamnus viscidiflorus
Desert Shrub	Mat saltbush Castle Valley clover Buckwheat Shadscale Galleta grass	Atriplex corrugata Atriplex cuneata Eriogonum gordonii Atriplex confertifolia Hilaria jamesii
Sagebrush-Grass	Big sagebrush Indian ricegrass Cheatgrass	Artemisia tridentata Oryzopsis hymenoides Bromus tectorum
Pinyon-Juniper	Gambel oak Utah juniper Pinyon pine Big sage	Quercus gambelii Juniperus osteosperma Pinus edulis Artemisia tridentata
Mountain Brush	Mountain snowberry Gambel oak Yarrow Mountain mahogany	Symphoricarpos oreophilus Quercus gambelii Achillea millefolium Cercocarpus montanus
Ponderosa Pine	Ponderosa pine Douglas fir Bitterbrush Serviceberry	Pinus ponderosa Pseudotsuga menziesii Purshia tridentata Amelanchier utahensis
Aspen-Conifer	Quaking aspen Douglas fir Mountain juniper Alpine fir Engelmann spruce	Populus tremuloides Pseudotsuga menziesii Juniperus scopulorum Abies lasiocarpa Picea engelmannii
Aspen	Quaking aspen Tailcup lupine Nodding brome Big sage Dandelion	Populus tremuloides Lupinus caudatus Bromus anomalus Antemisia tridentata Taraxacum officinale

APPENDIX 3 (concluded)

Mountain Meadow	Slender wheatgrass	Agropyron trachycaulum
	Bluegrass	Poa spp.
	Needlegrass	Stipa lettemannii
	Larkspur	Delphinium nelsonii
	Cinquefoil	Potentilla fruticosa

APPENDIX 4

AREAS WITH POTENTIAL FOR SPECIAL DESIGNATION

AGENCY	NAME	POTENTIAL DESIGNATION	REFERENCE
FS	(4-307) ^a	Wilderness ^b	RARE II FES January, 1979
BLM	Link Flat Natural Area	Wilderness	FLPMA, 1976
BLM	UT-060-068A	Wilderness ^c	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
BLM	UT-060-054	Wilderness ^c	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
BLM	UT-060-023	Wilderness ^c	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
BLM	UT-060-025 (WSA)	Wilderness	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
BLM	UT-060-007	Wilderness ^c	IPP Accelerated Wilderness Inventory, 1979
BLM	UT-060-011	Wilderness ^d	IPP Accelerated Wilderness Inventory, 1979
BLM	UT-060-012	Wilderness ^d	IPP Accelerated Wilderness Inventory, 1979
BLM	UT-060-028A (WSA)	Wilderness	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
BLM	UT-060-029A (WSA)	Wilderness	Utah BLM Intensive Wilderness Inventory Wilderness Study Areas, 1980
BLM	UT-060-045 (WSA)	Wilderness	Utah BLM Intensive Wilderness Inventory Wilderness Study Areas, 1980
HCRS	Green River	Wild and Scenic	HCRS Nationwide River Inventory, 1980
HCRS	Range Creek	Wild and Scenic	HCRS Nationwide River Inventory, 1980
HCRS	Muddy Creek	Wild and Scenic	HCRS Nationwide River Inventory, 1980
HCRS	Price River	Wild and Scenic	HCRS Nationwide River Inventory, 1980
HCRS	San Rafael River	Wild and Scenic	HCRS Nationwide River Inventory, 1980

^aNumbers in parenthesis are designation numbers used in the reference

^bRecommended to Congress for wilderness designation

^cA portion of the unit was determined to contain wilderness values and was designated as a WSA, and the remainder of the unit was released from further wilderness review. The inventory findings and the subsequent decision were protested/appealed. The entire unit is currently subject to further wilderness review and interim management protection until a decision concerning management of the unit is again reached (timeframe unknown)

^dThe unit was determined to lack wilderness character and was released from further wilderness review. The inventory findings and the subsequent decision were protested/appealed. The entire unit is currently subject to further wilderness review and interim management protection until a decision concerning management of the unit is again reached (timeframe unknown)

APPENDIX 5

OBJECTIVES OF VISUAL RESOURCE MANAGEMENT CLASSIFICATIONS

The BLM and Forest Service use scenic quality, sensitivity and visual distance criteria to determine visual management objectives for public lands under their respective jurisdictions. Visual management terminology differs between the two agencies, but management objectives are similar as outlined below:

<u>FOREST SERVICE TERMINOLOGY</u>	<u>BLM TERMINOLOGY</u>	<u>MANAGEMENT OBJECTIVE</u>
Preservation	Class I	This class provides for natural ecological changes only. (There are no Class I areas within the planning area.)
Retention	Class II	Changes in any of the basic landscape elements should not be evident in the management activity.
Partial Retention	Class III	Changes in the basic elements may be evident in the management activity. However, modifications should remain subordinate to the landscape character.
Modification- Maximum Modi- fication	Class IV	Changes may subordinate the landscape character, but must reflect what could be natural occurrence in the characteristic area.
Unacceptable Modification	Class V	Change is required. The area has been disturbed to a point where rehabilitation is needed to bring it back into character with the surrounding landscape.

APPENDIX 6

AREAS WITH POTENTIAL FOR SPECIAL DESIGNATION IN GARFIELD COUNTY

Agency	Name	Potential Designation	Reference
1. HCRS	Escalante River	Wild and Scenic River	HCRS Nationwide River Inventory, 1980
2. HCRS	Paria River	Wild and Scenic River	HCRS Nationwide River Inventory, 1980
3. HCRS	Colorado River	Wild and Scenic River	HCRS Nationwide River Inventory, 1980
4. HCRS	Dirty Devil River	Wild and Scenic River	HCRS Nationwide River Inventory, 1980
5. FS	4-254 ^a	Wilderness ^b	RARE II Final EIS, 1979
6. FS	4-259	Wilderness ^c	RARE II Final EIS, 1979
7. FS	4-260	Wilderness ^b	RARE II Final EIS, 1979
8. BLM	Phipps-Death Hollow & contiguous lands	Wilderness (WSA)	FLPMA, 1976 and Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
9. BLM	The Gulch & contiguous lands	Wilderness (WSA)	FLPMA, 1976 and Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
10. BLM	North Escalante Canyon & contiguous lands	Wilderness (WSA)	FLPMA, 1976 and Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
11. BLM	Escalante Canyon & contiguous lands	Wilderness (WSA)	FLPMA, 1976 and Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
12. BLM	Devil's Garden	Wilderness	FLPMA, 1976 and Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
13. BLM	UT-050-238	Wilderness ^d	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
14. BLM	UT-050-242 (WSA)	Wilderness	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
15. BLM	UT-050-248	Wilderness ^d	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
16. BLM	UT-050-249 (WSA)	Wilderness	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
17. BLM	UT-050-241	Wilderness ^d	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980

(continued)

APPENDIX 6 (Concluded)

	Agency	Name	Potential Designation	Reference
18.	BLM	UT-050-247 (WSA)	Wilderness	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
19.	BLM	UT-040-075	Wilderness ^e	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
20.	BLM	UT-040-076	Wilderness ^e	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
21.	BLM	UT-040-078	Wilderness ^e	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
22.	BLM	UT-040-268 (WSA)	Wilderness	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
23.	BLM	UT-040-077	Wilderness ^d	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
24.	BLM	UT-040-082	Wilderness ^d	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
25.	BLM	UT-040-061 (WSA)	Wilderness	Utah BLM Intensive Wilderness Inventory, Wilderness Study Areas, 1980
26.	NPS	Bryce Canyon National Park	Wilderness	Bryce Canyon N.P. Wilderness Proposal, 1974
27.	NPS	Glen Canyon National Rec- reation Area	Wilderness	Glen Canyon National Park Wilderness Proposal, 1976
28.	NPS	Capital Reef National Park	Wilderness	Capital Reef National Park Wilderness Proposal, 1974

^aDesignation numbers used in reference

^bRecommended to Congress for wilderness designation

^cRecommended to Congress for further planning

^dA portion of the unit was determined to contain wilderness values and was designated as a WSA. The remainder of the unit was determined to lack wilderness values and was released from wilderness review. The inventory findings and the subsequent decision were protested (December, 1980). The entire unit is currently subject to further wilderness review and interim management protection until a decision concerning management of the unit is again reached (timeframe unknown)

^eThe unit was determined to lack wilderness character and was released from further wilderness review. The inventory proceedings and subsequent decision were protested (December, 1980). The entire unit is currently subject to further wilderness review and interim management protection until a decision concerning management of the unit is again reached (timeframe unknown)

APPENDIX 7

AIR QUALITY MODELING

Air quality modeling was performed by Radian Corporation, Austin, Texas (Radian, 1981) under contract to BLM. Annual average concentrations of TSP, SO₂, and NO₂ were computed using a Gaussian-based model almost identical to the EPA Climatological Dispersion Model. Emissions were calculated from coal mines (existing and proposed), towns, roads, and major industrial sources. Particulate emissions from surface mining operations were calculated for topsoil removal, overburden removal, drilling, blasting, product removal, truck dumping product storage, haul and access roads, and exposed areas. Emissions from underground mining operations were calculated for conveying, transferring, processing, product loadout, product storage, haul and access roads, and exposed areas. Emission factors were obtained from EPA reports (EPA 1979a and 1979b) and are shown in Tables 1 and 2.

Particulate and NO₂ emissions from vehicles traveling on roadways with over 5,000 annual average daily traffic in the impact area were estimated. Exhaust emissions of SO₂ from mobile sources were insignificant and not modeled. The emission factors for NO₂ were determined using procedures outlined in Mobile Source Emission Factors (EPA 1978) and its attendant computer program MOBILE 1. Emission factors used for roadway emissions are shown in Table 3.

Emissions from towns and cities whose growth would be affected by the proposed action were calculated using population projections. Emissions of TSP, NO₂, and SO₂ for Carbon, Emery, Sevier, and Sanpete Counties were taken from the Utah Bureau of Air Quality emission inventory for 1976. Emissions of each pollutant

for the towns for 1976 were determined using 1976 population estimates. The emissions for the towns for 1976 were determined using 1976 population estimates. The emissions were calculated as the ratio of the town population to the county-wide population multiplied by the total area source emissions of each pollutant for the county, excluding inappropriate source categories such as forest emissions. Future emissions were then estimated by multiplying of the projected town population for the study years to the 1976 population.

Major industrial point sources near the proposed lease tracts and affected cities and roads were included in the analysis and consisted of

- Huntington Powerplant, Units 1 and 2
- Hunter (Emery) Powerplant, Units 1, 2, 3, 4
- Carbon Powerplant, Units 1 and 2
- Two coal dryers
- One coal preparation facility

The joint frequency distribution of stabilities, windspeeds and wind directions for Grand Junction, Colorado for the years 1959 through 1968 calculated from National Weather Service data was used for the annual modeling. The Grand Junction joint frequency distribution show a strong upslope-downslope valley flow influence. This meteorological regime is representative of valley locations within the study area. The alignment of the valley around the Grand Junction site is different from that of valleys in the coal region. Therefore, the Grand Junction joint frequency distribution was shifted in direction to compensate for differences in orientation of the dominant terrain between the Grand Junction area and the subareas modeled.

Deposition velocities for a typical particle (22 microns and density of 1 gram per cubic centimeter) is 3 centimeters per second (Pedco 1978). The actual deposition velocity may be greater because deposition mechanisms include (in addition to gravity), surface impaction, electrostatic attraction, adsorption, and chemical interaction. Therefore 5 centimeters per second was used as the deposition velocity in the modeling (Pedco 1978).

Studies performed by Radian Corporation (1976) in which annual average particulate concentrations from ground-level area sources were predicted and compared to measured levels, show that under the conditions studied the model was accurate within a factor of 1.8.

In this study, Larsen statistics were applied to the annual average modeling results to estimate maximum short-term pollution levels (Larsen 1971).

Three computer models were used to predict worst-case visibility impacts in the Uinta-Southwestern Utah coal region resulting from the proposed federal lease alternatives. VISM0D is a visibility screening model designed to predict those conditions under which emissions from a point source may result in a significant visual impact upon an observer looking horizontally through the center of the point source plumes. Visibility reducing sulfate, nitrate, and particulate aerosols are considered. MULTIM0D is a visibility screening model similar to VISM0D. The primary difference is that MULTIM0D can calculate the combined visual impact of multiple point and area sources. BOXVIS is a visibility screening model designed to predict those conditions under which regional emissions from point, area, or line sources lying within a valley may result in a significant visual

impact upon an observer looking horizontally through the region. Ambient concentrations of NO₂ and of visibility-reducing sulfate, nitrate, and particulate aerosols are predicted using the VISMOD atmospheric chemistry sub-model. The resulting optical effects are calculated using the VISMOD atmospheric optics sub-model.

At this time, no visibility model has been fully validated. Preliminary validation studies of a Gaussian point source visibility model (Bergstrom, et al., 1980) for a coal-fired powerplant indicate that the primary source of error in visibility models is the dispersion component, which can err by a factor of two in predicting pollutant concentrations. Simple box models may be expected to predict pollutant concentrations with even greater uncertainty. The atmospheric optics submodel in the validation study, which is very similar to the atmospheric optics submodel in the VISMOD, BOXVIS, and MULTIMOD models, predicted radiance values to within an accuracy of ten percent.

The results of the application of the models to the six scenarios selected are summarized in Table 4.

Detailed discussion of

Basic models used

Emission source terms

Mines

Transportation

Towns

Major industrial sources

Meteorological parameters

Mixing height

Ambient temperature

Joint frequency of occurrence distribution

Wind speed

Wind direction

Stability class

Source inputs

Dispersion model outputs

Model validation and confidence limits

Annual model application

Short-term statistical model application

Visibility modeling methodology

are given in the Radian (1981) report and its supporting appendices A through C.

TABLE 1
PARTICULATE EMISSION FACTORS FOR SURFACE MINING OPERATIONS

Process Operation	Emission Factor	Units
Topsoil Removal	0.38	lb/yd
Overburden Removal		
Shovel/Truck	0.037	lb/yd
Dragline	0.053	lb/yd
Drilling		
Coal	0.22	lb/hole
Overburden	1.50	lb/hole
Blasting		
Coal	78.1	lb/blast
Overburden	85.3	lb/blast
Product Removal	0.014	lb/ton
Truck Dumping (Storage)	0.007	
Product Storage	1.6 x wind speed	lb/acre-hr
Haul and Access Roads	$d(0.81s)\left(\frac{S}{30}\right)\left(\frac{365-W}{365}\right)F$	lb/miles traveled
Exposed Areas	Soil loss equation*	lb/acre-hr

Source: Interim Policy Paper on Air Quality Review of Surface Mining Operations

*Cowherd, et al., 1974

TABLE 2
PARTICULATE EMISSION FACTORS FOR UNDERGROUND MINING OPERATIONS

Process Operation	Emission Factor	Units
Conveying	0.20 C*	lb/ton
Transferring	0.20 C	lb/ton
Processing	0.18 C	lb/ton
Product Loadout	0.05 C	lb/ton
Product Storage	$\frac{0.33}{\left(\frac{PE}{100}\right)^2}$	lb/ton
Haul and Access Roads	Same as Table 2-1 Factor	lb/mile traveled
Exposed Areas	Same as Table 2-1 Factor	lb/acre-hr

Sources: Interim Policy Paper on Air Quality Review of Surface Mining Operations
Product Storage Factor from Compilation of Air Pollutant Emission Factors

*C = Control Efficiency = 50% assumed for conservative estimate

TABLE 3
EMISSION FACTORS FOR VEHICLE EMISSIONS (GS/VEHICLE MILE)

Year of Interest	Total Suspended Particulate ^a Matter	Nitrogen Oxides ^b
1987	3.50	3.57
1990	3.50	3.19
1995	3.50	3.05
2000	3.50	3.05

Sources: ^aCompilation of Air Pollutant Emission Factors
^bMOBILE1

TABLE 4

PREDICTED WORST-CASE VISIBILITY IMPAIRMENT FROM ALTERNATIVE ONE

Scenario Sight Path	Wind Direction (Degrees Clock- wise from North)	Viewing Distance (miles)	Predicted Value for Background Visual Range = 243 Miles		Predicted Value for Background Visual Range = 121 Miles	
			Visual Range Reduction ¹	Contrast Reduction ²	Visual Range Reduction ¹	Contrast Reduction ²
1. From Observation Point to Mt. Baldy ³	21	42	1.33	0.016	1.33	0.009
2. From Murphy's Point to Mt. Baldy ⁴	0	101	0.97	0.004	0.97	0.001
3. From Murphy's Point to Mt. Baldy ⁴	180	101	0.37	0.002	0.37	0.004
4. From Murphy's Point to Patmos Head ⁴	81	81	1.20	0.007	1.20	0.002
5. Looking at North Horn Mountain	Perpendicular to sight path	19-75	15.4-21.6	0.096-0.295	15.4-21.6	0.029-0.219
6. Looking down the length of Castle Valley	Stagnation Conditions	81	1.26-11.5	0.009-0.068	1.26-11.50	0.002-0.018

Threshold of Perceptibility: Visual Range Reduction = 5.0-10.0⁵; Contrast Reduction > 0.02-0.04⁶

¹Percent Reduction in Visual Range

²Decrease in Apparent Contrast

³Capitol Reef National Park

⁴Canyonlands National Park

⁵Cramer et al., 1978

⁶Malm et al., 1979

LITERATURE CITED

- Bergstrom, R.W., C. Seigneur, B.L. Babson, H.Y. Holman, M.A. Wojcik, 1980: "Comparison of the Observed and Predicted Visual Effects Caused by Power Plant Plumes." Symposium on Visibility, Measurements and Model Components, Grand Canyon, Arizona.
- Cowherd, Chatten, Kenneth Axetell, Jr., et al., 1974: Development of Emission Factors for Fugitive Dust Sources, Publication No. EPA-450/3-74-037, U.S. Environmental Protection Agency, Office of Air and Waste Management, Research Triangle Park, North Carolina.
- Larsen, Ralph I., 1971: A Mathematical Model for Relating Air Quality Standards, Environmental Protection Agency, Research Triangle Park, North Carolina.
- PEDCO-Environmental, Inc., 1978: "Survey of Fugitive Dust from Coal Mines," Contract No. 68-01-4489, Project No. 3311, Cincinnati, Ohio.
- Radian Corporation, 1976: Final Report: Arkansas Air Quality Maintenance Plan Development, U.S. Environmental Protection Agency, Region IV, Dallas, Texas.
- U.S. Environmental Protection Agency, 1978. Mobile Source Emission Factors, EPA-400/9-78-006, Washington, D.C., March 1978.
- U.S. Environmental Protection Agency, 1979. Compilation of Air Pollution Emission Factors, AP-42, Third Edition, Research Triangle Park, North Carolina.
- U.S. Environmental Protection Agency, 1979. Region VIII Interim Policy Paper on the Air Quality Review of Surface Mining Operations, Denver, Colorado.



United States Department of the Interior
FISH AND WILDLIFE SERVICE

MAILING ADDRESS:
Post Office Box 25486
Denver Federal Center
Denver, Colorado 80225

STREET LOCATION:
134 Union Blvd.
Lakewood, Colorado 80228

IN REPLY REFER TO:

FA/SE/BLM--Uinta Utah SW
Coal Sites (6-5-80-F-169)

JUN 26 1980

MEMORANDUM

TO: State Director
Bureau of Land Management, Salt Lake City, Utah

FROM: Regional Director, Region 6
U.S. Fish and Wildlife Service, Denver, Colorado

SUBJECT: Section 7 Consultation, Uinta S.W. Utah Preliminary Coal
Tracts, Utah

This biological opinion was prepared pursuant to Section 7 of the Endangered Species Act (ESA) and in response to your memorandum of February 1, 1980. Your memorandum requested consultation on the expected impacts of coal development on candidate and listed plants.

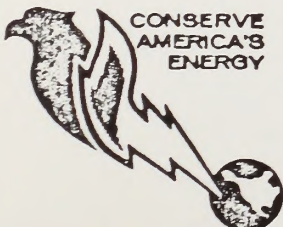
Biological Opinion

The proposed project is likely to jeopardize the continued existence of the Wright fishhook cactus (Sclerocactus wrightiae) unless an alternative program recommended in this opinion is successfully implemented by the Bureau of Land Management (BLM) in consultation with the Fish and Wildlife Service (FWS).

Your February 1 memorandum included candidate plants in the request for consultation. Last chance townsendia (Townsendia aprica) was found on the coal lease tracts, and probably will be proposed by the FWS this calendar year for listing as endangered. The proposed coal leasing project is likely to jeopardize the existence of this species also; however, the alternatives for the fishhook cactus will work for townsendia as well.

Project Description

A regional coal-leasing target was set by the Secretary of the Interior in 1979 with the coal-leasing goal for the Uinta Southwest Utah Coal Program being 322 million tons. In order to meet this goal, the proposed action involves mining coal at three leasing tracts in Emery County, Utah. Approximately 2,201 acres would be leased for coal extraction at the Emery North



Save Energy and You Serve America!

Tract. Forty percent would be surface mined; the remainder would be mined below ground. Surface mining is expected to span 24 years whereas underground mining would last 19. Coal would be extracted through surface mining from 2,968 acres at the Emery Central Tract. This mine is expected to last 40 years. The Emery South Tract is expected to yield coal for 11 years from surface mining of 748 acres.

Basis For Opinion

The Wright fishhook cactus was officially listed as endangered on October 11, 1979. This uncommon cactus inhabits all three coal tracts. It occurs between 3,000 and 5,000 feet on clay soils within sandstone habitats on Mancos Shale Formations in Emery and Wayne Counties. This cactus is seriously threatened by collectors and by energy and mineral exploration and other development which alters its habitat. Five populations are known at two localities in these counties.

Last chance townsendia is not a federally listed species nor is it proposed for listing. However, it will be proposed in the near future due to its precarious status. Only three populations are known, including this one. A gypsum mining operation destroyed one population and the second is threatened by livestock. Normally, FWS does not include candidate species in biological opinions because their inclusion is not a requirement of the ESA and because candidate species sometimes are found to be relatively secure once status surveys are done. In this case, we are offering you counsel on a candidate plant because you requested our advice and provided data on townsendia. Also, both BLM and FWS recognize that this plant could easily become extinct without precautionary measures. Moreover, as implied earlier, this plant may be listed before coal is mined from the Emery tracts. In fact, your concern for this species helps to make unlikely the need for it to be listed under emergency provisions of the ESA.

Townsendia was found in the Emery South Tract during your recent inventory of threatened and endangered plants. It inhabits clay soil covered with sandstone, basalt cobble, and pebbles which form a pavement-like surface. It covers several acres of habitat in the south area. We commend you for your foresight in locating this plant in the coal impact area and plotting its habitat for protection from coal mining.

Coal mining activities which remove land from production of native plants may adversely impact imperilled plants such as the Wright fishhook cactus and last chance townsendia. In particular, strip mining devastates vegetation of all kinds. The fishhook cactus and townsendia have strict habitat requirements and can be eradicated by mining activities. Construction of haul roads, pipelines, power lines, and other activities associated with mining are serious threats. Both plants evolved through progressive changes to occupy specific sites. Strip mining would alter species composition, soil types, temperatures, and water availability.

Underground mining disturbs less surface than strip mining; consequently, impacts are less extensive from subsurface mines.

Reasonable and Prudent Alternatives

Section 7 of the ESA requires FWS to recommend reasonable and prudent alternatives for any proposed project likely to jeopardize continued existence of a listed species. The purpose is to avoid jeopardy to such species while allowing implementation of the proposed project or an alternative that would accomplish the desired objective.

Section 7 requires the consulting Federal agency (in this case BLM) to insure that its actions will not jeopardize a listed species. We are concerned that coal mining could destroy the listed Wright fishhook cactus and the last chance townsendia in areas of conflict. Consequently, we are recommending two alternatives. You may prevent jeopardy to these two plants by executing either alternative. The first alternative consists of the following five recommendations which would allow coal development in a manner least damaging to the plants.

1. Plot plant distributions on overlays of proposed coal operations.
2. Determine appropriate buffer zones. We will be pleased to consult again with you on the sizes and configurations of buffer zones.
3. Limit size of construction activities to a minimum.
4. Construct mines, coal haul roads, portals, loading stations, and other activities so as to avoid habitats of the two plants.
5. Monitor the plant populations during mining to insure they are not damaged inadvertently.

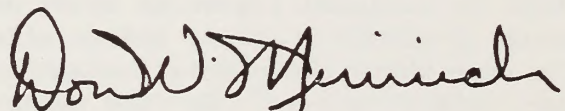
Sclerocactus spp. were collected at 10 locations in the Emery North, Central, and South Tracts. We recognize it is difficult or impossible to differentiate between Whipple's cactus (S. whipplii) and Wright fishhook cactus (S. wrightiae) without flowers. Your supplemental data gave no indication of the acreage that support both Sclerocactus spp. and coal reserves. Thus, we assigned 1 acre as being needed for each individual plant or small group of plants located, and we allowed up to 10 acres to be set aside in the case where the population/habitat data sheet stated plants were "scattered over several acres." By this means of approximation, we estimate that 19 acres would have to be preserved for the Wright fishhook cactus. The BLM data sheet also stated that townsendia was scattered over several acres. Again, we allowed 10 acres to be set aside. This brings the land

to be preserved for both plant species to a total of 29 acres. We recognize this is a rough estimate, but no specific acreages were measured during the BLM survey. Regardless, we believe the acreage estimate to be accurate enough for this stage of project planning. Again, we will be pleased to help you establish appropriate buffer zones if you select this alternative. The economic impact of setting aside these acres will depend on the configuration and distribution of the lands to be protected.

The second alternative features experimentation with propagation and another Section 7 consultation when results of the experiments are known. The intent would be to establish at least one new population each of the fishhook cactus and townsendia in the wild. This alternative involves the determination of the practicality of cultivating numerous plants in habitats strongly similar to those on the Emery coal tracts where the plants are growing. Because coal will not be mined from the Emery tracts for an estimated 4 to 5 years, BLM has time to determine whether either of the two plants of concern can be grown in large numbers (approximately the number that would be lost through mining). Transplanting or propagation by seeds or tissue culture are possibilities. Through further consultation, the FWS and BLM could determine the number of plants that BLM could use from the Emery tracts for experimentation. Whipple's cactus occupies some of the same habitat as Wright's fishhook cactus and could be used for some of the experimental work. Section 7 requires insurance that Federal actions do not jeopardize the existence of listed species, thus success of establishing and protecting new populations in the wild cannot be in doubt when the experiments end and before mining begins. However, if this alternative cannot offer such insurance after experimentation, the first alternative can still be implemented. We request that you inform us in writing as to which alternative you select so that further consultation can be arranged if needed.

If new information is revealed that was not considered during this consultation, or a new species is listed in the project area, Section 7 consultation must be reinitiated. Moreover, BLM should not make any irreversible or irretrievable commitment of resources which could alter implementation of the above recommendations.

We appreciate your strong interest in conserving imperilled species. If we can be of further assistance, please advise us.



DON W. HATCH



United States Department of the Interior

FISH AND WILDLIFE SERVICE
AREA OFFICE COLORADO-UTAH
1311 FEDERAL BUILDING
125 SOUTH STATE STREET
SALT LAKE CITY, UTAH 84138

October 21, 1980

IN REPLY REFER TO:

MEMORANDUM

TO: State Director
Utah State Office
Bureau of Land Management
Salt Lake City, Utah

FROM: Area Manager
Area 5
Fish and Wildlife Service
Salt Lake City, Utah

SUBJECT: Amendment To Biological Opinion For
Uinta Southwest Utah Preliminary Coal Tracts

This memorandum amends our June 26, 1980 biological opinion on the Uinta Southwest Utah Preliminary Coal Tracts. That biological opinion discussed the expected impacts of coal development on the endangered Wright fishhook cactus (Sclerocactus wrightiae).

In a memorandum dated August 11, 1980, you asked us to revise the conclusions we had reached for the fishhook cactus. We are amending our biological opinion because of the information that you provided with your August request for a new consultation. Your memorandum explained that our biological opinion was based on inaccurate information concerning the identity of the cactus of concern that was found on the coal lease tracts. The botanist who did the original field surveys for your agency mistook Sclerocactus parviflorus for S. wrightiae. The significance is that S. parviflorus is a much more common plant and is not imperilled in any way. The presence of S. parviflorus and the absence of S. wrightiae was determined through additional field surveys and through forcing the specimens in question to bloom in greenhouses. The presence of flowers was necessary for the botanists to distinguish between the two species of cactus.

We hereby change our biological opinion because of the additional information that you obtained by re-assessing the identification of the cactus of concern. Our opinion of course is that the proposed coal development is not likely to jeopardize the continued existence of the Wright fishhook cactus.

We ask that you continue to consider the comments we made in our biological opinion on the last chance townsendia (Townsendia aprica), a species expected to be proposed for listing within a few months. Thank you for your interest in conserving imperilled species.

Robert H. Shields

APPENDIX 9

PHEASANT POPULATION ESTIMATE FORMULA

Cock Harvest: from Harvest Survey in annual report

Post-Season Hens/Cocks: from Winter Sex-Ratio Counts in the annual report

Percent Cocks Harvested: calculated by change in ratio from pre-season to
post-season =

Post Cocks/Hens pre cocks/hens

(from Winter Sex Ratio counts)-(assumed 1.2 hens/cocks

Post Cocks/Hens

Pre-Season Population: Cock Harvest: percent harvested =
Pre-season Cocks: pre-season cocks
x 1.2 (assumed hens/cocks pre-season)=
pre-season hens; then combine cocks and hens for
total

Pheasants per acre in the fall = estimated cocks, hens or total ÷ acres of
cropland in county.

APPENDIX 10
NET ENERGY ANALYSIS

The accompanying "net energy analyses" estimate the amount of energy in the coal produced on the Preliminary Coal Lease Tracts, the energy expended in its production, and the energy in the coal left in the ground as not being economically recoverable.

The energy input shown as required for "production and transportation" includes all energy required to produce the coal and transport it to a rail shipping point. This comprises fuel used directly or as electricity for mine production, truck transportation of coal, and transportation of personnel and supplies, and also the energy used for manufacturing or constructing the mining and transportation equipment and facilities needed and for manufacturing supplies. Also included is the petroleum used in hydraulic fluids, lubricants, and explosives and the hydrocarbons in feedstocks used in supply manufacture.

The energy input shown as required for "infrastructure" includes the energy consumed as electricity, natural gas, heating oil, and gasoline by mine employees and families, by a similar number of service employees in the production area who support them and by a proportionate number of commercial establishments. Also included is the energy consumed by workers producing the equipment and supplies used for coal production and by the service employees and commercial establishments that support them.

Estimates of electricity, fuel and mining supply consumption and of mine equipment and facility depreciation are based on mine models published by the Bureau of Mines, mainly Information Circulars 8682, 8703, and 8761. The models were modified as needed to reflect conditions at individual tracts. Direct mine operating and construction employment was estimated by the Geological Survey and shown in the "Economic Recovery Potential" reports for the tracts. Truck transportation fuel consumption is estimated using data obtained for the Central and Southern Utah Coal Resource Environmental Statements and for the Kaiparowits transportation study.

Nationwide and statewide averages of energy minerals used per dollar--added-in-manufacturing were used to estimate the energy consumed in manufacturing equipment and supplies for which only a dollar measure of quantity is reported in statistical abstracts. Similar National and State averages of electricity, natural gas, and gasoline used per household were used for estimating infrastructure consumption.

Energy consumption is considered as beginning for electricity with deliveries of coal or other fuels to the generating station, for petroleum products with deliveries to area suppliers, and for natural gas with deliveries to consumers. The analysis ends with the coal loaded in rail cars for shipment. Rail shipment of coal requires about 600 Btu's per ton mile in the form of direct energy and a similar amount is estimated as being consumed indirectly and by associated infrastructure. About one-half percent of the energy in coal is required to transport it 100 miles by rail.

BLM NET ENERGY ANALYSIS: COAL LEASING

NET ENERGY SUMMARY SHEET

SITE: Rilda Canyon (Section 32) Preliminary Tract with 195,000 ton annual production from tract portion of proposed large mining unit.

All Numbers: Billion Btu Annual Life of Mine (40)

1. Energy Output, Btu 4,950.0 198,000.0

2. Energy Input, (direct & indirect), Btu

2.1 Production/Transportation
Direct Operations

Petroleum	26.2	1,048.0
Natural Gas	--	--
Coal	34.5	1,380.0
Hydro Power	--	--
Nuclear	--	--
Other	--	--
	<u> </u>	<u> </u>

Total	60.7	2,428.0
Ratio Output/Input	<u> </u>	<u>81.5</u>

Equipment, Facilities, & Supplies

Petroleum	2.0	80.0
Natural Gas	11.4	456.0
Coal	5.0	200.0
Hydro Power	1.6	64.0
Nuclear	1.5	60.0
Other	--	--
	<u> </u>	<u> </u>

Total	21.5	860.0
Ratio Output/Input	<u> </u>	<u>230.2</u>

Total Production/Transportation	82.2	3,288.0
Ratio Output/Input	<u> </u>	<u>60.2</u>

2.2 Infrastructure

Production Area

Petroleum	18.4	736.0
Natural Gas	20.8	832.0
Coal	15.1	604.0
Hydro Power	--	--
Nuclear	--	--
Other	--	--
	<u> </u>	<u> </u>

Total	54.3	2,172.0
Ratio Output/Input	<u> </u>	<u>91.2</u>

	<u>Annual</u>	<u>Life of Mine (40)</u>
Equipment and Supplies		
Petroleum	13.9	556.0
Natural Gas	12.1	484.0
Coal	3.8	152.0
Hydro Power	1.3	52.0
Nuclear	1.1	44.0
Other	<u>--</u>	<u>--</u>
Total	<u>32.2</u>	<u>1,288.0</u>
Ratio Output/Input		<u>153.7</u>
Total Infrastructure	<u>86.5</u>	<u>3,460.0</u>
Ratio Output/Input		<u>57.2</u>
2.3 Total 2.1 + 2.2		
Petroleum	60.5	2,420.0
Natural Gas	44.3	1,722.0
Coal	58.4	2,336.0
Hydro Power	2.9	116.0
Nuclear	2.6	104.0
Other	<u>--</u>	<u>--</u>
Total	<u>168.7</u>	<u>6,748.0</u>
Ratio Output/Input		<u>29.3</u>
Unrecovered Resource, Btu	<u>7,430</u>	<u>297,200</u>

BLM NET ENERGY ANALYSIS: COAL LEASING

NET ENERGY SUMMARY SHEET

SITE: Cottonwood Preliminary Tract

All Numbers: Billion Btu

	<u>Annual</u>	<u>Life of Mine (40)</u>
1. Energy Output, Btu	14,490	579,600
2. Energy Input, (direct & indirect), Btu		
2.1 Production/Transportation Direct Operations		
Petroleum	51.5	2,060.0
Natural Gas	--	--
Coal	103.3	4,132.0
Hydro Power	--	--
Nuclear	--	--
Other	--	--
	<u>154.8</u>	<u>6,192.0</u>
Total		
Ratio Output/Input	<u>93.6</u>	
2.2 Infrastructure		
Equipment, Facilities, & Supplies		
Petroleum	7.7	308.0
Natural Gas	33.9	1,320.0
Coal	16.0	640.0
Hydro Power	4.5	180.0
Nuclear	4.4	176.0
Other	--	--
	<u>66.5</u>	<u>2,660.0</u>
Total		
Ratio Output/Input	<u>217.9</u>	
Total Production/Transportation	<u>221.3</u>	<u>8,852.0</u>
Ratio Output/Input	<u>65.5</u>	
2.2 Infrastructure		
Production Area		
Petroleum	76.0	3,040.0
Natural Gas	50.9	2,036.0
Coal	54.0	2,160.0
Hydro Power	--	--
Nuclear	--	--
Other	--	--
	<u>180.9</u>	<u>7,236.0</u>
Total		
Ratio Output/Input	<u>80.1</u>	

	<u>Annual</u>	<u>Life of Mine (40)</u>
Equipment and Supplies		
Petroleum	41.0	1,640.0
Natural Gas	37.1	1,484.0
Coal	11.5	460.0
Hydro Power	3.5	140.0
Nuclear	3.2	128.0
Other	<u>--</u>	<u>--</u>
Total	<u>96.3</u>	<u>3,852.0</u>
Ratio Output/Input		<u>150.5</u>
Total Infrastructure	<u>272.2</u>	<u>11,088.0</u>
Ratio Output/Input		<u>52.3</u>
2.3 Total 2.1 + 2.2		
Petroleum	176.2	7,048.0
Natural Gas	121.9	4,876.0
Coal	184.8	7,392.0
Hydro Power	8.0	320.0
Nuclear	7.6	304.0
Other	<u>--</u>	<u>--</u>
Total	<u>498.5</u>	<u>19,940</u>
Ratio Output/Input		<u>29.1</u>
Unrecovered Resource, Btu	<u>21,730</u>	<u>869,200</u>

	<u>Annual</u>	<u>Life of Mine (40)</u>
Equipment and Supplies		
Petroleum	67.6	2,704.0
Natural Gas	76.6	3,064.0
Coal	24.6	984.0
Hydro Power	7.0	280.0
Nuclear	7.0	280.0
Other	<u> --</u>	<u> --</u>
Total	<u>182.8</u>	<u>7,312.0</u>
Ratio Output/Input		<u>117.5</u>
Total Infrastructure	<u>263.2</u>	<u>10,528.0</u>
Ratio Output/Input		<u>81.6</u>
2.3 Total 2.1 + 2.2		
Petroleum	219.5	8,780.0
Natural Gas	168.0	6,720.0
Coal	441.5	17,660.0
Hydro Power	18.3	732.0
Nuclear	18.4	736.0
Other	<u> --</u>	<u> --</u>
Total	<u>865.7</u>	<u>34,628.0</u>
Ratio Output/Input		<u>24.8</u>
Unrecovered Resource, Btu	<u>2,380.0</u>	<u>95,200.0</u>

BLM NET ENERGY ANALYSIS: COAL LEASING

NET ENERGY SUMMARY SHEET

SITE: Emery North Preliminary Tract, with spur of proposed Castle Valley R.R. adjacent to mine.

All Numbers: Billion Btu	Annual Production		Life of Mine Total 40 Years
	Years 1-20 Surface	Years 20-40 Underground	
1. Energy Output Btu	11,030	13,120	483,000
2. Energy Input, (direct & indirect), Btu			
2.1 Production/Transportation Direct Operations			
Petroleum	41.4	27.7	1,382.0
Natural Gas	---	---	---
Coal	244.2	128.0	7,444.0
Hydro Power	---	---	---
Nuclear	---	---	---
Other	---	---	---
Total	<u>285.6</u>	<u>155.7</u>	<u>8,826.0</u>
Ratio Output/Input	<u>38.6</u>	<u>84.3</u>	<u>54.7</u>
Equipment, Facilities, & Supplies			
Petroleum	10.0	7.7	354.0
Natural Gas	40.2	34.0	1,484.0
Coal	19.1	15.5	692.0
Hydro Power	5.5	4.6	202.0
Nuclear	5.3	4.3	192.0
Other	---	---	---
Total	<u>80.1</u>	<u>66.1</u>	<u>2,924.0</u>
Ratio Output/Inout	<u>137.7</u>	<u>198.5</u>	<u>165.2</u>
Total Production/Transp.	<u>365.7</u>	<u>221.8</u>	<u>11,750.0</u>
Ratio Output/Input	<u>30.2</u>	<u>59.2</u>	<u>41.1</u>
2.2 Infrastructure			
Production Area			
Petroleum	31.8	62.8	1,892.0
Natural Gas	13.4	26.4	796.0
Coal	17.6	34.6	1,044.0
Hydro Power	---	---	---
Nuclear	---	---	---
Other	---	---	---
Total	<u>62.8</u>	<u>123.8</u>	<u>3,732.0</u>
Ratio Output/Input	<u>175.6</u>	<u>106.0</u>	<u>129.4</u>

	Annual Production		Life of Mine Total 40 Years
	Years 1-20 Surface	Years 20-40 Underground	
Equipment & Supplies			
Petroleum	48.9	40.6	1,790.0
Natural Gas	43.3	35.9	1,584.0
Coal	14.5	11.8	526.0
Hydro Power	4.2	3.2	148.0
Nuclear	4.0	3.0	140.0
Other	---	---	---
Total	<u>114.9</u>	<u>94.5</u>	<u>4,188.0</u>
Ratio Output/Input	<u>96.0</u>	<u>138.8</u>	<u>115.3</u>
Total Infrastructure	<u>177.7</u>	<u>218.3</u>	<u>7,920.0</u>
Ratio Output/Input	<u>62.1</u>	<u>60.1</u>	<u>61.0</u>
2.3 Total 2.1 + 2.2			
Petroleum	132.1	138.8	5,418.0
Natural Gas	96.9	96.3	3,864.0
Coal	295.4	189.9	9,706.0
Hydro Power	9.7	7.8	350.0
Nuclear	9.3	7.3	332.0
Other	---	---	---
Total	<u>543.4</u>	<u>440.1</u>	<u>19,670.0</u>
Ratio Output/Input	<u>20.3</u>	<u>29.8</u>	<u>24.6</u>
Unrecovered Resource, Btu	<u>1,950.0</u>	<u>10,310.0</u>	<u>245,200.0</u>

BLM NET ENERGY ANALYSIS: COAL LEASING

NET ENERGY SUMMARY SHEET

SITE: Tucker Canyon Preliminary Tract (from Kimball mine area).
 Including only 42,500 tpy production from federal land,
 although additional private coal will also be mined.

All Numbers: Billion Btu

Annual Life of Mine ²⁰ (~~40~~)

1. Energy Output, Btu	1,070.0	21,400.0
2. Energy Input, (direct & indirect), Btu		

2.1 Production/Transportation
 Direct Operations

Petroleum	2.9	58.0
Natural Gas	--	--
Coal	11.9	238.0
Hydro Power	--	--
Nuclear	--	--
Other	--	--
	<u> </u>	<u> </u>

Total	<u>14.8</u>	<u>296.0</u>
Ratio Output/Input		<u>72.3</u>

Equipment, Facilities, & Supplies

Petroleum	1.0	20.0
Natural Gas	3.4	68.0
Coal	2.0	40.0
Hydro Power	0.5	10.0
Nuclear	0.5	10.0
Other	--	--
	<u> </u>	<u> </u>

Total	<u>7.4</u>	<u>148.0</u>
Ratio Output/Input		<u>144.6</u>

Total Production/Transportation	<u>22.2</u>	<u>444.0</u>
Ratio Output/Input		<u>48.2</u>

2.2 Infrastructure

Production Area

Petroleum	5.3	106.0
Natural Gas	6.1	122.0
Coal	4.4	88.0
Hydro Power	--	--
Nuclear	--	--
Other	--	--
	<u> </u>	<u> </u>

Total	<u>15.8</u>	<u>316.0</u>
Ratio Output/Input		<u>67.7</u>

	<u>Annual</u>	<u>Life of Mine</u> ²⁰ (40)
Equipment and Supplies		
Petroleum	4.2	84.0
Natural Gas	3.7	74.0
Coal	1.2	24.0
Hydro Power	0.4	8.0
Nuclear	0.4	8.0
Other	<u> --</u>	<u> --</u>
Total	<u> 9.9</u>	<u>198.0</u>
Ratio Output/Input		<u>108.1</u>
Total Infrastructure	<u>25.7</u>	<u>514.0</u>
Ratio Output/Input		<u>41.6</u>
2.3 Total 2.1 + 2.2		
Petroleum	13.4	268.0
Natural Gas	13.2	264.0
Coal	19.5	390.0
Hydro Power	0.9	18.0
Nuclear	0.9	18.0
Other	<u> --</u>	<u> --</u>
Total	<u>47.9</u>	<u>958.0</u>
Ratio Output/Input		<u>22.3</u>
Unrecovered Resource, Btu	<u>1,790.0</u>	<u>35,800.0</u>

BLM NET ENERGY ANALYSIS: COAL LEASING

NET ENERGY SUMMARY SHEET

SITE: Miller Creek Preliminary Tract (from Broad Canyon access) with 433,000 tons annual production.

All Numbers: Billion Btu Annual Life of Mine (40)

1. Energy Output, Btu 10,390.0 415,600

2. Energy Input, (direct & indirect), Btu

2.1 Production/Transportation
Direct Operations

Petroleum	24.1	964.0
Natural Gas	--	--
Coal	101.4	4,056.0
Hydro Power	--	--
Nuclear	--	--
Other	--	--
	<u> </u>	<u> </u>

Total	125.5	5,020.0
Ratio Output/Input		<u>82.8</u>

Equipment, Facilities, & Supplies

Petroleum	8.2	328.0
Natural Gas	29.3	1,172.0
Coal	15.7	628.0
Hydro Power	4.9	196.0
Nuclear	4.9	196.0
Other	--	--
	<u> </u>	<u> </u>

Total	63.0	2,520.0
Ratio Output/Input		<u>164.9</u>

Total Production/Transportation	188.5	7,540.0
Ratio Output/Input		<u>55.1</u>

2.2 Infrastructure

Production Area

Petroleum	55.4	2,216.0
Natural Gas	63.3	2,532.0
Coal	45.6	1,824.0
Hydro Power	--	--
Nuclear	--	--
Other	--	--
	<u> </u>	<u> </u>

Total	164.3	6,572.0
Ratio Output/Input		<u>63.2</u>

	<u>Annual</u>	<u>Life of Mine (40)</u>
Equipment and Supplies		
Petroleum	37.1	1,484.0
Natural Gas	32.1	1,284.0
Coal	10.2	408.0
Hydro Power	2.9	116.0
Nuclear	2.9	116.0
Other	<u> --</u>	<u> --</u>
Total	<u>85.2</u>	<u>3,408.0</u>
Ratio Output/Input		<u>121.9</u>
Total Infrastructure	<u>249.5</u>	<u>9,980.0</u>
Ratio Output/Input		<u>41.6</u>
2.3 Total 2.1 + 2.2		
Petroleum	124.8	4,992.0
Natural Gas	124.7	4,988.0
Coal	172.9	6,916.0
Hydro Power	7.8	312.0
Nuclear	7.8	312.0
Other	<u> --</u>	<u> --</u>
Total	<u>438.0</u>	<u>17,520.0</u>
Ratio Output/Input		<u>23.7</u>
Unrecovered Resource, Btu	<u>15,590</u>	<u>623,000.0</u>

BLM NET ENERGY ANALYSIS: COAL LEASING

NET ENERGY SUMMARY SHEET

SITE: Emery South Preliminary Tract with Underground Production Methods and Truck Haulage to Nearby Shipping Point on Proposed Castle Valley R.R.

All Numbers: Billion Btu Annual Life of Mine (40)

1. Energy Output, Btu	3,300	132,000
2. Energy Input, (direct & indirect), Btu		
2.1 Production/Transportation Direct Operations		
Petroleum	13.4	536.0
Natural Gas	--	--
Coal	26.5	1,060.0
Hydro Power	--	--
Nuclear	--	--
Other	<u> --</u>	<u> --</u>
Total	<u>39.9</u>	<u>1,596.0</u>
Ratio Output/Input		<u>82.7</u>
Equipment, Facilities, & Supplies		
Petroleum	1.8	72.0
Natural Gas	8.6	344.0
Coal	4.1	164.0
Hydro Power	1.4	56.0
Nuclear	1.0	40.0
Other	<u> --</u>	<u> --</u>
Total	<u>16.9</u>	<u>676.0</u>
Ratio Output/Input		<u>195.3</u>
Total Production/Transportation Ratio Output/Input	<u>56.8</u>	<u>58.1</u> <u>2,272.0</u>
2.2 Infrastructure		
Production Area		
Petroleum	22.4	896.0
Natural Gas	9.4	376.0
Coal	12.3	492.0
Hydro Power	--	--
Nuclear	--	--
Other	<u> --</u>	<u> --</u>
Total	<u>44.1</u>	<u>1,764.0</u>
Ratio Output/Input		<u>74.8</u>

	<u>Annual</u>	<u>Life of Mine (40)</u>
Equipment and Supplies		
Petroleum	10.2	408.0
Natural Gas	9.3	372.0
Coal	2.6	104.0
Hydro Power	0.7	28.0
Nuclear	0.6	24.0
Other	<u> --</u>	<u> --</u>
Total	<u>23.4</u>	<u>936.0</u>
Ratio Output/Input		<u>141.0</u>
Total Infrastructure	<u>67.5</u>	<u>2,700</u>
Ratio Output/Input		<u>48.9</u>
2.3 Total 2.1 + 2.2		
Petroleum	47.8	1,912.0
Natural Gas	27.3	1,092.0
Coal	45.5	1,820.0
Hydro Power	2.1	84.0
Nuclear	1.6	64.0
Other	<u> --</u>	<u> --</u>
Total	<u>124.3</u>	<u>4,972.0</u>
Ratio Output/Input		<u>26.5</u>
Unrecovered Resource, Btu	<u>4,150.0</u>	<u>166,000.0</u>

	<u>Annual</u>	<u>Life of Mine (40)</u>
Equipment and Supplies		
Petroleum	45.1	1,804.0
Natural Gas	39.5	1,580.0
Coal	12.8	512.0
Hydro Power	3.8	152.0
Nuclear	3.5	140.0
Other	--	--
Total	<u>104.7</u>	<u>4,188.0</u>
Ratio Output/Input		<u>153.8</u>
Total Infrastructure	<u>325.1</u>	<u>13,004.0</u>
Ratio Output/Input		<u>49.5</u>
2.3 Total 2.1 + 2.2		
Petroleum	189.6	7,584.0
Natural Gas	161.1	6,444.0
Coal	214.3	8,572.0
Hydro Power	8.7	348.0
Nuclear	8.1	324.0
Other	--	--
Total	<u>581.8</u>	<u>23,272.0</u>
Ratio Output/Input		<u>27.7</u>
Unrecovered Resource, Btu	<u>24,140</u>	<u>965,600.0</u>

BLM NET ENERGY ANALYSIS: COAL LEASING

NET ENERGY SUMMARY SHEET

SITE: Slaughterhouse Canyon Preliminary Tract with mining of both coal seams by underground methods.

<u>All Numbers: Billion Btu</u>	<u>Annual</u>	<u>Life of Mine (8)</u>
1. Energy Output, Btu	5,180.0	41,440.0
2. Energy Input, (direct & indirect), Btu		
2.1 Production/Transportation Direct Operations		
Petroleum	12.3	98.0
Natural Gas	--	--
Coal	56.5	452.0
Hydro Power	--	--
Nuclear	--	--
Other	--	--
	<u>68.8</u>	<u>550.0</u>
Total Ratio Output/Input	<u>75.3</u>	
Equipment, Facilities, & Supplies		
Petroleum	4.5	36.0
Natural Gas	15.6	125.0
Coal	7.1	57.0
Hydro Power	2.0	16.0
Nuclear	1.8	14.0
Other	--	--
	<u>31.0</u>	<u>248.0</u>
Total Ratio Output/Input	<u>167.1</u>	
Total Production/Transportation Ratio Output/Input	<u>99.8</u>	<u>798.0</u>
	<u>51.9</u>	
2.2 Infrastructure		
Production Area		
Petroleum	21.8	174.0
Natural Gas	24.5	196.0
Coal	17.8	142.0
Hydro Power	--	--
Nuclear	--	--
Other	--	--
	<u>64.1</u>	<u>512.0</u>
Total Ratio Output/Input	<u>80.8</u>	

	<u>Annual</u>	<u>Life of Mine (40)</u>
Equipment and Supplies		
Petroleum	17.7	142.0
Natural Gas	15.5	124.0
Coal	5.4	43.0
Hydro Power	1.4	11.0
Nuclear	1.3	11.0
Other	<u> --</u>	<u> --</u>
Total	<u>41.3</u>	<u>331.0</u>
Ratio Output/Input		<u>125.4</u>
Total Infrastructure	<u>105.4</u>	<u>843.0</u>
Ratio Output/Input		<u>49.1</u>
2.3 Total 2.1 + 2.2		
Petroleum	56.3	450.0
Natural Gas	55.6	445.0
Coal	86.8	694.0
Hydro Power	3.4	27.0
Nuclear	3.1	25.0
Other	<u> --</u>	<u> --</u>
Total	<u>205.2</u>	<u>1,641.0</u>
Ratio Output/Input		<u>25.2</u>
Unrecovered Resource, Btu	<u>11,540.0</u>	<u>92,320.0</u>

BLM NET ENERGY ANALYSIS: COAL LEASING

NET ENERGY SUMMARY SHEET

SITE: North Horn Mountain Preliminary Tract with Conveyor Transportation to Clawson
and Annual production of 2,470,000 tons.

All Numbers: Billion Btu

	<u>Annual</u>	<u>Life of Mine (40)</u>
1. Energy Output, Btu	61,610.0	2,464,400.0
2. Energy Input, (direct & indirect), Btu		
2.1 Production/Transportation Direct Operations		
Petroleum	98.1	3,924.0
Natural Gas	--	--
Coal	434.3	17,372.0
Hydro Power	--	--
Nuclear	--	--
Other	<u> --</u>	<u> --</u>
Total	<u>532.4</u>	<u>21,296.0</u>
Ratio Output/Input		<u>115.7</u>
Equipment, Facilities, & Supplies		
Petroleum	38.3	1,532.0
Natural Gas	124.4	4,976.0
Coal	56.4	2,256.0
Hydro Power	15.9	636.0
Nuclear	15.9	636.0
Other	<u> --</u>	<u> --</u>
Total	<u>250.9</u>	<u>10,036.0</u>
Ratio Output/Input		<u>245.6</u>
Total Production/Transportation Ratio Output/Input	<u>783.3</u>	<u>31,332.0</u>
		<u>78.7</u>
2.2 Infrastructure		
Production Area		
Petroleum	373.9	14,956.0
Natural Gas	155.5	6,220.0
Coal	195.2	7,808.0
Hydro Power	--	--
Nuclear	--	--
Other	<u> --</u>	<u> --</u>
Total	<u>724.6</u>	<u>28,984.0</u>
Ratio Output/Input		<u>85.0</u>

Equipment and Supplies

Petroleum	149.2	5,968.0
Natural Gas	131.4	5,256.0
Coal	38.2	1,528.0
Hydro Power	10.7	428.0
Nuclear	10.7	428.0
Other	--	--

Total	<u>340.2</u>	<u>13,608.0</u>
Ratio Output/Input		<u>181.1</u>

Total Infrastructure	<u>1,064.8</u>	<u>42,592.0</u>
Ratio Output/Input		<u>57.9</u>

2.3 Total 2.1 + 2.2

Petroleum	659.5	26,380.0
Natural Gas	411.3	16,452.0
Coal	724.1	28,964.0
Hydro Power	26.6	1,064.0
Nuclear	26.6	1,064.0
Other	--	--

Total	<u>1,848.1</u>	<u>73,924.0</u>
Ratio Output/Input		<u>33.3</u>

Unrecovered Resource, Btu	<u>92,410.0</u>	<u>3,696,400</u>
---------------------------	-----------------	------------------

BLM NET ENERGY ANALYSIS: COAL LEASING

NET ENERGY SUMMARY SHEET

SITE: Meetinghouse Canyon Preliminary Tract

<u>All Numbers: Billion Btu</u>	<u>Annual</u>	<u>Life of Mine (40)</u>
1. Energy Output, Btu	7,790	311,600
2. Energy Input, (direct & indirect), Btu		
2.1 Production/Transportation Direct Operations		
Petroleum	38.8	1,552.0
Natural Gas	--	--
Coal	57.2	2,288.0
Hydro Power	--	--
Nuclear	--	--
Other	--	--
	<u>96.0</u>	<u>3,840.0</u>
Total	<u>96.0</u>	<u>3,840.0</u>
Ratio Output/Input	<u>81.1</u>	
Equipment, Facilities, & Supplies		
Petroleum	2.8	112.0
Natural Gas	4.0	160.0
Coal	8.3	332.0
Hydro Power	2.5	100.0
Nuclear	2.4	96.0
Other	--	--
	<u>20.0</u>	<u>800.0</u>
Total	<u>20.0</u>	<u>800.0</u>
Ratio Output/Input	<u>389.5</u>	
Total Production/Transportation	116.0	4,640.0
Ratio Output/Input	<u>67.2</u>	
2.2 Infrastructure		
Production Area		
Petroleum	38.7	1,548.0
Natural Gas	25.8	1,032.0
Coal	27.4	1,096.0
Hydro Power	--	--
Nuclear	--	--
Other	--	--
	<u>91.9</u>	<u>3,676.0</u>
Total	<u>91.9</u>	<u>3,676.0</u>
Ratio Output/Input	<u>84.8</u>	

LIST OF PREPARED

	<u>Annual</u>	<u>Life of Mine (40)</u>
Equipment and Supplies		
Petroleum	23.0	920.0
Natural Gas	2.3	92.0
Coal	6.1	244.0
Hydro Power	1.5	60.0
Nuclear	1.1	44.0
Other	<u> --</u>	<u> --</u>
Total	<u>34.0</u>	<u>1,360.0</u>
Ratio Output/Input		<u>229.1</u>
Total Infrastructure	<u>125.9</u>	<u>5,036.0</u>
Ratio Output/Input		<u>61.9</u>
2.3 Total 2.1 + 2.2		
Petroleum	103.3	4,132.0
Natural Gas	32.1	1,284.0
Coal	99.0	3,960.0
Hydro Power	4.0	160.0
Nuclear	3.5	140.0
Other	<u> --</u>	<u> --</u>
Total	<u>241.9</u>	<u>9,676.0</u>
Ratio Output/Input		<u>32.2</u>
Unrecovered Resource, Btu	11,690	467,600

LIST OF PREPARERS

RONALD B. BOLANDER: Team Leader. Botany, Ecology. Bureau of Land Management 6 years.

DENNIS E. OAKS: Technical Coordinator and Land Use. Geography. Bureau of Land Management 3 years, Pacific Northwest River Basins Commission 4 years.

LARRY K. EYRE: Environmental Coordination and Vegetation. Botany, Zoology. Bureau of Land Management 5 years. Utah Division of Wildlife Resources 10 years.

DONALD R. CAIN: Special Assistance. Botany. Bureau of Land Management 17 years.

MICHAEL C. SIEG: Socio-economics. Natural Resource Economics. Bureau of Land Management 2 years, Colorado State University 2 years.

SAMUEL A. HOTCHKISS, JR: Geology and Mineral Resources. Geology. Forest Service 3 years, Industry 5 years.

BONNIE HOFFMANN: Word Processor and Editorial Assistant. Word Processing. U.S. Government 20 years.

HELENE FAIRCHILD: Editor. Writer-Editor, Printing Specialist. Bureau of Land Management 6 years, Industry 15 years.

MARGARET MATTHIES: Recreation, Visual Resources, and Special Designation Areas. Outdoor Recreation Planning. Bureau of Land Management 6 years.

DONALD W. HOOK: Transportation. Civil Engineer. Bureau of Land Management 5 years, Environmental Protection Agency 5 years, Federal Water Pollution Control and Federal Water Quality Commission 5 years, Indiana State Government 10 years.

WILLIAM W. WAGNER: Air Quality and Climate. Air Resource Specialist and Radiation Ecology. Bureau of Land Management 5 years, University of Utah 10 years.

MARK GREEN: Air Quality and Climate. Meteorology. Bureau of Land Management 3 years.

BOYD CHRISTENSON: Water Resources. Hydrology. Bureau of Land Management 3 years, Forest Service 10 years.

JAMES F. KOHLER: Mineral Resources. Geology. Geological Survey 3 years. Bureau of Land Management 4 years.

JOSEPH JARVIS: Wildlife and Threatened and Endangered Species. Wildlife Biology. Private Consultant 2 years, Bureau of Land Management 6 years, Fish and Wildlife Service 2 years, State Government 5 years.

MARK A. MACKIEWICZ: Soils. Soil Scientist. Bureau of Land Management 3 years, Soil Conservation Service 1 year.

HEIDI ROBERTS: Cultural Resources. Archaeology. Bureau of Land Management 2 years, Industry 1 year.

CHARLES STOUT: Graphics. Cartographic Technician. Bureau of Land Management 1 year.

GLOSSARY

- ACRE-FOOT.** The quantity of water required to cover 1 acre to a depth of 1 foot; equal to 43,560 cubic feet or 325,851 gallons.
- ALLUVIAL.** Pertaining to deposits made by flowing water.
- ANIMAL UNIT MONTH (AUM).** The amount of forage required to graze one cow or five sheep for a one month period. A measure of range capacity.
- ANNUAL AVERAGE DAILY TRAFFIC.** Theoretically this would be a summation of all the vehicles passing one point divided by the number of days in the year. Practically, this figure is usually based on sample traffic counts adjusted on the basis of nearby permanent traffic count stations. Peak traffic counts would be substantially greater.
- ANTICLINE.** Applied to strata which dip in opposite directions from a common ridge or axis.
- AQUIFER.** A zone, stratum, or group of strata that can store and produce water and can yield water to wells in economically significant quantities.
- BUTEO.** The broad-winged, soaring buzzard hawks.
- BUTTE.** An isolated hill with steep sides and a top that is flat.
- CE-1 ZONE, CE-2 ZONE.** Lands within Carbon and Emery Counties determined by the counties to be critical environmental zones and are accordingly ascribed limited uses.
- COAL FIELD.** An area of country, the underlying rocks of which contain minable coal seams.
- COLLUVIAL.** Consisting of alluvium in part and containing angular fragments of the original rocks.
- CONTINUOUS MINER.** A mining machine designed to remove coal from the face and load the coal into cars or conveyors without the use of drills or explosives, employing instead a rotating head which cuts up and down the coal face.
- CROWDED (TRANSPORTATION).** Any two-lane State highway which is or would be carrying an equivalent of 5,000 vpd, counting each truck as five autos in rolling terrain.
- DEMONSTRATED RESERVES.** A collective term for the sum of measured and indicated coal reserves or resources in a given area.
- DIP.** The angle at which a bed or stratum is inclined from the horizontal.
- DOME.** A symmetrical structural uplift having approximate circular outline in plain view.
- DRAGLINE.** A type of excavating equipment which casts a rope-hung bucket a considerable distance, collects the dug material by pulling the bucket toward itself on the ground with a second rope, elevates the bucket, and dumps the material on a spoil bank, in a hopper, or on a pile.
- EYRIE.** The nest of a bird of prey.
- FAULT.** A fracture or a fracture zone along which there has been displacement of the two sides relative to one another parallel to the fracture.
- FISHEDOUT.** A permanent reduction in expected or previously experienced fishing success on a particular water body to the point of abandonment of the effort by the majority of the participants.
- FLOODPLAIN.** The flat ground along a stream covered by water at the flood stage.
- GLACIATION.** In geology, pertaining to, characteristic of, produced, deposited, or derived from a glacier.
- GRABEN.** A depressed segment of the earth's crust bounded on at least two sides by faults.
- INFERRED RESOURCE.** A mineral (e.g., coal) for which quantitative estimates are based largely on broad knowledge of the geologic character of the deposit and for which there are few, if any, samples or measurements.
- INFRASTRUCTURE.** The basic equipment, utilities, productive enterprises, installation and service essential for the development, operation, and growth of an organization, a city, or a nation.
- IN PLACE RESOURCE.** The total amount of coal both inferred and demonstrated, estimated to be located in a given area.
- INSTANT STUDY AREA.** An area that was officially designated as a natural or primitive area prior to the 1976 passage of FLPMA.
- JOINT.** A divisional plane that divides a rock and along which there has been no visible movement parallel to the plane.
- KNOLL.** A usually small rounded land eminence.
- KNOWN GEOLOGIC STRUCTURE (KGS).** A natural underground reservoir capable of holding oil and gas.
- KNOWN RECOVERABLE COAL RESOURCE AREA (KRCRA).** An area of country, including Federal lands, which meet minimum standards for recoverable coal deposits in accordance with accepted mining practices as determined by the Geological Survey.
- LAND MANAGEMENT PLAN.** A plan establishing the allocation of land resources and the decisions relating to the coordination of the various uses and activities within a planning unit.
- LIMESTONE.** A sedimentary rock which contains at least 50 percent calcium carbonate and magnesium carbonate.
- LITHIC SCATTER.** An archaeological site characterized by the presence of flaked tools, chips, cores, or flakes only.
- LOGICAL MINING UNIT (LMU).** An area of coal land that can be developed and mined in an efficient, economical, and orderly manner with due regard for the conservation of coal reserves and other resources.
- LONGWALL MINING.** A system of mining on straight coal faces in which the developing headings are driven to the boundary or limit line and then the coal seam is extracted by longwall faces retreating toward the entry.
- MAXIMUM MODIFICATION.** A Forest Service visual resource management classification that allows for management activities to dominate the landscape character in foreground, middleground, and background areas.
- MINING PLAN.** A complete mining and reclamation operation plan prepared in compliance with the Mineral Leasing Act of 1920, Surface Mining Control and Reclamation Act of 1977, and other applicable laws and regulations.
- MITIGATING MEASURE.** Methods used (often included as lease stipulations) to reduce the significance of or eliminate an anticipated environmental impact.
- MODIFICATION.** A Forest Service visual resource management classification that allows for management activities to dominate the landscape character in background areas.
- MOLLUSCS.** Invertebrate animals (such as oysters, snails, or clams) with a soft unsegmented body usually enclosed in a calcareous shell.
- MONOCLINE.** An abrupt downward flexure of nearly horizontal strata without any corresponding bend to form an anticline or syncline.
- NATIONAL REGISTER PROPERTY.** A site, structure, district, building, or object deemed significant in American history, architecture, archaeology, or culture which is identified on a list maintained by the Secretary of the Interior.
- NATURAL AREA.** Public land area, designated by the BLM as a Natural Area, to be in a manner that protects the area's unique or unusual natural values.
- OVERBURDEN.** Material of any nature, consolidated or unconsolidated, that overlies a deposit of useful material, ores, or coal.
- PARTIAL RETENTION.** A Forest Service visual resource management classification that allows for management activities to be visually evident but subordinate to the landscape character.
- PERCHED AQUIFER.** Unconfined ground water separated from an underlying body of ground water by an unsaturated zone.
- PLANNING AREA.** A group of planning units for which a single Land Management Plan has been prepared.

PLANNING UNIT. The basic management unit of BLM administered lands or National Forest lands. Land Management Plans are generally prepared for these units.

POTABLE WATER. Water suitable for human use and consumption.

PREFERENCE RIGHT LEASE APPLICATION (PRLA). Until the early 1970's, the Federal government issued prospecting permits to interested parties to explore coal in areas where economically valuable deposits were not known to exist. By demonstrating that the permit area contained commercially valuable coal, a prospecting permit holder could apply for, and obtain, a lease to mine the deposit. Such lease applications were called preference right lease applications (PRLAs) and leases were issued without competition. Under the Federal Coal Leasing Amendments Act of 1976, non-competitive coal leases are no longer permitted, subject to valid existing rights.

PRESERVATION. A Forest Service visual resource management classification that allows for natural ecological changes only.

PRIMITIVE AREA. Public land area, designated by the BLM as a Primitive Area, to be managed in a manner that protects the area's primitive recreational values.

QUATERNARY. Comprises all geologic time from the end of the tertiary up to the present.

RAPTOR. Living on prey; a group of carnivorous birds consisting of hawks, eagles, falcons, vultures, and owls.

REGIONAL COAL TEAM. A specific coal production region's Federal/State team which pursuant to 43 CFR 3400.4(b) considers and suggests policy for regional leasing target setting, tract delineation, and site-specific analysis in the coal production region; guides and reviews tract ranking; and conducts the selection and sale scheduling process in order to recommend regional lease sale alternatives to be analyzed in the Regional Lease Sale Environmental Impact Statement and to be recommended to the Secretary of the Interior.

RETENTION. A Forest Service visual resource management classification that allows only for management activities that are not visually evident.

ROADLESS AREA REVIEW AND EVALUATION II. The Forest Service review and evaluation of public lands under its jurisdiction for Congressional wilderness designation.

ROADLESS INVENTORY UNIT. An area of public lands under jurisdiction of the BLM that is roadless, is at least 5,000 acres in size, or is contiguous to an area that is undergoing wilderness inventory.

ROCK SLOPE. An inclined passage (portal) driven through rock strata to obtain access to the coal.

ROOM AND PILLAR. A system of mining in which the coal is mined in rooms separated by narrow ribs or pillars. The rooms are driven parallel to each other. The pillars are usually pulled as mining operations retreat from the area.

SCOPING. Process used for determining the range of issues to be addressed, potential significant issues, and possible alternatives which should be considered in an EIS. Scoping also identifies insignificant issues which do not require analysis. Federal, State, and local agencies, and the public sector participate in the scoping process.

SEDIMENTARY. A descriptive term for rock formed of sediment, or rocks formed by precipitation from solution.

SEDIMENT YIELD. The amount of soil an area loses every year through natural processes, usually expressed in acre-feet per square mile per year. One acre-foot per square mile per year, reduced to simpler terms, means that a square mile of land loses about 0.01 inches of soil every year. This is a result of the normal and ongoing processes of water and wind erosion.

SHALE. A laminated sediment, in which the constituent particles are predominantly of the clay grade.

SITE SPECIFIC ANALYSIS. An environmental assessment prepared for a specific coal tract, detailing environmental impacts expected to result from the leasing and development of that tract.

STIPULATION. A condition or requirement attached to a lease, usually dealing with protection of the environment or recovery of the coal.

SUBSIDENCE. Surface sinking, caving, or distortion resulting from the collapse of underground mine workings.

SURFACE MINING. Mining at or near the surface where the overburden is removed to expose and extract the coal.

SYNCLINE. A fold in rocks in which the strata dip inward from both sides toward the axis.

TOPSOIL. The fertile, dark colored surface soil, or A horizon.

TRACT. A defined area of land which will logically be proposed as a single lease offering. At the preliminary tract stage, the exact boundaries of tracts are still subject to adjustment based on subsequent analysis and revised coal information.

UNACCEPTABLE MODIFICATION. A Forest Service visual resource management classification that identifies areas where manmade disturbance is excessive and rehabilitation is necessary.

UNDERGROUND MINING. A mining method used to extract coal where the overburden is not removed, as opposed to surface mining.

UNSUITABILITY CRITERIA. Criteria, specified in coal management regulations 43 CFR 3461 that identifies those lands which shall be considered unsuitable for all or certain stipulated methods of coal mining.

VRM (VISUAL RESOURCE MANAGEMENT). The system by which the Forest Service and BLM classify and manage the visual resource of public lands under their respective jurisdictions. Based on their scenic qualities, sensitivities, and the distances from which they are viewed, the lands are classified into management units.

VRM CLASS I. A BLM visual resource management classification that allows for natural ecological change only.

VRM CLASS II. A BLM visual resource management classification that allows for management activities that are not visually evident.

VRM CLASS III. A BLM visual resource management classification that allows for management activities to be visually evident but subordinate to the landscape character.

VRM CLASS IV. A BLM visual resource management classification that allows for management activities to subordinate the landscape character.

VRM CLASS V. A BLM visual resource management classification that identifies areas where manmade disturbance is excessive and rehabilitation is necessary.

WILD AND SCENIC RIVER. Rivers officially designated by Congress as part of the National, Wild, and Scenic River System to be managed in a manner that protects its wild, scenic, and/or recreational values.

WILDERNESS AREA. Public land area officially designated by Congress as part of the National Wilderness Preservation System, to be managed in a manner that protects the area's naturalness, solitude, and primitive and recreational values.

WILDERNESS STUDY AREA. An area of public lands under jurisdiction of BLM that has been determined and declared to have wilderness character through inventory and evaluation.

ABBREVIATIONS

AADT: Annual Average Daily Traffic
ADT: Average Daily Traffic
AUM: Animal Unit Month
BACT: Best Available Control Technology
BLM: Bureau of Land Management
Btu: British thermal unit
CFR: Code of Federal Regulations
cfs: Cubic feet per second
DOE: Department of Energy
DOI: Department of the Interior
D&RGW: Denver and Rio Grande Western Railway Company
EIS (ES): Environmental Impact Statement
EMRIA: Energy Minerals Rehabilitation Inventory and Analysis
EPA: Environmental Protection Agency
ERT: Environmental Research & Technology, Inc.
FCLAA: Federal Coal Leasing Amendments Act of 1976
FLPMA: Federal Lands Policy and Management Act of 1976
FS: Forest Service
GS: Geological Survey
HCRS: Heritage Conservation and Recreation Service
I-70: Interstate Highway 70
IPP: Intermountain Power Project
ISA: Instant Study Area
KGS: Known Geologic Structure
KRCRA: Known Recoverable Coal Resource Area
LMU: Logical Mining Unit
MER: Maximum Economic Recovery
mgd: Million gallons per day
mg/L: Micrograms per liter
MTY: Million tons per year
MW: Megawatt
NAAQS: National Ambient Air Quality Standards
NOAA: National Oceanic and Atmospheric Administration
NPS: National Park Service
ORV: Off-road vehicle
OSM: Office of Surface Mining
PRLA: Preference Right Lease Application
PSD: Prevention of Significant Deterioration
RARE II: Roadless Area Review and Evaluation II
RCT: Regional Coal Team
SBA: Small Business Administration
SCORP: State Comprehensive Outdoor Recreation Plan
SID: Secretarial Issue Document
SMCRA: Surface Mining Control and Reclamation Act
TDS: Total Dissolved Solids
T&E: Threatened and Endangered
TSP: Total Suspended Particulates
U-10: Utah State Highway 10
UDOT: Utah Department of Transportation
UDWR: Utah Division of Wildlife Resources
UP&L: Utah Power and Light Company
U.S. 6: United States Primary Highway 6
VPD: Vehicles per day
VRM: Visual Resource Management
WPRS: Water and Power Resources Service
WSA: Wilderness Study Area

REFERENCES CITED

- Aerovironment. 1977. *Assemblage of Data on Air Quality in Central and Southern Utah and Assessing the Impact of Coal Development in This Region on the Air Quality*. Contract No. 14-08-0001-16467. Geological Survey, Salt Lake City, UT.
- Alton, E.F. 1973. "Revegetating Disturbed Areas in the Semiarid Southwest." *Journal of Soil and Water Conservation*. Volume 28, Number 5. pp. 223-225.
- Aldon, E.F., and Springfield, H.W. 1975. "Techniques for Establishing Native Plants on Coal Mine Spoils in New Mexico." Prepared for the Third Symposium on Surface Mining and Reclamation. Volume 1.
- Allee, Paul A., and Pueschel, Rudolph F. 1979. *A Study of Visibility in Carbon and Emery Counties, Utah*. Prepared for National Oceanic and Atmospheric Administration, Boulder, CO.
- Amstrup, S.C., and Beacham, J., 1976. "Activity Patterns of Radio-Collared Black Bears in Idaho." *Journal of Wildlife Management*. Volume 40, Number 2.
- Bagley, J.M., et al. 1964. "Water Yields in Utah." Utah Agricultural Experiment Station Special Report No. 18. 65 p.
- Barney, Milo A., and Frischknecht, Neil F. 1974. "Vegetation Changes Following Fire in the Pinyon-Juniper Type of West Central Utah." *Journal of Range Management*. Volume 27. pp. 91-96.
- Berg, W.A. 1975. "Use of Soil Laboratory Analyses in Revegetation of Mined Lands." *Mining Congress Journal*. January. pp. 33-35.
- Bleak, A.T., et al. 1965. "Problems in Artificial and Natural Revegetation of the Arid Shadscale Zone of Utah and Nevada." *Journal of Range Management*. Volume 18, Number 2.
- Boner, T.C., et al. 1977. "A Survey of Endangered, Threatened, and Unique Terrestrial and Aquatic Wildlife in Utah's Coal Planning Area." Utah Division of Wildlife Resources, Salt Lake City, UT. Prepared for U.S. Department of the Interior, Bureau of Land Management, Utah State Office, Salt Lake City, Utah. Contract Number YA-512-CT6-257. 62 p.
- Burrus, J.S. 1980. *Utah Cougar Harvest Book 1978-79*. Publication Number 79-9. Utah Division of Wildlife Resources, Salt Lake City, UT.
- Centaur Associates. 1980. *Draft Statement Components, Uinta-Southwest Utah Coal Region Environmental Impact Statement*. Centaur Associates, Washington, D.C.
- Chapman, A.G. 1967. "Effects of Spoil Grading on Tree Growth." *Mining Congress Journal*. August. pp. 93-100.
- Cobban, W.A. 1976. "Ammonite Record From the Mancos Shale of the Castle Valley-Price-Woodside Area, East Central Utah." *Brigham Young University Geology Studies*. Volume 22, Part 3. Brigham Young University, Provo, UT. pp. 117-126.
- Colorado School of Mines Research Institute and Engineering Enterprises, Inc. 1976. "Mineralogy of Overburden as Related to Groundwater Degradation in the Strip Mining of Coal." Interim Progress Report. Colorado School of Mines, Golden, Colorado.
- Cotter, E. 1976. "The Role of Deltas in the Evolution of the Ferron Sandstone and Its Coals, Castle Valley, Utah." *Brigham Young University Geology Studies*. Volume 22, Part 3. Brigham Young University, Provo, UT. pp. 15-42.
- Cramer, H.E. et al. 1978. "Calculated Visibility Impacts of the Proposed Emery Power Plant Expansion" H.E. Cramer Co., TR-78-449-01, Salt Lake City, Utah.
- Criddle, W.C., and Jensen, D.W. 1964. *Water Laws of Utah and Interstate Compacts and Treaties*. State of Utah, Salt Lake City, UT. 167 p.
- Cross, A.T. 1976. "Some Algal Deposits and Their Significance in the Northwest Colorado Plateau." *Brigham Young University Geology Studies*. Volume 22, Part 3. Brigham Young University, Provo, UT. pp. 127-142.
- Dalton, L.B., et al. 1977. *Species List of Vertebrate Wildlife That Inhabits Southeastern Utah*. Utah Division of Wildlife Resources, Salt Lake City, UT.
- Dalton, L. 1979. "Unpublished Records and Data." Utah Division of Wildlife Resources, Price, UT.
- Doelling, H.H. 1972. "Central Utah Coal Fields, Sevier-Sanpete Wasatch Plateau, Book Cliffs, and Emery." *Utah Geological and Mineralogical Survey Monograph*. Series No. 3. Salt Lake City, UT.
- Dunrud, C.R. 1976. "Some Engineering Geologic Factors Controlling Coal Mine Subsidence in Utah and Colorado." U.S. Department of the Interior, Geological Survey Professional Paper No. 969.
- Ellis, D.H., et al. 1969. "Studies on Raptor Mortality in Western Utah." *The Great Basin Naturalist*. Volume 29, Number 3. Brigham Young University, Provo, UT. pp. 165-167.
- Environmental Protection Agency. 1974. *Surface Protection in the Surface Mining of Coal*. Washington, D.C.
- Environmental Protection Agency. 1976. *Erosion and Sediment Control, Surface Mining in the Eastern U.S.* Washington, D.C.
- ERT. 1980. *Kaiparowits Coal Development and Transportation Study*. Fort Collins, CO.
- Five County Association of Governments. 1978. *Planning for Growth in Garfield County*. St. George, UT. 45 p.
- Five County Association of Governments. 1980. "Socio-Economic Technical Report Submitted to the Kaiparowits Steering Committee." St. George, UT. 53 p.
- Foster, Robert H. 1968. "Distribution of the Major Plant Communities in Utah." PhD Dissertation. Department of Botany, Brigham Young University, Provo, UT.
- Foster, Robert H. 1979. *Utah Threatened and Endangered Plant Inventory, Final Report*. Omniplan Corporation, Santa Monica, CA. Prepared for U.S. Department of the Interior, Bureau of Land Management, Utah State Office. Contract Number YA-512-CT9-223.
- Frischknecht, Neil C., and Ferguson, Robert B. 1980. *1979 Annual Progress Report, Revegetation Studies on Disturbed Overburden, Emery Coal Field*. Interagency Agreements UT-910-1A9-0436 and Utah 6. Prepared for Intermountain Forest and Range Experiment Station, Shrub Sciences Laboratory, Provo, UT. 35 p.
- Gazin, C.L. 1941. "The Mammalian Faunas of the Paleocene of Central Utah with Notes on the Geology." *U.S. Natural History Museum Proceedings*. Volume 91, Number 3121. pp. 1-53.
- Geoscientific Systems and Consulting. 1979. *EMRIA Report No. 16, Reclaimability Analysis of the Emery Coal Field, Emery County, Utah*. Prepared for U.S. Department of the Interior, Bureau of Land Management, Utah State Office, Salt Lake City, UT.
- Geyer, W.A., and Rogers, W.F. 1972. "Spoil Change and Tree Growth on Coal Mined Spoils in Kansas." *Journal of Soil and Water Conservation*. Volume 17. pp. 114-116.
- Gilmore, C.W. 1946-1947. *Reptilian Fauna of the North Horn Formation of Central Utah*. U.S. Department of the Interior, Geological Survey, Professional Paper 210-c. pp. 29-53.
- Graham, R.L. 1970. "Preliminary Geology of the Paradise Area." Unpublished Report. Utah Geological and Mineralogical Survey, Salt Lake City, UT.
- Hagihara, J.S., et al. 1972. *Interim Guide for Rating Soils According to Their Soil Suitability (for Rangeland) Seeding, Nevada*. Prepared for U.S. Department of the Interior, Bureau of Land Management, Utah State Office, Salt Lake City, UT. Technical File Code 7312.3.
- HCRS. 1980. *Nationwide Rivers Inventory, Phase I*. Denver, CO.

- Heib, Susan R., Editor. 1976. "Proceedings of the Elk-Logging-Roads Symposium, Publisher Forest." Wildlife and Range Experiment Station, University of Idaho, Moscow, ID.
- Hoffman, Stephen W. 1978. "Inventory of Nesting Raptors in the Escalante Resource Area." U.S. Department of the Interior, Bureau of Land Management, Cedar City District Office, Cedar City, UT.
- Hubbard, R.L. 1956. *The Effects of Plant Competition Upon the Growth and Survival of Bitterbrush Seedlings*. Research Note No. 109. Prepared for U.S. Department of Agriculture, Forest Service, California Forest and Range Experiment Station.
- Jensen, J.A. 1966. "Dinosaur Eggs From the Upper Cretaceous North Horn Formation of Central Utah." *Brigham Young University Geology Studies*. Volume 13, Brigham Young University, Provo, UT. pp. 55-67.
- Jewsa, G.K. 1978. "Big Game Harvest Report." Unpublished Report. Utah Division of Wildlife Resources, Salt Lake City, UT.
- Kaiser Engineers. 1976. Castle Valley Railroad Drawings 1-C to 7-C. U.S. Department of the Interior, Bureau of Land Management, Utah State Office, Salt Lake City, UT.
- Kelly, Dennis. 1980. *Hydrologic Review for the Cottonwood Tract*. Prepared for U.S. Department of Agriculture, Forest Service, Manti LaSal National Forest. Forest Supervisor's Office, Price, UT.
- Landis, E.R. 1959. *Coal Resources of Colorado*. U.S. Geological Survey Bulletin 1072C. U.S. Department of the Interior, Geological Survey, Denver, CO.
- LaRocque, A. 1960. "Molluscan Faunas of the Flagstaff Formation of Central Utah." *Geological Society of America*. Memorandum 78. 100 p.
- Leatham, J.P., and Bunnell, D.S. 1978. *Utah Upland Game Annual Report*. Publication Number 79-12. Utah Division of Wildlife Resources, Salt Lake City, UT.
- Lindzey, F.G., and Meslow, E.C. 1977. "Population Characteristics of Black Bears on an Island in Washington." *Journal of Wildlife Management*. Volume 41, Number 3.
- Lyon, L. Jack. 1979. "Habitat Effectiveness for Elk as Influenced by Roads and Cover." *Journal of Forestry*. Volume 77, Number 10.
- Lyons, Steven M. 1978. "The Impact of Surface Soil Removal on Plant Production, Transpiration Ratios, Nitrogen Mineralization Rates, Potential Sediment Losses, and Chemical Water Quality Within the Chained and Reseeded Pinyon-Juniper Types in Utah." MS Thesis. Utah State University, Logan, UT.
- McAda, Charles, et al. 1977. *A Survey of Threatened and Endangered Fish in Southeastern Utah Streams*. Utah Cooperative Fish Resources Unit, Utah State University, Logan, UT. 245 p.
- McNeese, D.C., and Hoag, A.L. 1957. *Engineering and Technical Handbook*. Prentice-Hall, New York, NY.
- McWhorter, D.B. and Skogerboe, R.K. 1975. *Surface and Sub-surface Water Quality Hydrology in Mine Spoils*. Second Quarterly Progress Report for EPA. Grant No. R 803175-01-02. Colorado State University, Fort Collins, CO.
- Malm, W.E. et al. 1980. "Visibility in the Southwestern United States from Summer 1978 through Spring 1979." Symposium on Plumes and Visibility, Grand Canyon, 10-14 November 1980.
- Merz, R.W., and Finn, R.W. 1951. *Difference in Infiltration Rates on Graded and Ungraded Strip Mined Land*. U.S. Department of Agriculture, Forest Service, Central States Experiment Station. Note 65. 2 p.
- Mundorf, J.C. 1972. *Reconnaissance of Chemical Quality of Surface Water and Fluvial Sediments in the Price River Basin, Utah*. State of Utah Technical Publication. 55 p.
- National Academy of Science and National Academy of Engineering. 1973. *Water Quality Criteria, 1972*. U.S. Environmental Protection Agency Report EPA-R3-73-033. 594 p.
- Oxley, O.J. 1974. "The Effects of Roads on Population of Small Mammals." *Journal of Applied Ecology*. Volume 11, Number 1.
- Parker, L.R. 1976. "The Paleocology of the Fluvial Coal-Forming Swamps and Associated Floodplain Environments in the Blackhawk Formation (Upper Cretaceous) of Central Utah." *Brigham Young University Geology Studies*. Volume 22, Part 3. Brigham Young University, Provo, UT. pp. 99-116.
- Pedco Environmental, Inc. 1979. *Site Specific Analyses for Green River-Hams Fork Environmental Impact Statement*. Prepared for U.S. Department of the Interior, Bureau of Land Management, Wyoming State Office, Cheyenne, WY. Contract Number YA-512-CT7-27.
- Phillips, T.A. 1976. "An Analysis of USFS Pinyon-Juniper Chaining Projects in Region 4, 1954-1974." Unpublished Report. U.S. Department of Agriculture, Forest Service, Ogden, UT. 17 p.
- Phillips, T.A. 1977. "An Analysis of Pinyon-Juniper Chaining Projects in the Intermountain Region, 1954-1975." *Range Improvement Notes*. Prepared for U.S. Department of Agriculture, Forest Service, Intermountain Region, Ogden, UT. 20 p.
- Porter, R.D., and White, C.M. 1973. "The Peregrine Falcon in Utah, Emphasizing Ecology and Competition with the Prairie Falcon." *Biological Series*. Volume 18, Number 1. Brigham Young University, Provo, UT.
- Price, Don, and Arnow, Ted. 1974. "Summary Appraisal of the Nation's Groundwater Resources-Upper Colorado Region." Geological Survey Professional Paper 813-C. 40 p.
- Price, Don, and Waddell, K.M. 1973. "Selected Hydrologic Data in the Upper Colorado River Basin." *Geological Survey Hydrologic Investigations Atlas HA-477*.
- Radian Corporation. 1980. *Preliminary Environmental Assessment: Climate and Air Quality Impacts, Green River-Hams Fork Regional Environmental Impact Statement*. Prepared for U.S. Department of the Interior, Bureau of Land Management, Wyoming State Office, Cheyenne, WY. Contract Number YA-512-CT7-29.
- Radian Corporation. 1981. *Final Technical Report on Regional Air Quality and Visibility for the Uinta-Southwest Utah Coal Region*. Radian Corp., Austin, Texas.
- Rahn, P.H. 1975. "Potential of Coal Strip Mine Fills as Aquifers in the Powder River Basin." Quarterly Progress Report and Assessment and Evaluation of Work Completed to Date. Engineering and Mining Experiment Station, South Dakota School of Mines and Technology, Rapid City, SD.
- Rector, John, and Amberson, Robert J. 1976. *Technical Examination Input for Developing Environmental Analysis Reports for Coal Lease Continuances*. Manti-LaSal National Forest, Price, Utah. 54 p.
- Rich, H.V., and Collinson, S.W. 1973. "First Mammalian Fossil from the Flagstaff Limestone, Central Utah: *Vulpavus australis* (Carnivora: Miacidale)." *Journal of Paleontology*. Volume 45, Number 5. pp. 854-860.
- Richardson, E. Arlo. 1975. "Climatological Summary, Emery, Utah." USDC, NOAA, EDS, and Employment Division of the Utah Department of Employment Security, Climatology of the U.S.
- Robinson, S.F. 1977. "Paleontological Inventory of Existing Data for the Moab District." Unpublished Report. U.S. Department of the Interior, Bureau of Land Management Moab District Office, Moab, UT.
- Sargeant, A.B., and Forbes, J.E. 1973. "Mortality Among Birds, Mammals and Certain Snakes on 17 Miles of Minnesota Roads." *The Loon*.
- SCORP. 1973. "State Comprehensive Outdoor Recreation Plan 1970-1985." Utah Outdoor Recreation Agency, Salt Lake City, UT.
- SCORP. 1978. "Utah SCORP (State Comprehensive Outdoor Recreation Plan) Proposed Plan Outline." Utah Outdoor Recreation Agency, Salt Lake City, UT.

- Scott, R.W., Boner, T.C., and Smith, R. 1977. "Ranking of Wildlife Values on Federal Coal Lands." Utah Division of Wildlife Resources, Salt Lake City, UT.
- Seidensticker, J.C., Hornocker, Maurice, Wiles, Wilbur, and Messick, John. 1973. "Mountain Lion Social Organization in the Idaho Primitive Area." *Wildlife Monographs* Number 35. Wildlife Society, Washington, D.C.
- Snow, Carol. 1972. *Habitat Management Series for Endangered Species: Black-Footed Ferret*. Report Number 2. U.S. Department of the Interior, Bureau of Land Management, Colorado State Office, Denver, CO.
- Southeastern Utah Association of Governments. 1977. *Waste Water Quality Management Planning*. Volume I, Appendix WQ-1 through WQ-11; Volume II, Appendixes WQ-12 through AQ-3. Salt Lake City, UT.
- Southeastern Utah Association of Governments. 1980. "Community Attitude Survey." Compiled by Dr. T. J. Alsop. January, 1980. U.S. Department of the Interior, Bureau of Land Management, Utah State Office, Salt Lake City, UT.
- Stahlecker, D.W. 1975. "Impacts of a 230-kV Transmission Line on Great Plains Wildlife." Unpublished MS Thesis. Colorado State University, Fort Collins, CO. 59 p.
- Stalmaster, M.V., and Newman, J.R. 1978. "Behavioral Responses of Wintering Bald Eagles to Human Activity." *Journal of Wildlife Management*. Volume 43, Number 3.
- Stokes, W.L., and Balsley, J. 1968. "Supposed Coprolites from the Ferron Sandstone of Utah (Abstract)." *Utah Academy of Sciences, Arts, and Letters, Proceedings*. Volume 45, Part 1. p. 320.
- Thames, J.L., Editor. 1977. "Reclamation and Use of Disturbed Land in the Southwest." University of Arizona Press, Tucson, AZ.
- Thayne and Hudson. 1978. "Calculations for Increase in Deer, Elk, Uplands Game and Fishing Pressures in the State of Utah." Technical Report Prepared for Intermountain Power Project. U.S. Department of the Interior, Bureau of Land Management, Richfield District Office, Richfield, UT.
- U.S. Department of Agriculture, Soil Conservation Service. 1978. *Soil Survey and Interpretations of the Coal Creek - Emery Portions of the Price River and Emery County Areas, Carbon and Emery County, Utah*. Salt Lake City, UT.
- U.S. Department of Agriculture, Soil Conservation Service. 1979. "The Uintah Basin Unit Colorado River Basin Salinity Control Study." Salt Lake City, UT.
- U.S. Department of Agriculture, Forest Service. 1979. *Land Management Plan, Ferron-Price Planning Unit, Manti-LaSal National Forest*. Forest Supervisor's Office, Price, UT.
- U.S. Department of the Interior. 1980. "Federal Coal Management Report, Fiscal Year 1979." Annual Report of the Secretary of the Interior under Section 8 of the Federal Coal Leasing Amendment Acts of 1976. Washington, D.C.
- U.S. Department of the Interior, Bureau of Land Management. 1976. *Final Environmental Impact Statement, Kaiparowits*. Utah State Office, Salt Lake City, UT.
- U.S. Department of the Interior, Bureau of Land Management. 1979. "Energy Minerals Rehabilitation Inventory and Analysis." *EMRIA Report Number 16: Reclaimability Analysis of the Emery Coal Field, Emery County, Utah*. Prepared by Geoscientific Systems and Consulting, Playa Del Ray, CA. Colorado State Office, Denver, CO.
- U.S. Department of the Interior, Bureau of Land Management. 1979. "Environmental Assessment Report, Castle Valley Railroad Land Exchange." Moab District Office, Moab, UT.
- U.S. Department of the Interior, Bureau of Land Management. 1979. *Final Environmental Statement, Federal Coal Management Program*. Utah State Office, Salt Lake City, UT.
- U.S. Department of the Interior, Bureau of Land Management. 1979. *Intermountain Power Project: Accelerated Wilderness Inventory*. Utah, Nevada, and Arizona State Offices.
- U.S. Department of the Interior, Bureau of Land Management. 1980. *Allen-Warner Valley Energy System Final Environmental Impact Statement*. Utah State Office, Salt Lake City, UT.
- U.S. Department of the Interior, Bureau of Land Management. 1980. "Kaiparowits Coal Development and Transportation Study." Unpublished Background Data. Utah State Office, Salt Lake City, UT.
- U.S. Department of the Interior, Bureau of Land Management. 1980. "Intensive Wilderness Inventory, Wilderness Study Areas." November, 1980. Utah State Office, Salt Lake City, UT.
- U.S. Department of the Interior, Fish and Wildlife Service. 1976. *Transaction of the Mountain Lion Workshop, Sparks, Nevada, January 13 and 14, 1976*. Region 1, Portland, Oregon. 213 p.
- U.S. Department of the Interior, Geological Survey. 1976. "Water Resources Data for Utah." Water Resources Division, Salt Lake City, UT.
- U.S. Department of the Interior, Geological Survey. 1977. "Water Resources Data for Utah 1976." Water Data Report UT-76-1. Salt Lake City, UT. 617 p.
- U.S. Department of the Interior, Geological Survey. 1978. "Utah Basic Data Release No. 31." Water Resources Division, Salt Lake City, UT.
- U.S. Department of the Interior, Geological Survey. 1978. "Water Resources Data for Utah." Water Resources Division, Salt Lake City, UT.
- U.S. Department of the Interior, Geological Survey. 1979. "Cottonwood Tract. Tract Summary and Geologic Report." Unpublished Report. Salt Lake City, UT.
- U.S. Department of the Interior, Geological Survey. 1979. *Development of Coal Resources in Central Utah Final Environmental Impact Statement*. Volumes I and II. Denver, CO.
- U.S. Department of the Interior, Geological Survey. 1979. *Development of Coal Resources in Southern Utah Final Environmental Impact Statement*. Volumes I and II. Denver, CO.
- U.S. Department of the Interior, Geological Survey. 1979. "Emery North Tract. Tract Summary and Geologic Report." Unpublished Report. Salt Lake City, UT.
- U.S. Department of the Interior, Geological Survey. 1979. "Gordon Creek Tract. Tract Summary and Geologic Report." Unpublished Report. Salt Lake City, UT.
- U.S. Department of the Interior, Geological Survey. 1979. "Meetinghouse Canyon Tract. Tract Summary and Geologic Report." Unpublished Report. Salt Lake City, UT.
- U.S. Department of the Interior, Geological Survey. 1979. "Reconnaissance of the Wasatch Plateau Book Cliffs Coal Field Area, Utah." Open File Report 79-988. Salt Lake City, UT.
- U.S. Department of the Interior, Geological Survey. 1979. "Slaughterhouse Canyon Tract. Tract Summary and Geologic Report." Unpublished Report. Salt Lake City, UT.
- U.S. Department of the Interior, Geological Survey. 1979. "Utah Hydrologic Data Report No. 32." Water Resources Division, Salt Lake City, UT.
- U.S. Department of the Interior, Geological Survey. 1980. "Emery Central Tract. Tract Summary and Geologic Report." Unpublished Report. Salt Lake City, UT.
- U.S. Department of the Interior, Geological Survey. 1980. "Miller Creek Tract. Tract Summary and Geologic Report." Unpublished Report. Salt Lake City, UT.
- U.S. Department of the Interior, Geological Survey. 1980. "Hollberg PRLA. Summary and Geologic Report." Unpublished Report. Salt Lake City, UT.
- U.S. Department of the Interior, Geological Survey. 1980. "North Horn Mountain Tract. Tract Summary and Geologic Report." Unpublished Report. Salt Lake City, UT.
- U.S. Department of the Interior, Geological Survey. 1980. "Rilda Canyon Tract. Tract Summary and Geologic Report." Unpublished Report. Salt Lake City, UT.
- U.S. Department of the Interior, Geological Survey. 1980. "Tucker Canyon Tract. Tract Summary and Geologic Report." Unpublished Report. Salt Lake City, UT.
- Utah Department of Transportation. 1976. "Traffic on Utah Highways, 1975." Salt Lake City, UT.
- Utah Department of Transportation. 1979. "Traffic on Utah Highways, 1978." Salt Lake City, UT.

- Utah Department of Transportation. 1980. Letter to Bureau of Land Management, Utah State Office, Salt Lake City, Utah. December 15. 1p.
- Utah Division of Water Resources. 1975. "Hydrologic Inventory of the Price River Study Unit." Utah State Department of Natural Resources, Salt Lake City, UT. 63 p.
- Utah Division of Water Resources. 1976. "The State of Utah Water, 1975." Utah Board of Water Resources, Salt Lake City, UT. 65 p.
- Utah Division of Water Resources. 1977. "Hydrologic Inventory of the Dirty Devil Study Unit." State Capitol, Salt Lake City, UT.
- Utah Division of Wildlife Resources. 1978. *Statewide Fishery Management Survey, 1977*. Publication 78-13. Salt Lake City, UT.
- Utah Division of Wildlife Resources. 1979. *Utah Big Game Investigations and Management Recommendations*. Publication 79-6. Salt Lake City, UT.
- Utah Division of Wildlife Resources. 1979. *Utah Upland Game Annual Report, 1979*. Publication 80-7. Salt Lake City, UT.
- Utah Division of Wildlife Resources. 1980. "The 1980 Utah Investigations and Management Recommendations Book." Salt Lake City, UT.
- Utah Highway Department. 1978. "Average Daily Traffic on Utah Highways." Salt Lake City, UT.
- Utah Power and Light Company. 1979. *Resource Development Evaluation of the Garfield Coal Deposit, Garfield and Kane Counties, Utah (with Appendices)*. Salt Lake City, UT.
- Utah Power and Light Company. 1980. "Hydrologic Monitoring Program Annual Report for 1979." Hydrologic Section of the Power Operation Department, Mining and Exploration Department, Salt Lake City, UT.
- Utah Transportation Commission. *Official Highway Map, 1977-78 Edition*. Salt Lake City, UT.
- Utah Travel Council. *Utah Multipurpose Map Series, 1:250,000 Scale*. Salt Lake City, UT.
- Vories, D.C., Editor. 1976. "Reclamation of Western Surface Mined Lands Workshop Proceedings." Ecology Consultants, Inc., Denver, CO. 152 p.
- Van Voast, W.A., and Hedges, R.B. 1975. "Hydrologic Aspects of Existing and Proposed Strip Coal Mines Near Decker, Southeastern Montana." Montana Bureau of Mines and Geology Bulletin 97. Helena, MT.
- Vaughn Hansen Associates. 1978. *Preliminary 208 Water Quality Plan* Prepared for Southeastern Utah Association of Governments, Salt Lake City, UT.
- Weed, Carol S., and Altschul, Jeffrey H. 1980. *The Central Coal II Project: A Class II Inventory of Selected Portions of Carbon, Emery, and Sevier Counties, Utah*. Unpublished Report. New World Research, Inc. Prepared for U.S. Department of the Interior, Bureau of Land Management, Utah State Office, Salt Lake City, UT. Contract Number YA-512-CT9-263.
- Weir, R.D. 1976. *Annotated Bibliography of Bird Kills at Man-Made Obstacles, A Review of State of the Art and Solutions*. Canada Wildlife Service, Ontario Region, Ottawa, Ontario, Canada. 85 p.
- Welsh, S.L. 1977. *Endangered and Threatened Plant Species of the Central Coal Lands, Utah*. Brigham Young University, Provo, UT.
- Welsh, Stanley, L., and Neese, Elizabeth. 1980. *Inventory of Potentially Endangered or Threatened Plant Species of Selected Coal Lands of Emery County, Utah*. Endangered Plant Studies, Inc. Prepared for U.S. Department of the Interior, Bureau of Land Management, Utah State Office, Salt Lake City, UT. Contract Number UT-060-79-SOA-019.
- Wentz, D.A. 1974. "Effects of Mine Drainage on the Quality of Streams in Colorado, 1971-1972." Colorado Water Resources Circular No. 21. Denver, CO. 117 p.
- Wilson, L., et al. 1975. *Soils of Utah*. Agricultural Experimental Station Bulletin 492. Utah State University, Logan, UT. 94 p.

INDEX

Aesthetics: See Visual Resources

Air Quality: 6, 65, 67, 75, 121, 133, 134, 141, 171, 173, 174, 177, 178, 198, 199, 217, 219, 236, 238, 246, 258

Alternatives, Coal Leasing:

General: 2, 6, 10, 12, 13, 17, 75, 133

Alternative One: 49, 55, 58, 134, 178, 179, 180, 181, 182, 196, 198, 199, 200, 201, 217, 219, 220, 221, 226, 236, 238

Alternative Two: 55, 178

Alternative Three: 55, 71, 199, 245

Alternative Four: 58, 219

Alternative Five: 58, 133, 238

Analysis Guidelines: 133

Archaeological Resources: See Cultural Resources

Authorizing Actions: See Required Authorizations

Big Game: See Wildlife

Capitol Reef National Park: 78, 129, 174

Castle Valley Railroad Spur: 12, 38, 44, 49, 104, 111, 133, 153, 164, 168, 176, 177

Climate: 75, 121, 123

Coal Fields:

Emery: 2, 10, 12, 17, 78, 81, 86, 89, 91, 92, 93, 95, 116, 141, 146

Wasatch Plateau: 2, 10, 12, 17, 78, 89, 91, 95, 145, 179, 200, 220

Kaiparowits: 12, 15, 123, 134, 246

Coal Regions: 1, 2, 3

Coal Transportation: 6, 12, 17, 21, 26, 32, 38, 44, 49, 55, 58, 71, 104, 111, 121, 128, 133, 134, 164, 168, 173, 177, 192, 259

Cottonwood Tract: 7, 17, 32, 49, 55, 58, 71, 78, 79, 81, 86, 89, 92, 103, 114, 115, 116, 134, 144, 153, 170, 178, 196, 199, 214, 219, 236, 260

Cultural Resources: 6, 10, 63, 65, 114, 115, 128, 169, 173, 174, 177, 178, 196, 198, 214, 217, 232, 236, 242, 253, 256, 258, 261, 262

Emery Central Tract: 8, 17, 44, 49, 65, 66, 75, 78, 80, 92, 104, 114, 115, 116, 117, 118, 119, 134, 146, 153, 169, 170, 173, 262

Emery North Tract: 3, 6, 10, 17, 38, 49, 65, 66, 75, 79, 81, 91, 92, 95, 100, 103, 104, 114, 115, 116, 118, 119, 134, 141, 142, 146, 153, 169, 170, 171, 173, 261

Emery South Tract: 8, 17, 44, 49, 66, 75, 78, 91, 95, 115, 118, 119, 134, 141, 142, 146, 170, 262

Energy Balance: 168, 174, 196, 214, 232, 253

Fisheries: See Wildlife

Fossils: See Paleontology

Fugitive Dust: 134, 141, 170, 174, 178, 198, 199, 217, 221, 232, 239, 246, 248

Geology: 9, 10, 81, 89, 90, 123, 145, 175, 179, 200, 220, 239, 248

Gordon Creek Tract: 6, 7, 17, 21, 49, 55, 58, 79, 81, 91, 92, 96, 103, 104, 114, 115, 116, 134, 150, 153, 170, 178, 180, 196, 219, 221, 236, 259

Grazing, Grazing Allotments: 103, 104, 126, 153, 171, 174, 176, 178, 182, 198, 199, 204, 226, 240, 250, 251, 256, 258, 260, 261

Hollberg PRLA: 1, 10, 12, 17, 49, 55, 58, 65, 91, 95, 104, 114, 116, 133, 134, 174, 176, 177, 178, 199, 219, 238

Housing Development: 49, 55, 58, 72, 103, 107, 109, 133, 141, 146, 150, 152, 153, 161, 170, 171, 173, 174, 176, 177, 178, 179, 180, 187, 198, 199, 200, 201, 204, 212, 217, 219, 220, 221, 226, 232, 238, 239, 240, 242, 245, 246, 248, 250, 256, 258, 259, 260, 261, 262

Hunter Powerplant: 12, 13, 26, 32, 38, 75, 89, 103, 133, 192
Huntington Powerplant: 26, 103
Hydrology: See Water Resources
Interrelationships: 12, 13
Intermountain Power Project (IPP): 1, 12, 13, 71
Irreversible or Irretrievable Commitment of Resources: 173, 178, 199, 219, 238, 259, 260, 261
Irrigated Cropland: 86, 95, 103, 126, 133, 146, 150, 152, 153, 171, 173, 174, 175, 176, 178, 179, 180, 182, 198, 199, 200, 201, 204, 217, 219, 220, 221, 236, 238, 240, 250, 251, 256, 258, 261
Kaiparowits Plateau: 10, 13, 15, 93, 119, 121, 122, 123, 128, 129, 131, 245, 246, 253
Land Use: 10, 65, 103, 126, 152, 176, 182, 204, 221, 240, 250
Land Use Plans:
 BLM and FS: 2, 13
 State and Local: 12, 15
Leasing Target: 1, 6, 10, 12, 55
Meetinghouse Canyon Tract: 7, 17, 26, 32, 49, 55, 58, 66, 71, 78, 79, 86, 89, 92, 103, 104, 114, 115, 116, 118, 119, 134, 144, 153, 170, 171, 178, 182, 196, 199, 214, 219, 236, 260
Miller Creek Tract: 6, 8, 17, 21, 49, 55, 79, 92, 96, 103, 104, 114, 115, 116, 118, 134, 150, 153, 170, 178, 180, 196, 259
Mineral Resources: 10, 61, 89, 91, 123, 145, 146, 175, 179, 200, 220, 239, 248
Mining Accidents : 145, 180, 200, 220, 240
Mitigating Measures (Stipulations): 17, 65, 148, 152, 175, 221
Navajo Sandstone Aquifer: 72, 122, 247, 250
North Horn Mountain Tract: 7, 17, 32, 38, 49, 55, 67, 71, 79, 89, 92, 96, 103, 104, 114, 115, 116, 133, 134, 141, 142, 144, 153, 169, 170, 178, 196, 199, 201, 214, 217, 261
ORV Activities: 119, 129, 169, 171, 172, 196, 198, 214, 217, 218, 221, 232, 236, 237, 239, 240, 242, 245, 253, 256
Paleontology: 67, 89, 91, 123, 145, 146, 173, 175, 180, 200, 220, 240, 248
Preference Right Lease Applications (PRLAs): 1, 10, 12, 13, 15, 17, 26, 38, 49, 65, 67, 71, 72, 119, 122, 123, 125, 128, 129, 133, 134, 177, 178, 196, 200, 214, 220, 239, 240, 248, 253, 256, 258, 262
Purpose and Need for Leasing: 1
Reclamation: 17, 38, 44, 49, 65, 66, 67, 72, 78, 95, 133, 141, 142, 146, 147, 170, 173, 174, 177, 178, 196, 200, 201, 214, 217, 219, 220, 221, 236, 239, 240, 247, 248, 251, 253, 256, 258, 262
Reclamation Potential:
 Emery Coal Field: 6, 78, 95, 148, 176
 Wasatch Plateau Coal Field: 6, 78, 95, 146, 148, 180
 Kaiparowits Coal Field: 123, 248
Recreation: 6, 64, 119, 129, 133, 169, 170, 171, 173, 177, 178, 196, 198, 214, 217, 236, 239, 245, 246, 250, 253, 256, 258, 259
Regional Coal Team (RCT): 1, 2, 3, 6, 10, 12, 17, 55
Required Authorizations: 17, 58
Rilda Canyon Tract: 7, 9, 17, 26, 32, 49, 55, 66, 79, 89, 92, 103, 114, 116, 119, 134, 144, 170, 171, 178, 196, 260
Salinity: 78, 81, 122, 142, 144, 171, 173, 174, 175, 179, 198, 199, 200, 217, 219, 220, 236, 238, 239, 246, 247
Scoping: 2, 10, 11, 13, 17
Short-Term Use and Long-Term Productivity: 173, 178, 198, 219, 238, 258

Slaughterhouse Canyon Tract: 6, 8, 17, 26, 49, 79, 89, 91, 92, 104, 114, 115, 116, 118, 119, 134, 144, 148, 150, 153, 169, 170, 171, 259

Socioeconomics:

 General: 2, 6, 10, 49, 55, 58, 62, 72, 104, 126, 133, 153, 171, 173, 174, 176, 178, 182, 198, 199, 201, 204, 217, 219, 226, 236, 238, 240, 245, 251, 256, 258

 Economic and Demographic: 104, 126, 156, 176, 182, 187, 204, 226, 242, 245, 251

 Social: 107, 161, 164, 174, 182, 192, 212, 226, 242, 245, 251

Soils: 6, 78, 79, 80, 121, 122, 123, 147, 171, 173, 174, 178, 179, 198, 199, 200, 217, 219, 220, 236, 238, 239, 246, 256, 258

Special Designation Areas:

 General: 63, 65, 116, 121, 129, 169, 177, 196, 214, 232, 242, 253

 Wilderness: 65, 116, 129, 169, 177, 196, 214, 232, 242, 253

 Roadless Inventory Units: 116, 129, 169, 177, 214, 242, 253

 Wild and Scenic Rivers: 116, 129, 169

Subsidence: 44, 65, 66, 141, 145, 146, 150, 153, 171, 173, 174, 175, 178, 179, 180, 182, 198, 199, 200, 201, 204, 217, 219, 220, 221, 226, 236, 238, 239, 246, 247, 256, 258, 259, 260

Surface Mine Reclamation: 38, 44, 49, 66, 67

Threatened and Endangered Species:

 Plants: 6, 66, 95, 125, 148, 180, 201, 221, 240, 247, 260, 262

 Animals: 6, 66, 100, 103, 240

Topography: 61, 66, 75, 81, 89, 91, 121, 123, 145, 146, 175, 179, 200, 239, 248

Traffic Accidents: 114, 115, 168, 171, 173, 174, 177, 192, 198, 199, 212, 214, 219, 232, 236, 238, 242, 253, 258

Traffic, Transportation: 10, 12, 13, 63, 104, 111, 128, 133, 150, 152, 164, 168, 171, 173, 177, 178, 182, 192, 198, 199, 201, 212, 217, 219, 232, 236, 238, 242, 253, 256, 258, 259, 260

Tucker Canyon Tract: 8, 17, 49, 55, 66, 79, 92, 104, 114, 115, 116, 119, 134, 150, 153, 168, 170, 171, 173, 178, 180, 182, 192, 196, 198, 199, 259

Unavoidable Adverse Impacts: 171, 178, 198, 217, 236, 256, 259

Unsuitability Criteria: 2, 6, 13, 65

Utah Power and Light (UP&L) Exchange:

 General: 1, 10, 13, 17, 26, 32, 55, 67, 71, 75, 133, 134, 199, 245

 Alternative One: 13, 71, 245

 Alternative Two: 13, 245, 246

Vegetation: 6, 10, 66, 91, 94, 123, 146, 171, 173, 175, 176, 178, 180, 198, 199, 200, 217, 219, 220, 236, 238, 240, 248, 256, 258

Visual Resources: 6, 10, 66, 116, 118, 119, 129, 133, 169, 170, 173, 174, 196, 198, 199, 214, 217, 236, 242, 253, 261, 262

Water Resources:

 General: 6, 10, 12, 61, 65, 66, 78, 81, 86, 122, 128, 141, 142, 153, 171, 173, 174, 175, 177, 179, 182, 198, 199, 200, 217, 219, 220, 236, 238, 239, 246, 250, 256, 258

 Water Quality: 66, 77, 81, 86, 122, 141, 142, 144, 152, 175, 179, 198, 200, 201, 220, 221, 247

 Surface Water: 6, 81, 122, 141, 150, 171, 175, 179, 180, 198, 200, 217, 219, 221, 236, 238, 246

 Ground Water: 6, 72, 77, 81, 83, 86, 122, 144, 145, 173, 174, 179, 198, 199, 200, 217, 219, 236, 238, 239, 247, 256, 258

 Consumptive Use: 21, 26, 32, 38, 44, 49, 55, 58, 72, 86, 141, 171, 175, 178, 179, 198, 199, 200, 217, 219, 220, 236, 238, 246, 247, 256, 258

 Trace Elements: 86, 145, 179

 Sewage Effluent: 102, 107, 128, 133, 161, 171, 175, 177, 179, 198, 200, 217, 220, 236, 239, 247, 256

 Water Rights: 86, 107, 133, 161, 175

Wilderness: See Special Designation Areas

Wildlife:

General: 6, 10, 12, 13, 62, 65, 67, 96, 119, 125, 148, 152, 170, 171, 173, 174, 176, 178, 180, 198, 199, 201, 217, 219, 221, 232, 236, 238, 240, 248, 256, 258, 260

Mule Deer: 96, 119, 125, 129, 146, 150, 171, 176, 180, 181, 182, 198, 201, 217, 221, 236, 240, 250

Elk: 96, 119, 125, 129, 146, 148, 150, 152, 180, 181, 201, 221, 240

Moose: 96, 146, 148, 150, 152, 180, 182, 201, 260

Antelope: 13, 96, 152, 181

Pheasants: 125, 150, 173, 174, 176, 180, 198, 201, 217, 221, 261

Raptors: 100, 125, 150, 176, 181, 201, 240, 248, 250

Fish, Fisheries: 100, 103, 119, 125, 126, 129, 152, 182, 201, 221, 240, 250

Zoning: 12, 15, 65, 103, 153, 161, 182, 204, 226

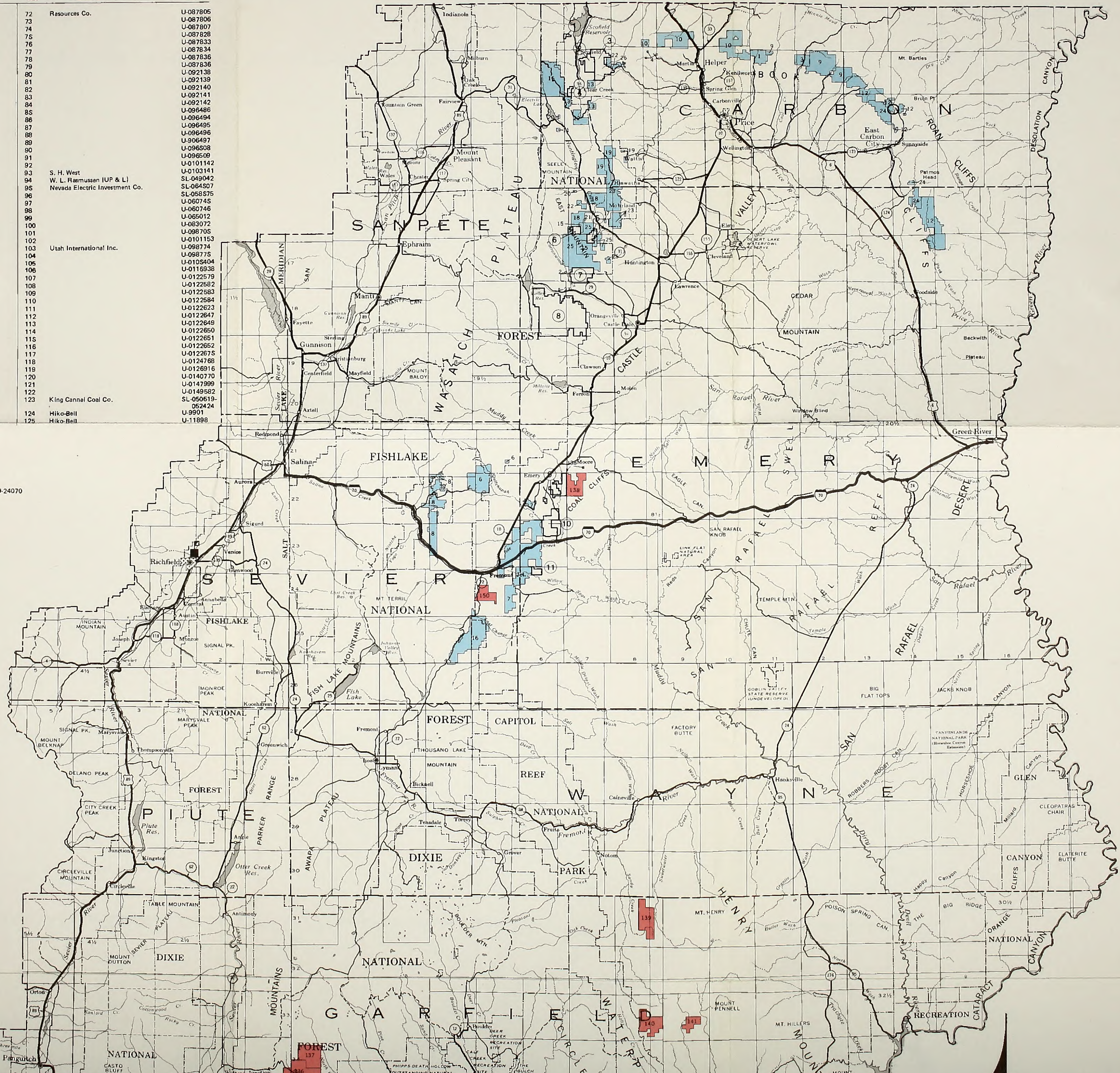
SLM LIBRARY
R2 120A BLDG. 20
DENVER FEDERAL CENTER
P.O. BOX 25021
DENVER, CO 80225

BLM LIBRARY
RS 150A BLDG. 50
DENVER FEDERAL CENTER
P.O. BOX 25047
DENVER, CO 80225

UINTA - SOUTHWESTERN UTAH COAL STUDY REGION

UTAH COAL LEASES

REF. NO.	LESSEE	SERIAL NUMBER	REF. NO.	LESSEE	SERIAL NUMBER
1	AMCA Coal Leasing Inc.	SL-027304 SL-063068 U-010581 U-082896 SL-051279-063188	72	Resources Co.	U-087806 U-087806 U-087807 U-087828 U-087833 U-087834 U-087836 U-087836 U-092138 U-092139 U-092140 U-092141 U-092142 U-096486 U-096494 U-096495 U-096496 U-906497 U-096508 U-096509 U-096510 U-0101142 U-0103141 SL-049042 SL-064507 SL-058575 U-060745 U-060746 U-065012 U-083072 U-098705 U-0101153 U-098774 U-098775 U-0105404 U-0116938 U-0122579 U-0122582 U-0122583 U-0122584 U-0122623 U-0122647 U-0122648 U-0122650 U-0122651 U-0122652 U-0122675 U-0124768 U-0126916 U-0140770 U-0147999 U-0149582 SL-056519 052424 U-9901 U-11898
2	John L. Bell	U-04814	73		
3	California Portland Cement Co. (Soldier Creek Coal Co.)	U-7683	74		
4	Carbon Emery Bank	SL-063720 U-08606 U-044814 U-7683	75		
5	Carroll County Coal Co.	SL-062583	76		
6	Coastal States Energy Co. (Southern Utah Fuel Co.)	U-053995 U-062453 U-0149084 U-28297 U-0730 U-073039 U-073040 U-073041 U-090231 U-0101213 U-0101214 U-0101215 U-0101217 U-0101218 U-5287	77		
7	Consolidation Coal Co.-Kammerer Coal Co.	U-073040 U-073041 U-090231 U-0101213 U-0101214 U-0101215 U-0101217 U-0101218 U-5287	78		
8	Energy Reserves Group Inc.	U-0141171 U-0141176 U-0141177 U-0141178	79		
9	Eureka Energy Co.	U-05067-08916 U-07064-027821 U-07746 U-089096 U-092147 U-0144820	80		
10	Franklin Real Estate Co. (Braztah Corp.)	SL-029093-046653 SL-046652 SL-048442-050115 SL-071737 U-019524 U-058184 U-0146345 U-0148779 U-25484 U-25485	81		
11	Intermountain Exploration Co.	SL-050641	82		
12	Kaiser Steel Corp.	SL-062966-063383 U-010140 SL-066490 SL-069291 U-02786 U-014217 U-014218 U-038706 U-0126947 U-0126948 U-32083	83		
13	Kanawha & Hocking Coal & Coke Co. (Valley Camp of Utah)	SL-062605 U-017354 U-067498 U-073120 U-022918	84		
14	J. O. Kingston	SL-050862-U-24069-U-24070	85		
15	Malcom N. McKinnon (Utah Power & Light)	SL-070845 U-02292 U-020305 U-142235 U-0147570 U-044076	86		
16	Armeda N. McKinnon (Utah Fuel Co.)	U-020305	87		
17	Mountain States Resources Corp. Nevada Electric Investment Co.	U-5135 U-020668 U-38727	88		
18	Peabody Coal Co.	SL-051221 U-06039 U-014275 U-024316 U-024317 U-024318 U-024319 SL-031286 U-7949 U-13097 SL-050655 SL-062648 U-2810	89		
19	Plateau Mining Co.	SL-064903 U-020641 U-8319 U-33454 SL-025431 SL-069965 U-026583-058261 SL-046612 SL-066145 SL-068754-U-01216 SL-050133 SL-064900 SL-064607-064621 SL-066116 U-02664 U-044025 U-040151 U-083086 U-084923 U-084924 U-1358	90		
20	John F. Sanders	SL-050655	91		
21	Smith Holiday & Associates, Ltd.	SL-062648	92		
22	Swisher Coal Co.	SL-064903 U-020641 U-8319 U-33454 SL-025431 SL-069965 U-026583-058261 SL-046612 SL-066145 SL-068754-U-01216 SL-050133 SL-064900 SL-064607-064621 SL-066116 U-02664 U-044025 U-040151 U-083086 U-084923 U-084924 U-1358	93		
23	United States Fuel Co.	U-02664 U-044025 U-040151 U-083086 U-084923 U-084924 U-1358	94		
24	United States Steel Corp.	SL-066116 U-02664 U-044025 U-040151 U-083086 U-084923 U-084924 U-1358	95		
25	Utah Power & Light Co.	SL-066116 U-02664 U-044025 U-040151 U-083086 U-084923 U-084924 U-1358	96		
26	Wasatch Coal Co.	SL-063011 SL-036407 SL-036407 U-098783	97		
27	Fliza & Lloyd Wilberg	U-098783	98		
28	Consolidation Coal Co.	U-098783	99		
29		U-098784	100		
30		U-098785	101		
31		U-098787	102		
32		U-0103107	103		
33		U-0103109	104		
34		U-0103129	105		
35		U-0103130	106		
36		U-0106418	107		
37		U-0149373	108		
38		SL-071561	109		
39	Caesar Fujton	U-083000	110		
40	El Paso Natural Gas Co.	U-083005 U-0115791 U-0115792 U-0115793 U-0115933 U-0130985 U-0130986 U-0130988 U-0130989 U-0136512 U-0140836 U-0140837 U-0148536 U-24427 U-27835	111		
41		U-083005	112		
42		U-0115791	113		
43		U-0115792	114		
44		U-0115793	115		
45		U-0115933	116		
46		U-0130985	117		
47		U-0130986	118		
48		U-0130988	119		
49		U-0130989	120		
50		U-0136512	121		
51		U-0140836	122		
52		U-0140837	123		
53		U-0148536	124		
54		U-24427	125		



AN EQUAL OPPORTUNITY EMPLOYER

NESS
E USE \$300

80225-0047

R'S CARD

8 1981 c.2

Southwestern
coal

OFFICE	DATE RETURNED

(Continued on reverse)

TD 195 .C58 U58 1981 c.2

Final Uinta-Southwestern
Utah regional coal

BLM LIBRARY
RS 150A BLDG. 50
DENVER FEDERAL CENTER
P.O. BOX 25047
DENVER, CO 80225

