

Glen A. Zumwalt
Vice President and
General Manager

*File: ACT/007/005
3 (cover letter)
(1) # 15 (w/maps)
(1 copy to Mine Plan)
on file*



**Utah Fuel
Company**

P.O. Box 719
Helper, Utah 84526
(801) 637-7925 or
Salt Lake (801) 566-7111

Subsidiary of
Coastal States
Energy Company

April 23, 1985

RECEIVED

APR 25 1985

DIVISION OF OIL
GAS & MINING

Mr. D. Wayne Hedberg
Permit Supervisor
Reclamation Hydrologist
DIVISION OF OIL, GAS & MINING
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3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

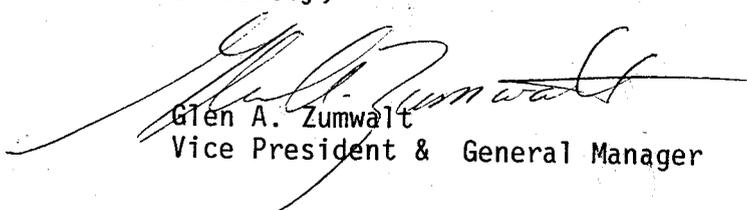
Re: Minor Modification - Skyline Mines M&RP Temporary Waste Rock
Storage at Mine Site

Dear Wayne:

Enclosed are 13 copies of pages 4-56 and Map 3-8 for the Minor Mod-
ification to allow temporary waste rock storage at the mine site.

We appreciate your review and approval of this modification.

Sincerely,


Glen A. Zumwalt
Vice President & General Manager

GAZ:KZ:jsg

Enclosure

4.16 UNDERGROUND DEVELOPMENT WASTE AND EXCESS SURFACE SPOIL

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Skyline Project Communications Interface

I. Verbal Communications

General Coordination - Vernal Mortensen (801-487-0756)
John Garr (801-637-2185)

Engineering - Roland Heath (713-877-6497 until 12/23/79,
then 801-487-0756)

Construction and Schedules - Dave Krohn (801-487-0756)

Environmental and Hydrology - Keith Welch (801-487-0756)

Geology - Roger Holland (801-487-0756)

Mining Operations - Vernal Mortensen (801-487-0756)

II. Correspondence

Vernal Mortensen - Coastal States Energy Co., 1354 East 3300
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cc to Leo Smith - Coastal States Energy Co., Nine Greenway
Plaza, Houston, TX 77046

S K Y L I N E

COAL MINING PROJECT

COASTAL STATES ENERGY COMPANY
GETTY MINERAL RESOURCES COMPANY

1979



VOLUME 1

INTRODUCTION

The following volumes of material constitute an Amendment to the Mining and Reclamation Plans for the Proposed McKinnon No. 1 and No. 2 Mines and revised Mining Permit Application. The McKinnon Mining and Reclamation Plans were filed in April and November, 1976, with the United States Geological Survey, Salt Lake City, Utah, and the State of Utah Division of Oil, Gas, and Mining. Since then, the ownership of the properties has been transferred resulting in a renaming of the proposed mining operations. The mining operations are to be known as the "Skyline Mines".

This Amendment is submitted under the Utah Regulations of Coal Mining and Reclamation Operations Act (Title 40, Chapter 10, Utah Code Annotated 1953, as amended), the Surface Mining Control and Reclamation Act of 1977 (P.L. 95-87), the Cooperative Agreement between the State of Utah and the United States Department of the Interior, the Federal Land Policy and Management Act of 1976, regulations of the U. S. Geological Survey, the Permanent Regulatory Program regulations of the Surface Mining Reclamation and Enforcement, the regulations of the State of Utah Department of Oil, Gas, and Mining and the regulations and guidelines of the U. S. Forest Service.

Seventy (70) authorized and identical copies of this Amendment have been prepared; each of which is numbered and bears the signatures and seals of an authorized representative of the Applicant. Other copies are not authorized and should be destroyed.

This copy is numbered -18-.

Organization of Amendment and Mining Permit Application

This Amendment and Mining Permit Application is organized in a series of volumes. The volume contents have been organized as follows:

VOLUME 1

Part 1 - Legal, Financial, Compliance Information

Part 2 - Environmental Resources

VOLUME 2

Part 3 - Mining Operation Plan

VOLUME 3

Part 4 - Reclamation Plan

Part 5 - References, Cross Reference

VOLUME(S) A-#

Part 6 - Appendices: Reports and Maps

Since this document is intended to satisfy the regulations of the Office of Surface Mining and Enforcement, the U. S. Geological Survey, and the Utah Division of Oil, Gas and Mining, the Permanent Regulatory Program of the Office of Surface Mining and Enforcement was chosen to provide a format for this Amendment and Mining Permit Application. Additional materials have been inserted in appropriate sections to ensure compliance with the regulations of the U. S. Geological Survey, Utah Division of Oil, Gas, and Mining, and the U. S. Forest Service. Any such additional material is noted in the cross reference tables of Part 5.

The purpose of this document is to amend the previously filed mining and reclamation plans in order that the plans, as amended, will satisfy existing regulations, many of which have been promulgated since the filing of the original McKinnon Mining and Reclamation Plans.

Part 1 contains the legal, financial and compliance information required by 30 CFR Part 782 and applicable State of Utah regulations as well as an overview of the Skyline Mines Project as detailed in this Amendment. The formal Application for Mining Permit is also presented in Part 1, Volume 1.

Part 2 contains the baseline environmental resource information required by 30 CFR Part 783 and applicable State of Utah regulations. These baseline data include information regarding the existing geology, hydrology, climate, soils, vegetation, and fish and wildlife resources. Information regarding the prime farmland investigation, socio-economic data, and landuse is also included in Part 2. The discussions of the existing environment are summaries of field studies performed by various individuals and organizations for the Applicant.

Part 3 contains the proposed mining operation plan. The operations detailed therein have been designed to fulfill the requirements of the performance standards of 30 CFR Part 817 and the U. S. Geological Survey 30 CFR 211 regulations.

Part 4 contains the proposed reclamation plan that, in combination with Part 3, describes the manner in which the proposed mining and reclamation operations will proceed in order to fulfill regulatory requirements. The regulations of 30 CFR Parts 784 and 817 are addressed as well as various parts of 30 CFR 211 and the regulations of the Utah Division of Oil, Gas, and Mining.

Part 5 contains reference and cross reference information identifying the various sections which respond to specific regulations.

The maps illustrating the activities described in the proposed mining and reclamation plans are presented at the end of Part 3 and at a larger scale in Part 6. Part 6 also contains reports of environmental baseline information and other reports in their entirety as prepared by consultants for the Applicant, as well as selected reference material pertinent to the information presented in Volumes 1 through 3.

SKYLINE PROJECT OVERVIEW

Coastal States Energy Company and Getty Mineral Resources Company collectively called the "Applicant", herein proposes to construct and operate an underground coal mining operation ("the Skyline Mines") to be located in northwest Carbon County, Utah, approximately twenty air miles northwest of Price, Utah. The surface facilities (the portals) are to be constructed within Sections 13 and 24, Township 13 South, Range 6 East, SLM approximately three and one-half miles to the southwest of Scofield, Utah and four miles northwest of Clear Creek, Utah. (See Vicinity Map, page 1-32) The underground mining operations are to extend over 4,021.58 acres of the 6,400 acre federal coal leasehold during the projected 30 year life of the mining operation. The majority of the development will be on lands owned by the United States and administered by the U.S. Forest Service as a part of the Manti-LaSal National Forest.

The Applicant acquired during 1978 the properties on which the mining operation is to be developed. The properties are in an area which has had a history of coal mining and the Skyline property, specifically, had been under investigation for development of its coal resources for several years prior to the Applicant's acquisition thereof. Mining and Reclamation Plans detailing the formerly proposed development, the McKinnon Mines, had been filed with various governmental agencies by Routt County Development, Ltd., a predecessor in title to the Applicant. The Applicant now proposes by way of this Amendment and Mining Permit Application to develop the properties in substantially the same manner as detailed in the Mining and Reclamation Plans for the McKinnon Mines. An amendment of the McKinnon mine plans is necessary for compliance with presently existing governmental regulations, many of which were promulgated after the preparation and filing of the initial mine plans and permit application.

The formerly proposed development has been evaluated for site-specific impact and was considered as a part of the regional analysis in the Final Environmental Statement for Coal Resources in Central Utah. The environmental assessment was based upon the filed Mining and Reclamation Plans as they describe the proposed development, operation and reclamation of the McKinnon Mines. The Applicant believes that modifications of the previously filed plan, contained within this Amendment and Mining Permit Application,

will tend to reduce the potential environmental impacts as evaluated in the site specific and regional environmental statement.

During 1978 and 1979, the Applicant began extensive studies to provide an understanding of the existing geology, environment and community infrastructure of the Skyline Project Area. The results of these studies were used extensively in the planning of the Skyline mining project and will provide the basis for evaluating the effects of the Skyline Mines upon various aspects of the environment. The environmental baseline studies also provide goals for reclamation and revegetation after the mining is completed. As a part of these studies, the Applicant has generated various methods which could be incorporated into the overall design to reduce potential degradation of the environment. The Applicant believes that the 1978 - 1979 studies have determined that underground coal mining can be conducted as proposed in this Amendment, with little more than temporary impact upon the ecological balance and that affected acreage can be essentially restored to its premining condition.

The Applicant has contacted several officials of local, state and federal governments to provide information regarding the Skyline Project in a hope that problems and concerns can be alleviated. The Applicant will continue this dialogue as the project develops.

Construction of the Skyline Project will begin with dirtwork as soon as is reasonably possible after receiving necessary governmental approvals. The project will be developed in three stages with each stage representing the opening of a mine. The mines are designed as multiseam operations, i.e., mining will occur in three vertically displaced seams over the same approximate horizontal area. The operations will be sequenced by mining the upper seams at least two years in advance of mining the seam just below to reduce interference from the upper seam mining on the mining of the lower seam.

Due to the nature of multiseam mining operations, the Applicant has chosen to present the proposed development of all three mines within this Amendment and Mining Permit Application. It is believed that a better overall understanding of the Skyline Project can be presented in this manner instead of dividing the discussion of each proposed mine into a separate mining and reclamation plan.

At full production, the Skyline Mining Project will produce approximately five million tons of coal per year and employ 900 persons. The coal is expected to average approximately 11,500 BTU per pound and contain approximately 0.5% sulfur.

The mine facilities have been designed such that the mine portals will be built in the same general location resulting in a relatively small area committed to surface facilities as compared to the acreage required if each portal were to be built in a separate location. The coal will be mined underground by both continuous and longwall mining equipment. The coal will be conveyed from the portal area to an enclosed coal storage and train load-out at the mouth of Eccles Canyon. The Applicant expects the coal to be marketed throughout the western portion of the United States primarily for generation of electrical power.

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Geotechnical

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Air Quality

"Summary Report for Coastal States Energy Company,
Clear Creek, Utah, Monitoring Program"

Community Infrastructure

"A Review of Community Infrastructure and Socioeconomic Aspects -
Skyline Coal Project"

Land Use

"Land Use Inventory of the Skyline Property and Adjacent Area -
Carbon and Emery Counties, Utah"

Archaeology

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Vegetation and Soils

"Report of Vegetation, Plant Community Analysis, Threatened and Endangered
Plant Species, Soils, and Reclamation Plans for Coastal States Energy
Company, McKinnon Properties, Skyline Project, Carbon - Emery Counties,
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Terrestrial Wildlife

"Wildlife Assessment of the Skyline Property and Adjacent Areas,
Carbon and Emery Counties, Utah"

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"Skyline Mines Project - Raptors"

Aquatic Wildlife

"Aquatic Ecology of Surface Water Associated with the Skyline Project,
Coastal States Energy Company - General Aquatic Resource Description"

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1.1 APPLICATION

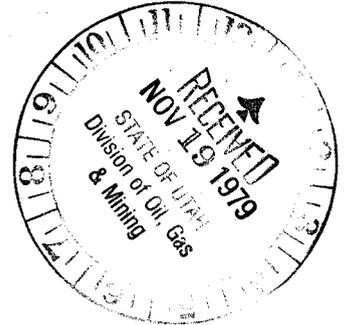
STATE OF UTAH

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF OIL, GAS, and MINING

1588 West North Temple

Salt Lake City, Utah 84116



APPLICATION FOR MINING PERMIT

AMENDMENT 1

This Application For Mining Permit is submitted pursuant to Title 40, Chapter 10, Utah Code Annotated 1953, as amended; the Cooperative Agreement between the United States Department of Interior and the State of Utah; the Surface Mining Control and Reclamation Act (P.L. 95-87); the Federal Land Policy and Management Act of 1976; and all regulations promulgated under those Acts affecting coal mining operations conducted in the State of Utah.

NAMES, ADDRESSES, and
TELEPHONE NUMBERS
OF APPLICANT:

Coastal States Energy Company
Nine Greenway Plaza
Houston, Texas 77046

Area Code (713) 877-6400

and

Getty Mineral Resources Company
c/o Getty Oil Company
Suite 1901
3810 Wilshire Boulevard
Los Angeles, California 90010

Area Code (213) 381-7151

LOCATION OF MINE AREA:

* All or portions of Sections
10, 11, 12, 13, 14, 15, 22, 23, 24,
25, 26, 27, 34, 35 of Township
13 South, Range 6 East, SLM;

* All or portions of Sections
17, 18, 19, 20 of Township 13
South, Range 7 East, SLM.

MINERAL TO BE MINED:

Coal

OPERATOR:

Utah Fuel Company, a wholly owned
subsidiary of Coastal States
Energy Company
Nine Greenway Plaza
Houston, Texas 77046

PHONE NUMBER OF OPERATOR

Area Code (713) 877-6400

HOLDER OF RECORD

Coastal States Energy Company
Nine Greenway Plaza
Houston, Texas 77046

and

Getty Mineral Resources Company
c/o Getty Oil Company
Suite 1901
3810 Wilshire Boulevard
Los Angeles, California 90010

AGENT FOR SERVICE
OF PROCESS (Coastal States
Energy Corporation):

C. T. Corporation Systems
811 Dallas Avenue
Houston, Texas 77002

AGENT FOR SERVICE
OF PROCESS (Getty Mineral
Resources Company):

C. T. Corporation Systems
175 South Main
Salt Lake City, Utah 84111

*Typographic Correction

RESIDENT AGENT (Coastal States
Energy Company):

Bernard W. Schrader
Coastal States Energy Company
Nine Greenway Plaza
Houston, Texas 77046

Area Code (713) 877-6859

RESIDENT AGENT (Getty Mineral
Resources Company):

John M. Mintz
Getty Mineral Resources Company
c/o Getty Oil Company
Suite 1901
3810 Wilshire Boulevard
Los Angeles, California 90010

Area Code (213) 381-7151

We, the undersigned, hereby certify that the material and information contained in this Application are complete and are correct to the best of our knowledge and belief.

Coastal States Energy Company

By: *L. Smith*
(Senior Vice President)

Getty Mineral Resources Company

By: *D. A. Nichols*
(Attorney in Fact)

State of Texas
County of Harris

Subscribed and sworn to and before me this 6th day of November
1979.

Barbara J. Trickham
Notary Public for the State of Texas

Residing at *Cypress, Texas*

My Commission Expires: *July 17, 1981*

1.2 BUSINESS DESIGNATION

Utah Fuel Company, a wholly owned subsidiary of Coastal States Energy Company, will operate the Skyline Mines. The Skyline Mines will be owned by Coastal States Energy Company, a wholly owned subsidiary of Coastal States Gas Corporation, and Getty Mineral Resources Company, a wholly owned subsidiary of Getty Oil Company.

O. S. Wyatt, Jr. is the only stockholder of Coastal States Gas Corporation owning more than five percent of the corporation's outstanding common stock. The Sarah C. Getty Trust and The Title Insurance and Trust Co., Gordon P. Getty and Jean Ronald Getty, Executors of the Estate of J. Paul Getty are the only stockholders owning more than 5% of the outstanding common stock of Getty Oil Company.

Neither Utah Fuel Company, Getty Mineral Resources Company nor Getty Oil Company has carried on any coal mining activities in any name other than in the name of the company as aforesaid. Coastal States Energy Company and thereby Coastal States Gas Corporation (the parent corporation) owns an underground coal mine located near Salina, Utah, operated as Southern Utah Fuel Company.

Various contractors and subcontractors will be engaged to perform portions of the construction and mining activities. At this time however, the names and activities of the specific contractors are unknown.

The officers of Utah Fuel Company are:

O. S. Wyatt, Jr.	Chairman of the Board
H. L. Blomquist, Jr.	President
Roy L. Gates	Senior Vice President
George L. Brundrett, Jr.	Senior Vice President
James R. Paul	Senior Vice President and Treasurer
Leo C. Smith	Senior Vice President
Rex S. Bennett	Vice President
Thomas L. Gambill	Vice President
Vernal Mortenson	Vice President
Austin M. O'Toole	Vice President and Secretary

H. deForest Ralph, Jr.	Vice President
Charles M. Wheat	Vice President
Loren A. Williams	Vice President
J. Stewart Williams, Jr.	Controller
E. C. Simpson	Assistant Vice President
Robert A. Forrester	Assistant Secretary
J. J. Meadows	Assistant Secretary
Ronald A. Meadows	Assistant Secretary
Eugene O. Rooke	Assistant Secretary
John C. Simons	Assistant Secretary
C. Wesley Tyson, Jr.	Assistant Secretary
W. H. Brister	Assistant Treasurer
Fred D. Gray	Assistant Treasurer
Robert T. McCarthy	Assistant Treasurer
Dan L. Funderberg	Assistant Controller
R. G. Holsclaw	Assistant Controller
H. R. Natho	Assistant Controller
Donald L. Peters	Assistant Controller

The officers of Getty Mineral Resources Company are:

Glenn E. McKinley	President
Siegfried Muessig	Vice President
Robert P. Blanc	Vice President
John M. Mintz	Vice President
C. R. Moore	Vice President
J. Brooks McNeill	Secretary
John C. Sample, Jr.	Assistant Secretary
K. A. Jensen	Assistant Secretary
Royal E. Peterson	Assistant Secretary
Cecil H. Smith	Vice President
William A. O'Neil	Assistant Secretary
Donald E. Rovang	Treasurer
G. P. Bowers	Assistant Treasurer

The officers of Coastal States Energy Company are:

O. S. Wyatt, Jr.	Chairman of the Board
H. L. Blomquist, Jr.	President
Roy L. Gates	Senior Vice President
George L. Brundrett, Jr.	Senior Vice President
James R. Paul	Senior Vice President and Treasurer
Leo C. Smith	Senior Vice President
Ernest Solomon	Senior Vice President
M. T. Arnold	Vice President and Assistant Secretary
Rex S. Bennett	Vice President
Wesley F. Blankenship	Vice President
John E. Cooper	Vice President
Thomas L. Gambill	Vice President
Vernal Mortenson	Vice President
Austin M. O'Toole	Vice President and Secretary
H. deForest Ralph, Jr.	Vice President
Fred O. Sharp, Jr.	Vice President
Charles M. Wheat	Vice President
Loren A. Williams	Vice President
J. Stewart Williams, Jr.	Controller
E. C. Simpson	Assistant Vice President
Robert A. Forester	Assistant Secretary
J. J. Meadows	Assistant Secretary
Ronald A. Meadows	Assistant Secretary
Eugene O. Rooke	Assistant Secretary
John C. Simons	Assistant Secretary
C. Wesley Tyson, Jr.	Assistant Secretary
W. H. Brister	Assistant Treasurer
Fred D. Gray	Assistant Treasurer
Robert T. McCarthy	Assistant Treasurer
Dan L. Funderberg	Assistant Controller
R. G. Holsclaw	Assistant Controller
H. R. Natho	Assistant Controller
Donald L. Peters	Assistant Controller

The addresses and phone numbers for the officers and directors of Utah Fuel Company, Coastal States Energy Company or Getty Mineral Resources Company, are the same as those previously listed (Section 1.1 - Application) for the company for which the individuals are officers.

Written correspondence regarding the Skyline Mines should be addressed to:

Senior Vice President
Coastal States Energy Company
Nine Greenway Plaza
Houston, Texas 77046

A copy of any written correspondence regarding the Skyline Mines should be addressed to:

Vice President
Getty Mineral Resources Company
c/o Getty Oil Company
Suite 1901
3810 Wilshire Boulevard
Los Angeles, California 90010

1.3 MULTIPLE BUSINESS ENTITIES

Neither the companies nor any major stockholder of any company having any interest, either legal or equitable, in the Skyline Mines have had a State or Federal mining permit suspended or revoked or a security deposited in lieu of bond revoked.

1.4 MINING PERMITS - COMPLIANCE INFORMATION

Coastal States Energy Company presently holds an approved Mining Permit (Number ACT/041/002) for its Southern Utah Fuel Company operation located in Sevier County, Utah. The permit was approved and issued by the State of Utah Division of Oil, Gas, and Mining on September 14, 1977 and the mining and reclamation plan for the operation was approved by the U. S. Geological Survey on February 3, 1978.

None of the corporations involved in this Application (i.e., Coastal States Gas Corporation, Utah Fuel Company, Getty Oil Company, nor Getty Mineral Resources Company) presently hold, or have held, any coal mining permits issued by a State or Federal Agency.

Coastal States Energy Company, through its subsidiary mining operation, Southern Utah Fuel Company, received on May 10, 1979 a Notice of Violations of the Surface Mining Control and Reclamation Act of 1977 (P.L. 95-87). An Application for Review of that notice was filed on June 6, 1979. The four violations cited in the Notice were:

- (1) Failure to have a copy of the current mining permit to operate the mine available for inspection at or near the mine site.
- (2) Failure to grade and revegetate road cuts, mine entry cuts and other surface work areas.
- (3) Failure to pass surface drainage from disturbed area through adequately sized sedimentation ponds.
- (4) Failure to dispose excess rock and earth materials in an area approved by the regulatory authority.

A conference with OSM was held in August 24, 1979 seeking re-evaluation of the Proposed Assessment of Penalties filed June 19, 1979; the information presented at that conference is under review at this time.

* The conditions cited in Violations 1, 2 and 3 have been abated. The proposed actions to abate Violation 3 have been submitted to the Office of Surface Mining as part of the Addendum to the Southern Utah Fuel Company Mine Plan filed in October of 1979. Confirmation of these terminations is presented in Volume A-5, Appendices, Section entitled Technical Correspondence. Coastal States Energy Company intends to continue to operate its mining operations in compliance with all applicable laws and regulations.

1.5 MINE IDENTIFICATION

Since all three mining operations will utilize surface facilities in the same general area and will mine generally the same area in horizontal extent, the three operations are treated in this Amendment and Mining Permit Application as a single mining operation to be known as the "Skyline Mines". The "Skyline Mines" will involve a multiseam mining operation of three coal seams with certain areas being mined sequentially at different depths with slight variations due to geological and mining restraints. To distinguish the operations of mining one seam from the others, each operation has been named individually:

<u>Mine Operation</u>	<u>Seam to Be Mined</u>
Skyline Mine No. 1	Upper O'Connor
Skyline Mine No. 2	Lower O'Connor "B"
Skyline Mine No. 3	Lower O'Connor "A"

The Mine Safety and Health Administration numbers for the Skyline Mines are:

Skyline Mine No. 1	-	42-01435
Skyline Mine No. 2	-	42-01565
Skyline Mine No. 3	-	42-01566

1.6 RIGHT TO ENTER

The Skyline Mines will be operated on the leasehold interests owned by the Applicant, Coastal States Energy Company and Getty Mineral Resources Company. The lands on which mining is to occur are a part of the Manti-LaSal National Forest (see Map 1-1, Volume 1). The leasehold interests involve all or a part of the following coal leases, which have been subleased and/or assigned to Coastal States Energy Company and Getty Mineral Resources Company:

	<u>Federal Lease</u>	<u>Issued To</u>	<u>Date of Issuance</u>
*	Utah - 020305 ¹	Emmett K. Olson	3-1-62
	Utah - 044076	Armeda N. McKinnon	9-1-65
	Utah - 0142235	Malcolm N. McKinnon	10-1-64
	Utah - 0147570	Malcolm N. McKinnon	5-1-65
	Utah - 073120	Independent Coal and Coke Company	2-1-64

	<u>County Lease</u>	<u>Issued To</u>	<u>Date of Issuance</u>
*	Carbon County ¹ Coal Lease	Kanawha and Hocking Coal & Coke Company	5-1-74

The legal description of the above listed coal leases are:

Federal Coal Lease Serial #Utah-020305*

T. 13 S., R. 6 E., SL Meridian, Utah

Sec. 13: SW-1/4 SW-1/4 (Lot 7);

Sec. 14: SE-1/4 SE-1/4;

Sec. 23: E-1/2 E-1/2;

Sec. 24: W-1/2 NW-1/4, SE-1/4 NW-1/4, S-1/2;

Sec. 25: All (Lots 1 thru 4, S-1/2 N-1/2, S-1/2);

Sec. 26: E-1/2 E-1/2;

containing 1,439.40 acres;

*Typographic Correction

Federal Coal Lease Serial #Utah-044076

T. 13 S., R. 6 E., SL Meridian, Utah

Sec. 26: W-1/2 E-1/2, W-1/2;

Sec. 27: Lots 1, 2, 3, 4, E-1/2, E-1/2 W-1/2,
excluding Lawrence Reservoir;

Sec. 34: Lots 1, 2, 3, 4, 5, 6, 7, 8, and S-1/2
excluding Lawrence Reservoir;

Sec. 35: Lots 1, 2, 3, 4, 5, 6, 7, NE-1/4,
E-1/2 NW-1/4, NE-1/4 SW-1/4, N-1/2
SW-1/4;

containing 2357.82 acres;

Federal Coal Lease Serial #Utah-0142235

T. 13 S., R. 6 E., SL Meridian, Utah

Sec. 11: S-1/2 S-1/2;

Sec. 14: W-1/2, SW-1/4 SE-1/4;

containing 520.00 acres;

Federal Coal Lease Serial #Utah-0147570

T. 13 S., R. 6 E., SL Meridian, Utah

Sec. 10: Lots 3 and 4, E-1/2 SW-1/4 and SE-1/4;

Secs. 15 and 22, All;

Sec. 23: W-1/2 E-1/2 and W-1/2;

containing 2,092.70 acres

Federal Coal Lease Serial #Utah-073120

T. 13 S., R. 6 E., SL Meridian, Utah

Section 13: Lots 1, 2, 3, 4, 5, 6, 8;

Section 14: NE-1/4, N-1/2 SE-1/4;

Section 24: NE-1/4 NW-1/4;

containing 557.22 acres.

Carbon County Coal Lease

*

Township 13 South, Range 6 East SLM

Section 24: Portion of W-1/2 NE-1/4 Containing 65.0 Acres

¹Subject to that certain Exchange Agreement dated September 9, 1975 between Valley Camp of Utah, Inc. and Energy Fuels Corporation, a Colorado corporation. The effect of the Exchange Agreement was to transfer the ownership of coal rights such that Energy Fuels Corporation owned or controlled the coal which is located north and west of the Connelville Fault. The Connelville Fault is the south-easterly boundary of the Skyline permit area. The result of this agreement is that only a portion of the originally leased property is controlled by the Applicant and included in the permit area.

The right to enter the leaseholds conveyed by the Federal Coal leases is conferred to the lessees by the Mineral Leasing Act of 1920 and the leases themselves. Approximately 6,400 acres are contained in the leaseholds of the leases. Due to limiting factors of "no or thin coal areas and vertical seam proximity areas", restrictions of the Exchange Agreement or other restraints, underground coal mining will occur only on a portion of the Federal leaseholds.

Coastal States Energy Company and Getty Mineral Resources Company by their Joint Venture Agreement effective September 8, 1978, have agreed that Utah Fuel Company, a wholly owned subsidiary of Coastal States Energy Company, is to operate the Skyline Mines, and that Utah Fuel Company shall have the right to enter the subject leaseholds.

The permit area will include, in addition to leaseholds of the Federal Coal leases, areas for access roads, conveyor belts, utilities and facilities for loading unit trains and associated facilities. Rights-of-way and surface easements acquired by Coastal States Energy Company and Getty Mineral Resources Company allow, among other rights, the right to construct, operate and maintain access roads and a coal conveyance system from the mine portal area through Eccles Canyon and the right to construct, operate and maintain coal storage and train load-out facilities at the mouth of Eccles Canyon. These rights to enter, construct, operate and maintain facilities were conferred by:

REPLACES		TEXT
Section 1.5 Page 1-14 Date 11/16/79		Section 1.5 Page 1-14 Date 4/28/80

* Denotes change or addition

- (1) A surface lease and easement agreement dated on August 6, 1976 and entered into by and between Helen, Nick and Koula Marakis and Kanawha and Hocking Coal and Coke Company allows the exclusive use and possession of the surface of the subject lands for purposes of granting access to and ingress and egress to and from other properties as well as other rights incidental to the transportation of coal across the leased acreage.

- (2) On August 3, 1978, Energy Fuels Corporation conveyed its exclusive and perpetual easement to Coastal States Energy Company for the purpose of constructing and maintaining a temporary coal storage and loading facility. The easement had been initially granted by Leon J. Nicolaidis et al, to Kanawha and Hocking Coal and Coke Company, Energy Fuels Corporation's predecessor in title.

The facilities to be constructed on the surface easements and rights-of-way are a part of the Skyline Mines and these areas of surface use are to be included in the permit area as shown on Map 1-1.

The Lawrence Reservoir (Map 1-1), proposed in 1938, was never developed. Efforts to pursue the project were discontinued and resulted in case file closure by the Utah State Engineer's Office on August 8, 1961. When Federal Coal Lease Utah 044076 was issued, the site area of the proposed Lawrence Reservoir was excluded from the leased premises. At the time of filing this Application, the Applicant has no leasehold rights to mine the site on the proposed Lawrence Reservoir and, therefore, the area of the formerly proposed Lawrence Reservoir site is excluded from the proposed permit area. The Applicant intends to pursue the acquisition of this excluded acreage as a lease modification of Federal Coal Lease Utah-044076 or as a separate Federal Coal Lease. No surface activity pursuant to underground coal mining or underground coal mining will be carried out within the excluded, unleased area until the acreage is under lease to the Applicant. At the time of acquisition the Applicant will request that the acquired acreage be included in the Skyline permit area.

1.7 CONTIGUOUS OWNERS

The following list contains the names and addresses of all owners of surface lands contiguous to the permit boundary.

United States of America
Department of Agriculture
U. S. Forest Service
350 East Main Street
Price, Utah 84501

Helen Marakis
160 East 1st South
Price, Utah 84501

Nick and Koula Marakis
150 East 1st South
Price, Utah 84501

Milton A. Oman
61 South Main
Salt Lake City, Utah 84115

The following list contains the names and addresses of the owners of mineral acreage contiguous to the permit boundary:

Carbon County, Utah
Court House
Price, Utah 84501

United States of America
Department of the Interior
Bureau of Land Management
University Club Building
Salt Lake City, Utah 84138

Kaiser Steel Corporation
300 Lakeside Drive
Oakland, California 94666

Kanawha and Hocking Coal and Coke Company
P. O. Box 507
Clear Creek, Utah 84501

Kemmerer Coal Company
Frontier, Wyoming 83121

Phelps - Dodge
300 Park Avenue
New York City, New York 10022

Utah Power and Light Company
1407 West North Temple
Salt Lake City, Utah 84110

Various organizations hold interest, as overriding royalty interests, in and to the coal within permit area boundaries. The identified holders of overriding interests are:

Kanawha and Hocking Coal and Coke Company
P. O. Box 507
Clear Creek, Utah 84501

Routt County Development, Ltd.
c/o Energy Fuels Corporation
Three Park Central
Suite 900
1515 Arapahoe
Denver, Colorado 80202

The Estate of Macolm N. McKinnon holds an equitable interest in and to the coal with permit boundaries: The address of the McKinnon Estate is:

The Estate of Malcolm N. McKinnon
c/o Frank Armstrong
1300 Walker Bank Building
Salt Lake City Utah 84111

1.8 APPLICANT'S INTEREST IN CONTIGUOUS AREAS

Coastal States Energy Company and/or Getty Mineral Resources Company owns or controls the following interest in lands or minerals contiguous to the mining permit area:

A sixty five (65.0) acre underground coal mining lease dated May 1, 1974 from Carbon County, Utah, covering the interest in and to the 65.0 acre tract. The lease is recorded in Book 151 at page 149 in the County Clerk's Records of Carbon County, Utah.

- * The legal description of acreage leased is Section 24 W-1/2 NE-1/4 T. 13 S, R. 6 E., Carbon County, Utah.

For location of the above interests see Map 1-1. No surface disturbance or underground mining will be conducted on the above described lands.

None of the corporations involved in this Application (i.e., Coastal States Gas Corporation, Coastal States Energy Company, Utah Fuel Company, Getty Oil Corporation and Getty Mineral Resources Company) own or control, indirectly or directly, legally or equitably any interest in the areas contiguous to the permitting area other than the interest described above.

The Applicant has no option, bid, or other interest in any contiguous acreage other than that stated above.

*Typographic Correction

1.9 AREAS DESIGNATED UNSUITABLE FOR MINING

The Bureau of Land Management has included the proposed permit area in the Wattis Planning Unit Study to determine the results of the application of the Departmental Coal Unsuitability Criteria as mandated by the Federal Lands Review, Section 522 (6) of the Surface Mining Control and Reclamation Act of 1977 (P.L. 95-87).

The Applicant recognizes, however, that the permit area may possibly undergo further examination during some phase of the permitting process to determine if it should be designated as an area unsuitable for mining. The Applicant believes that the environmental baseline information contained in Volume 1 clearly demonstrates that the permit area should not be so designated as an area which is unsuitable for mining.

The Applicant does not propose to conduct or locate surface facilities within 300 feet of any occupied dwelling.

- Should address mining w/in 100 ft of public road. (MAN 12-3-80)

1.10 PERMIT TERM INFORMATION

The following information is presented to identify permit term requirements and stipulations.

1.10.1 The Applicant projects as the Anticipated Date of Commencement of Construction: June, 1980.

1.10.2 Although the permit application is to cover the first five year period of mining, information is presented below for the life of the mining operation.

	<u>Mine No. 1</u>	<u>Mine No. 2</u>	<u>Mine No. 3</u>
First Coal Produced	Jan., 1982	Jan., 1987	Jan., 1982
Termination of Mining Activity	Dec., 2012	Dec., 2015	Dec., 2015
Horizontal Extent of Mine Workings (Life of Mine)	3,956 acres	3,039.54 acres	4,021.58 acres
Vertical Extent of Mine Workings (Life of Mine)	Surface to 1,200'	Surface to 1,400'	Surface to 1,800'

1.10.3 The anticipated number of total surface land acres to be affected (life of mines) is less than the total of the disturbed acreages for each of the three mines due to the overlapping of mining operations which is inherent to multiseam mining operations. The total acreage to be disturbed by underground mining during the life of the entire mining operation is 4839.0 acres.

The acreage of disturbance required for surface facilities is 75.8 acres.

1.10.4 The following information is based on projection for the First Five Years.

	<u>Mine No. 1</u>	<u>Mine No. 2</u>	<u>Mine No. 3</u>
Extent of Horizontal Workings	1,128.47	-0-	755.13
	acres		acres
Extent of Vertical Workings	Surface to	-0-	Surface to
	1,200'		1,000'

The anticipated amount of total surface land acreage during the first five years of operation to be affected by underground mining activities is 1,295.59 acres.

* Area of Surface Disturbance

The construction/installation of surface facilities at the mine site, loading area, as well as the mine access road and conveyor belt route during the first five years of operation will disturb 74.8 acres.

During the second five years of operation, 1.0 acre will be disturbed for the construction/installation of a ventilation shaft.

The total surface disturbance for the life of the project will be 75.8 acres.

Legal Description of disturbed acreage (First Five Years):

In T. 13 S., R. 6 E., Salt Lake Meridian: the south 1/2 of Section 10; the south 1/2 of the south 1/2 of Section 11; the west 1/2 of Section 13; all of Section 14; all of Section 15; the west 1/2 of Section 23; and the northwest 1/4 of Section 24.

REPLACES		TEXT
Section 1-10 Page 1-22 Date 04/28/80		Section 1.10 Page 1-22 Date 9/22/80

* Denotes change or addition

	<u>Mine No. 1</u>	<u>Mine No. 2</u>	<u>Mine No. 3</u>
Extent of Horizontal Workings	1,128.47	-0-	755.13
	acres		acres
Extent of Vertical Workings	Surface to 1,200'	-0-	Surface to 1,000'

The anticipated amount of total surface land acreage during the first five years of operation to be affected by underground mining activities is 1,295.59 acres.

* Area of Surface Disturbance

The construction/installation of surface facilities at the mine site, loading area, as well as the mine access road and conveyor belt route during the first five years of operation will disturb 74.8 acres.

During the second five years of operation, 1.0 acre will be disturbed for the construction/installation of a ventilation shaft.

The total surface disturbance for the life of the project will be 75.8 acres.

Legal Description of disturbed acreage (First Five Years):

Beginning in the Southeast Corner of Section 11, R.6E., T. 13 S., Salt Lake Meridian, thence south 500', thence east 2620', thence south 4210' thence west 750', thence north 200', thence west 640', thence south 7440', thence 2745' west, thence north 62° west 1285', thence north 86°30' west 5860', thence north 1235', thence east 6600', thence north 27°30' east 5210', thence west 10230', thence north 2510', thence north 48°30' east 5230', thence south 60° east 7145', thence north 2120', thence east 150' to the Point of Beginning.

* Denotes change or addition

1.11 PERSONAL INJURY AND PROPERTY DAMAGE INSURANCE INFORMATION

This section presents complete reproductions of Certificates of Insurance issued to Coastal States Gas Corporation and its subsidiary and affiliated companies to cover its public liability and property damage. Said Certificates of Insurance are applicable to surface coal mining and reclamation operations as proposed in this Amendment and Mining Permit Application.

Suite 4500
1100 Milam Bldg.
Houston, Texas
77002

**Marsh &
McLennan**

CERTIFICATE OF INSURANCE

This is to certify that the Insurance Company listed below has issued the indicated insurance policies and they are in force at this time and that if such policies are cancelled or materially changed, the Company will give ten (10) days prior written notice to the holder of this Certificate.

Issued to: State of Utah
Division of Oil, Gas and Mining
Salt Lake City, Utah

Insured's Name and Address: Coastal States Gas Corporation
including all Affiliated or Subsidiary Companies
Coastal Tower
Nine Greenway Plaza
Houston, Texas 77046

Type of Coverage	Policy Number	Policy Term	Limits of Liability
Workers' Compensation & Employers' Liability	61WBRF 10459E (Texas)	1-1-79/80	Statutory \$500,000 ea. accident
	61WBRF 10460E (All Other)		
	61WBF 10458E (California)		
Comprehensive General Liability including Contractual	61CF 10461E	1-1-79/80	<u>Bodily Injury</u> \$1,000,000 ea. occurrence \$1,000,000 aggregate <u>Property Damage</u> \$1,000,000 ea. occurrence \$1,000,000 aggregate
	61JPRF 10463E	1-1-79/80	<u>Bodily Injury</u> \$1,000,000 ea. occurrence \$1,000,000 aggregate <u>Property Damage</u> \$1,000,000 ea. occurrence \$1,000,000 aggregate
Comprehensive Automobile Liability	61CF 10462E (All States)	1-1-79/80	<u>Bodily Injury</u> \$ 500,000 ea. person \$1,000,000 ea. occurrence <u>Property Damage</u> \$ 500,000 ea. occurrence

Date: October 15, 1979

The Hartford Insurance Group

Marsh & McLennan, Inc.

BY: Joe H. Bearden

Joe H. Bearden, Vice President

This Certificate of Insurance neither affirmatively nor negatively amends, extends or alters the coverage afforded by the policies shown.

Suite 4500
1100 Milam Bldg.
Houston, Texas
77002

**Marsh &
McLennan**

CERTIFICATE OF INSURANCE

This is to certify that the Insurance Company listed below has issued the indicated insurance policies and they are in force at this time and that if such policies are cancelled or materially changed, the Company will give ten (10) days prior written notice to the holder of this Certificate.

Issued to: U. S. Department of Interior
Denver, Colorado

Insured's Name and Address: Coastal States Gas Corporation
including all Affiliated or Subsidiary Companies
Coastal Tower
Nine Greenway Plaza
Houston, Texas 77046

Type of Coverage	Policy Number	Policy Term	Limits of Liability
Workers' Compensation & Employers' Liability	61WBRF 10459E (Texas)	1-1-79/80	Statutory
	61WBRF 10460E (All Other)		\$500,000 ea. accident
	61WBF 10458E (California)		
Comprehensive General Liability including Contractual	61CF 10461E	1-1-79/80	<u>Bodily Injury</u> \$1,000,000 ea. occurrence \$1,000,000 aggregate <u>Property Damage</u> \$1,000,000 ea. occurrence \$1,000,000 aggregate
	61JPRF 10463E	1-1-79/80	<u>Bodily Injury</u> \$1,000,000 ea. occurrence \$1,000,000 aggregate <u>Property Damage</u> \$1,000,000 ea. occurrence \$1,000,000 aggregate
XCU Exclusions Deleted			
Comprehensive Automobile Liability	61CF 10462E (All States)	1-1-79/80	<u>Bodily Injury</u> \$ 500,000 ea. person \$1,000,000 ea. occurrence <u>Property Damage</u> \$ 500,000 ea. occurrence

Date: August 9, 1979

The Hartford Insurance Group

Marsh & McLennan, Inc.

BY:

Joe H. Bearden
Joe H. Bearden, Vice President

This Certificate of Insurance neither affirmatively nor negatively amends, extends or alters the coverage afforded by the policies shown.

1.12 PERMITS AND LICENSES

Prior to commencement of construction of the mine facilities the Applicant will obtain all permits and licenses necessary for construction.

A list of all required permits and licenses including names and addresses of the issuing agencies is presented in Volume A, Appendices of this Amendment and Mining Permit Application. Identification numbers of applications or permits, if issued, and the status of pending or future permit applications also is contained therein.

1.13 IDENTIFICATION OF PUBLIC OFFICE FOR FILING OF APPLICATION

The Applicant will simultaneously file a complete copy or copies of this Application with the following agencies:

State of Utah - 7 copies
Division of Oil, Gas, Mining
1588 West North Temple
Salt Lake City, Utah 84116

Office of Surface Mining - 7 copies
Reclamation and Enforcement
Post Office Building Room 270
1823 Stout Street
Denver, Colorado 80202

United States Geological Survey -3 copies
Office of the Area Mining Supervisor
Conservation Division
8426 Federal Building
125 South State Street
Salt Lake City, Utah 84138

United States Forest Service -3 copies
Manti-LaSal National Forest
350 East Main Street
Price, Utah 84501

Carbon County Clerk -1 copy
Carbon County Court House
Price, Utah 84501

1.14 NEWSPAPER ADVERTISEMENT AND PROOF OF PUBLICATION

In compliance with federal regulations, the Applicant will publish an announcement of its intent to apply for a mining permit in a local newspaper of general circulation. The announcement will include a description of lands affected by the mining operation and will be published at least once a week for four consecutive weeks. Exhibit 1.14-1 represents the announcement as it will appear.

Proof of publication will be forwarded to the Division of Oil, Gas, and Mining and the Office of Surface Mining within four weeks after the date of publication.

LEGAL NOTICE

Coastal States Energy Company, Houston, Texas, hereby announces its intent to file an application for a coal mining permit under the laws of the State of Utah and the U.S. Office of Surface Mining (OSM).

The project, which will be known as the Skyline Mines, of Utah Fuel Company, will be operated on the leasehold interest owned by Coastal States Energy Company and Getty Mineral Resources Company. The land on which mining is to occur (except for a small tract leased from Carbon County) is a part of the Manti-LaSal National Forest 4 miles southwest of Scofield, Utah, in Eccles Canyon. The entire property is within the USGS 7.5-minute "Scofield" Quadrangle map. The approximately 6,400 acre leasehold interests involve all or part of the following coal leases which have been assigned to Coastal States Energy Company and Getty Mineral Resources Company.

<u>Federal Lease</u>	<u>Issued To</u>	<u>Date of Issuance</u>
Utah - 020305	Emmett K. Olson	3-1-62
Utah - 044076	Armeda N. McKinnon	9-1-65
Utah - 0142235	Malcolm N. McKinnon	10-1-64
Utah - 0147570	Malcolm N. McKinnon	5-1-65
Utah - 073120	Independent Coal and Coke Company	2-1-64

<u>County Lease</u>	<u>Issued To</u>	<u>Date of Issuance</u>
Carbon County Coal Lease	Kanawha and Hocking Coal & Coke Company	5-1-74

The legal description of the above listed coal leases are:

Federal Coal Lease Serial Utah-020305

T. 13 S., R. 6 E., 1E Meridian, Utah

Sec. 13: SW-1/4 SW-1/4 (Lot 7)
Sec. 14: SE-1/4 SE-1/4
Sec. 23: E-1/2 E-1/2
Sec. 24: W-1/2 NW-1/4, SE-1/4, NW-1/4, S-1/2
Sec. 25: All (Lots 1 thru 4, S-1/2 N-1/2, S-1/2)
Sec. 26: E-1/2 E-1/2
containing 1,439.40 acres

Federal Coal Lease Serial Utah-044076

T. 13 S., R. 6 E., SL Meridian, Utah

- Sec. 26: W-1/2 E-1/2, W-1/2;
- Sec. 27: Lots 1, 2, 3, 4, E-1/2, E-1/2 W-1/2
excluding Lawrence Reservoir;
- Sec. 34: Lots 1, 2, 3, 4, 5, 6, 7, 8, S-1/2,
excluding Lawrence Reservoir;
- Sec. 35: Lots 1, 2, 3, 4, 5, 6, 7, NE-1/4,
E-1/2 NW-1/4, NE-1/4 SW-1/4, N-1/2
SE-1/4;
containing 2,357.82 acres;

Federal Coal Lease Serial Utah-0142235

T. 13 S., R. 6 E., SL Meridian, Utah

- Sec. 11: S-1/2 S-1/2;
- Sec. 14: W-1/2, SW-1/4 SE-1/4;
containing 520.00 acres;

Federal Coal Lease Serial Utah-0147570

T. 13 S., R. 6 E., SL Meridian, Utah

- Sec. 10: Lots 3 and 4, E-1/2 SW-1/4 and SE-1/4;
- Sec. 15: All;
- Sec. 22: All;
- Sec. 23: W-1/2 E-1/2 and W-1/2;
containing 2,092.70 acres

Federal Coal Lease Serial Utah-073120

T. 13 S., R. 6 E., SL Meridian, Utah

- Sec. 13: Lots 1, 2, 3, 4, 5, 6, 8;
- Sec. 14: NE-1/4, N-1/2 SE-1/4;
- Sec. 24: NE-1/4 NW-1/4;
containing 557.22 acres

Carbon County Coal Lease

Township 13 South, Range 6 East SLM

Section 24: W-1/2 NE

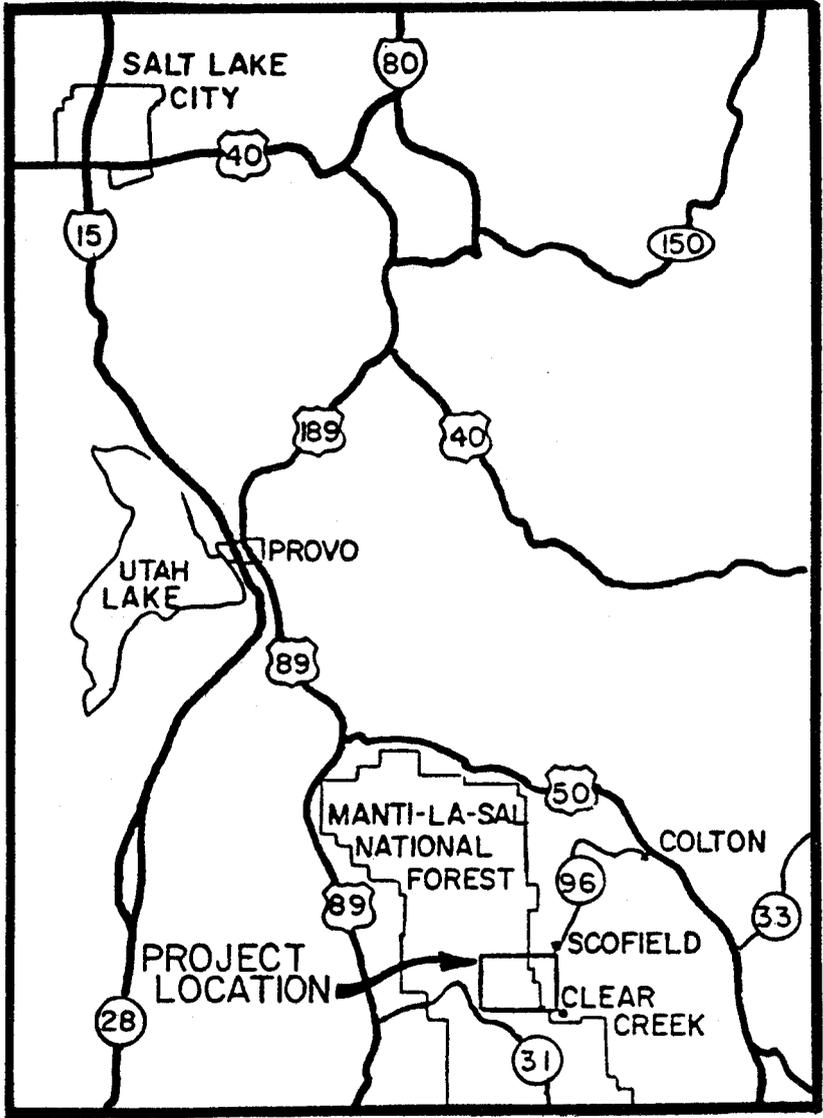
The application also includes, in addition to the federal coal leases, areas for use in building access roads and rail loading facilities. Rights-of-way and surface easements are also included for construction of a coal conveyance system from the mine portal area down Eccles Canyon to the coal storage and loadout facility at the mouth of the canyon. The rights to enter and construct these facilities were conferred by Energy Fuels Corporation.

Portions of the Forest Development Road 50227 will be relocated around the portal area in Eccles Canyon.

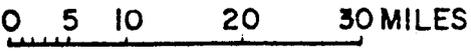
Electric Lake overlies about 38 acres of Routt County Lease U-044076 and Scofield Reservoir lies about 4 1/2 miles to the northeast of the portal area.

After filing, copies of the permit application will be available for inspection at the following locations: Utah Division of Oil, Gas, & Mining, Salt Lake City, Utah; Office of Surface Mining, Denver, Colorado; U.S. Geological Survey, Salt Lake City, Utah; Coastal States Energy Company, Houston, Texas; Getty Mineral Resources Company, Los Angeles, California.

Written comments, objections, or requests for informal conferences on the application may be addressed to the Utah Division of Oil, Gas, & Mining, 1588 West North Temple, Salt Lake City, Utah 84116, with copies to Coastal States Energy Company, 9 Greenway Plaza, Houston, Texas 77046.



VICINITY MAP



2.1 GENERAL ENVIRONMENTAL RESOURCES SUMMARY

The environmental resources in the Skyline project area have been individually studied and are addressed in this document. Much of the information presented in this environmental resources discussion is either an update of, or supplement to, the material previously published by the U.S. Department of the Interior in the SITE SPECIFIC ANALYSIS--Part 2 of the final ENVIRONMENTAL STATEMENT OF DEVELOPMENT OF COAL RESOURCES IN CENTRAL UTAH.

The Applicant has attempted to provide pertinent and complete reports for each environmental study discipline through the use of independent consultants who are recognized as experts in their individual fields. It is the Applicant's intent that by so doing, the reviewing agencies will have available to them complete and reliable data for their environmental analysis.

With the exception of the community infrastructure analysis and the climatological and air quality monitoring program, the environmental studies have been sub-contracted through the hydrologic consultant. This approach was adopted to enable a complete integration of the vegetative, fish, and wildlife aspects with hydraulic, hydrologic, and water quality considerations. The study area covers all areas to be affected during the entire life of the Skyline Mines.

The hydrologic analyses and coordination of environmental resource studies were contracted to Vaughn Hansen Associates of Salt Lake City. Drs. Stanley Welsh and Joseph Murdock combined their efforts on the vegetative and soils requirements. Dr. Robert Winget, with frequent assistance from personnel of the Utah State Division of Wildlife Resources, conducted the aquatic studies. Dr. Clyde Pritchett supervised the mammals study, and Dr. Clayton White concentrated on the birds with particular emphasis on the area's raptors. Drs. Welsh, Murdock, Winget, Pritchett, and White are all associated with the faculty of Brigham Young University. The cultural resource analyses were performed by Archeological-Environmental Research Corporation of Salt Lake City with Dr. Rick Hauck serving as project director. The geological investigations were conducted by Mr. Roy P. Full, a consulting geologist of Salt Lake City, Utah, Mr. Donald Reitz, President of Resource Technology Corporation, Westminster, Colorado and personnel of the Applicant.

Radian Corporation of Austin, Texas conducted the climatological and air quality monitoring program. Kaiser Engineers of Oakland, California prepared the community infrastructure analysis.

Summaries of each of these studies are included in this Part 2 of the Application. To a large extent, the summaries presented as Sections 2.3 - 2.5 and 2.7 - 2.13, were prepared by the individual consultants as a synopsis of their study results. (Brief studies may be included in their entirety.) The complete reports with substantiating documentation and methodologies are presented in Volumes A-1, A-4, and A-5, Appendices.

Numerous color photographs have been taken of the area which show pre-project conditions. Photographic subjects include the areas proposed for portal and load-out facilities, existing and proposed roads, the proposed conveyor route, streams, the existing gas pipeline, proposed waste material disposal and soil storage areas, and major geologic features. Photographs were taken from the ground and the air. A helicopter was utilized to obtain a different perspective of the proposed surface facilities area and to reach areas which were inaccessible from the ground. These photographs are presently being catalogued and are in the possession of the Applicant. Copies will be made available to the U.S. Forest Service upon request. Additional photographs were taken by the consultants of the vegetative reference plots and are presented in the Vegetation Report of Volume A-5, Appendices of this Application. The Applicant has additionally provided three aerial photographs depicting the proposed mine site, load-out site (mouth of Eccles Canyon) and portal site areas in Volume A-6, Appendices.

Description of Cultural, Historical and Archaeological Resources

The Applicant initiated a variety of cultural resource evaluations involving the Skyline permit and adjacent areas. These evaluations included the following:

- A detailed literature search for all known historic and prehistoric sites within the project area was conducted utilizing records of the Archeological-Environmental Research Corporation and the files at the State Historic Preservation Office.

- Previous negative-result surface evaluations within the general project area were used as a random sample survey (on the BLM Class II level) for cultural sites; hence additional sample surveys of the project area to determine site presence and density were not taken, nor requested, by federal and state officials.
- All surfaces on both U.S. Forest and private lands scheduled to be disturbed during explorational activities and mine development (e.g., drill holes, access roads, and service areas) were intensively evaluated for historic and prehistoric cultural resources.

During mining operations, subsurface cultural remains encountered will be protected, by the Applicant, from further disturbance until a professional archaeologist can evaluate the resource and initiate any appropriate salvage/preservation action.

The evaluation reports of the cultural and historical resources are presented in Volume A-5, Appendices. Although during a surface survey the remains of two historic structures were found, the sites were reported to be of marginal resource value and, since peripheral to the zone of proposed construction, are not endangered by the Skyline project. No cemeteries, National Trails or Wild and Scenic Rivers, public parks or National Register status properties exist on or adjacent to the project area. No surface mines, active or abandoned, exist on the project area. The surface facilities area of the old abandoned underground Eccles Mine will be completely encompassed by the Skyline Mines portal facilities.

Copies of the survey reports, including those referenced in the SITE SPECIFIC ANALYSIS - Part 2, final ENVIRONMENTAL STATEMENT OF DEVELOPMENT OF COAL RESOURCES IN CENTRAL UTAH, are included in Volume A-5, Appendices.

2.2 GEOLOGY

Comprehensive geological evaluations of the Skyline permit area, performed by and for the Applicant, have established the baseline environmental data necessary for mine development. Future studies will be necessary to refine present concepts, monitor the existing geological/hydrological environment and provide additional data to be used for the continual mine planning process. Continuation of this work will maximize the recovery of coal reserves by allowing increased accuracy in predicting coal seam discontinuities and will optimize safety by early identification of geology-related potential mine hazards. Continuation of geological evaluations will also provide realistic recognition and assessment of any environmental impacts associated with the proposed coal mining.

2.2.1 Location and Access

The Skyline permit area is located in Carbon and Emery Counties, Utah, approximately 22 miles northwest of Price, the county seat of Carbon County (Volume 1). The permit area is near the north end of Wasatch Plateau, in mountainous terrain approximately two miles southwest of Scofield, Utah. Scofield is situated in Pleasant Valley, and is accessible by an all-weather road, Utah State Highway 96. This highway intersects U.S. Highways 6 and 50 at Colton Junction, approximately 15 miles to the northeast of Scofield, Utah. From Colton Junction, U.S. Highways 6 and 50 follow Spanish Fork Canyon westward to Thistle, and then northwestward to the Interstate 15 junction at Spanish Fork. From Colton Junction southeastward, U.S. Highways 6 and 50 follow Price Canyon to Price, Utah, and continues on to junction with Interstate 70 a few miles west of Green River, Utah.

- * Utah State Highway 31 passes within four miles of the western permit boundary. From that point, it is about three miles farther west to Fairview, Utah, where U.S. Highway 89 leads northward to Thistle, and southward to Interstate 70 near Salina.

The Denver and Rio Grande Western Railroad maintains a spur which connects the Utah No. 2 mine (east of the Skyline permit area, in Pleasant Valley) with the main line at Colton Junction. This spur will service the Skyline Mines as well as the Utah No. 2 mining operation.

2.2.2 Previous Investigation

Early geologic reports by Spieker (1931) and Waltron (1955) describe the salient geologic features of the northern part of the Wasatch Plateau. Doelling (1972) compiles the profuse data on the coal fields of Utah and includes a section on the Scofield NW quadrangle (7 1/2 min.) which encompasses the Skyline permit area (p 217-224). Doelling's discussion of the Wasatch Plateau coal field (p. 58-132) provides a regional overview.

In 1973, a detailed evaluation of the coal reserve was undertaken by Sanders and Associates, Inc. of Kaysville, Utah. Core drilling records from early exploration by Malcolm N. McKinnon were evaluated and a drilling program was initiated to determine the extent, quantity, and quality of coal seams at a mineable depth. Sanders' study continued through 1977, and made use of records of more than 75 drill holes.

2.2.3 Production History

The abandoned Eccles Canyon Mine is the only mine present within the permit area. This mine is located in the south side of Eccles Canyon and was reportedly worked intermittently from 1899 to 1952. The Lower O'Connor "A" seam was mined. The extent of mining is unknown but is believed to be small and relatively insignificant. The approximate outlines of this mine and other mine workings immediately adjacent to, but outside the permit area, are presented on Map G-2 (Volume A-2, Appendices). The Belina Mine is the only active operation within the map area.

A report by Roy P. Full outlines the history of the entire mining district (Volume A-1, Appendices) and includes a mine map of the district (Geology Report Figure 3).

2.2.4 Investigations - 1979

Staff geologists and independent consultants cooperated in acquiring and evaluating the data summarized herein. Photogeology, surface mapping, drilling and seismic surveys were used to develop new data and to test projections based on older data.

Drilling and coring operations, in addition to seismic reflection surveys, were conducted during the summer of 1979. Preliminary results of these studies support the consulting geologist's (Roy P. Full) interpretations. A complete set of these new data will be presented to the Area Mining Supervisor, U.S. Geological Survey, in Salt Lake City, Utah after the data is reformatted, compiled, and interpreted.

An important objective of the 1979 drilling program was to develop baseline hydrologic data on the basis of the drilling results. This hydrologic data is incorporated into the hydrologic report prepared by Vaughn Hansen Associates, a Salt Lake City, Utah, consulting firm (see Volume A-1, Appendices). Also important to the proposed mining operation is the baseline data regarding the potential acidity or alkalinity of the strata immediately above and below the coal seams to be mined.

The base maps and contour maps in Volumes A-1 and A-3, Appendices were prepared by the Applicant. These maps differ from Full's maps in scale. Applicant prepared maps are at a scale of 1:6000 rather than 1:24,000 and are computer drawn. Radian Corporation's CPS-1 program was used on an IBM 370 computer, equipped with a Calcomp plotter. The gridding process utilized the piecewise least squares algorithm, a smoothing filter, and finally a resampling step. No kriging algorithm was available. Computer drawn maps were compared with Full's maps, and the differences found were within the estimated limits of map accuracy given the spacing of drill holes and outcrop data. Full's maps illustrate the geology more clearly than the cumbersome large scale computer maps, and at a convenient topographic map scale. The computer maps are needed for comparison with mining maps of the same scale, and provide required information and maps not included in Full's report.

Forty-three borehole logs were photographically reduced to a scale of 40 feet = 1 inch and are presented in a common format in Maps G-19 thru G-61 (Volume A-3, Appendices). Geophysical logs are shown for most holes. Other boreholes either had no geophysical logs run, or the logs were uninterpretable. The cuttings and core descriptions are represented graphically to facilitate log interpretation.

Other studies were independently conducted which provided additional geologic data. Dames and Moore, Salt Lake City, Utah, performed geotechnical studies in the Eccles Canyon area where the proposed surface facilities will be located. In conjunction with the geotechnical work, the Dames and Moore report (Volume A-4, Appendices) describes the geology of strata down to and including the stratum immediately below the coal seams to be mined.

2.2.5 Stratigraphy

Spieker (1931), Doelling (1972), and Full (Volume A-1, Appendices) reported on the geology of the Skyline permit area and vicinity. The description of the geology which follows is mostly a synthesis of their findings.

Rocks mapped by Full (1979) on the Skyline permit area (Plate 1) and adjacent areas are of Upper Cretaceous age. The oldest, the Star Point Sandstone, underlies the coal-bearing Blackhawk Formation. Within the Blackhawk Formation, Full (Volume A-1, Appendices; Geology Report p. 23) has identified a persistent sandstone unit which he correlated with Aberdeen Sandstone Member found farther east. Overlying the Blackhawk is the Castlegate Sandstone, the basal member of the Price River Formation, and the youngest unit exposed in the area. Figure 2.2.-1 (taken from Full, Volume A-1, Appendices, Report Figure 7) shows the generalized stratigraphic sequence.

Star Point Sandstone

The Star Point Sandstone is a prominent cliff-former and an important marker horizon throughout the region. The unit is the basal formation of the Mesaverde Group in the Wasatch Plateau, which overlies the Mancos Shale. Spieker (1931) describes the contact between the Star Point and the overlying Blackhawk Formation as a "smooth, clear-cut surface, easily recognizable and usually well exposed". This surface occurs where the massive sandstone of the Star Point is overlain by less resistant beds of the Blackhawk Formation. The abrupt change in lithologies at the upper contact is a convenient contact for surface mapping and is easily recognizable in subsurface logs. In addition,

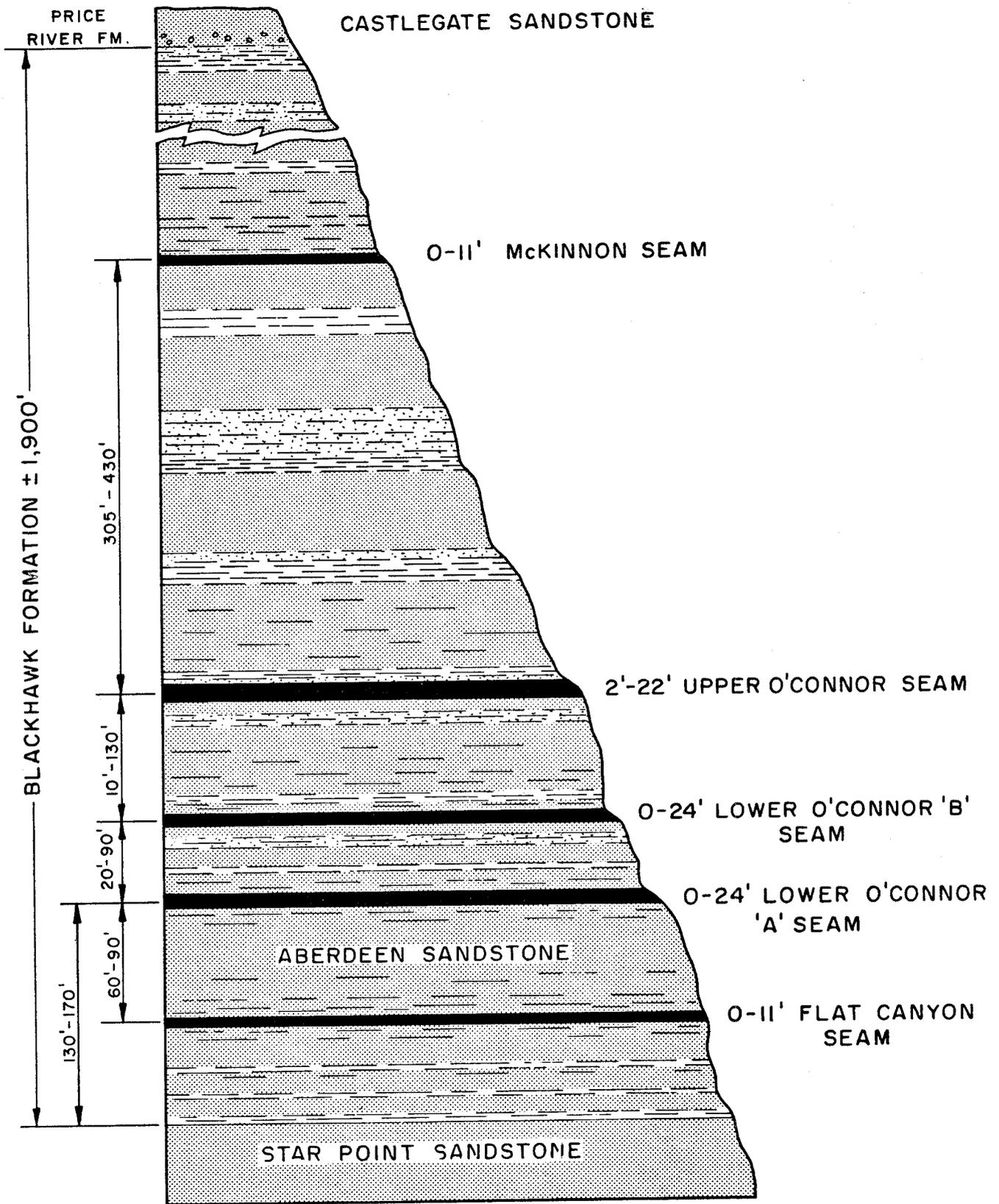


FIGURE 2.2-1 GENERALIZED COLUMNAR SECTION -
ECCLES CANYON AREA

it occurs at the change from littoral to continental deposition. Spieker (1931, p.24) estimates a Blackhawk Formation thickness of more than 1000 feet in Pleasant Valley, a thickness twice that of the type section at a location only seven miles to the east.

Only the upper part of the Star Point Sandstone is exposed in the area. No outcrops occur on the Skyline permit area, although the formation does outcrop east of the Connelville Fault in the South Fork of Eccles Canyon and about 1800 feet east of the Manti La-Sal National Forest boundary in Eccles Canyon.

The upper part of the Star Point Sandstone is mostly a fine to medium-grained, sub-rounded to well rounded, light-colored sandstone, with a "salt and pepper" appearance. Approximately the top 20 feet tend to have a pronounced white appearance in outcrop. The massive beds exposed in the Skyline area are moderately well consolidated.

Blackhawk Formation

The Blackhawk Formation is the coal-bearing division of the Mesaverde Group in the Skyline area. Full (1979) mapped the formation for most of the leasehold (Geology Report - Plate 1). The lower formational contact with the Star Point Sandstone is generally sharp, but inter-tonguing may be present locally. Only on the high ridges in the northwest corner of the permit area, is the overlying Castlegate Sandstone present. Similar to the Star Point Formation, the Blackhawk Formation is atypically thick in the Skyline area and ranges from 1700 to 1900 feet in thickness where the complete section is present.

Full (1979) observed only one persistent marker horizon within the Blackhawk Formation. Full correlates this unit with the Aberdeen Sandstone Member of the western Book Cliffs field. Spieker (1931, p. 16, 28, 36) traced the Aberdeen Sandstone southward along the eastern margin of the Wasatch Plateau as far as Gentry Mountain. Spieker considered the sandstone to be the chief guide to the identity of the Castlegate "A" coal bed, a bed which Full (Geology Report, p. 23) equates with the Lower O'Connor "A" bed. This sandstone allows a tripartite division of the Blackhawk into a lower coal-bearing unit, the Aberdeen Sandstone unit and an upper coal-bearing unit.

The lower coal-bearing unit of the Blackhawk consists of 100 feet of fine-grained sandstones and siltstones, with zones of dark, carbonaceous shale and siltstone. The uppermost carbonaceous zone contains, in places, one or more thin lenticular coal beds. The thickest of these beds is usually referred to as the Flat Canyon seam, and is reported to be of mineable thickness over an area of approximately 1100 acres in the southwest corner of the permit area. Seam thickness diminishes rapidly however to the north and east, and perhaps in all directions (Geology Report, Plate 9). No detailed megascopic descriptions of the seam are available.

The top of the Aberdeen Sandstone Member occurs 130 to 170 feet above the top of the Star Point Sandstone, in the lower part of the Blackhawk Formation. (See Map Cross Sections G-15 thru G-18, Volume A-3, Appendices). The Aberdeen Sandstone ranges in thickness from 20 to greater than 60 feet, and is similar in appearance to the Star Point Sandstone previously described. No marine shale is apparent at the base of the sandstone, although a thin tongue of Mancos Shale is reported by Young (1966, p. 13) as being present in the Book Cliffs. The Aberdeen Sandstone tends to grade upward from fine-grained at the base to medium and course grained at the top and contains thin shaley intervals near the base. The conspicuously white upper few feet of the sandstone is significant because it generally lies immediately beneath the lowest coal seam to be mined. The chalky white appearance and the texture of this interval is similar to the uppermost part of the Star Point. The white color is imparted by the presence of a clay matrix which apparently formed diagenetically due to the action of acid waters from the overlying coal swamp (Young, 1966, p. 13) or as a result of subaerial weathering (Geology Report, p. 24). Up to five percent clay matrix is present in the top few feet of this predominantly quartz sandstone.

In sharp contact with the Aberdeen Sandstone is the overlying, upper coal-bearing unit of the Blackhawk Formation. This interval appears to be similar to the Blackhawk stratigraphy described by Marley (1978) and drilled extensively by the Applicant and the U.S. Geological Survey in the southern Wasatch Plateau, although the intervals compared are not stratigraphically equivalent. This comparison is made without the benefit of the detailed outcrop mapping which Marley performed.

Based on geophysical borehole logs and observations by Full (1979) the similar features of the two areas include:

- A basal zone of sandstones, siltstones, carbonaceous shales, and economically important coal beds;
- An interval several hundred feet above the underlying littoral sandstone with very lenticular coal beds which may thicken from less than four feet to more than eight feet within a horizontal distance of less than 1000 feet;
- Very thin and lenticular coal beds interspersed throughout the Blackhawk Formation;
- Sandstone bodies which can be differentiated on the basis of grain size, thickness, structure, and type of basal contact; and
- An upward increase in the frequency of large, lenticular sandstone bodies.

Blackhawk Formation sandstones described by the Applicant's consultants and geologists are generally buff to gray, but weather to orange and red-brown as outcrops. Unweathered samples may be similar in appearance to the Star Point and Aberdeen Sandstones, but tend to have more clay matrix. As in the sandstones described by Marley (1978), they range in grain size from very fine to coarse, are thin to thick bedded, may be massive or exhibit cross-bedding or other structures, and basal contacts tend to be sharp and erosional in all but some of the very thin, tabular bodies. Within Skyline area, the geometry of these sandstones has not been determined due to the lack of adequate surface exposures and the spacing of boreholes. It has been inferred that these sandstones are analogous to those described by Marley, and that geometries will be similar, even though some differences may occur due to different environmental settings. The Skyline area is much nearer the axis of the Rocky Mountain geosyncline, and as a result, the Cretaceous section is much thicker.

Argillaceous rocks of the Blackhawk Formation include green and gray claystone, clay shale and silty shale. Carbonaceous and coaly rocks are present in every gradation and range from slightly carbonaceous shale to pure coal.

Three mineable coal seams are present in the basal coal zone of the upper coal-bearing unit of the Blackhawk Formation. In ascending order, they are the Lower O'Connor "A", the Lower O'Connor "B", and the Upper O'Connor seams. These coals are of high-volatile B rank and in general contain few partings and little pyrite. Hoover (1979) describes these coal seams as attrital, with midlustrous attrital being the most common coal lithotype. Some resin was observed in all three seams.

The upper coal zone of the upper coal-bearing unit of the Blackhawk Formation generally contains carbonaceous shales and thin coal beds. This zone occurs from 480 to 590 feet above the Aberdeen Sandstone Member. These coals are discontinuous with only local development of mineable thicknesses. In the southeast corner of the leasehold area, a coal bed known as the McKinnon seam appears to be of mineable thickness over an area of approximately 1100 acres. Similar to the lower mineable coals, the McKinnon seam is of high-volatile B rank. This seam differs from the lower mineable coals in that partings are common (Geology Report (Full), p. 34), lateral thickness changes are pronounced, and correlations are difficult. In addition, Hoover (1979) notes that the McKinnon seam is often very rich in megascopic resin.

Castlegate Sandstone

The Castlegate Sandstone is the basal member of the Price River Formation, and is the sedimentary unit in the area. The Castlegate is exposed only in the northwest corner of the property, where a maximum of 300 feet is present and rests unconformably on the Blackhawk Formation. The coarse-grain tan to brown sands with minor amounts of conglomerate contrast with the finer-grain sandstones and shales of the Blackhawk Formation. The contact is easily mapped where the Castlegate has not been completely eroded.

Intrusive Igneous Rocks

Lamprophyre dikes have been reported cutting the sedimentary rocks in the area. The age of the intrusive rocks is not known, although no dikes have been observed to cut Tertiary rocks in the area. Where dikes cut the coal seams east of Pleasant Valley, a band of from two to ten feet of metamorphosed coal is found adjacent to the dike. The dominant trend of dikes is almost due east.

Surficial Deposits

Unconsolidated soil, gravel, alluvium, landslide deposits, etc., mask many of the geological features of the Skyline permit area. A description of these deposits is beyond the scope of this section. Soils and Geotechnical Study Reports which evaluate these materials are included in Volumes A-4 and A-5, Appendices.

2.2.6 Structural Geology

The Clear Creek anticline is a major structural feature of the northern Wasatch Plateau. In the Skyline area, large faults of the Pleasant Valley fault zone form a north-south oriented graben along the axis of the anticline. The permit area is situated on the western limb of the anticline. Strata dip to the northwest at the north end of the permit area, almost west at Eccles Canyon, and southwest at the south end of the permit area. Dips range from three to six degrees on the permit area (see Plate 1).

Walton (1955) published a map showing the major faults within the Skyline permit area (see Volume A-1; Geology Report, Figure 5). Faults and other "fracture zones" confirmed by Full (1979) are shown in Plate 1. Full (1979) discusses these features in considerable detail. Nearly vertical faults trend north-south to northeast-southwest in the area. The largest of these, the Connelville Fault, forms much of the eastern boundary of the permit area. In the fault block east of the Connelville Fault, the Belina Mine has encountered very small displacement, east-west faults which deviate from vertical with angles of up to 30 degrees.

Of the three major fracture/fault features known to have displacement, only the Connelville Fault is sufficiently developed to displace structural contours. The second fault (known locally as the Valentine Fault), and the North Joes Valley Fault are thought to have considerably less displacement than the Connelville Fault. All three faults gradually disappear to the north. The Connelville and Valentine Faults are vertically displaced downward to the west, and the North Joes Valley fault is vertically displaced downward to the east.

Full notes that the Connelville Fault is a complex zone with a width of up to 1000 feet. The cumulative displacement across the zone appears to increase from approximately 55 feet in the Winter Quarters Mine north of Skyline, to 200 feet or more near the southern edge of the Skyline permit area. Individual faults within the zone have much smaller, and highly variable displacement. The Connelville Fault, as shown in Plate 1 and on numerous other maps presented as a part of this Application, is near the western edge of the complex zone, although segments of the zone may be encountered west of the map location shown.

The Valentine Fault is located approximately midway between the eastern and western borders of the permit area and has a curvilinear trace oriented nearly north-south. Similar to the Connelville Fault, the Valentine Fault has a displacement which diminishes to the north. Maps G-4 to G-14 and Plate 1 show the interpreted extent of the fault within the permit area. Displacement is probably on the order of a few tens of feet along two or more splits in a zone 200 or 300 feet wide. The structure contour maps and cross sections do not reflect this poorly defined feature.

The North Joes Valley Fault can be traced nearly one mile northward from the southwest corner of the permit area to where it disappears under the alluvial deposits of Huntington Canyon. It has a displacement of 80 to 100 feet approximately one half mile south of the permit area boundaries and has not been observed in the northern part of the permit area. In order to avoid potentially unrealistic extrapolation of available geologic data, the extent and displacement of the North Valley Joes Fault is not shown on Maps G-4 thru G-18.

The locations of small or questionable faults and fractures, and features which suggest the presence of structures (e.g. slumps, springs) are discussed in Full's Geology Report (Volume A-1, Appendices).

2.2.7 Mineable Coal Deposits

The three mineable coal seams in the permit area; (Refer to Section 3.1 for Rationale Used in Determining "Mineable" Coal Seams.) the Lower O'Connor "A", the Lower O'Connor "B", and the Upper O'Connor, occur in a zone immediately overlying the Aberdeen Sandstone Member of the Blackhawk Formation. Characteristics of these seams and their enclosing strata, which affect mineability are summarized in the following discussion. Analyses of coal seams are tabulated and discussed in Full's Geology Report (Volume A-1, Appendices). Analyses of floor and roof materials are summarized later.

Lower O'Connor "A" Seam

The Lower O'Connor "A" seam is completely absent or badly split with rock partings in the southeast part of the permit area, but reaches a maximum thickness of 25 feet near the northern boundary of the permit area. The seam is, stratigraphically, the lowest coal which is mineable within the permit area. It rests directly on the Aberdeen Sandstone, or is separated from it by a few feet of siltstone, mudstone, and shale. The overlying or roof strata include sandstone, siltstone, mudstone, and shale, which are often interbedded and interlaminated. Where sandstone forms the floor or roof, the contact is generally sharp. Several inches of softer carbonaceous or coaly claystone or mudstone may form a gradational contact. Most floor and roof strata are well indurated. Near the South Fork of Eccles Canyon, and in the vicinity of Electric Lake, the separation between the Lower O'Connor "A" and the Lower O'Connor "B" seams becomes small and the former seam is not considered mineable for this area. The Lower O'Connor "A" seam geologic maps are presented as Maps G-4 thru G-7 (Volume A-2, Appendices) and as Plates 7 and 8 in the Geology Report (Volume A-1, Appendices).

Lower O'Connor "B" Seam

The Lower O'Connor "B" seam is of mineable thickness over the southern two-thirds of the permit area, but is thin or absent to the north. In the southwest corner of the permit area, the seam reaches its maximum thickness of nearly 17 feet. The floor and roof strata are comprised of rock types found in the Lower O'Connor "A" roof, and common to this coal zone. The interval separating the Lower O'Connor "B" and the uppermost seam of the zone, the Upper O'Connor seam, thickens northward and ranges from less than two feet to more than 100 feet where the Lower O'Connor "B" seam thins to four feet. The Lower O'Connor "B" seam geologic maps are presented as Maps G-7 thru G-11 (Volume A-2, Appendices) and as Plates 5 and 6 in Full's Geology Report (Volume A-1, Appendices).

Upper O'Connor Seam

The Upper O'Connor seam is thickest in the east central part of the permit area where a maximum thickness of 19 feet is reported. The seam thins to less than six feet in the southwest portion of the permit area, and to less than three feet along most of the northern boundary. Floor and roof strata are interbedded and interlaminated sandstone, siltstone, mudstone, and shale. The upper and lower contacts of the coal may be either sharp or gradational, as is the case with the previously described seams. Upper O'Connor seam geologic maps are presented as Maps G-11 thru G-14 (Volumes A-2 and A-3, Appendices) and as Plates 3, 4, and 5 of Full's Geology Report (Volume A-1, Appendices).

Coal Reserves

Presented in the Geology Report of Volume A-1, Appendices are calculations of the total mineable (not recoverable) reserves for the three mineable coal seams. Report estimates include that tonnage within the now abandoned, but unleased for coal, 121.5-acre Lawrence Reservoir site. This unleased area is outlined on the large-scale geologic maps prepared by the Applicant but not on Full's report maps. Full considers his tonnage estimates to be in the measured category, although the economic recoverability of four-to-five-foot thick (approximately 2% of total mineable reserves) coal is questioned.

A tabulation of coal seam thicknesses and depths is included in Full's Geology Report. This table can be consulted to identify coal seams on the geophysical logs presented as Maps G-19 thru G-61 (Volume A-3, Appendices). Results of the coal core analyses are tabulated and averages are calculated by Full and presented in his report.

Coal cleat directions are not known, although some evidence is available which allows an estimate of cleat orientation. Dames and Moore (Volume A-4; Appendices, Geotechnical Report, Plate 4) measured sufficient joint attitudes in the portals area to indicate that most joints trend either north-south or east-west. In many areas, coal cleat orientations parallel joint orientations in the overlying rocks. However, the foregoing is not always true, and the projection of such a prediction for a large distance is speculative.

2.2.8 Other Mineral Deposits

Natural gas is the only mineral resource, other than coal, reported in the permit area. The Clear Creek Gas Field was discovered in 1951 and is apparently nearing depletion. Two boreholes, presumably natural gas tests, have been drilled and abandoned on the site area. The T. F. Kerns No. 1 was drilled to a depth of 5,825 feet in Section 13, Township 13 South, Range 6 East. In Section 23 of the same Township, the Superior Oil Federal No. 1-23 was drilled to 362 feet. No drilling records or geophysical logs are available from the Utah Division of Oil, Gas, and Mining, American Stratigraphic Company, or Petroleum Information at this time. Locations of these holes are shown on Map G-3.

2.2.9 Environmental and Engineering Geology-Study Results Summary

The Applicant has compiled substantial geologic information necessary to assess and monitor the potential environmental impacts of the proposed coal mining. General geology, hydrology, engineering geology and geochemistry were the principal topics of study.

General Geology

The geologic report by Full (Volume A-1, Appendices) and the preceding geologic summary describe the surface and subsurface geology of lands within the proposed mine plan area which are underlain by coal to be extracted. The geology of the three mineable seams is also described. Maps included as part of this Application illustrate: surface geology (Plate 1), coal seam overburden (Maps G-5, G-9, and G-13), coal seam structure (Maps G-4, G-8, and G-14), and interburden between mineable coal seams (Maps G-7, G-11). A topographic map of the Skyline permit area shows all drill holes on the property (Map G-1). Drill holes used for the coal evaluation are posted together with collar elevations on a base map of the permit area (Map G-3). Geophysical well logs with graphical interpretations provide lithologic details of the entire geologic section including the coal seams, their roof and floor materials, and the unit below the lowest seam to be mined (Maps G-19 thru G-61). Mine workings on or adjacent to the Skyline permit area are outlined on Map G-2.

Hydrology

Vaughn Hansen Associates has prepared a Hydrologic Inventory (Volume A-1, Appendices) Report describing the location of surface water which will be exposed at the face-up area, and the location of subsurface water. Springs and seeps in the Eccles Canyon area are mapped (Volume A-1, Hydrologic Inventory Report, Plate 5). Plate 7 of the Hydrologic Inventory Report shows ground water contours.

Engineering Geology

Dames and Moore determined the geology and physical properties of each stratum to be affected by surface operations and facilities. (Their report is presented in its entirety in Volume A-4, Appendices).

Geochemistry

Chemical analyses required to identify horizons which contain potential acid-forming, toxic-forming, or alkalinity producing materials are included in the geotechnical study reports prepared by Dames and Moore (Volume A-4, Appendices).

Analyses were performed on 24 core samples of roof and floor strata for each of the three seams to be mined. The potential acid-forming or alkalinity-producing materials in the strata to be affected by mining are assessed (See Table 2.2-1). Samples included sandstone, siltstone, and shale material. Many samples contained carbonaceous material. No relationship is apparent between any of the analyses and the lithologic or stratigraphic position of a particular sample. The samples are all slightly alkaline and low in sulfur content.

Clay content of floor samples was not determined analytically. The lithology of the stratum immediately below the mineable coals varies from borehole to borehole. Accordingly, clay content will range from almost 100% in a pure claystone, to less than 5% in a submature or mature sandstone.

Pyrite, marcasite, and sulfur content of the three mineable coal seams are determined by the standard "forms of sulfur" analysis (Volume A-4, Appendices; Geotechnical Report, Table VIII). Marcasite was not determined directly for the following reasons:

- The standard wet chemical analysis (ASTM D 2492) determines iron soluble in nitric acid, and calculates from this the pyrite content. This test does not separate marcasite values from pyrite values and merely reports the total as pyrite.
- On a dry basis the three mineable seams average from 0.55 to 0.62 percent total sulfur by weight. On the same basis, pyritic sulfur averages from 0.07 to 0.21 percent. Even if all the pyritic sulfur were marcasite, it would not be sufficient to cause acid mine drainage problems.
- The Applicant consulted with Commercial Testing and Engineering Laboratories, Inc. in Denver, Colorado, and Standard Laboratories, Inc. in Charleston, West Virginia, and did not find an accurate and quantitative method to determine marcasite content in coal.

Table 2.2-1

SUMMARY OF 24 ANALYSES*

ANALYSIS	Max.	Min.	Mean	Standard Deviation
Water Soluble Alkalies				
(Dry Basis)				
Na ₂ O	0.025	0.007	0.009	0.004
K ₂ O	0.032	0.005	0.018	0.010
Sulfur Forms				
(Dry Basis)				
Pyritic	0.83	0.03	0.14	0.18
Sulfate	0.03	0.00	0.01	0.01
Organic (Diff)	0.42	0.00	0.05	NA
Total	1.26	0.02	0.20	0.27
Acidity (pH)				
Equipotential	8.58	7.10	8.04	0.37
1:5	8.92	7.27	8.45	0.39
1:20	9.06	7.10	8.65	0.54

*Analyses will be filed with the Area Mining Supervisor, U.S.
Geological Survey, Salt Lake City, Utah

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p. 7-21.

2.3 GROUND WATER HYDROLOGY

The principle factor controlling the occurrence and availability of ground water in any area is geology. Nearly all of the region surrounding the project area is underlain by rocks of continental and marine origin, consisting predominately of interbedded sandstones and shales (see Section 2.2). The existence of these relatively impermeable shales tends to limit the ability of the rock units in the area to yield a significant amount of water for extended periods of time due to the recharge impediment.

The project area is located in the headwaters of the Price and San Rafael River Basins (see Figure 2.3-1). Wells in these basins normally yield less than 50 gallons per minute. In the immediate vicinity of the project area a yield of only 10 gallons per minute can be expected. Exceptions to these yield estimates occur where wells penetrate highly fractured sandstones.

Rock strata in the mountainous areas near the project area have low specific yields (0.2 to 0.7 percent) and low hydraulic conductivities. The volume of recoverable water is small, averaging less than 600 acre-feet per square mile in the upper 100 feet of saturated rock.

Ground water quality in the Price and San Rafael River Basins deteriorates in a downstream direction. Dissolved solids content of the ground water ranges from less than 250 milligrams per liter in the headwaters near the Skyline permit area to approximately 3000 milligrams per liter near the confluence of the two rivers with the Green River. This large increase results from the contact of the water with fine-grained units, particularly the saline Mancos Shale.

2.3.1 Geologic Setting of the Ground Water System

The Skyline permit area lies in the northern end of the Wasatch Plateau, on the west edge of the Clear Creek anticline. As such, the dip of the strata is generally towards the west, varying between six percent (three degrees) and ten percent (six degrees).

With the exception of local alluvial deposits, all of the units exposed on and immediately adjacent to the project area are formations of the

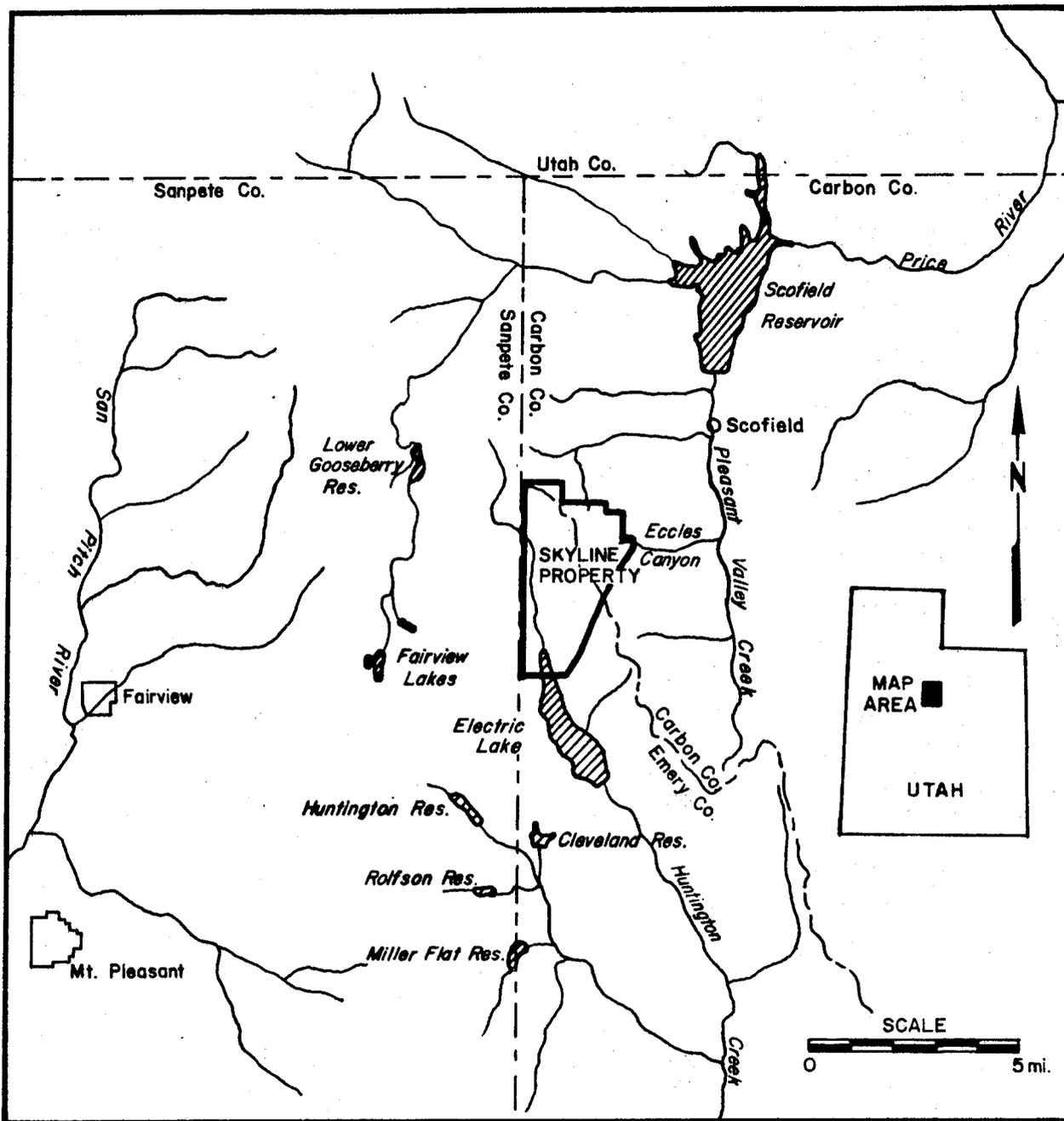


Figure 2.3-1. Location of the Skyline project Area

Cretaceous Mesaverde Group. The Star Point Sandstone is a massive, medium-grained sandstone which is approximately 1000 feet thick and nearly devoid of shale in the project area.

The Blackhawk Formation, which immediately overlies the Star Point, is an interbedded formation of sandstones, shales, siltstones, and coal. The sands of the Blackhawk Formation are fine- to medium-grained, tending to have locally high clay contents. An exception to this is the Aberdeen Sandstone, a coarse-grained sand with a thickness of 20 to 80 feet which can be traced throughout the region. The shales of the Blackhawk Formation are irregularly bedded. Due to their bentonitic tendency, they swell when wet and form an effective barrier to the vertical movement of water. 7

The youngest geologic unit in the permit area is the Castlegate Sandstone, found only in a small area in the northwestern portion of the permit area. This unit consists of massive medium- to coarse-grained sandstones with interbedded conglomerates near the base.

Faults within the permit area occur as zones, with individual slips being clean, sharp displacements. Displacements are normally small (less than 20 feet) with the exception of the Connelville Fault, which forms the eastern boundary of the permit area. It is suspected that faults have only local hydrologic importance within the Blackhawk Formation because of its high clay content, giving it an ability to rapidly seal. In contrast, faulting within the Star Point Sandstone probably increases its water yielding capacity through the creation of secondary porosity.

A detailed discussion of the geological characteristics of the project area is presented in the preceding section.

2.3.2 Characteristics of Seeps and Springs

As a result of field investigations during the low flow season, 174 seeps and springs were located on and immediately adjacent to the

Skyline project area. This equates to an average of one water source for approximately every 40 acres existing in the area, not including the perennial streams. As a result, the travel distance between water supplies is short for the wildlife and sheep which utilize the area. Therefore, should a frequently-used spring dry up as a result of mining impacts, animals using the water supply would not be greatly affected.

Geologic conditions play an important role in the occurrence of springs in the project area. A majority of the springs issue from west-facing slopes, often at a sandstone-shale interface considerably above the adjacent stream bed. Apparently, water which infiltrates into the soil and is not consumptively used percolates down until an impeding shale lense is met. It then follows the shale member downdip until an outlet is reached (either the surface or a discontinuous sandstone member). Thus, deep ground water recharge is apparently slow in the project area due to the presence of a large amount of shale.

Very few seeps and springs in the project area appear to be fault-related, due to the sealing ability of the Blackhawk Formation. Instead, spring water appears to originate in the small surface depressions or basins in the immediate vicinity.

Sustained flows from individual springs tend to be low. Only four of the springs were measured having flows greater than or equal to 10 gallons per minute during the fall, low-flow inventory. Most measurements were two gallons per minute or less. Approximately 30 percent of the sources were seeps, some of which had dried entirely during the previous summer. Flows at a given spring may vary by as much as one order of magnitude during the year, with the higher flows occurring during the snowmelt season. This observation further substantiates the theory that water supplying the springs is generally very local in origin. Water originating from a deeper, more regionalized source would normally provide a more constant flow. It also implies that flows from springs are quite sensitive to the amount of precipitation received during the previous winter (as substantiated following the dry winter of 1977--see Hydrologic Inventory Report, Volume A-1, Appendices).

2.3.3 Stream Seepage

Approximately 19 percent (3.03 inches) of the average annual flow of Huntington Creek above Electric Lake is contributed by ground water. In contrast, ground water yield accounts for nearly 64 percent (8.59 inches) of the average annual yield of Eccles Creek above Pleasant Valley Creek. The principle cause of the high ground water yield in Eccles Canyon relative to Huntington Creek is the Star Point Sandstone, which is present over approximately 25 percent of the surface of Eccles Canyon but does not appear on the surface in the Huntington Creek Basin.

To better define recharge-discharge conditions for major streams in the area, seepage studies were conducted on the Main Fork of Eccles Creek, the South Fork of Eccles Creek, and Huntington Creek. The studies were conducted by measuring the flow rate and collecting a water quality sample at selected points along the stream segment and at points of major tributary inflow.

Significant changes occur in the Main Fork of Eccles Creek when it crosses the Star Point Sandstone. These changes are especially noticeable at the O'Connor Fault, which crosses the stream at a point about one mile downstream from the confluence of the Main and South Forks. This fault apparently acts as a conveyance structure in the fractured Star Point, discharging water into Eccles Creek.

Another significant change in the characteristics of Eccles Creek occurs near the mouth of the canyon at the Pleasant Valley Fault. This probable flow barrier appears to be bringing water to the surface which had previously been flowing in the rock beneath the stream channel.

- * Changes in conditions along the South Fork of Eccles Creek can be largely accounted for by surface phenomena (hillside springs, tributary inflow, etc.). The Connelville Fault zone has little apparent affect on the recharge-discharge characteristics of the stream. This confirms

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the previous conclusion that faults in the Blackhawk do not act as conduits to the surface but, rather, seal to prevent vertical water movement.

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Although surface flow conditions along the Connelville Fault appear to be uniform, the amount of water encountered in the proposed mine near the fault zone may vary, depending upon the rock material encountered at the fault by the advancing mine face. A shale would likely yield little additional inflow to the mine whereas point inflow to the mine would probably increase significantly for a short period of time (a few days) if a sandstone lense was encountered. Because of the discontinuous nature of the Blackhawk Formation and its apparent slow recharge rate, only an underground area of local extent should be expected to yield water at any fault in the area, resulting in a relatively rapid decrease in flow at the encountered fault.

Downstream changes in the characteristics of Huntington Creek can also be largely accounted for by tributary inflows, hillside springs, etc. The flow losses which do occur in the lower portions of the stream (immediately upstream from Electric Lake) can presumably be attributed to recharge of the alluvium. This recharge water is suspected to travel below the surface of the shale-alluvium interface towards Electric Lake.

2.3.4 Aquifer Characteristics

Measurements at a network of observation wells installed in the project study area indicate that ground water flows in a west to southwest direction, generally following the dip of the strata. Flow gradients average approximately 250 feet per mile over most of the project area although a gradient averaging 700 feet per mile was encountered in the southern portion of the lease area. This anomaly is probably associated with the Valentine Fault zone, which passes through one of the observation well sites. The fracture has apparently connected the sandstone lenses of the Blackhawk Formation with the underlying Star Point Sandstone, thereby significantly increasing the water yield characteristics of the rock at this point and influencing the piezometric head in the area.

The differences between the elevation of water in the observation wells and that of surrounding springs indicates that two ground water systems occur in the Skyline project area. A shallow system, very local in

extent and discontinuous, provides water to numerous seeps and springs through thin sandstone layers in the Blackhawk Formation. A deep ground water system is present in the saturated rocks surrounding and below the coal. This deep system has little affect on the surface hydrologic regime of the permit area since the water generally flows well below the perennial streams of the permit area (i.e., the water level contours showed no connection with permit area streams, etc.).

* As isopach map of the Aberdeen Sandstone has been prepared from information obtained primarily from the exploratory holes drilled during 1979 (Plate 10, Hydrologic Inventory Report; Vol. 1-A, Appendices). These exploratory holes did not extend through the Star Point Sandstone as it is located beneath the Aberdeen Sandstone and is approximately 1000 feet thick. Consequently, an isopach of the Star Point Sandstone under the permit area is unavailable. Neither of these sandstones qualifies as an aquifer as defined in 30 CFR 701.5 (i.e., a zone, stratum, or group of strata that can store and transmit water in sufficient quantities for a specific use). These well cemented sandstones, as stated in the Hydrologic Inventory Report, have very low permeabilities and do not feed the springs on the Skyline permit area. Springs in the overlying Blackhawk Formation are fed from perched water in shallow sandstone lenses underlain with shale well above the regional ground water level.

* Useable quantities of water from wells in either the Aberdeen Sandstone or the Star Point Sandstone are unlikely unless a fracture zone is encountered. Drawdown and recovery tests, which were conducted at two different depths in an open test well located in the proposed portal area, indicated that the transmissivity of the Blackhawk Formation is approximately 18 gallons per day per foot. No significant difference in transmissivity exists between the coal zone and the Aberdeen Sandstone. The low transmissivities and discharge rates (approximately 5 gallons per minute) indicate that the Blackhawk Formation is, at best, a poor aquifer.

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* The potentiometric surface, determined on the basis of data from the shallower holes primarily from the Blackhawk Formation, is shown on Plate 11 of the Hydrologic Inventory Report (Vol. A-1, Appendices). Potentiometric data from the deeper holes penetrating the Star Point Sandstone within the permit area and from the exposed Star Point Sandstone east of the permit area were used to prepare Plate 12 of the Hydrologic Inventory Report. Both potentiometric surfaces are below the ground surface, even in the canyon bottoms, and the deeper holes under the Blackhawk show a generally higher potentiometric surface than the shallower holes. East of the permit area, where the Star Point Sandstone is exposed, the potentiometric surface intersects the ground surface in the canyons, thereby producing springs along the bottoms of the canyons. Water Table conditions exist primarily in shallow alluvial deposits along larger perennial streams.

2.3.5 Ground Water Quality

* The high cost associated with properly constructing and developing the observation wells drilled in the formations found in the area precluded the collection of reliable water quality data from the wells.

As reported in the Hydrologic Inventory Report (Volume A-1, Appendices) several core holes have been used to obtain limited ground water. As these wells were being drilled, static water levels were measured above the coal zone, in the coal zone, and below the coal zone in the Star Point Sandstone. The wells were finally cased down to the Star Point and the bottom 20 feet of the casings were perforated. Measuring the static water levels at different stages of drilling showed that deeper ground water had a higher piezometric head than the shallow ground water. Because of this, four shallow wells were drilled adjacent to four of these deep wells, and casings with perforations in the bottom 20 feet were installed. Piezometric heads were measured in shallow and deep holes showing the vertical piezometric gradient associated with the ground water.

The instability of the Blackhawk Formation made it difficult to keep uncased holes open for several hours. Reliable water quality samples

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could therefore not be obtained from the core holes. Several holes were more than 1,000 feet deep and one was more than 2,000 feet deep.

Two wells have been drilled in Eccles Canyon to determine aquifer characteristics of the Star Point Sandstone. The locations of these wells, W13-1 and W17-1, are shown on Plate 7 of the Hydrologic Inventory Report. Well W13-1 extends through the Blackhawk Formation into the Star Point Sandstone and is now cased. During the drawdown and recovery tests, the casing had not been installed.

The water quality analyses reported in Attachment 5 (Hydrologic Inventory Report - 1980 Supplement) were measured from samples collected after periods of pumping from the well. Well W17-1 is located adjacent to Eccles Creek in the canyon bottom and extends through alluvial materials before penetrating the Star Point Sandstone. The well had been pumped for a few hours when the water quality sample was collected. Results of the laboratory analysis of this sample are also contained in Attachment 5. Analyses involving potential acid-forming, toxic-forming, or alkalinity-producing material above and below the coal seams is additionally presented in the Hydrologic Inventory Report - 1980 Supplement (Volume A-1, Appendices).

A comparison of water quality data collected from the permit area springs, local mines, and a well indicated that the springs were of a quality similar to that of the deep ground water system of the area (Hydrologic Inventory Report, pp 88-89; Volume A-1, Appendices). Thus, inferences on ground water quality have been drawn principally from data collected almost entirely from springs as listed in the appended report.

* Almost without exception, the ground water in the area is of a strong calcium bicarbonate type. Although the quality of the deeper ground water is expected to be more uniform, the data show that three distinctive qualities of spring water can be found in the project area. Springs issuing near the outcrop of the Castlegate Sandstone in the north-west corner of the project area have a very low dissolved solids content (normally less than 100 milligrams per liter). This results

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* from the lack of shaley layers in the Castlegate. Local conditions have probably resulted in the slightly higher concentrations in the springs issuing in the headwaters of Eccles Canyon (dissolved solids

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concentrations between 300 and 350 milligrams per liter). Springs issuing over the remainder of the project area have dissolved solids content which generally varies from 180 to 260 milligrams per liter, averaging 220 milligrams per liter.

Seasonal changes in ground water quality constituents showed no consistent trends. Concentrations are generally lower in spring water than noted in surface water samples, although the differences do not appear to be very significant. In many cases, trace metal concentrations were consistently below the detection limit of routine laboratory techniques.

2.3.6 Monitoring Program

A monitoring program will be conducted at each of the ground water stations shown on Plate 4 (See Hydrologic Inventory Report; Volume A-1, Appendices). In addition, data will be collected from the mines and the proposed water supply well.

Water quality samples will be collected during August of each year from the nine selected springs, the mines, and the water supply well in the portal area. The samples will be analyzed for the parameters listed in Table 2.3-1 or an approved abbreviated schedule. The data collected at the springs will give a measure of the impact of mining on the ground water system at its primary point of use in the permit area (i.e., most usage is through springs for stock-watering). The measurements taken from the mines and the well will give an indication of impacts on the deep ground water system.

- * In addition to the collection of the outlined water quality data, water level data will be collected seasonally each year from each of the wells noted on Plate 4 (Hydrologic Inventory Report). The amount of water discharged from the mines will also be monitored at the mine mouth through the use of a totalizing flow meter or similar device. Significant changes in the source of water in the mine will be noted during the period of operation.

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TABLE 2.3-1.
 COMPREHENSIVE WATER QUALITY ANALYTICAL SCHEDULE.

Field Measurements	Laboratory Measurements	
Discharge	Acidity (as CaCO ₃)	Lead, Total
Dissolved Oxygen	Alkalinity (as CaCO ₃)	Lead, Dissolved
pH	Ammonia (NH ₃ as N)	MPN Fecal Coliform
Specific Conductance	Arsenic, Total	MPN Total Coliform
Temperature, Air	Arsenic, Dissolved	Magnesium
Temperature, Water	BOD (5 Day)*	Manganese, Total
	Barium, Total	Mercury, Total
	Barium, Dissolved	Nitrate (NO ₃ as N)
	Bicarbonate	Oil and Grease
	Boron, Total	Phenol
	Boron, Dissolved	Phosphate (PO ₄ as P)
	Cadmium, Total	Potassium
	Cadmium, Dissolved	Selenium, Total
	Calcium	Selenium, Dissolved
	Chloride	Silver, Total
	Chromium, Total	Silver, Dissolved
	Chromium, Dissolved	Sodium,
	Copper, Total	Sulfate
	Copper, Dissolved	Suspended Solids
	Cyanide	Total Dissolved Solids
	Fluoride	Total Organic Carbon
	Gross Alpha Radioactivity	Turbidity (NTU)
	Gross Beta Radioactivity	Zinc, Total
	Iron, Total	Zinc, Dissolved
	Iron, Dissolved	

*Above and below proposed surface disturbances

* As required, ground water quality data collected from the property area will be submitted to the Utah Division of Oil, Gas, and Mining. Such reports will normally be submitted within 60 to 90 days of the end of each fiscal quarter.

In addition to the outlined monitoring program, an NPDES discharge permit will be acquired for mine water discharges as necessary. Monitoring of all discharges will be conducted in accordance with this permit.

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2.4 SURFACE WATER HYDROLOGY

As previously discussed, the Skyline permit area is located in the headwaters of the Price and San Rafael River Basins. Snowmelt is the primary source of water for the perennial streams in the two basins, with only a small amount of the total flow in the region being derived from rainfall. As a result, flow volumes per unit area are high in the headwaters and low near the mouths of the two basins.

The quality of surface water in the headwaters region is excellent, with total dissolved solids (TDS) concentrations normally varying between 100 and 400 milligrams per liter. However, this quality deteriorates rapidly as the streams cross the saline Mancos Shale downstream and receive irrigation return flows from Mancos-derived soils. TDS concentrations in the Price and San Rafael Rivers, near their confluence with the Green River, generally vary between 1500 and 4000 milligrams per liter. Sediment yields in the two basins experience similar geographic variations, with the bulk of the sediment yielded at the mouths of the two major rivers coming from those areas which are underlain by the highly erodable Mancos Shale.

*Albert,
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2.4.1 Drainage Basin Characteristics

- * Portions of four perennial watersheds drain the Skyline project area and include the east Eccles Canyon, Green Canyon, Winter Quarters Canyon (all tributaries of Pleasant Valley Creek in the Price River Basin), and the west Huntington Creek (a tributary of the San Rafael River). Channels draining the permit area form dendritic patterns, with stream channels of the area flowing in all four major directions. Plate 13 (Hydrologic Inventory Report; Vol. A-1, Appendices) has been prepared to show the perennial, intermittent and ephemeral streams in the region surrounding the Skyline permit area. All surface streams shown on Plate 13 have been classified by the Utah Division of Health as :

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- 1C protected for domestic use with prior treatment process,
- 3A protected for cold water aquatic life, and
- 4 protected for agricultural uses including stockwatering.

Electric Lake has been classified as 3A and 4 while Scofield Reservoir has been classified as 1C, 3A, 4, as well as 2B, protected for recreational uses, excluding swimming. The numerical standards which apply to these classifications are presented in Table 6 of the Hydrologic Inventory Report.

Slopes on the permit area are steep, averaging approximately 31 percent. Dominant aspects are to the west in the Huntington Creek Basin and to the east in the Price River Basin. The landscape varies greatly, with most of the permit area being covered with conifer and aspen vegetative communities.

Because of the climatological conditions of the area (high precipitation and low evapotranspiration resulting in excess water), there are

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numerous water sources in the Skyline project area. Most of these are undeveloped springs, seeps and streams. The one notably developed water body located partially in the project area is Electric Lake, a 31,200 acre-foot reservoir whose upstream tip covers a small portion of the southwest corner of the project area in Huntington Creek. This reservoir is owned and operated by Utah Power and Light Company as a storage facility for water used at coal-fired power plants.

The thick vegetative cover on the project area has resulted in a well-maintained soil organic matter content, thus developing a more open soil structure with high infiltration rates. As a result, the potential for runoff from a rainfall event on the project area is low. Thus, snowmelt produces most of the runoff from the area during periods when soils are frozen and/or saturated.

2.4.2 Flow Characteristics

- * The Hydrologic Inventory Report (pgs. 18-41; Volume A-1, Appendices) contains information regarding the flow characteristics of Huntington Creek, Eccles Creek, and Pleasant Valley Creek. These are the three major streams in the Skyline permit area. The large majority of the remaining streams shown on Plate 13 (Hydrologic Inventory Report) flow only seasonally or after major precipitation events.

The watersheds draining the project area yield an average of approximately 13.5 inches of water annually to the Price River Basin. However, because the relatively impermeable Blackhawk Formation underlies all of the Huntington Creek Basin above the southern boundary of the project area (either on the surface or directly beneath the surface member), the yield to the San Rafael River Basin is slightly higher (averaging approximately 16 inches per year).

The seasonal distribution of flows in the perennial streams draining the project area is typical of western high elevation, snowmelt streams, where the majority of the flow occurs within a relatively short period

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of time in late spring and early summer (April, May, and June). Flows in Huntington Creek above Electric Lake can be expected to vary from 1 to 200 cubic feet per second while those of Eccles Creek above Pleasant Valley Creek normally vary between 1 and 50 cubic feet per second.

2.4.3 Surface Water Quality

* A significant surface water quality sampling program has been conducted in Eccles Creek, Pleasant Valley Creek, and Huntington Creek as well as some of the major tributaries of Huntington Creek and Eccles Creek on the Skyline permit area. The results of the program are described in detail and presented in the Hydrologic Inventory Report (Volume A-1, Appendices). The following briefly describes the major water quality characteristics of the permit area.

Surface water in the Skyline project area is of a calcium bicarbonate type. Total dissolved solids concentrations in the area are lowest during the months of April through June when flows are highest and

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affected by the diluting effect of direct snowmelt. As flows decrease and the majority of the flow is derived from seepage of local groundwater systems, the dilution effect becomes less pronounced and concentrations increase. As a result, the dissolved solids content of surface water in the area varies from less than 100 milligrams per liter (headwaters of Huntington Creek during the high flow season) to slightly greater than 500 milligrams per liter (Pleasant Valley Creek during low flow conditions).

Suspended solids concentrations in the area tend to vary proportionately with flow rate, although the relation is not as distinct as is the case with dissolved solids. During the snowmelt runoff season, concentrations are also naturally higher in Eccles Canyon than in the Huntington Creek drainage basin. Channel erosion, although relatively low throughout the area, appears to be more extensive in Eccles Canyon than in the Huntington Creek Basin and is probably the source of most of the increased sediment concentrations.

Hydrogen ion activity (pH) tends to be rather constant in the surface waters on and adjacent to the Skyline project area, varying normally between 7.5 and 8.5. The basic condition of the water with low acidity and high alkalinity indicates that acid drainage problems should not develop as a result of mining in the permit area.

Total and dissolved iron measurement values vary widely throughout the area, with the potential source being the iron contained in Blackhawk Formation cementing agents. Total iron, which varied in measurements from less than 0.01 to 5.84 milligrams per liter during the baseline study period, tends to be somewhat directly related to flow rate, probably due to its association with sediment. In contrast, dissolved iron tends to be much more variable, with concentration measurements normally being one-fifth to one-tenth of the concurrent total iron concentration.

Total manganese concentrations in the area were low, varying normally between 0.02 and 0.06 milligrams per liter. No distinct seasonal variations were noted.

Baseline concentrations of various constituents were normally well within the State of Utah standards for the waters of the Skyline project area. Exceptions to this were un-ionized ammonia, phenol, and total phosphate. The unusually high concentrations of these constituents probably resulted from the breakdown of organic residue in the area (Hydrologic Inventory Report, pg. 48; Volume A-1, Appendices). Some of the phosphate concentration may also be associated directly with the sediment, thereby explaining the increased phosphate concentrations in Eccles Canyon relative to Huntington Creek.

- * Concentrations of other constituents sampled at surface water stations throughout the area are generally well within the State standard values. In many instances, trace metal concentrations are consistently below the detection of routine laboratory techniques. Locations of these sampling stations as well as results of the laboratory analyses of the samples collected from each station are diagrammed on Plate 3 and Plate 11 of the Hydrologic Inventory Report (Vol. A-1, Appendices).

2.4.4 Sediment Yield

The Skyline project area yields an average of approximately 0.44 acre-feet per square mile per year, based on methods developed by the Pacific Southwest Inter-Agency Committee. This converts to a total average annual yield of 1.25 acre-feet of sediment to the Price River Basin and 3.07 acre-feet of sediment to the San Rafael River Basin. The majority of this sediment is yielded as suspended sediment, with only a small fraction occurring as bedload.

2.4.5 Monitoring Program

Surface water monitoring programs will be conducted at each of the appropriate stations shown on Plate 4 (Hydrologic Inventory Report). In order to concentrate on areas of immediate impact, however, surface water stations in Eccles Canyon will be sampled more frequently than those on Huntington Creek during the initial phases of construction and mining.

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Samples will be collected annually from all surface water stations and analyzed as outlined in Table 2.4-1. These samples will be collected during the month of August each year to allow sufficient time prior to snowfall periods for the collection of additional

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TABLE 2.4-1
 COMPREHENSIVE WATER QUALITY ANALYTICAL SCHEDULE

Field Measurements	Laboratory Measurements	
Discharge	Acidity (as CaCO ₃)	Lead, Total
Dissolved Oxygen	Alkalinity (as CaCO ₃)	Lead, Dissolved
pH	Ammonia (NH ₃ as N)	MPN Fecal Coliform
Specific Conductance	Arsenic, Total	MPN Total Coliform
Temperature, Air	Arsenic, Dissolved	Magnesium
Temperature, Water	BOD (5 Day)*	Manganese, Total
	Barium, Total	Mercury, Total
	Barium, Dissolved	Nitrate (NO ₃ as N)
	Bicarbonate	Oil and Grease
	Boron, Total	Phenol
	Boron, Dissolved	Phosphate (PO ₄ as P)
	Cadmium, Total	Potassium
	Cadmium, Dissolved	Selenium, Total
	Calcium	Selenium, Dissolved
	Chloride	Silver, Total
	Chromium, Total	Silver, Dissolved
	Chromium, Dissolved	Sodium,
	Copper, Total	Sulfate
	Copper, Dissolved	Suspended Solids
	Cyanide	Total Dissolved Solids
	Fluoride	Total Organic Carbon
	Gross Alpha Radioactivity	Turbidity (NTU)
	Gross Beta Radioactivity	Zinc, Total
	Iron, Total	Zinc, Dissolved
	Iron, Dissolved	

*Above and below proposed surface disturbances

data should laboratory results show unique, unexpected conditions. In addition to the annual comprehensive samples, stations in Eccles Canyon will be sampled monthly (when accessible) during construction and the first two years of development. These samples will be analyzed for the parameters listed in the abbreviated schedule of Table 2.4-2, which has been developed based on the need to clarify background conditions and future impacts. If future data indicate a need, parameters may be added or deleted from this table. Following the first two years of mine operation, the frequency of sampling will be decreased to a seasonal basis (spring runoff, early fall, mid-winter) unless data prior to this time indicate that an unstable condition exists.

As mining progresses towards Huntington Creek, seasonal samples will be collected from the five Huntington Creek stations when access permits and analyzed as outlined in Table 2.4-1. Sampling will begin one year prior to any potential underground impact. Comprehensive analyses (Table 2.4-1 or an approved abbreviated schedule) will still be conducted in August even after seasonal sampling begins.

Seasonal sampling will continue at all surface water stations throughout the post-mining period and until the reclamation effort is determined successful by the regulatory authority. August samples will also continue to be analyzed for the parameters outlined in Table 2.4-1 throughout the post-mining period, unless deletions in the list of parameters is determined to be appropriate.

In addition to the above outlined monitoring program, an NPDES discharge permit will be acquired as necessary. Monitoring of all surface water discharges will be conducted in accordance with this permit.

As required, water quality data collected from the surface water monitoring stations will be submitted to the Utah Division of Oil, Gas, and Mining. Such reports will normally be submitted within 60 to 90 days of the end of each quarter.

TABLE 2.4-2
 ABBREVIATED WATER QUALITY ANALYTICAL SCHEDULE

Field Measurements	Laboratory Measurements	
Discharge	Ammonia (NH ₃ as N)	Phenol
pH	Bicarbonate	Phosphate (PO ₄ as P)
Specific Conductance	Calcium	Potassium
Temperature, Air	Chloride	Sodium
Temperature, Water	Iron, Total	Sulfate
	Magnesium	Suspended Solids
	Manganese, Total	Total Dissolved Solids

2.5 Hydrological Impacts of Mining Activities

Presented in the following subsections is a summary of the hydrological impacts of the mining activities of the Skyline project.

2.5.1 Potentially Affected Water Rights

Surface and groundwater rights in the general project area are primarily for stockwatering and irrigation. Stockwatering rights are located almost entirely and directly on the streams. Irrigation rights are centered around the town of Scofield and in Flat Canyon, southwest of the permit area. Irrigated lands consist primarily of pasture. Only stockwatering rights are present in the Skyline permit area. Only one spring in the permit area has a filed water right. A limited number of wells are located in the general area, none of which are located directly on the property area shown on Map 1-1.

2.5.2 Mining Impact on Water Quantity

Due to the high shale content of the Blackhawk Formation, recharge to the deep ground water system through the Blackhawk Formation is slow. Fractures in the formation seal readily due to swelling of the bentonitic shale when wet. As a result, the impact of mining (including subsidence) on the quantity of water in the permit area will be minimal. Should subsidence occur, the subsidence cracks should seal rapidly, preventing the deep percolation and subsequent loss of water previously destined for springs and other water sources. The location of a spring may change by a few feet, but no significant loss of water is anticipated. The sealing of potential cracks will be accelerated where subsidence occurs under stream bodies, due to the natural deposition of silt in the stream channel along with the swelling of the shale.

Although the Blackhawk Formation is saturated above the proposed mine workings, a relatively insignificant quantity of water will probably be encountered in the mine due to the impermeable nature of the formation, which limits the recharge rate and the ability of the rock to readily yield water. It is estimated that inflow to the mine will equal less than 10 gallons per minute per active face, with mine entries dry

approximately 500 feet up-dip from the face. This rate could change significantly for a short period of time, however, if the mine encounters a thick sandstone layer at the face of a significantly displaced fault.

Water encountered in the mines will be utilized underground for dust suppression, etc. As a result, only those inflows which temporarily exceed storage and mine use requirements will be discharged to the surface. Because this water would normally have flowed down-dip to the west, any discharges to the surface in Eccles Canyon will result in an insignificant depletion in the amount of water which would have reached another basin (Hydrologic Inventory Report, pp. 122-126; Volume A-1, Appendices). (Procedures for the handling of mine water are discussed in detail in Sections 4.13 and 4.19).

Indigenous water associated with the coal will be removed from the area. This, however, will represent only a small fraction of the water flowing from the Wasatch Plateau.

2.5.3 Mining Impact on Water Quality

The construction of surface facilities utilized in conjunction with the Skyline Mines (yard areas, roads, conveyor lines, etc.) will result in temporary increases in the suspended sediment concentration of the adjacent stream. However, because of the regulatory requirement that sediment control be provided for all areas of surface disturbance, concentrations should be quickly normalized.

Groundwater in the Wasatch Plateau can be expected to flow towards the lowlands if not removed, passing through saline shales and emerging to augment streamflow with a dissolved solids content that significantly exceeds the concentrations found in the headwaters area. Because the Skyline Mines will act as interceptor drains, the groundwater that is brought to the surface from the mines will have a much lower dissolved solids content than would have existed if the water was to continue its downward movement through shaley layers. Thus, the mines will have some beneficial impact on the chemical quality of water in the region, due to the fact that the small amount of water which may be discharged will

have fewer dissolved constituents when discharged to the stream channel than it would have following flow through the shaley formations. Although suspended sediment and oil and grease may increase at the mine mouth, these constituents will be removed during the treatment processes described in Sections 4.13 and 4.19.

Because of the high alkalinity and low acidity concentrations in the area (differing normally by two orders of magnitude), acid drainage problems should not occur as a result of mining. This is supported by the fact that coal in the area has a low sulphur content.

2.5.4 Alternative Water Supply

- * OSM Regulation Section 783.17 requires that alternative sources of water supply be identified if mining impacts will result in the contamination, diminution, or interruption of existing sources. Because no significant hydrologic impacts are expected as a result of mining in the Skyline permit area, no individual or collective source of alternative water supply has been identified.
- * However, the Applicant presently owns 248 acre-feet of water rights in the Scofield Reservoir. Of these water rights, water sufficient for the Applicant's needs will be exchanged for rights from wells to be located near the mine site and at the mouth of Eccles Canyon for use in culinary and dust suppression water systems. Of this 248 acre-feet, a 30 acre-foot exchange has already been approved by the State Engineer of Utah. An exchange of an additional 118 acre-feet has been applied for and is pending.
- * The Applicant will replace the water supply of any land owner, if such a water supply is contaminated, diminished or interrupted as a result of the Skyline mining operations.

REPLACES		TEXT
Section 2.5 Page 2-42 Date 11/16/79		Section 2.5 Page 2-42 Date 4/28/80

* Denotes change or addition

2.6 CLIMATE

The climate of the Skyline Mines area is typical of subalpine areas in the central region of Utah. In general, the summer season is short with maximum temperature readings (F°) in the 80's and minimum readings in the 40's. Fall and spring seasons are erratic in nature with snow precipitation occurring as early as September and as late as the first part of June. Winters in this subalpine area are often severe, with recorded temperatures of -30°F or below at times. Major snowfalls occur in the months of January, February and March. Weather monitor station records near the Scofield Dam have shown winter snowfalls to range between two and eight inches per 24 hour period although daily snowfalls have been recorded in excess of one foot. Snow frequently remains on the ground from November until April in depths varying to five feet. The prevailing wind direction within the general area of the Skyline Mines site is south-southwest. Winds are generally parallel to the canyons except during storm periods. Seasonal wind direction variance is minimal.

At the proposed minesite, average monthly temperatures range from 15°F in January to 60°F in July. Extreme temperatures are about -40° and 80°F. Average annual precipitation is 25 to 30 inches, including 8 inches of rainfall from May to September. Potential evapotranspiration is less than 18 inches per year. Snowfalls generally occur during the months of October through May. During this period, snow accumulation averages 4.5 feet. Maximum snow depth to be expected is 9 feet.

2.6.1 Climatological and Air Quality Monitoring Program

In order to provide climatological and air quality information specific to the Skyline Mines site area, the Applicant contracted Radian Corporation of Austin, Texas, to conduct an air monitoring program beginning January, 1979.

The monitoring program, designed to generate site specific data of the air quality and meteorological conditions of the Skyline area, will involve three separate monitoring phases - preoperational, construction, and operational (life of the mines). The preoperational monitoring

program includes continuous meteorological monitoring of the Skyline site area for a 12 month period and 24-hour total suspended particulate (TSP) monitoring every third day for a period of six months (beginning May, 1979). Two locations, Boardinghouse Peak and Eccles Canyon, were selected as monitor station sites for the preoperational phase monitoring program. Portions of the preoperational climatological/air quality study will be continued throughout the construction phase and operational life of the mines.

All equipment utilized by Radian in the performance of air quality and meteorological sampling has been approved by the EPA for use in similar applications. Following are detailed discussions of the preoperational monitoring programs conducted at each site.

Boardinghouse Peak Monitoring Program

The lack of electrical power at the Skyline Mines site required the selection of Boardinghouse Peak as the location of the continuous monitoring system. Boardinghouse Peak is 2 miles to the south of the Skyline portal site (see Volume A-4; Air Quality Report, Figure II-1). On Boardinghouse Peak, an existing shelter with sufficient electrical power was adapted to house the data acquisition systems. Special use permit applications were approved by the United States Forest Service in Price, Utah, for the use of the Boardinghouse Peak and Eccles Canyon sites, which are located within the boundaries of the Manti-LaSal National Forest. At the Boardinghouse Peak site, the monitoring program includes:

- Continuous meteorological monitoring of wind speed, wind direction, and temperature at a ten meter level.
- Solar radiation and rainfall/snowfall are recorded continuously at ground level.
- A battery-powered mechanical weather station for redundancy and assuring data gathering in the event of power failure.
- Twenty-four hour high volume particulate samples collection every third day (beginning on or about May 1, 1979) with monitoring to continue for a six month period.

- Noise monitoring, performed twice, once in the spring and again in the fall of 1979. Each field sampling involves a three to four day sampling period.
- Upper air studies of wind speed, wind direction, temperature and air pressure performed once each month using a Radiosonde-type system.

Eccles Canyon Monitoring Program

To obtain data at the location of the Skyline portal site, Radian Corporation has positioned a battery-powered mechanical weather station within the boundaries of this site. The mechanical weather station monitors wind speed, wind direction and temperature. The monitoring program in Eccles Canyon was designed to coincide with the monitoring periods of the Boardinghouse Peak program.

Radian Corporation also monitored TSP at various locations in Eccles Canyon to provide site specific data for the Skyline portals. Monitoring at the portal site location, difficult due to the lack of continuous electrical power, required portable electrical generation and supervision for each 24-hour sample period. Ten samples were taken coinciding with sampling days at the Boardinghouse Peak facility. TSP samples were also collected on a three day basis at the mouth of Eccles Canyon, near Clear Creek, Utah, which is the location of the proposed train load-out facilities for the Skyline Mines.

2.6.2 Synopsis of Data

Radian Corporation's complete report of the air quality and meteorological conditions of the Skyline Mines area is presented in Volume A-4, Appendices. A summary discussion of their report follows.

The results of the meteorological and air quality studies indicate that the air quality of the Skyline project area is very good to excellent. Air in Eccles Canyon is of poorer quality due to an unpaved dirt road leading from the mouth of the canyon up past the proposed portal site.

The Applicant plans to pave this road when upgrading it to accommodate traffic. Paving of the dirt road should greatly improve the air quality of the Eccles Canyon area.

Presented below is a summary of the monitoring program results from January 1, 1979 through August 31, 1979.

Boardinghouse Peak - Monthly averages

	<u>Low</u>	<u>High</u>	<u>Average</u>
Wind Speed (MPH)	13.4	17.1	14.6
Temperature (°F)	18.8	57.6	39.2
Pyranometer (Langleys)	151.2	678.5	495.6
Net Radiometer (Langleys)	2.2	294.1	177.8
Total Suspended Particulates (ug/cu.m.)	24.7	49.5	35.3

Eccles Canyon

The TSP sampled in Eccles Canyon averaged 188.15 ug/cu.m. Due to the rugged terrain, the hi-vol sampler and portable generator had to be located within 60 feet of the existing dirt road. Even though the proximity of the dirt road has a significant effect on measured TSP levels, the Eccles Canyon monitor will provide useful preconstruction ambient data to be compared with levels once the mining operation begins.

Clear Creek

The TSP sampled at the Clear Creek monitoring station averaged 61.7 ug/cu.m.

Upper-Level Atmospheric Studies

During the upper-level atmospheric studies several different weather conditions occurred. The studies determined the relationship of the topographical features and temperature and wind flow effects. The findings were:

- Deep surface-based temperature inversions were detected in Eccles Canyon during several morning pilot balloon runs. These inversion layers ranged in depth from about 100 meters to 500 meters.
- During the July sampling period, solar radiation was found to result in large increases in temperatures near the surface of Eccles Canyon, while at the Boardinghouse Peak site, the daytime increase in temperature was relatively small.
- Most of the Eccles Canyon afternoon soundings during the July sampling period showed that, even at heights well above the tops of the canyon walls, temperatures were notably warmer than during the morning at the same levels, indicating that heating of the canyon floor on sunny days influenced temperatures at considerable heights above the canyon floor.
- Daytime up-valley winds in Eccles Canyon, which were typically east-northeasterly, were found to be quite shallow (generally less than 100 meters). With increasing height above the canyon floor, wind directions quickly turned toward the direction of flow at levels above the canyon. While many of the soundings were conducted when daytime up-valley flows were occurring, only one sounding was conducted early enough in the morning for the nocturnal down-valley flows (generally westerly) to still be present. However, the sounding data showed that the down-valley flow was quite shallow, probably less than 100 meters.
- The daytime up-valley flows tended to be overridden by the large scale flow over the region and by channeling effects during cloudy conditions and/or when the large scale flow was relatively strong.
- Wind speeds generally increased with height above the floor of Eccles Canyon.

Sound Survey

Several extraneous noise sources were recorded during the sound survey. On a Sunday, vehicles (recreational, perhaps motorcycles) passed through the area at a rate of about one per every fifteen minutes during daylight hours. The results of the sound study are presented in Radian Corporation's report (see Volume A-4, Appendices).

2.7 VEGETATION



2.7.1 General Description

The Skyline project area and adjacent areas occur within an aspen-spruce-fir phase of the boreal forest biome, with representatives of cool desert shrub, riparian, and, to a lesser extent, the mountain brush community types present as significant, though minor, components.

The spruce-fir community, a type mainly of north-facing slopes, is dominated by Engelmann spruce and subalpine fir, with variants supporting admixtures of aspen and wet meadow subtypes characterized by species of sedges and grasses. This forest type constitutes approximately six percent of the project area, but when added to the spruce, fir, aspen community composes approximately 40 percent of the entire area. The forest floor is frequently subjected to dense shade. Grasses and sedges are represented by Hood sedge, Mountain brome, Muttongrass, and Nodding bluegrass. Principal forbs in the spruce-fir community include Heartleaf arnica, Lanzwert sweetpea, Spreading sweetroot, Whipple beard tongue, and tuber starwort.

The aspen community is a forest type with Populus tremuloides as the principal tree species. Only nine percent of the project area is dominated singularly by aspen. South-facing slopes and ridges are the main localities of this community. It is transitional, however, to the aspen, grass, forb, elderberry community which occupies approximately 33 percent of the lease area. The aspen, grass, forb, elderberry communities combined occupy 42 percent of the project area.

Species diversity in the aspen community is great. The main ground layer species are the same as those in the aspen, grass, forb, elderberry community with which the aspen community is transitional. More than 80 species of plants are present in the aspen community.

The aspen, grass, forb, elderberry community is very large, as noted above. The species in this community are, with minor exceptions, the same as cited for the aspen community.

Eccles Canyon is vegetated by similar plant communities as described for the rest of the project area. However, Gambel oak, curl-leaf mountain mahogany, and blue spruce are components of the vegetation. The former two occur as minor stands on the dry south-facing slope of the canyon, the latter in the alluvial terraces at the mouth of Eccles Creek.

Maps showing locations of the various plant communities are presented in Volume A-5, Appendices (see Vegetation Report). Species lists by plant community and a discussion of the methods used in the community analysis are also presented therein.

2.7.2 Community Analysis - Results and Discussion

Greatest diversity of species was observed in the reference area transects occupied by aspen, and by the grass-forb-elderberry with which it intergrades. Those two types included from 23 to 32 plant species in transects and in the productivity plots. Spruce fir transects yielded from 17 to 26 species of plants and the riparian communities 15 to 26 species. The community type with least diversity in the reference areas was the sagebrush community, ranging from 10 to 14 species.

Sites in the reference areas differed in the production of herbage which can be eaten by livestock. Aspen and grass-forb-elderberry communities varied from 451.8 to 835.5 pounds per acre. Sagebrush in Site 3 in Burnout Canyon (see Plant Community Map in Volume A-4, Vegetation Report) exceeded that, with approximately 917.1 pounds per acre. Spruce fir is assumed to be non-productive because of shading and poor representation of species in the forest floor. The riparian habitats measured in the reference areas yielded only 180.5 and 286 pounds in Sites 3 and 4 (upper Eccles Canyon), respectively.

The importance of the aspen and grass-forb-elderberry communities, which occupy approximately 42 percent of the permit area, is seen in the comparison of area occupied by that community and that occupied by other types.

The sagebrush-snowberry, sagebrush, and fringed sagebrush occupy only 13 percent of the project area. They occur mainly on shallow soils. Collectively they are diverse, with approximately 90 species of vascular plants. Fringed sagebrush occurs on only one percent of the area and is confined to ridge crests at high elevations. Only 16 species were noted for this type.

The riparian community type consists of continuous strips of vegetation along the major drainages, as in the valley bottoms of Huntington Creek, Eccles Creek, and other minor tributaries. The community also occupies spring lines, seeps, and perennial channels down slope from minor springs, as in the valley of Huntington Creek. Dominant species on the wet lands are red top, silver sagebrush, sedge species, grasses, and numerous forbs.

Despite the importance of spruce-fir and spruce-fir-aspen community in the total vegetative cover of the permit area, however, these types are of little value in forage production. They are of value, however, in the protection of both wildlife and livestock. The dense shade provides cool bedgrounds, while main grazing areas are in adjacent aspen and grass-forb-elderberry communities.

Productivity of aspen is equalled by spruce and fir species. All types produced an annual growth increment averaging 4.2 mm per year. Aspen occurs in a density of only one-third the number of trees per acre when compared to spruce and fir. Spruce and fir production is most significant as a timber source, and historically has contributed substantially to lumber production in the permit area and in Eccles Canyon, where scars of drag roads provide evidence of lumbering operations.

Sagebrush and snowberry-sagebrush communities are productive (917.1 pounds per acre) and extensive, representing approximately 13 percent of the permit area. Despite the relatively small area occupied, the type is of much importance to grazing and browsing animals.

Relative vitality of tree stands indicates that aspen sites are composed of different size classes: young, moderate, and old. This seems to assure the continuity of the aspen community. Where aspen grows in an

admixture with spruce and fir, as at validation site 1 (upper divide between Eccles and Winter Quarters Canyons), it appears that the woodland is successional with trends towards dominance by the coniferous species. In more xeric sites, such as at reference site 3 - aspen, the stand of aspen is composed of trees of all age and size classes. In that site, there is a substantial understory of chokeberry which is subordinate to the aspen overstory.

The composition of the spruce-fir community at the portal-yard area indicates a climax forest dominated by spruce, with young, intermediate, and old trees being represented. Fir trees are represented by a large number of seedlings, but the lack of trees of intermediate and older ages suggests that fir is not successful in dominating the forest type.

The xeric conditions prevailing at reference sites 1 and 2 (Upper Kitchen Canyon) present a contrasting condition, with fir as the dominant and spruce as the subordinate species. Codominance of spruce and fir is demonstrated at reference site 3, where each species is represented by young, intermediate, and old trees.

That the communities in the portal yard and by-pass road validation sites are similar to the reference areas is indicated in the congruence of species numbers in each of the types. Aspen diversity, from 19 to 25 species, is only somewhat lower than that of the reference areas, which are from 22 to 29 species. Riparian communities are higher than that of the sedge type in Burnout Canyon reference site 3 (15-17 species vs. 27-34 species), but are not significantly different from those in the riparian zone of reference site (17-26 species vs. 27-34 species). These latter two sites are both in the drainage bottom to the southwest of the portal-yard area.

Total productivity of the validation sites and other areas to be disturbed is 839 animal units. This area will be lost to production during the active period of mine operation. Assuming a grazing period of three months (July, August, and September), the reduction is then equivalent to the loss of nine cow-calf units for the entire three-month period.

The new plant community disturbance caused by the Skyline project is estimated to be 14.8 acres of spruce/fir, 5.7 acres of aspen, and 6.7 acres of sagebrush. These estimates do not include the acreages which would be disturbed by the proposed U.S. Forest Service by-pass road.

2.7.3 Threatened and Endangered Plant Species

Passage of the Endangered Species Act of 1973 (Public Law 23-205) provided the legal basis for establishment of lists of endangered and threatened plant species. Such lists were prepared under direction of the Smithsonian Institution, and were published subsequently in the Federal Register (40:27824-27924. 1975; and 41:24524-24572. 1976). Work on endangered and threatened plants of Utah has been reviewed by Welsh, Atwood, and Reveal (1975), and reevaluated by Welsh (1978). The region under investigation was included in a report on threatened and endangered species of the Central Coal Lands of Utah (Welsh, 1976).

* A survey of the literature has failed to indicate the presence of any of the proposed endangered or threatened plant species in the area. This lack of critical or unique species is supported by the field surveys of the lease areas during this investigation. The region was searched on a quarter section by quarter section basis, with each community type within each quarter section being traversed. All community types were systematically searched by study teams walking parallel transects through the larger communities, and by individual search in the smaller vegetative types. No threatened or endangered species were encountered in either the permit area or surrounding areas.

REPLACES		TEXT
Section 2.7 Page 2-53 Date 11/16/79		Section 2.7 Page 2-53 Date 4/28/80

* Denotes change or addition

2.7.4 Potential for Reestablishing Vegetation

Disturbed areas are present in the proposed permit area, due to a small underground mine in Eccles Canyon which has long ago been abandoned. The area has been slightly treated to reclamation procedures.

Crested wheatgrass, intermediate wheatgrass, smooth brome, orchard grass, tall oatgrass, bulbous wheatgrass, and bluegrass are introduced species which are now naturalized in disturbed areas. Numerous examples of natural re-establishment were observed both in the proposed portal area and along Mountain Fuel Company pipeline corridor which transverses the ridge dividing Huntington Creek and Clear Creek drainage. Native species noted in the disturbed areas include yarrow, Artemisia species, sagebrush, aster, sedge, rabbitbrush, thistle, penstemon, bluegrass, cinquefoil, western coneflower, red elderberry and horsebrush.

Sparingly-vegetated sandstone ledges occupy approximately one percent of the project area. Species present on the ledges include serviceberry, aster, sedge, ferns, and others which are uncommon in the more densely-vegetated communities.

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* Denotes change or addition

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2.8 AQUATIC WILDLIFE RESOURCES

Both Huntington Creek and Eccles Creek run through the project area (Figure 1, Aquatic Resources Report; Volume A-5, Appendices) and both provide habitat for reproducing resident populations of cutthroat trout. Cutthroat trout from Electric Lake use upper Huntington Creek for spawning and nursery activities. Scofield Reservoir, although stocked with rainbow trout exclusively, has numerous cutthroat trout which have been produced in Eccles Creek and other tributary streams such as Winter Quarters, Woods Creek, Lost Creeks, and possibly Boardinghouse Creek.

Eccles Creek

Eccles Creek is a small mountain stream draining west to east into Pleasant Valley Creek which flows north approximately 3 miles where it empties into Scofield Reservoir. Discharges in Eccles Creek are frequently as low as 1 cfs during late summer, fall and winter months and high flows seldom exceed 20 cfs, even at the creek mouth. Water temperatures of streams such as Eccles Creek fluctuate greatly because the turbulence from the rough channels coupled with low flows allows the water temperatures to quickly equilibriate with existing air temperatures. During November to March, water temperatures remain between 0-2°C. In the summer, water temperatures often fluctuate from 12-15°C daily although high temperatures seldom exceed 20°C.

Through natural erosion of mudstone, sandstone and shale deposits, Eccles Creek has periods of high total suspended solids (sedimentation). This occurs, however, during periods of high runoff when the stream waters have sufficient energy (velocity) to carry the fine sediments out of the canyon rather than depositing them on the coarser substrate materials. There are numerous clean trout spawning gravel beds in Eccles Creek. The limiting factor to spawning success and number of resident trout in Eccles Creek is the amount of water available rather than water quality or habitat available.

The existing aquatic species of Eccles Creek, fish and macroinvertebrates, have adapted to tolerate natural temperature fluctuations and

sediment loads. The macroinvertebrate communities of Eccles Creek have a high diversity of species representing all major trophic groups. There are species found only in high quality water streams indicating the high water quality of Eccles Creek. There are also environmentally resistant taxa present. This high diversity represents a resiliency to environmental change, especially short term changes.

Upper Eccles Creek above the Valley Camp Mine Road (at sampling stations ECO3, ECO2, UPNF, UPSF, Aquatic Resources Report Figure 1), have numerous taxa of macroinvertebrates found only in high quality waters and stable habitats. Lower Eccles Creek (Stations ECO4 and ECO5, Aquatic Resources Report Figure 1) has a more tolerant macroinvertebrate community with taxa tolerant to sedimentation dominating the community.

Cutthroat trout maintain naturally reproducing populations in Eccles Creek from the National Forest boundary downstream to the creek mouth. The fish have upstream migration access to a point just above Whiskey Gulch where a series of beaver dams block upstream movement. There are no fish in the upper forks of Eccles Creek.

Huntington Creek

Huntington Creek above Electric Lake is a small mountain stream draining north to south into Electric Lake. Discharges are frequently as low as 4 cfs with spring high flows often exceeding 40 cfs. Water temperatures fluctuate as much as 15°C in a single day during summer months although daily highs seldom exceed 20°C. During winter months water temperatures seldom exceed 2°C and the stream is nearly completely iced over.

Through natural erosion of existing stream channel geological formations and adjoining hillsides, Huntington Creek waters have high loads of fine sediments during runoff periods. This occurs when runoff is high and these sediments are carried into Electric Lake rather than being deposited on spawning gravels or other coarse substrate materials. Huntington Creek has numerous clean trout spawning gravel beds and the amount of fine sediments is not high enough to hinder spawning.

Huntington Creek has a diverse aquatic community with macroinvertebrate taxa representing all trophic levels. The successful cutthroat trout spawning and high number of resident trout evidence the high quality waters and habitat of Huntington Creek plus the ability of the macroinvertebrate community to support quality fisheries. Cutthroat trout, according to Utah Division of Wildlife Resources (UDWR) surveys, are increasing in numbers in Huntington Creek above Electric Lake. Trout produced in Huntington Creek provide an important part of the total number of fish in Electric Lake.

Project Impacts on Fisheries Resources

The surface facility disturbances in the portal area will encroach on sections of all three upper Eccles Creek forks. In order to prevent sedimentation of these stream segments and the main stream Eccles Creek below, 500 ft. of the north fork, 1,000 ft. of the middle fork (UPMF), 1,300 ft. of the upper south fork (UPSF), and 1,400 ft. of Eccles Creek immediately above ECO2, will be diverted into closed culverts. This will modify 4,200 feet of total stream habitat but will not reduce available fish habitat since fish are not found above the U.S. Forest boundary. Downstream drift of macroinvertebrates from the upper reaches of these forks will still occur as before. This is important in preserving the macroinvertebrate community diversity and density in and below disturbance sites.

- * At the coal handling site near the mouth of the canyon (Station ECO5), approximately 600 ft. of stream will have to be moved to the north into a new channel. The new channel will be 110 feet shorter but have nearly the same gradient (3 ft. additional vertical drop/1,000 ft. horizontal channel). Moving the channel will eliminate existing phytoplankton and macroinvertebrates but colonization of the new channel should not take more than 2 to 4 weeks, the optimum colonization time for periphyton and macroinvertebrate artificial substrate samples.

	REPLACES		TEXT
Section	Page 2-58 Date 11/16/79		Section 2.8 Page 2-58 Date 4/28/80

* Denotes change or addition

Eccles Creek between the National Forest boundary and the surface coal handling facilities should not be directly impacted since road and conveyor plans have been developed to mitigate degradation.

There should be no immediate impacts on Huntington Creek above Electric Lake. Mining activities will not reach the channel area for several years. If any impacts occur, they will be related to intersection of groundwater before it reaches the stream or subsidence of the actual stream channel. Subsidence of the stream channel may occur. Since subsidence will correspond with mine expansions, the effects of subsidence will be monitored as mining progresses toward Huntington Creek. The early detection of the mining effects will allow the fish and wildlife protection plan to be modified and implemented, if necessary, before the stream is impacted. The proposed monitoring program will provide adequate pre-project baseline data of existing conditions so that any project impacts will be detected and mitigated.

2.9 Terrestrial Wildlife

From a search of the literature, live trapping and observation, 58 species of mammals, ten species of reptiles and four species of amphibians may reside in the environs of the Skyline project area. Excluding the bats, which are difficult to identify while flying, 34 of 45 (76 percent) of the mammals, 75 percent of the amphibians (3 of 4) and 50 percent (5 of 10) of the reptiles whose published ranges overlap the Skyline area were verified by actual observation during the study period. None of these animals are on an endangered or threatened species list. The Utah Division of Wildlife Resources (1979) has the status of one mammal on the list, Lynx rufus, Bobcat, "under investigation". Four species of mammals are limited viz.: Lepus americanus, Showshow Hare; Glaucomys sabrinus, Northern Flying Squirrel; Lontra canadensis, River Otter; and Lasiurus borealis, Red Bat. The status of another species, Mustela erminea, Short-tailed Weasel, is questioned. One amphibian, Ambistoma tigrinum, Tiger Salamander, is included on the UDWR questioned list.

Moose and elk use the entire project area but seem to concentrate in the environs of the South Fork of Eccles Canyon. Elk also use South Fork as a calving ground, as well as Coal Canyon and James Canyon.

- * Deer do move across the region that will be transected by the coal conveyor. However, provision of underpasses in each of the three canyons most used by deer should provide ample places for the deer to cross. The deer will become habituated to the conveyor and to the noise that it makes (Wildlife Report, p. 4; Volume A-5, Appendices). The conveyor should not have a great impact on these animals after the construction phase is over.

For a complete report of the studies involving the terrestrial animals of the Skyline project area, see Volume A-5, Terrestrial Wildlife Report.

REPLACES		TEXT
Section 2.9 Page 2-60 Date 11/16/79		Section 2.9 Page 2-60 Date 9/22/80

* Denotes change or addition

2.9 Terrestrial Wildlife

From a search of the literature, live trapping and observation, 58 species of mammals, ten species of reptiles and four species of amphibians may reside in the environs of the Skyline project area. Excluding the bats, which are difficult to identify while flying, 34 of 45 (76 percent) of the mammals, 75 percent of the amphibians (3 of 4) and 50 percent (5 of 10) of the reptiles whose published ranges overlap the Skyline area were verified by actual observation during the study period. None of these animals are on an endangered or threatened species list. The Utah Division of Wildlife Resources (1979) has the status of one mammal on the list, Lynx rufus, Bobcat, "under investigation". Four species of mammals are limited viz.: Lepus americanus, Showshow Hare; Glaucomys sabrinus, Northern Flying Squirrel; Lontra canadensis, River Otter; and Lasiurus borealis, Red Bat. The status of another species, Mustela erminea, Short-tailed Weasel, is questioned. One amphibian, Ambistoma tigrinum, Tiger Salamander, is included on the UDWR questioned list.

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For a complete report of the studies involving the terrestrial animals of the Skyline project area, see Volume A-5, Terrestrial Wildlife Report.

Note: This Section represents the Consultant's Report as received in its entirety.

2.10 RAPTORS

The Skyline Mines project area was studied at two different periods, a two-day winter period (April) and four-day breeding season period (July). Of prime consideration in this study was the determination of the presence or absence of two threatened or endangered species, the peregrine falcon (Falco peregrinus) and bald eagle (Haliaeetus leucocephalus). Additionally, all other raptors seen were recorded. Because of the elevation of the mines and the nature of the habitat, the numbers of individuals and numbers of species (diversity) of raptors is not great as compared to lower elevations where the habitat is less uniform. Several species may pass through the area in migration, but their numbers are not known nor has their length of stay been documented. Species likely to pass through the area are the marsh hawk (Circus cyaneus), Swainson's hawk (Buteo swainsoni) and rough-legged hawk (Buteo lagopus). In addition to field observations, the federal and state resource managers in the area were contacted to obtain information on raptors presence. Don Ward, U.S. Forest Service Biologist, and Larry Dalton, Utah Division of Wildlife Resources Biologists, had only general and limited information on the area. However, as an indication of the species that might be expected to occur in the Skyline Mines area, data from Jones (1979) are given in Table 2.10-1. These data come from the area between Huntington and Ferron Canyons to the south of Skyline Mines. The frequency or density of raptors studied by Jones was also highest at elevations lower than that equivalent to the Skyline Mine area.

The Winter Period - 7-8 April

Larry Dalton, Utah Division of Wildlife Resources, indicated that bald eagles arrive at Scofield Lake approximately 15 November and leave at variable times in early winter corresponding to the "freeze up" of the lake. This is normally before January. Bald eagles do not utilize Electric Lake at the south edge of the study area. Food supplies there may be insufficient.

TABLE 2.10-1
 RAPTOR SPECIES SEEN AND HABITAT SUITABILITY IN MANTI DIVISION,
 MANTI-LASAL NATIONAL FOREST

Areas surveyed	Species observed and expected ¹										Habitat ³			
	Goshawk	Sharp-shinned	Cooper's	Red-tailed	Golden Eagle	Eagle nest	Prarie Falcon	Kestrel	Owl cavity ²	Cliff	Riparian	Prey	Roosting ⁴	
1. Huntington C.	+	-	P	P	-	-	-	+	-	L,I	I	I	-	
2. Rilda C.	P	P	-	-	-	-	-	-	-	I	I	I	-	
3. Mill Fork C.	P	P	-	P	+	P	-	-	-	I,H	I	I Gos-	-	
4. Tie Fork C.	P	P	-	P	-	-	-	-	-	I	I	I	-	
5. Crandall C.	+	+	+	-	-	-	-	-	-	L	H	I	-	
6. Grimes Wash, Danish Basin	-	-	-	-	+	P	-	P	-	L,I	-	H	-	
7. Cottonwood C.	P	P	-	P	+	+	-	+	+	I,H	I,H	I,H	-	
8. Straight C.	+	-	+	-	+	+	-	+	+	I,H	I,H	I	-	
9. Lower Joes Valley, Lowry C.	-	+	-	+	+	+	+	+	+	I,H	I,H	H	H	
10. Upper Joes Valley	P	-	-	P	+	P	-	P	-	-	I	H	-	
11. North Horn Mtn.	-	-	-	-	+	-	-	+	-	-	-	H	-	
12. Upper Rock C.	-	-	-	-	+	+	-	P	-	I,H	-	L,I	-	
13. Lower Rock C., East Rim	-	-	-	-	+	-	-	-	+	L,I	-	L,I	-	
14. Ferron C., Bull Hollow	-	-	P	-	+	P	-	+	-	L,I	I,H	I,H	H	
15. Ferron C., Flag- staff Peak	P	-	-	+	-	-	-	P	+	L,I	-	I	-	
16. Muddy Creek C.	-	-	+	-	-	-	-	P	-	L,I	I	I	-	

1. Species and structures: + = observed, - = not observed, P = probable occurrence.
2. Cavities assumed used by Great-horned Owls.
3. Habitat suitability: L = low, I = intermediate, H = High.
4. Roosting habitat suitability judged with respect to wintering Bald Eagles.

Although bald eagle roosting site locations are unknown, it is unlikely that the birds utilize any of the study area regularly.

Only a goshawk (Accipiter gentilis), a red-tailed hawk (Buteo jamaicensis) and a golden eagle (Aquila chrysaetos) were seen in the Skyline area. Snow cover is generally too deep to provide open areas for prey species. Reports of golden eagles were received from several other persons who visited the general area during the winter. Raptor species that might occur there probably move to lower elevations during the winter. The great-horned owl (Bubo virginianus) might also winter in the immediate area of the mines, but none was seen.

The Breeding Season Survey - 26-29 July

The mine portal site and twelve drill hole sites were visited and the immediate area searched for nesting raptors. No nests were located and only a few species were observed in flight.

The individual raptors observed were recorded on Raptor Count Sheets (see Volume A-5, Raptors Report example), and sites visited and raptors seen are plotted on a map.

Those species seen were: eight sightings of red-tailed hawk and one kestrel (Falco sparverius, 26 July); one golden eagle and one great-horned owl (28 July).

It is highly likely that all of the species given on Table 2.10-1 occur in the Skyline Mine region, but since they probably occur in low numbers only extensive survey work would reveal their presence.

Conclusion

Common raptor species distinctive of conifer forests occur in small numbers on the Skyline Mine area. Nesting habitat for tree nesting species provides the only readily available habitat there. Bald eagles pass through the area and stop over in adjacent regions during that migration. They, however, move on as winter sets in. Peregrine

falcons may also pass over the area in migration, but any number that would do so is certainly small. No nesting sites of either species are known nor suspected in the Skyline area. The nearest known sites are in excess of 20 miles.

The overall elevation of the mining region is high enough and the habitat such as to restrict the density and diversity of raptors.

It is concluded that development of the Skyline Mine area will not have an adverse effect on critical raptor species, and any species that may be affected are common enough that the impact will be minimal on the populations.

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RAPTORS

Jones, S. G., 1979. Preliminary survey of raptor species in the Manti Division, Manti-LaSal National Forest. Great Basin Nat. 39(2):155-160.

2.11 SOILS

- * At each vegetation reference site (see Plant Community Map in Volume A-5, Appendices; Soils Report), a soil pit was excavated to the parent material layer. The exposed soil profile allowed for determination of information for classification of the soils into taxonomic units. The portal-yard and bypass access road areas were also sampled. Soils collected at the portal-yard validation sites were taken as a composite of the top six inches of the profile.

- * In addition to depth information obtained from the soil pit descriptions, there were 100 depth measurements along the transect areas and in the validation sites. Those readings were obtained by observing the depth of penetration of a sharpened steel rod.

Soils were classified to family unit according to the system utilized for classification of soils by the Soil Conservation Service (Johnson, 1975). Use of this method will allow correlation of permit area soils at the series level when the Soil Conservation Service completes the current mapping effort of adjacent areas.

- * The data compiled on soils suggest that a cryic temperature regime is a proper designation for this area. Cryic is typically conifer-aspen related, with some high meadows included. These areas are too cold for cultivation of crop plants by ordinary means. Frigid designation is given to soils typical of aspen-sagebrush types, and some crops can be grown. Most of the soils are in the udic (moisture arriving in summer) regime.

- * Maps of soil/plant associations including cadastral locations are presented in the Vegetation and Soils Report (Vol. A-5). (Physical and chemical analyses of overburden and soils in the project area (Tables LI-LXVI) are discussed in detail and presented in the Vegetation and Soils Report; Vol. A-5, Appendices. All data tables will be completed as soil survey studies are completed.)

REPLACES		TEXT
Section 2.11 Page 2-66 Date 11/16/79		Section 2.11 Page 2-66 Date 4/28/80

* Denotes change or addition

All soils have textures ranging from sandy loams to clay loams, and are considered neither unusual for the area in general nor for the vegetation types those soils support. The soils are not of a textural class that would be considered a problem either in disturbance or in reclamation activities. A comparison of spruce-fir and aspen soils, which as broad categories make up more than 80% of the permit area soils, shows that the pH and salinity measurements are probably normal for this climatic regime with the pH range from somewhat acidic to neutral for spruce-fir and aspen soils. There is a slight difference in soil reaction between spruce-fir (pH 5.0) and aspen (pH 6.0) soils,

(Continued on page 2-67.)

REPLACES			TEXT		
Section	Page	Date	Section	Page	Date
			2.11	2-66a	4/28/80

* Denotes change or addition

but this is also considered to be characteristic (i.e., evergreen conifer types more acidic than the deciduous forest of aspen).

- * Saline soil measured in the permit area, at reference site 2 -- aspen with an $EC \times 10^3$ value of 1.88, is considered extremely low when compared to agricultural soils. A slight difference between soils is noted when depths are compared. The solum of aspen extends to an average depth of 20 inches from nine locations and to 18 inches at seven locations of the spruce-fir. This corresponds to the average depths of penetrometer readings in aspen of 19.9 inches and of 18.1 inches in spruce-fir soils.

It is also apparent that soils in aspen communities are more fertile in the commonly applied fertilizers, N, P, and K, and also in most micro-nutrients. The levels of Fe, Mg, and Mn are considered to be adequate for growth of native vegetation, even though somewhat below amounts reported for average soils in the western United States (Shacklette, et. al., 1971). Moderate amounts of Zn, Ca, and K indicate that adequate quantities of these minerals are present, except in sagebrush soils.

- * High amounts of Ca, especially in the B-horizon of spruce-fir soils, are not considered a problem in immobilization of P due to the acid pH for these soils. Concentrations of Ca in sagebrush and aspen soils could become a problem in P relations if soils are altered to become more basic. NO_3 --nitrogen is low in quantity, as was expected for these soil types. Average amounts of NO_3 --nitrogen are inadequate in all soils of the region and all horizons. All areas would respond to addition of nitrogen, as indicated by the low total nitrogen content from all vegetation types.

In summary, the most important fertilizer to be applied in reclamation attempts is nitrogen. The addition of nitrogen should be timed with suitable moisture content in the soils (fall and spring). If soil moisture is insufficient, then supplemental irrigation should be provided.

REPLACES		TEXT
Section 2.11 Page 2-67 Date 11/16/79		Section 2.11 Page 2-67 Date 4/28/80

* Denotes change or addition

* A soils map of the portal-yard area has been prepared (see Volume A-5, Appendices; Soils Report). The soils are classified by the vegetative type with which they are correlated, as recommended by the Soil Conservation Service. Information from other areas to be disturbed can be extrapolated from the vegetative map and from the soil nomenclature assigned on the portal-yard area map.

* Additional Study

In coordination with Soil Conservation Service (SCS) personnel, the Applicant will design and perform a soil survey at the reconnaissance level for the permit area and a high-intensity detailed soil survey for the surface disturbance areas. The intensity or order of soil survey to be used in the surface disturbance areas, particularly the portal and facilities areas, is presently being considered by the SCS relative to the state of existing area disturbance and appropriate level of intensity. Presently nondisturbed areas will be surveyed at an Order 3 level.

Survey standards will be based on those described in the National Soil Survey Handbook and the Revised Soil Survey Manual which are standards for the National Cooperative Soil Survey Standards.

Survey maps will be of a scale greater than 1:12,000 for all areas. As the survey progresses through 1980, mapping unit descriptions including potential productivity of existing soils will be developed in compliance with the above standards and submitted with all survey results.

REPLACES		TEXT
Section 2.11 Page 2-68 Date 11/16/79		Section 2.11 Page 2-68 Date 4/28/80

* Denotes change or addition

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SOILS

Johnson, Wm. M. 1975. Soil Taxonomy, a basic system of soil classification for making and interpreting soil surveys. Supt. of Doc. S.C.S. Washington, D. C.

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2.12 LANDUSE

Existing Landuses

Existing landuses of the Skyline Mines project area and adjacent areas consist of grazing, recreation, and forestry. Four National Forest sheep allotments are contained partially within the project area. Recreational use of the areas to be affected by the mining operations consists primarily of hunting, fishing, sightseeing, and snowmobiling. Forestry uses are limited to cutting fence posts and firewood, with occasional timber sales to salvage bug-killed spruce timber.

Capability and Productivity of Permit Area Affected by Surface Operations

The area to be affected by surface mine operations and facilities is capable of supporting 765 animal units for one day or 26 animal unit months. Assuming an annual three month grazing period, the proposed disturbed area is capable of supporting an equivalent of nine animal units annually.

There are approximately 20.1 acres of the spruce-fir timber type and 17.7 acres of the aspen timber type within the area to be affected by mining activities. Based upon the available timber volume per acre of 10,000 board-feet per acre for spruce-fir timber and 5300 board-feet per acre for aspen timber (U.S. Forest Service, 1979), there could be approximately 201,000 board-feet of spruce-fir timber and 93,800 board-feet of aspen timber within the proposed surface area for mine operations and facilities.

Previously Mined Areas

The only known mine previously operated within the Skyline Mine permit area is the abandoned Eccles Canyon coal mine located immediately west of and within the National Forest boundary. The mine was an underground coal mine operated intermittently from 1899 to 1952 (Doelling, 1972).



Local Landuse Classifications

Emery and Carbon county zoning ordinances classify the Skyline Mine permit area as a recreation, forestry and mining zone to be used for "recreation, forestry, grazing, wildlife, and mining purposes".

Ninety nine percent of the permit area is located within the Manti-LaSal National Forest and is therefore subject to the "Land Management Plan" of the U.S. Forest Service (1979). All of the permit area within the National Forest is designated in the land management plan as "Coal Lands Management Area A". The management objectives related to the Skyline Mine permit area, as set forth by the U.S. Forest Service in the land management plan, are to improve and maintain watershed conditions, improve desirable plant species and vegetative cover, decrease soil erosion and maintain soil stability and productivity, coordinate mineral activities with other resource uses, manage and protect archaeological and paleontological resources, harvest timber and forest products on a sustained yield basis, provide quality recreational opportunities, coordinate transportation systems, and protect and maintain wildlife and fish habitats. (U.S. Forest Service, 1979).

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LANDUSE

- Doelling, H. H., 1972, Wasatch Plateau Coal Field. In Doelling, H.H. (ed.) Central Utah Coal Fields; Sevier-Sanpete, Wasatch Plateau, Book Cliffs and Emery. Utah Geological and Mineralogical Survey Monograph Series No. 3, Salt Lake City, Utah.
- U.S. Forest Service, Intermountain Region, 1979, Land Management Plan, Ferron-Price Planning Unit, Manti-LaSal National Forest, Price, Utah.

2.13 COMMUNITY INFRASTRUCTURE AND SOCIO-ECONOMICS

The objectives of the community infrastructure survey, which also dealt with certain socio-economic aspects, were to determine the capability of local communities to provide permanent employees for the mine, and the capability of those communities to accept new residents (workers) and provide them with the necessary infrastructure, i.e., community services such as water, sewage systems, housing, schools, and medical care. The purpose of the investigation was to further identify those communities that have shortages or deficiencies in necessary infrastructure and to suggest ways for rectifying the shortages before they adversely affect mine operations or the communities.

This section presents a summary of a report developed by Kaiser Engineers, based upon investigations in the communities around the Skyline Coal Project in Carbon, Emery, Sanpete, Juab, and Utah Counties in Utah. The report is based on the collection and review of existing published information, meetings with key local officials in the communities, and telephone conversations to confirm data and discuss potential solutions.

A more detailed discussion of the items presented in this summary may be found in Volume A-4, Final Report, a Review of Community Infrastructure and Socio-economic Aspects, Skyline Coal Project, Kaiser Engineers, August 1979. Documentation for the findings of this summary is appended to the Kaiser report.

2.13.1 Service Area

The Skyline Mine will have a relatively large service area. It is assumed, in describing the service area, that a new paved road will connect Utah State Highways U-96 and U-31. Conceptually, the service area can be viewed as two concentric circles. The inner circle is primary to the mine; the outer is secondary.

The primary area contains those communities that lie within a 45-minute commute and, therefore, are most likely to receive the largest influx of new residents seeking employment at Skyline. The secondary service area consists of those communities requiring over 45 minutes commute time to the mine. These communities are listed below by service area category.

PRIMARY SERVICE AREA

SECONDARY SERVICE AREA

Pleasant Valley

Scofield (4 minutes)
Clearcreek¹ (4 minutes)

* Sanpete Valley

Fairview (30 minutes)
Mt. Pleasant (37 minutes)
Spring City (44 minutes)

Carbon County

Price² (50 minutes)
Helper (44 minutes)

Carbon County

Wellington
Sunnyside
East Carbon
Hiawatha

Emery County

Cleveland
Orangeville
Castle Dale
Ferron
Huntington

Sanpete County

Moroni
Ephraim
Manti
Gunnison
Fountain Green
Milburn Station

Juab County

Nephi

Utah County

Payson
Spanish Fork
Santaquin
Mapleton
Salem

1 Clearcreek, in Pleasant Valley, can be virtually eliminated from labor force projections because it is entirely owned by the Valley Camp Mining Company.

2 Although Price is located 44 miles from the Skyline Mine and requires a commute time of 50 minutes, it is included within the primary area due to its large size and the fact that it will contribute a substantial percentage of the mine labor force during the early years.

It is expected that while some permanent residents from these secondary service area communities will commute to the Skyline Mine for employment, newcomers will not settle so far from the mine. Experience with other mines in the geographical area has shown that a 30

*Typographic Correction

to 40 minute commute over 40 miles or less represents the maximum that miners can be expected to commute and still maintain a high degree of reliability. If the time/distance factor is greater, experience demonstrates they will either move closer to the mine or seek work elsewhere. The Applicant plans to establish a reliable bus service in certain key areas. This service should increase the number of remote commuters.

2.13.2 Growth Capability

To determine the adequacy of infrastructure and the ability to accept additional population in these communities, Kaiser Engineers examined water and sewage systems, and the availability of land for expansion of schools, hospitals, housing, and commercial facilities. These infrastructure aspects for the primary service area communities are summarized in Table 2.13-1. Detailed discussions are available in the Volume A-4, report. Clearcreek was not included in the summary because of its relationship to Valley Camp Coal Company.

2.13.3 Labor Force

Demographically, there is a shortage of miners in the 30-50 year age bracket. A dormant period in the mining industry from the early 1950's to the early 1970's resulted in few new miners coming into the field for those 20 years. Consequently, the present miners tend to be either in their 50's, approaching retirement, or in their 20's, embarking on their first job.

The older miners are well settled in the existing towns and for the most part are located reasonably close to their present employment. They are not likely to change jobs or communities.

The younger men, who are learning mining skills, frequently change jobs to gain additional experience and/or to improve their earning power. If they have no children their logical choice for closeness to the mine would be Scofield, provided facilities are available there. If they have families, they are more likely to locate in one of the valleys where they have family connections, schools, and shopping facilities.

TABLE 2.13-1

GROWTH CAPABILITY SUMMARY

Services (Current Status)	Water	Sewer	Land For Expansion	Schools	Hospital	Housing	Commercial Facilities
Community							
Scofield	Requires Imp.	Requires Imp.	Yes	None	None	No Surplus	Minimal
Fairview	Currently Upgrading	Adequate	Yes	Overcrowded	None	Small Surplus	Partial
Mt. Pleasant	Recently Upgraded	Recently Upgraded	Yes	Overcrowded	Yes	Small Surplus	Full Convenience
Spring City	Recently Upgraded	Adequate	Yes	Unused Capacity	None	Small Surplus	Partial
Price	Adequate	Adequate	Yes	Adequate	Yes	Acute Shortage	Full Convenience
Helper	Adequate	Adequate	Yes	Adequate	None	Shortage	Partial

The distribution of labor, Table 2.13-2, shows the percentage of workers expected from each area for the first three years of mine life. It is assumed that the new road may not be open in time for the first manning and, therefore, an initial heavy reliance on Carbon and Emery Counties is projected.

Carbon/Emery Counties (Price, Helper)

Between 1982 and 1985, competition for labor will significantly reduce the number of employees commuting to the Skyline Mine from Carbon and Emery Counties. New residents fortunate enough to find housing in this rapidly growing area will probably join one of several power plant projects coming into the area, one of the new mines now being planned (see Table 2.13-3), or businesses that will eventually support the expanding community.

Sanpete Valley (Fairview, Mt. Pleasant, Spring City)

The Sanpete Valley should contribute the largest number of employees for the Skyline Mine once the road is constructed connecting Utah Highway 31 (U-31) to U-96. The supply of workers will have these sources:

- Unemployed residents,
- Underemployed residents presently working as turkey processors for \$3.70/hr. (or similar low-paying jobs),
- Family member and former residents living in Salt Lake City, Provo, and elsewhere who would probably return to the valley to live if employment opportunities existed there.

Since population expansion in the Sanpete Valley is expected to be primarily within families, the cultural shock of sudden expansion should be minimal. These valley communities could contribute a steady supply of quality workers to the Skyline Mine for several years.

Pleasant Valley (Scofield)

Scofield, in Pleasant Valley, will need expansion planning assistance. Although it has a harsh climate, low population, and no present expansion capabilities, expansion seems inevitable. Its location near the

TABLE 2.13-2

ESTIMATED LABOR DISTRIBUTION
FOR FIRST 3-YEAR PERIOD

<u>Area</u>	1982 % Labor Force <u>At Mine Beginning</u>	1985 % Labor Force <u>After 3 Years</u>
Carbon County (Price, Helper)	50%	20%
Sanpete County (Fairview, Mt. Pleasant Spring City)	35%	55%
Pleasant Valley (Scofield)	15%	25%

TABLE 2.13-3

PROJECTED MINES TO OPEN ON
FEDERAL LAND PRIOR TO 1985

<u>MINE NAME</u> <u>OPERATOR</u> <u>LOCATION</u>	<u>M.T.P.Y.</u> (1990 EST.)	* <u>EMPLOYMENT</u> ¹
"B" Canyon U.S. STEEL Near Sunnyside	1.0	280
FISH CREEK AND DUGOUT CANYON P G and E Near Wellington	3.2	896
DEADMAN'S MINE AMCA RESOURCE 10 miles east of Kennilworth	1.0	280
SKYLINE MINES COASTAL STATES Near Scofield	* 4.0 ²	* 800 ²
* BELINA #2 & O'CONNOR VALLEY CAMP Near Scofield	2.4	672
MINE #1 Mt. STATES RESOURCES 20 miles south of Emery	.5	140
SKUMPAH CANYON ENERGY RESOURCES GROUP 20 miles east of Emery	1.0	280
		<u>3,348</u>

* ¹ Employment based on 15 tons per man/shift, 480 production shifts per year.

* ² Applicant corrected Skyline Values to current mine plan.

SOURCE: Adapted from Table I-1 on page I-3 of the Final Environmental Statement Development of Coal Resources in Central Utah, prepared by the U.S. Department of the Interior.

mines and its close proximity to hunting and fishing areas will attract hardy people who do not mind living at this high elevation. Scofield could eventually supply up to a quarter of the labor force. If this community experiences severe growth problems, it could reflect unfavorably on the mining recruitment effort.

2.13.4 Suggested Action Items

Based on the study, recommended action items, according to area, are listed below.

Scofield and the Pleasant Valley Area

- Encourage the two (and possibly more) mining companies in Pleasant Valley to begin working on agreements to cooperate with each other and assist the local officials in solving existing problems.
- Hold an information exchange meeting with Scofield residents.
- Make a thorough investigation of the Utah Special Service District, which could provide many of the necessary community services to the mining companies and communities.
- Implement one of several housing assistance measures.

The Sanpete Valley Communities

- Hold an information meeting in Fairview or Mt. Pleasant to inform local officials of the mining program and establish communication points.
- Monitor the housing situation in Fairview, Mt. Pleasant, and perhaps Spring City and develop a dialogue with housing developers.
- Monitor school construction in North Sanpete School District. Provide updated employment information from time to time.

- Monitor hospital needs in the Sanpete Valley. Coordinate the mine manning schedule with local plans for a new hospital.
- Monitor water requirements, especially in Fairview.
- Request a copy of the tabulation of the Fairview resident survey.

Carbon/Emery Area

- Hold an information meeting in Price to inform local officials of progress and to establish communication points.
- Monitor essentials such as housing, water, sewage system, and capacity of new hospital.

* 2.13.5 Comprehensive Study Program

The Applicant will conduct a comprehensive study of the social, economic, and community impacts associated with the development of the Skyline Mine. This study shall encompass all impacted communities such as Scofield, Fairview, Mt. Pleasant, Spring City, Price, Helper, and other Carbon, Sanpete, Emery, and Utah County communities and shall commence upon approval of the mining and reclamation plan. This study shall include, but not be limited to, an analysis of the construction and mining work force, residential patterns, the community infrastructure associated with the identified work force, housing, transportation, and recreation impacts of the Skyline Mine Project. As a result of the comprehensive study, the Applicant will develop appropriate mitigation measures in consultation with the Counties Municipalities, Southeast Utah Association of Governments and the regulatory authority. The study shall include the following subjects:

- 1) an assessment of the construction and mining work force housing patterns. Should this assessment indicate significant housing shortages near Scofield, the Applicant will develop a plan to alleviate housing shortages;

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- Monitor hospital needs in the Sanpete Valley. Coordinate the mine manning schedule with local plans for a new hospital.
- Monitor water requirements, especially in Fairview.
- Request a copy of the tabulation of the Fairview resident survey.

Carbon/Emery Area

- Hold an information meeting in Price to inform local officials of progress and to establish communication points.
- Monitor essentials such as housing, water, sewage system, and capacity of new hospital.

- 2) a survey of the construction and permanent work force to evaluate the need to develop a coordinated transportation program (i.e., buses, vans, etc.).

- 3) The Applicant shall submit to the Counties, the Municipalities, the Southeast Utah Association of Governments, and the regulatory authority the results of the comprehensive study and the implementation of measures that have been undertaken by the Applicant to alleviate the impacts of the mine. This effort will be done on an annual basis commencing at the time of approval. The Applicant will submit a written report to the above named entities that evaluates the success of any mitigation measures.

The Applicant will participate in any organized municipal, multi-municipal, county, or regional effort to assess the impacts of the Skyline Mine and the cumulative impacts of future energy development in the region.

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2.14 PRIME FARMLAND INVESTIGATION

A pre-application investigation was conducted by the Applicant to determine if any prime farmland would be impacted within the area of the proposed surface facilities. Based on the criteria in 30 CFR 783.27 paragraph (b), items 1 and 5, the Eccles Canyon area cannot be classified as prime farmland. This opinion is substantiated by Dr. Theron B. Hutchings, State Soil Scientist for the Soil Conservation Service (see Volume A-5, Appendices; Technical Correspondence). Therefore, a negative determination for prime farmland classification of the Skyline project area is requested.