

October 26, 2017

Permit Supervisor  
Utah Coal Regulatory program  
Utah Division of Oil, Gas and Mining  
1594 West North Temple, Suite 1210  
PO Box 145801  
Salt Lake City, UT 84114-5801

**RECEIVED**  
**OCT 26 2017**  
DIV. OF OIL, GAS & MINING

Re: 4 Right 4 East Panel Amendment, Canyon Fuel Company, LLC, Sufco Mine, Permit Number  
C/041/0002

Dear Sirs:

Please find enclosed with this letter a copy of an amendment to the Sufco Mine Permit to provide specific information for the 4 Right 4 East panel. This amendment has been submitted in companion with the 3R4E panel amendment and many studies and reports associated with the 3R4E panel applies to the 4R4E panel.

The 4 Right 4 East Panel is located on the existing lease U-63214 which is part of the Quitchupah Tract/Lease. This lease was issued to the permittee in 1989, the tract was originally delineated in 1982. The mine plan can be found on Plate 5-7. Mining will occur only in the Upper Hiawatha coal seam. The overburden associated with this panel ranges from approximately 300-900 feet. An environmental assessment was prepared for Lease U-63214 in 1988 and an EIS for the Quitchupah Tract in 1983, a variety of information from these assessments are included in the existing M&RP.

No surface disturbance is anticipated beyond the potential for subsidence. Stan Welch with EPS, Inc. prepared a vegetation map of the Quitchupah Lease, which is included as Plate 3-1 (earlier documents listed the map as Map 8-1). A wildlife study was completed as "Wildlife Assessment of the Sufco Mining Property and Adjacent Area, Sevier County, Utah" incorporated in the 1980's as Appendix 3-3. As were an aquatic and avifauna study included as Appendix 3-2 and 3-4 (Confidential) respectively.

The original raptor surveys were done in the area of the panel in 1998 and 1999. The DWR nest site numbers were 315, 793, 794 and 795. Three of the nests were inactive and nest 794 was tended during their original survey. In summary, Nest 315 was inactive through 2008, with no survey since; nest 793 was inactive through 2005, active in 2007 and inactive in 2008, with no survey since; Nest 794 was inactive from 2000 through 2011, with no survey since; Nest 795 was inactive through 2004, tended in 2005, inactive 2006 through 2011, with no survey since by the permittee. The DWR has been surveying these nests as their resources allowed.

Raptor surveys were performed in the area of the panel in 1982 and 1988 by UDWR, USFWS, BLM, and USFS. There were no nests located within a 0.5 mile radius around the current location of the 4R4E panel during these surveys. The nests in the area of the 4R4E panel (Dry Fork Canyon) were re-surveyed in 2017. These surveys show that there are no active or in-active nests within 0.25 miles from the area of potential subsidence above the 4 Right 4 East panel.

Water data has been collected in the South Fork of Quitchupah Creek at monitoring site Sufco 06D above the panel since 2012. Sufco monitoring site 007 above the panel and site 042 below the panel have been

monitored since 1979 in the North Fork of Quitchupah Creek. The closest monitoring location is Sufco 021 (1979) which became UPDES Outfall 003A in 1999. The data has been recorded in the DOGM database. There are no water monitoring locations immediately adjacent to the panel. The monitoring locations are shown on Plate 7-3.

The first CHIA we have located for the Quitchupah Creek was first written in 1989, a second CHIA was prepared in 2005.

Appendix 7-17 of the Sufco permit contains the PHC for the Quitchupah Tract/Lease area.

There are several ponds, troughs and guzzlers north and east of the panel. Of the ponds Rock and Johnson ponds have been monitored for mining impacts annually for at least 16 years by Sufco personnel. The guzzlers and troughs are randomly monitored by cattlemen and Forest Service personnel. Although there are Forest Service water rights for streams and creeks that may feed the ponds, the rights are not specifically assigned to the ponds themselves according to Utah Division of Water Right files.

The chapter text submitted will contain redline/strikeout text and in most chapters only the pages where changes have occurred have been submitted. In addition, text existing in the M&RP that pertains to the panel(s) location has been highlighted in yellow text for ease of review is part of this submittal. Pagination will be adjusted to fit into the approved permit once the amendment has been reviewed and accepted for incorporation into the existing permit.

We appreciate your cooperation in completing the review and final approval of this project. If you have questions or need additional information please contact Bryant Bunnell (435) 286-4490 or Vicky Miller at (435)286-4481.

CANYON FUEL COMPANY  
SUFco Mine



  
Jacob Smith  
Technical Services Manager

Encl.

cc: DOGM Correspondence File

# APPLICATION FOR COAL PERMIT PROCESSING

Permit Change  New Permit  Renewal  Exploration  Bond Release  Transfer

**Permittee:** Canyon Fuel Company, LLC

**Mine:** Sulco Mine, Amendment to MRP to Address the Minding of 4 Right 4 East Panel(s)

**Permit Number:** C/041/0002

**Title:** Amendment to MRP to Address the Minding of 4 Right 4 East Panel(s)

**Description,** Include reason for application and timing required to implement:

**Instructions:** If you answer yes to any of the first eight (gray) questions, this application may require Public Notice publication.

- Yes  No 1. Change in the size of the Permit Area? Acres: \_\_\_\_\_ Disturbed Area: \_\_\_\_\_  increase  decrease.
- Yes  No 2. Is the application submitted as a result of a Division Order? DO# \_\_\_\_\_
- Yes  No 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area?
- Yes  No 4. Does the application include operations in hydrologic basins other than as currently approved?
- Yes  No 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond?
- Yes  No 6. Does the application require or include public notice publication?
- Yes  No 7. Does the application require or include ownership, control, right-of-entry, or compliance information?
- Yes  No 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
- Yes  No 9. Is the application submitted as a result of a Violation? NOV # \_\_\_\_\_
- Yes  No 10. Is the application submitted as a result of other laws or regulations or policies?

*Explain:* \_\_\_\_\_

- Yes  No 11. Does the application affect the surface landowner or change the post mining land use?
- Yes  No 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2)
- Yes  No 13. Does the application require or include collection and reporting of any baseline information?
- Yes  No 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
- Yes  No 15. Does the application require or include soil removal, storage or placement?
- Yes  No 16. Does the application require or include vegetation monitoring, removal or revegetation activities?
- Yes  No 17. Does the application require or include construction, modification, or removal of surface facilities?
- Yes  No 18. Does the application require or include water monitoring, sediment or drainage control measures?
- Yes  No 19. Does the application require or include certified designs, maps or calculation?
- Yes  No 20. Does the application require or include subsidence control or monitoring?
- Yes  No 21. Have reclamation costs for bonding been provided?
- Yes  No 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream?
- Yes  No 23. Does the application affect permits issued by other agencies or permits issued to other entities?

**Please attach one (1) review copy of the application.**

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

John D. Byrnes  
Print Name

J.D. Byrnes, Gen Mgr., 10-25-17  
Sign Name, Position, Date

Subscribed and sworn to before me this 25<sup>th</sup> day of October, 2017

Jill White  
Notary Public

My commission Expires: \_\_\_\_\_, 20\_\_\_\_ }  
Attest: State of \_\_\_\_\_ } ss:  
County of \_\_\_\_\_



**JILL WHITE**  
Notary Public  
State of Utah  
My Commission Expires 03/28/2020  
COMMISSION NUMBER 687950

**For Office Use Only:**

Assigned Tracking Number:

Received by Oil, Gas & Mining

**RECEIVED**

**OCT 26 2017**

**DIV. OF OIL, GAS & MINING**



**CHAPTER 1**  
**GENERAL CONTENTS**

United States of America  
Department of Interior  
Bureau of Land Management  
Price Coal Office  
125 South 600 West  
Price, Utah 84501

### **112.700 MSHA Numbers**

Mine ID No. 42-00089, Waste Rock ID No. 1211-UT-09-00089-01.

### **112.800 Interest in Contiguous Lands**

The applicant owns or controls, directly or indirectly, no legal or equitable interest in any lands contiguous to the permit area.

### **112.900 Certification of Submitted Information**

Canyon Fuel Company, LLC hereby attests that the information contained in this permit document is true and correct to the best of their knowledge.

### **113 Violation Information**

For violation information refer to Table 1-2 in the General Chapter 1 binder for Canyon Fuel Company, LLC prepared for the operations.

### **114 Right-of-Entry Information**

Copies of documents granting the legal right to enter and begin underground coal mining activities have not changed with the acquisition. They can be found in Appendix 1.1 Mining and Reclamation Plan for the SUFCO Mine, which is unmodified by this Notice of Change in Ownership and Control Information.

The right to enter the leaseholds conveyed by the Federal Coal Leases is conferred to the lessee by the Mineral Leasing Act of 1920 and the leases themselves. Copies of Federal Coal Leases U-47080, U-28297, U-62453, U-149084, U-63214, UTU-76195, UTU-91108 (ROW), SL-062583, and State of Utah Coal Lease ML 49443-OBA which grant the right to enter and conduct underground mining operations on the leased premises are presented in Appendix 1-2 Mining and Reclamation Plan for the SUFACO Mine. Appendix 1-2 is unmodified by this Notice of Change in Ownership and Control Information.

Federal Coal Lease SL-062583 grants the right to use lands for the construction and utilization of surface facilities necessary for underground coal mining.

BLM Lease UTU-84102 is in the process of being issued to Sufco. Once the lease/tract is issued to Canyon Fuel Company, LLC a copy of the documents will be incorporated into Appendix 1-2.

The legal description of the SUFACO coal leases:

Federal Coal Lease U-28297 - (716.51 acres +/-) - Approved January 1979  
Modified January 2012

T. 21 S., R. 5 E., SLM, Utah

Sec. 32, lot 1, N1/2S1/2

Sec. 33, NW1/4SW1/4

T. 22 S., R. 5 E., SLM, Utah

Sec. 5, W1/2W1/2;

Sec. 7, S1/2NE1 /4, E1/2SW1/4, W1/2SE1/4;

Sec. 8, W1/2NW1/4.

Federal Coal Lease U-062453 - (480 acres +/-) - Approved March 1962

T. 21 S., R. 5 E., SLM, Utah

Sec. 28, SW1/4SW1/4

Sec. 29, SE1/4SE1/4

Sec. 32, N1/2

T. 22 S., R. 4 E., SLM, Utah  
Sec. 2, lots 1-4, S1/2NE1/4, S1/2NW1/4, N1/2SW1/4;  
Sec. 3, NE1/4SE1/4

Federal Coal Lease U-63214 - (6336.34 acres +/-) - Approved July 1989  
Modified June 1999, December 2009, May 2011, January 2017

Tract 1:

T. 21 S., R. 4 E., SLM, Utah  
Sec. 12, E1/2SE1/4  
Sec. 13, E1/2NE1/4, S1/2  
Sec. 14, E1/2SW1/4, SE1/4  
Sec. 23, E1/2, E1/2W1/2  
Sec. 24, all.

T. 21 S., R. 5 E., SLM, Utah  
Sec. 16, W1/2NW1/4, W1/2SW1/4, W1/2E1/2NW1/4, W1/2E1/2SW1/4  
Sec. 17-19, all  
Sec. 20, NE1/4, W1/2 SE1/4, SW1/4, NW1/4  
Sec. 21, W1/2NW1/4, W1/2E1/2NW1/4  
Sec. 26, W1/2NW1/4SW1/4, SW1/4SW1/4  
Sec. 27, NE1/4, SE1/4, S1/2SW1/4, S1/2N1/2SW1/4  
Sec. 28, S1/2SE1/4, S1/2N1/2SE1/4, S1/2N1/2SW1/4, SE1/4SW1/4  
Sec. 29, S1/2NE1/4SE1/4  
Sec. 30, lot 1, N1/2NE1/4  
Sec. 33, NE1/4, E1/2NW1/4, NE1/4SW1/4, N1/2SE1/4  
Sec. 34, NW1/4NE1/4, NW1/4, NW1/4SW1/4.

Tract 3:

T. 21 S., R. 4 E., SLM, Utah  
Sec. 26, E1/2, E1/2SW1/4;  
Sec. 35, NW1/4, W1/2SW1/4.

**CHAPTER 2**

**SOILS**

## LIST OF APPENDICES

(Appendices appear in Volume 4)

### Appendix

- 2-1 Prime Farmland Determination Documents
- 2-2 Report of Studies of Vegetation and Soils for SUFCO Mine
- 2-3 Water and Soil Data Report
- 2-4 Submittal of Drainage Plan and Slope Stability for Reclamation for Convulsion Canyon Mine, Sergent, Hauskins & Beckwith
- 2-5 Final Reclamation Cut and Fill Quantities
- 2-6 Link Canyon Substation Soils Investigation
- 2-7 ~~(Revisions have eliminated this appendix)~~ **Quitcupah Tract Supplemental Environmental Assessment 1989 and Environmental Assessment for Costal States Energy Company, Coal Lease Application U-63214 Quitcupah Tract**
- 2-8 Pines Tract Soils Types
- 2-9 Link Canyon Portal Vegetation, Aquatic Fauna, and Soil Investigations
- 2-10 Muddy Tract Soils Types

## CHAPTER 2

### SOILS

#### 2.10 Introduction

This chapter and Volume 3 of this M&RP contains all pertinent information relating to identification, management, and reclamation activities associated with the soil resources present in the disturbed area of the SUFCO Mine.

#### 2.20 Environmental Description

The SUFCO Mine area lies in central Utah at the southern end of the Wasatch Plateau. Topography is dominated by plateaus separated by deeply incised canyons. Canyon walls are generally composed of laterally continuous (several thousand feet) ledge-forming sandstones, interbedded with slope forming shales and siltstones. Topography in the SUFCO Mine area ranges from 6500 to about 9,000 feet above sea level. Soils are generally not cultivated due to their thin nature, shortage of irrigation water, and a short growing season. Residual and colluvial soils are present at the SUFCO Mine surface facilities area. These soils have formed from residual sandstone and shale particles that mixed as they migrated down slope. Soils are usually very shallow, consisting predominantly of sand and silty sand loams which have high percolation rates. The soils are highly susceptible to wind erosion. The inherent erosion hazard from water is low. Rock outcrops consist of alternating layers of sandstone and shale. Subordinate amounts of coal and limestone are also present. The landscape is steep and rocky with massive sandstone ledges, and siltstone/shale slopes. Surface and subsurface layers are often rocky.

### **2.2.1 Prime Farmland Investigation**

No prime farmland exists in the SUFCO Mine disturbed area, Link Canyon disturbed area, or in any of its lease areas. Mining activities will not impact prime farmland. In compliance with R645-302-313, a pre-application investigation was conducted by the Applicant to determine if any prime farmland would be impacted by the project. Based on the federal criteria for determining the presence or absence of prime farmland, the Convulsion Canyon area, Link Canyon, the Pines Tract area, and the SITLA Muddy Tract area cannot be classified as prime farmland. Consultation with Dr. Theron B. Hutchings, State Soil Scientist for the Soil Conservation Service, substantiated the absence of prime farmland in the Convulsion Canyon and Link Canyon areas. (Appendix 2-1).

### **2.2.2 Soil Survey**

A Level I soil survey of the entire SUFCO Mine disturbed area, including the Link Canyon Substations No. 1 and 2, has been conducted. Soil survey data are presented in Appendix 2-2 for the majority of the permit area, Appendix 2-6 for the Link Canyon Substation areas, and are herein summarized in Sections 2.2.2.1 through 2.2.2.3. Survey data includes the following information: taxonomic classification, horizon name and depth, dry and moist color, texture (percent sand, silt, and clay), class, structure, percent rock fragments and organic matter, pH, effervescence, EC, and solubility of calcium, magnesium, and sodium (Appendices 2-2, and 2-6). A cross-reference list of map unit, soil taxonomic classification, and sample site appears in pages 17 through 19 of Appendix 2-2.

A site specific soil survey will be completed for the Overflow Pond prior to disturbance and this information will be utilized in determining topsoil salvage depth. The results of this soil survey will be included in the as-built addendum to be included in Appendix 2-2.

An Order 2 soil survey has been completed for the Link Canyon Substation No. 1 disturbed area and is included in Appendix 2-2. Additionally, an Order 1 soil survey was conducted of the substation Nos. 1 and 2 pad areas and the results are included in Appendix 2-6.

An Order 3 soil survey has been conducted for the Pines Tract and the results are included in Appendix 2-8. (Plate 2-2)

An Order 3 soil survey has been conducted for the SITLA Muddy Tract and the results are included in Appendix 2-10. (Plate 2-3) Soils associated with the 70 Acre BLM Right of Way are part of the Order 3 soil survey located in Appendix 2-10.

### **2.2.2.1 Soils Map**

Plates 2-1 and 2-2 delineates the soil types present in the disturbed and adjacent areas.

### **2.2.2.2 Soil Identification**

Soils present in the narrow V-shaped East Spring Canyon, which lie within and immediately adjacent to the disturbed area of the SUFCO Mine have been identified, characterized, and their spatial occurrences documented (Appendix 2-2). Four soil types are present in the disturbed area, and are herein referred to as soil types O, W, T, and X (Plate 2-1). Soil type O is a loamy-skeletal, mixed, frigid Ustic Torriorthent. Soil W is a loamy-skeletal, mixed, frigid Typic Xerothent. Soil type T is a loamy-skeletal, mixed, frigid, Calcixerollic Xerochrept. Soil X is a complex composed of both a clayey-skeletal, mixed, frigid, shallow Lithic Calcixeroll, and a fine, mixed, frigid Mollic Haploxeralf.

Analytical and field methodology utilized in characterizing these soil types and their soil horizons are found in pages 13 and 14 of Appendix 2-2. Soils were classified to family unit using the Soil Conservation Service's classification system (Johnson, 1975).

### **2.2.2.3 Soil Description**

#### Soil Type O

Soil type O is found at the north end of the disturbed area, in the area of the confluence of the Mud Spring Hollow and East Spring Canyon drainages (Plate 2-1). The taxonomic classifications of Soil O are that of a loamy-skeletal, mixed, frigid Ustic Torriorthent. This soil is found on slopes with grades of 60 percent or greater; consists of well-drained soils that have formed from residuum and colluvium; and supports Pinyon, Juniper, and Mountain Mahogany vegetative growth. The water holding capacity is 3.5 inches.

A description of the soils located in the Link Canyon Mine Portals area is provided in Appendix 2-9. The description of the soils was prepared by Dan Larsen, a soils scientist with EIS Environmental and Engineering Consultants.

#### Pines Tract

The general description of the soils within the Pines Tract is provided in Appendix 2-8.

#### SITLA Muddy Tract

The general description of the soils within the SITLA Muddy Tract is provided in Appendix 2-10.

#### 4 Right 4 East - Quitchupah Tract

A general description of the soils associated with the Quitchupah Tract is provided in the Supplemental Environmental Assessment prepared by UDOGM October 27, 1989 and Environmental Assessment prepared by the USDA (1988), included in Appendix 2-7. The soils above the 4 Right panel support sagebrush, grassland, mountain brush and Pinyon/Juniper, with islands of quaking aspen and scattered pines. The mining of the 4 Right panel has the potential for subsidence, refer to Sections 3.1.4.2, 5.2.5.1 and 5.2.5.2 for subsidence repair and revegetation commitments. No other disturbance to surface soil other than potential subsidence is anticipated or planned (i.e. construction).

#### **2.2.2.4 Soil Productivity**

In areas where soil disturbance has resulted from mining activities, the soils have lost their native identities. In most cases the soils have been quite thoroughly mixed. As a result, soil textures and horizons have been altered. Textures are now primarily loams and silty clay loams; depths over indurated material or shale are generally greater than 30 inches, except along "cut" slopes of the mountain where geologic strata are exposed.

As a result of this disturbance in "fill" areas, the potential for reclamation has been enhanced. The soils are deeper and the resulting textures are more desirable for plant growth.

Saturation percentages are unavailable. When the original sampling and analyses of soils for the portal yard area were completed, saturation percentage was not required by the regulatory agencies.

Electrical conductivity and other analytical data for soils of the disturbed area, soil types O, W, T, and X, are found in Tables 51, 56, 53, 57, and 58, of Appendix 2-2, respectively. These data reveal a high percentage of rock fragments which may limit fertility for both topsoil and subsoil. Vegetation associated with these soils regarding soil productivity are presented (as recommended by the Soil Conservation Service) in Appendix 2-2 and discussed in Chapter 3 of the Mining Reclamation Plan (MR&P).

### **2.2.3 Prime Farmland Soil Characterization**

No prime farmland exists in the permit area (see Section 2.2.1).

### **2.2.4 Substitute Topsoil**

During final reclamation suitable growth medium/substitute topsoil will be collected at potential locations such as the upper sediment pond dam, the fill slope above the upper sediment pond and soil resources used to construct the original surface pad. The applicant has no sound method for calculating the quantity of growth medium/substitute topsoil available from these potential locations. The preconstruction topography is poor or non-existent and a record of the quantity of material used for the construction of these locations is not available. A random composite sample will be taken for approximately every 2,000 tons as the soil is collected to determine suitability as growth medium/substitute topsoil. The soil resources will be supplemented as described in Section 2.4.3.

## **2.30 Operation Plan**

### **2.3.1 General Requirements**

#### **2.3.1.1 Removing and Storing Soil Methods**

**APPENDIX 2-7**

**Quitcupah Tract Supplemental Environmental Assessment 1989**

**Quitcupah Tract Environmental Assessment 1988**

**SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT**

**QUITCHUPAH LEASE TRACT ADDITION**

**CONVULSION CANYON MINE  
SOUTHERN UTAH FUEL COMPANY  
ACT/041/002  
SEVIER COUNTY, UTAH**

**Prepared by**

**Utah Division of Oil, Gas and Mining**

**and**

**United States Department of the Interior  
Office of Surface Mining  
Reclamation and Enforcement**

**October 27, 1989**

## PURPOSE AND NEED

The Utah Division of Oil, Gas and Mining (DOGGM) and the Office of Surface Mining Reclamation and Enforcement (OSM) received a Permit Application Package (PAP) for the mining of leased federal coal within the Quitchupah Lease Tract at the Southern Utah Fuel Company's (SUFCO) Convulsion Canyon Mine on July 3, 1989. OSM determined that the proposed operation described in the Quitchupah Lease Tract PAP required approval of a mining plan by the Assistant Secretary - Land and Minerals Management. Pursuant to the Mineral Leasing Act of 1920, as amended, section 523 of the Surface Mining Control and Reclamation Act of 1977 (SMCRA), and 30 CFR 746.14, the Assistant Secretary must approve, approve with conditions, or disapprove the mining plan for the mining of Federal coal as proposed in the PAP. This document assesses the effects of the proposed mining operations within the Quitchupah Lease Tract and alternative actions available to the Assistant Secretary to determine if approval, approval with conditions, or disapproval of the mining plan will have impacts on the human environment. This document supplements the May 1987 Environmental Assessment (EA) for the Convulsion Canyon Mine. Certain portions of this EA summarize detailed discussions from the May 1987 EA where either the descriptions of the Affected Environment or discussion of Impact Analysis have not changed.

The Convulsion Canyon underground coal mine is located in Sevier County, Utah, approximately 30 miles east of Salina, Utah. The mine has been in operation since 1941. The Quitchupah Lease Tract contains 9,905 acres of leased Federal coal within Federal Lease U-63214. No new surface disturbance is proposed. Coal within the Quitchupah Lease Tract will be accessed from existing underground entries in the Convulsion Canyon Mine. Approximately 86 million tons of coal will be mined from this lease tract during the 30 years following permit approval.

Coal is shipped by truck from the mine to Salina or Levan, Utah, where it is further shipped to buyers by truck or rail. Employment at the mine (300 jobs) and in support services (900 jobs) remains at a total of approximately 1,200 persons.

## ALTERNATIVES

### Alternative 1. Approval Without Special Federal Conditions

The Assistant Secretary-Land and Minerals Management may approve the mining plan in accordance with the recommendation of DOGM. This is the preferred alternative.

## Alternative 2. Disapproval

The Assistant Secretary-Land and Minerals Management may disapprove the mining plan which would have the same effect as taking no action.

## Alternative 3. Approval With Special Federal Conditions

The Assistant Secretary-Land and Minerals Management may approve the mining plan with special Federal conditions in addition to those attached to Utah Permit ACT/041/002 by DOGM.

The analysis of Alternative 1, Approval Without Special Federal Conditions, did not result in the identification of any impacts that could or should be mitigated beyond that mitigation proposed in the PAP and by Utah DOGM's conditions of approval. Therefore, this alternative is not analyzed further.

## AFFECTED ENVIRONMENT

### Topography and Geology

The proposed permit area is in the Wasatch Plateau Coal Field, which underlies a major portion of the Wasatch Plateau in Utah. The topography consists of gently rolling surface on the Wasatch Plateau and steep V-shaped canyons with horizontal sandstone ledges at elevations from approximately 6,900 to 9,100 feet.

The major geologic formations of the area are the Blackhawk, Price River, and North Horn Formations. The strata which outcrops within and adjacent to the proposed permit area consists of alternating clays, shales, and sandstones which range from upper Cretaceous to Tertiary in age. The Blackhawk Formation is the coal bearing formation with three coal bearing seams present within the lower 200 feet of this formation: (1) the Upper Hiawatha seam, (2) the Lower Hiawatha seam, and (3) the Duncan seam. The Upper Hiawatha seam and portions of the Lower Hiawatha seam are the economically extractable targets within the proposed permit area. The overburden above the Upper Hiawatha seam in the permit area ranges from 0 feet at the coal outcrop to approximately 1,500 feet near Little Drum Mountain.

### Climate and Air Quality

The climate of the proposed permit area is typical of canyon areas of central Utah. Summer temperatures range from 40 degrees to 95 degrees (°F) and winter temperatures average 25 degrees. The average annual precipitation is 12 inches. Winds in the mine area are affected by the area's topography, although general wind directions in the region are from the north-northeast in the winter and south-southwest in the summer.

Central Utah is primarily rural with some light or dispersed industrial activity. Existing air quality is generally excellent, although high total suspended particulate values result from travel on unpaved roads. Carbon monoxide, ozone, lead, and hydrocarbons are not monitored in the region, but are estimated to be within the National Ambient Air Quality Standards (NAAQS) (Bureau of Land Management, 1983).

### Surface Water

Surface waters within the proposed Quitchupah Lease Tract permit area drain into the North Fork of Quitchupah Creek, the South Fork of Quitchupah Creek, Dry Fork, Link Canyon, and Box Canyon. All surface water eventually flows to Muddy Creek; a tributary to the Dirty Devil River and hence, to the Colorado River.

The North Fork of Quitchupah Creek, the South Fork of Quitchupah Creek, and Box Canyon are considered perennial. All other drainages are intermittent. Water quality data indicate streams within the proposed permit area are within Utah Water Quality Standards.

Nine stock ponds that intercept surface runoff are located within the proposed permit area.

Mine inflow that is encountered in the Quitchupah Lease Tract would be conveyed to the previously approved discharge location at the Convulsion Canyon Mine. Discharge would be to the main channel of Quitchupah Creek. To date, mine water discharge has met Utah Water Quality Standards.

Subsidence buffer zones, based on a 21 degree angle of draw, would be established to protect the three perennial streams. Only main entry accesses would be developed beneath the streams within the buffer zones. Pillars would be sized to achieve a safety factor of 2.0 to maintain channel integrity.

### Ground Water

The U.S. Geological Survey has identified ten springs occurring within the proposed Quitchupah Lease Tract permit area. Five springs occur in the Castlegate Sandstone and five springs occur in the Price River Formation. All springs are considered to have high resource value due to the general dry nature of the proposed permit area.

The Castlegate Sandstone and Price River Formation are extensively exposed within the proposed permit area and are most likely recharged locally from precipitation. Recharge to the Star Point Sandstone and Blackhawk Formation is presumed to occur along naturally occurring faults and fractures. Ground-water flow is assumed to follow the northwesterly dip of the rocks.

## Soils

The soils found in the proposed permit area were formed from weathering of clay, sandstone, and limestone. Four soil orders were found to exist in the area. They are alfisols, entisols, inceptisols, and mollisols. Alfisols were formed on side slopes ranging from 15 to 35 percent. Predominant vegetation consists of Douglas fir, spruce, black sagebrush, and wildrye. Entisols and inceptisols were formed on steep slopes of 60 percent or greater. Predominant vegetation is pinyon-juniper, black sagebrush, grasses, and mountain mahogany. Mollisols are found on lesser slopes ranging from 0-15 percent. Typical vegetation is ponderosa, aspen, mountain mahogany, rabbitbrush, and pinyon-juniper (see Volume 5, pp. 13-35, Map B, PAP).

The pH and EC of the soil range from approximately 5.3 to 8.6 and 0.24 to 9.6 millimhos, respectively. Soil textures are from sandy loam to clay. The A horizon ranges from as little as two inches thick in the alfisols, entisols, and inceptisols, to as deep as 12 inches thick in the mollisols (see Volume 5, table 37-59, PAP).

## Vegetation

Vegetation types contained within the proposed permit area and adjacent areas include the pinyon-juniper, ponderosa pine, fir and aspen types of the boreal forest biome, and the sagebrush/grass, black sagebrush, and mountain sagebrush types of the desert shrub biome.

No plant species federally listed as Threatened or Endangered (T&E) have been found to occur on the proposed permit area, nor has a literature survey indicated the potential for any such occurrences (letter from Field Supervisor, Endangered Species Office, U.S. Fish and Wildlife Service, May 15, 1985; Environmental Assessment for Coastal States Energy Company, Coal Lease Application U-63214, Quitchupah Tract, October, 1988).

## Fish and Wildlife

The proposed permit area consists of a variety of habitat types and, therefore, supports a wide variety of wildlife species. Economically important and high interest species include elk, mule deer, black bear, coyote, mountain lion, mountain cottontail, and several furbearing species. Bird species of high interest that are present in the area include the golden eagle, blue grouse, ruffed grouse, western bluebird, and Grace's warbler. Golden eagle, prairie falcon, and Cooper's hawk nests have been found in or near the proposed permit area.

No fisheries exist within the proposed permit area.

No species officially designated as T&E have been found to reside in the proposed permit area (letter from Field Supervisor, Endangered Species Office, U.S. Fish and Wildlife Service, May 15, 1985, Environmental Assessment for Coastal States Energy Company, Coal Lease Application U-63214, Quitchupah Tract, October 1988). Bald eagles may pass through the area during their annual migration, but none nest or winter in the proposed permit area.

Golden eagles have historically nested within the proposed permit area along the Castlegate Sandstone escarpment. However, mine development plans indicate a subsidence buffer zone will be established outside the escarpment to maintain escarpment integrity. Pillars will be sized to achieve a safety factor of 2.0 to prevent escarpment failure.

### Land Use

Land uses in the proposed permit area include mining, logging, livestock grazing, wildlife habitat, watershed, oil and gas exploration, and recreation. Most of these uses have existed since the early 1900's and would be expected to continue without disruption by continued mining in the Quitchupah Lease Tract.

### Cultural Resources

More than 10 percent (960 acres) of the proposed Quitchupah Lease Tract permit area has been surveyed for cultural resources. Survey results indicate the area was used lightly in prehistoric times. The U.S. Forest Service concluded in 1988 (letter from Forest Supervisor, Six State Historic Preservation Offices, September 9, 1988; Environmental Assessment for Coastal States Energy Company, Coal Lease Application U-63214, Quitchupah Tract, October 1988) that cultural resource concerns would probably be generally minimal in complexity and that mitigation in the event of future surface-disturbing projects would also be somewhat minimal in difficulty.

### Transportation

There are three roads that are used in connection with the surface facilities: Mine Access Road, East Side Road, and the Old Woman Plateau Road. The main Mine Access Road is a paved Sevier County Road (Class B) which extends from Interstate Highway 70 to the guardhouse at the minesite. SUFCO is responsible for the maintenance of the stretch of road in the proposed permit area, 350 feet from the guardhouse north to the surface facilities area. The County Access Road would be left at the conclusion of mining.

Three unimproved access roads occur within the proposed permit area. If roads are impacted by mining-induced subsidence, they would be restored by SUFCO.

## Socioeconomics

Currently, SUFCO employs 300 personnel at the mine. Current production (2 MTY) and employment is projected to remain relatively stable through the next five years, but is dependent on market conditions.

According to the company, the following list represents the residential status of employees:

<u>Location</u>	<u>1980 Census Population</u>	<u>Number Employees</u>	<u>Percent</u>
Sevier County			
Salina	3,615	80	27
Richfield	8,062	45	15
Aurora	874	39	13
Redmond	619	23	8
Sanpete County			
Gunnison	2,431	36	12
Other (rural Sevier and Sanpete County)		77	25
Total		300	100

## IMPACT ANALYSIS

### IMPACTS OF ALTERNATIVE 1, APPROVAL WITHOUT SPECIAL FEDERAL CONDITIONS.

Mining operations within the Quitchupah Lease Tract would not encompass additional surface disturbance. Thus, only mining-induced subsidence would potentially impact surface resources. In areas of double-seam longwall mining (approximately 805 acres), surface lands may be lowered by as much as 12 feet. In areas of single seam mining, surface lands will be lowered proportionately less. Approximately 1,403 acres would be first mined only and 5,757 acres developed as single-seam longwall panels for a total of 7,160 acres of single-seam mining only in the Upper Hiawatha seam.

Mining-induced lowering of surface lands within remote plateau areas elsewhere in the Wasatch Plateau Coal Field has not resulted in observable impacts. Accordingly, the lowering of surface lands within the Quitchupah Lease Tract would most likely not result in adverse impacts.

## Surface Water

Mining operations within the Quitchupah Lease Tract would not encompass additional surface disturbance. Thus, only mining beneath perennial streams would potentially impact surface water.

Mining development plans incorporate adequately designed buffer zones for areas beneath perennial streams to maintain channel integrity. Accordingly, the development of main access entries beneath perennial streams pose low risk for causing adverse impacts to surface water.

## Ground Water

Mining operations within the Quitchupah Lease Tract may result in the extension and expansion of the existing fracture system and upward propagation of new fractures. Inasmuch as vertical and lateral migration of ground water appears to be partially controlled by fracture conduits, readjustment or realignment in the conduit system would inevitably produce changes in the configuration of ground-water flow. Potential changes include increased flow rates along fractures that have "opened", and diverting flow along new fractures or within permeable lithologies. Subsurface flow diversion may cause the depletion of water in certain localized aquifers and potential loss of flow to springs that would be undermined. Increased flow rates along fractures would reduce ground-water residence time and potentially improve water quality.

Overburden thickness averages 1,000 feet within the Quitchupah Lease Tract and therefore, diversion of spring flow is considered to be at an overall low risk. The mining plan incorporates proposals to replace water if spring flow is reduced due to mining-induced subsidence.

Following cessation of operations, the lower parts of the mine workings would become flooded. Since the northwest portion of the Quitchupah Lease Tract is approximately 500 feet lower than the portals, the potential for complete mine flooding is low because the hydraulic head generated as flooding proceeds would increase until the hydraulic properties of the roof, floor and rib are exceeded, and flow within the rocks initiates. Thus, mine flooding would result in recharging of regional aquifer storage and re-establishment of the natural ground-water system that operated prior to mining. The potential for postmining portal discharge is considered low.

Based on information presented in the PAP, mining within the Quitchupah Lease Tract should not have an adverse impact on ground-water resources.

## Soils

No further surface disturbance is associated with the Quitchupah Lease Tract.

Previous analyses of soil materials indicated no acid- or toxic-forming materials are present within the surface disturbed areas of the Convulsion Canyon Mine (Environmental Assessment, Convulsion Canyon Mine, Souther Utah Fuel Company, May 1987).

## Vegetation

No further surface disturbance is associated with the Quitchupah Lease Tract.

Past mining activities at the Convulsion Canyon Mine surface facilities have altered and/or removed 17 acres of native vegetation. The life-of-mine operations will not cause long-term adverse impacts because (1) adequate revegetation with native species is practical as proposed, (2) all of the mine-related disturbance has occurred, and (3) all disturbed areas will be revegetated.

## Fish and Wildlife

Mining operations within the Quitchupah Lease Tract would not encompass additional surface disturbance.

Mining development plans incorporate adequately designed subsidence buffer zones for areas outside the Castlegate Sandstone escarpment to maintain cliff integrity and thereby, prevent adverse impacts to raptor nesting habitat. Accordingly, mining within the Quitchupah Lease Tract should not have an adverse impact on raptors.

## Cultural Resources

Mining operations within the Quitchupah Lease Tract would not encompass additional surface disturbance. Cultural resource surveys indicate the proposed permit area was lightly used by prehistoric people.

The U.S. Forest Service and State Historic Preservation Officer have determined that mining-induced subsidence will have minimal impact on cultural resources.

## Socioeconomics

The major project related impact cited by local officials is SUFCO's transportation of coal through the town of Salina. Coal is currently being hauled from the site by 26 to 40 ton capacity trucks at an average rate of 11 per hour, running 20 hours a day, six days a week. The coal is hauled to rail facilities in Salina and Levan, Utah (80 miles one way) or directly to consumers. As a result, there has been a continual need to maintain the road network in the area. Local officials are attempting to facilitate plans for a rail line in the valley to minimize truck haulage of coal.

No adverse impacts are anticipated due to the continued operation of the Convulsion Canyon Mine. Transportation impacts are the major concern to local officials. At present, the mine is a major employer in the area and helps provide stability to the local and regional economy. Cumulative forecasts, however, indicate that some communities will have to further prepare for growth as a result of future energy development projects.

## Long-Term Impacts

Long-term impacts that would occur are expected to be minor and include possible subsidence on some parts of the permit area and possible loss of spring flow in the area.

## IMPACTS OF ALTERNATIVE 2, DISAPPROVAL

If the Quitchupah Lease Tract mining plan is disapproved, the impacts described for Alternative 1, Approval Without Special Federal Conditions, would not occur. If the mining plan is disapproved, SUFCO would not be able to mine this Federal coal. This would curtail the amount of coal that the company would be able to produce and may result in mine closure at an earlier date when existing permitted coal resources are depleted. One of the most noticeable impacts of mine closure would be a permanent loss of 300 direct and induced secondary jobs in the surrounding region. Local payrolls, retail purchases, and tax collections would also decline. In the long term, closure could result in a decline in local population. The largest share of the losses would be concentrated in Sevier and Sanpete Counties.

Further, this alternative would result in approximately 86 million tons of coal not being mined. However, this alternative would avoid additional subsidence in unmined areas and continued impacts to water, air and land resources. SUFCO would have the option of resubmitting another mining plan for this lease in the future.

PREVIOUS ENVIRONMENTAL IMPACT STATEMENTS AND ENVIRONMENTAL ASSESSMENTS

Environmental studies on the Convulsion Canyon Mine and Quitchupah Lease Tract prepared by Federal agencies include the following documents:

Bureau of Land Management, 1983, "Uinta-Southeastern Utah Coal Region, Final Environmental Impact Statement."

Office of Surface Mining Reclamation and Enforcement, 1987, "Environmental Assessment, Convulsion Canyon Mine, Southern Utah Fuel Company."

U.S. Forest Service and Bureau of Land Management, 1988, "Environmental Assessment for Coastal States Energy Company, Coal Lease Application U-63214 Quitchupah Tract."

CONSULTATION

State Historic Preservation Officer  
U.S. Forest Service  
U.S. Fish and Wildlife Service  
Bureau of Land Management  
U.S. Geological Survey

PREPARER

Richard V. Smith, Permit Supervisor, Utah Division  
of Oil, Gas and Mining

REVIEWERS

Richard Holbrook, Senior Project Manager, Office of Surface  
Mining Reclamation and Enforcement

Floyd McMullen, Project Leader, Office of Surface Mining  
Reclamation and Enforcement

**QUITCHUPAH AND MUDDY CREEKS  
CUMULATIVE HYDROLOGIC IMPACT  
ASSESSMENT**

**CONVULSION CANYON MINE  
(QUITCHUPAH LEASE TRACT ADDITION)  
ACT/041/002**

**Sevier and Sanpete Counties, Utah**

**October 1989**

## TABLE OF CONTENTS

		Page
I.	<b>Introduction</b> . . . . .	<u>1</u>
	Geology . . . . .	<u>1</u>
	Vegetation . . . . .	<u>1</u>
	Hydrology . . . . .	<u>4</u>
II.	<b>Cumulative Impact Area</b> . . . . .	<u>4</u>
III.	<b>Scope of Mining</b> . . . . .	<u>5</u>
	Convulsion Canyon Mine (SUFECO) . . . . .	<u>5</u>
	(including Quitchupah Lease Tract Addition)	
IV.	<b>Study Area</b> . . . . .	<u>5</u>
	Geology . . . . .	<u>5</u>
	Hydrologic Resources . . . . .	<u>5</u>
	Ground Water . . . . .	<u>5</u>
	Surface Water . . . . .	<u>8</u>
V.	<b>Potential Impacts</b> . . . . .	<u>9</u>
	Ground Water . . . . .	<u>9</u>
	Dewatering . . . . .	<u>9</u>
	Subsidence . . . . .	<u>11</u>
	Surface Water . . . . .	<u>11</u>
VI.	<b>Summary</b> . . . . .	<u>12</u>
VII.	<b>References</b> . . . . .	<u>13</u>

Figures

	Page
1. Wasatch Plateau Coal Field . . . . .	<u>2</u>
2. CIA and Mining Map . . . . .	<u>Folder</u>
3. Stratigraphy and Hydrologic Characteristics . . . . . of the Southern Wasatch Plateau Coal Field (after Doelling, 1972 and Danielson, et al., 1981)	<u>6</u>
4. Water Monitoring Locations and Potentiometric . . . . . Surface of the Star Point-Blackhawk Aquifer and Castlegate Aquifer	<u>Folder</u>
5. Surface Water Drainage Area Map . . . . .	<u>Folder</u>
6. Potential Recharge Above the Coal Resource . . . . .	<u>Folder</u>

## I. INTRODUCTION

The purpose of this report is to provide a Cumulative Hydrologic Impact Assessment (CHIA) for Quitchupah and Muddy Creeks, located in Sevier and Sanpete Counties, Utah. This assessment encompasses the probable cumulative impacts of all anticipated coal mining in the general area on the hydrologic balance and whether the operations proposed under the application have been designed to prevent damage to the hydrologic balance outside the proposed mine plan area. This report complies with legislation passed under Utah Code Annotated 40-10-1 et seq., and the attendant State Program rules under UMC 786.19[c].

Quitichupah and Muddy Creeks occur within the southern end of the Wasatch Plateau Coal Field, approximately 30 miles east of Salina, Utah (Figure 1). The Wasatch Plateau is a north-south trending high plateau which is bounded by Sanpete Valley to the west and Castle Valley to the east. Elevations along the southern portions of the Wasatch Plateau range from approximately 6,500 to over 9,000 feet.

Precipitation varies from 40 inches at higher elevations to less than 10 inches at lower elevations. The area encompassed by the Wasatch Plateau may be classified as semiarid to subhumid.

### GEOLOGY

Outcropping rocks of the Wasatch Plateau Coal Field range from Upper Cretaceous to Quarternary in age. The rock record reflects an overall regressive sequence from marine (Mancos Shale) through littoral (Star Point Sandstone) and lagoonal (Blackhawk Formation) to fluvial (Castlegate Sandstone, Price River Formation and North Horn Formation) and lacustrine (Flagstaff Limestone) depositional environments. Oscillating depositional environments within the overall regressive trend are represented by lithologies within the Blackhawk Formation. The major coal-bearing unit within the Wasatch Plateau Coal Field is the Blackhawk Formation.

### VEGETATION

Vegetation of the Wasatch Plateau area is classified within the Colorado Plateau floristic division (Cronquist et al., 1972). The area occupies parts of both the Utah Plateaus and the Canyonlands floristic sections. Vegetation communities of the area include sagebrush-grassland, pinyon-juniper, mountain brush, Douglas fir-white fir-blue spruce, and Engelmann spruce-subalpine fir.

In the sagebrush-grassland type, typical overstory consists of big sage, Artemisia tridentata var. vaseyana or black sage (A. nova) with a co-dominant perennial grass understory.

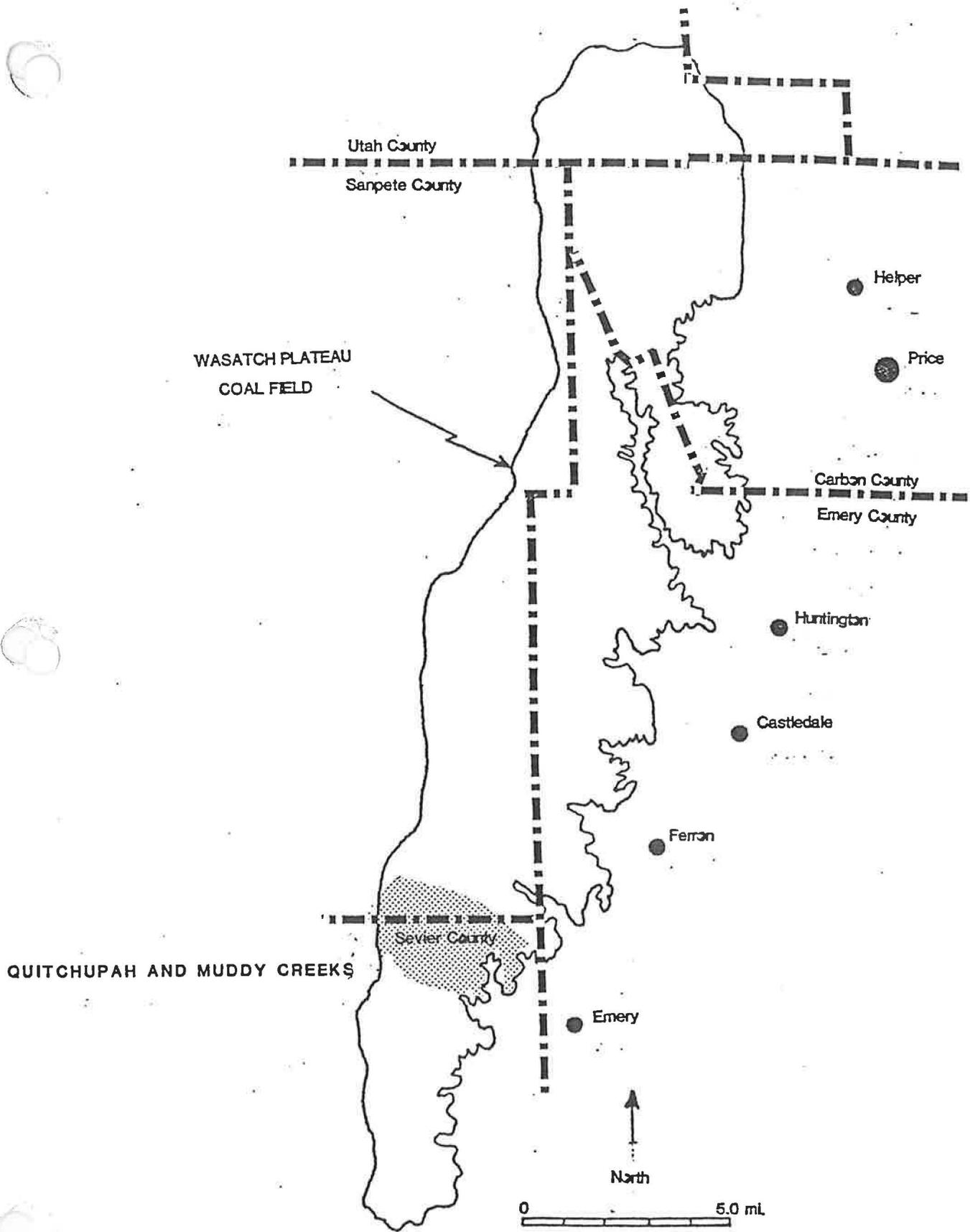


Figure 1. Wasatch Plateau Coal Field.

Pinyon-juniper woodlands occupy drier sites often with stoney to very rocky soils. Pinus edulis and Juniperus osteosperma are co-dominant in the overstory. Understory vegetation ranges from sparse to moderate ground cover on range sites in poor to excellent condition. Understory species include sagebrush, mountain mahogany (Cercocarpus montanus), serviceberry (Amelanchier utahensis), and several perennial grasses including slender wheatgrass (Agropyron trachycaulum), Salina wildrye (Elymus salina), junegrass (Koeleria cristata) and Indian ricegrass (Oryzopsis hymenoides).

Dominant shrubs of the mountain brush communities will vary depending on elevation and aspect. The drier south and west-facing slopes may support dense stands of Gambel oak (Quercus gambellii). Other dominants of this community may include serviceberry, mountain mahogany (Cercocarpus montanus) or (C. ledifolius), bitterbrush (Purshia tridentata) and greenleaf manzanita (Arctostaphylos patula).

The range of the Douglas fir-white fir-blue spruce community is about 8,000 to 10,000 feet. Douglas fir (Pseudotsuga mensiesii) is usually the dominant tree. Blue spruce (Picea pungens) is usually limited to the most mesic sites, often along streams. With dense canopies, understory vegetation may be sparse. Common shrubs include serviceberry (Amelanchier spp.), Oregon grape (Berberis repens), chokecherry (Prunus virginiana), Rocky Mountain maple (Acer glabrum), mountain lover (Pachistima myrsinites) and snowberry. Bluebunch wheatgrass (Agropyron spicatum), mountain brome (Bromus carinatus), and Kentucky bluegrass (Poa pratensis) are common grasses. Aspen stands (Populus tremuloides) can be found throughout the zone, particularly in mesic sites and as successional communities.

Engelmann spruce (Picea engelmannii) and subalpine fir (Abies lasiocarpa) dominate the spruce-fir zone at the highest elevations of the hydrologic impact area. While receiving about the same precipitation as the Douglas fir communities, lower evapo-transpiration with cooler temperatures can permit a more lush vegetation in the spruce-fir zone. Limber pine (Pinus flexilis) often occupies steep or rocky, drier sites of this zone.

Small riparian communities are found at all elevations within the impact assessment area. With greater water availability and cooler temperatures, the riparian zone often includes more mesic species (e.g., those from a higher vegetation zone). Shrub species from the mountain shrub type may be found at most elevations.

Additional riparian zone shrubs include aspen, narrowleaf cottonwood (Populus angustifolia), red osier dogwood (Cornus stolonifera), skunkbush (Rhus trilobata), river birch (Betula occidentalis) and various willows (Salix spp.). Small wet areas around springs and seeps will often support a dense growth of grasses, sedges and willows.

## HYDROLOGY

The Convulsion Canyon Mine, operated by Southern Utah Fuel Company (SUFCO), is located on a tributary to Quitchupah Creek below the confluence of East Spring Canyon and Mud Spring Hollow. The permit area for the mine encompasses perennial, intermittent, and ephemeral drainage to Muddy Creek on the northern boundary of the CIA and Quitchupah Creek on the southern boundary. All flow is to the Muddy Creek drainage. Approximately 50 to 70 percent of streamflow occurs during the snowmelt runoff period. Summer precipitation does not usually produce high runoff except in localized areas. Average annual precipitation ranges from 40 inches on the mountain ridges to less than 20 inches in the valleys. Water in the headwaters of Quitchupah Creek is a calcium-bicarbonate type and is generally good quality, with mean concentrations of Total Dissolved Solids (TDS) about 260 milligrams per liter. In the lowland streams below the CIA, the dominant ions during high flow are calcium, magnesium, and bicarbonate, and during low flow, the dominant ions are sodium, calcium, and sulfate, with values of more than 2,000 mg/l Total Dissolved Solids commonly occurring. This decrease in quality is a result of natural runoff and irrigation return flows from Mancos Shale lands. The Mancos shale is easily weathered, gypsiferous, sodium- and sulfate-rich. Irrigation return flows are the primary source of salts, causing an acceleration of the natural leaching of the solutes in the soils.

Ground water is present in all lithostratigraphic units within the Wasatch Plateau Coal Field. Ground water occurs under localized conditions that often form a system of "perched" aquifers and associated springs and/or seeps. Significant localized ground-water resources are often associated with the North Horn Formation and Price River Formation. The U.S. Geological Survey has identified and formally designated the Star Point-Blackhawk aquifer as the only regional ground-water resource occurring in the Wasatch Plateau Coal Field (Danielson, et al., 1981 and Lines, 1985).

## **II. CUMULATIVE IMPACT AREA (CIA)**

Figure 2 delineates the CIA for current and projected mining in the Quitchupah and Muddy Creek areas. The CIA encompasses approximately 77 square miles. The northern and southern CIA boundaries are designated by Muddy Creek and Quitchupah Creek, respectively. The eastern boundary is defined by the drainage divides between Wileys Fork and East Fork Box Canyon, and between Link Canyon Wash and Christiansen Wash. The western boundary is delineated by the drainage divide between Skumpah Creek and North Fork Quitchupah Creek.

### III. SCOPE OF MINING

The Convulsion Canyon Mine permit area currently encompasses 7,355 acres and with the inclusion of the Quitchupah Lease Tract Addition, the total permitted area will be 17,260 acres. Leases that are designated in the Quitchupah "Logical Mining Units" are as follows: U-28297, U-062453, U-0149084, SL-062583, U-47080, and U-63214.

The Convulsion Canyon Mine commenced operation in 1941, mining federally-owned coal. The applicant currently holds six federal leases and one fee lease, of which 96 percent of the area is federally owned. Total surface disturbance for the surface facilities is approximately 68 acres.

Projected life of the mine is 50 years, with an average annual production of 2,000,000 tons per year. The majority of coal will be longwall mined from the Lower Hiawatha seam in the lease tract addition. Coal will be moved by underground conveyor from the face to the portal, then shipped by truck to Levan, Utah.

### IV. STUDY AREA

#### GEOLOGY

The Quitchupah and Muddy Creeks CIA is characterized by cliffs, narrow canyons and high plateaus. Stratigraphic units outcropping within the area include, from oldest to youngest, Mancos Shale, Star Point Sandstone, Blackhawk Formation, Castlegate Sandstone, Price River Formation, North Horn Formation, and Quarternary deposits. Lithographic descriptions and unit thicknesses are given in Figure 3.

Rocks in the study area strike northeast and dip approximately two degrees to the northwest. No major faults or folds occur within the CIA.

#### HYDROLOGIC RESOURCES

##### Ground Water

The ground-water regime within the CIA is dependent upon climatic and geologic parameters that establish systems of recharge, movement and discharge.

Snowmelt at higher elevations provides most of the ground-water recharge, particularly where permeable lithologies such as sandstone are exposed at the surface. Vertical migration of ground water occurs through permeable rock units and/or along zones of faulting and fracturing. Lateral migration initiates when ground water encounters impermeable rocks and continues until either the land surface is intersected (and spring discharge occurs) or other permeable lithologies or zones are encountered that allow further vertical flow.

System	Series	Formations and Members	Thickness (feet)	Lithology and Water-Bearing Characteristics
Quaternary	Holocene and Pleistocene		0-100	Alluvium and colluvium; silt, sand, gravel, and boulders; yields water to springs that may cease to flow in late summer.
Tertiary	Paleocene	North Horn Formation	1,100	Variiegated shale and mudstone with interbeds of tan to gray sandstone; all of fluvial and lacustrine origin; yields water to springs.
Cretaceous	Upper Cretaceous	Price River Formation	550	Gray-to-brown, fine-to-coarse, and conglomeratic fluvial sandstone with thin beds of gray shale; yields water to springs locally.
		Castlegate Formation	150-250	Tan-to-brown fluvial sandstone and conglomerate; forms cliffs in most exposures, yields water to springs locally.
		Blackhawk Formation	850-950	Tan-to-gray discontinuous sandstone and gray carbonaceous shales with coal beds; all of marginal marine and paludal origin; locally scour-and-fill deposits of fluvial sandstone within less permeable sediments; yields water to springs and coal mines, mainly where fractured or jointed.
		Star Point Sandstone	200-300	Light-gray, white, massive, and thin bedded sandstone, grading downward from a massive cliff-forming unit at the top to thin interbedded sandstone and shale at the base; all of marginal marine and marine origin; yields water to springs where fractured and jointed.
		Masuk Member Mancos Shale	600-700	Dark gray marine shale with thin, discontinued layers of gray limestone and sandstone; yields water to springs locally.

Figure 3. Stratigraphy and Hydrogeologic Characteristics of the Southern Wasatch Plateau Coal Field (after Doelling, 1972 and Danielson, et al., 1981).

The Star Point Sandstone and lower portion of the Blackhawk Formation, Castlegate Sandstone, Price River Formation, North Horn Formation, and Quarternary deposits are potential reservoirs or conduits for ground water in the CIA. Reservoir lithologies are predominantly sandstone. Sandstone reservoirs occur as channel and overbank, lenticular and tabular deposits. Shale, siltstone and cemented sandstone beds act as aquacludes to impede ground-water movement. The Mancos Shale is considered a regional aquaclude that delimits downward flow within the CIA. Localized aquacludes include relatively thin, impermeable lithologies occurring within the stratigraphic section above the Star Point Sandstone.

The Star Point-Blackhawk aquifer is present and represents the only identified regional ground-water resource in the study area. Ground water associated with the Castlegate Sandstone may be characterized as occurring within a "perched" aquifer zone and represents a locally significant hydrologic resource.

Data from eight boreholes located within the proposed permit area for the Quitchupah Lease Tract Addition and Convulsion Canyon Mine permit area indicate ground water within the Star Point-Blackhawk aquifer is moving towards the southeast. An additional four boreholes located within the Convulsion Canyon Mine permit area indicate ground water within the Castlegate aquifer flows to the south. Ground-water data also show the Castlegate aquifer to have better water quality than the Star Point-Blackhawk aquifer.

Approximately 18 springs occur within the CIA (Figure 6). Total spring discharge is less than 35 gpm, giving an average spring discharge of less than 2 gpm. Spring discharge is distributed as follows:

<u>Lithologic Unit</u>	<u>Number of Springs</u>	<u>Total Discharge</u>
North Horn Formation	4	4.2 gpm
Price River Formation	3	4.6 gpm
Castlegate Formation	9	17.8 gpm
Blackhawk Formation	2	5.0 gpm

Analysis indicates spring water is comprised of two types representative of the north and east portions of the lease area. Spring data from Link Canyon, in the Quitchupah Creek drainage basin, indicates a neutrally aciditic sodium-bicarbonate type water. Water quality is fair to good with moderate salt concentrations. This site is representative of the eastern portion of the lease area. Spring data in the northern portion of the lease area indicates a neutrally aciditic calcium-bicarbonate type water. Water quality is considered good to excellent.

Mine inflow is approximately 650 gpm for the Convulsion Canyon Mine. Mine water is discharged to the North Fork of Quitchupah Creek and Convulsion Canyon. Analysis indicates mine discharge water to be a calcium-bicarbonate type of good quality.

Mine water within the CIA represents ground-water discharge and depletion from storage in the Blackhawk Formation and Star Point Sandstone and interception of flow along faults/fractures.

### Surface Water

The CIA has been divided into two major drainage basins (Figure 5), waters draining to Muddy Creek, and waters draining to Quitchupah Creek. Although no surface disturbance is found within the Muddy Creek drainage, approximately 2.75 square miles of drainage area will fall within the mine's permit area. A major portion of this drainage area will be undermined. The surface facilities and current mine breakouts found within the Quitchupah drainage area include 23.9 square miles of potentially undermined drainage area.

#### **Muddy Creek (1, 2 and 3)**

Most of the runoff to the Muddy Creek drainage area within the CIA either comes from snowmelt in mountainous areas or baseflow recharge from ground-water. Area Two encompasses the Box Canyon drainage, which is considered a perennial drainage, due to springs issuing from the Castlegate Formation. The average gradient of Box Canyon is 50 percent. Two sampling sites (09, 089) are proposed for Box Canyon to monitor the quality and quantity of this perennial stream. A subsidence buffer zone is proposed to protect Box Canyon. Approximately 1,834 acres of permit area are found within the Box Canyon drainage. The total drainage area in Box Canyon within the CIA draining to Muddy Creek is 7,256 acres. Drainage Areas One and Three are 9,584.75 acres, and 1,071.02 acres, respectively, and drain to Muddy Creek. Neither area is undermined or within the permit area, but is contained within the CIA boundary, as potentially affected by groundwater recharge from permitted areas associated with the Quitchupah Lease Tract.

#### **Quitchupah Creek (4, 5 and 6)**

Area Four encompasses the mine site and facilities area in the Spring Canyon drainage. The average channel gradient of Spring Canyon is 6.7 percent, and the drainage contains 7,226 acres. There are five sampling sites associated with the Spring Canyon drainage. Three sampling sites are on surface water (022, 030, and 047A) and one is a spring (001) and one is a mine discharge point.

Area Five is the North Fork of Quitchupah Creek, which encompasses 15,168 acres. The average gradient of the North Fork of Quitchupah Creek is 5.9 percent. The following sampling sites (006, 007, 021 and 042) are found within Area Four. Sample site 006 is found on the South Fork of the North Fork of Quitchupah Creek. Sample Site 007 is found on the North Fork of Quitchupah Creek. Sample Site 021 is a mine water discharge point found in Section 29, T21S, R5E. Sample site 042 is found at the confluence of the North Fork of Quitchupah Creek, and the Main Fork. The channel gradient is found in the North Fork of Quitchupah Creek, and is 5.9 percent.

Area Six is the Link Canyon drainage area. There is one spring, 6W-21, in the upper reaches of Link Canyon, which will be monitored. The Link Canyon drainage is 9,972 acres and 5.1 percent gradient.

No surface facilities are found within Area Four or Five.

## V. POTENTIAL IMPACTS

### Ground Water

Dewatering and subsidence related to mining have the greatest potential for impacting ground-water resources in the CIA.

The Waste Rock Disposal Site for the Convulsion Canyon Mine is located in the Skumpah Creek drainage, approximately four miles east of the Quitchupah and Muddy Creeks CIA. The July 24, 1988 Cumulative Hydrologic Impact Assessment for the Waste Rock Disposal Site concluded that the proposed designs were consistent with preventing damage to the hydrologic balance outside the mine plan area.

Dewatering. The volume of water being discharged from the Convulsion Canyon Mine (690 gpm) approximates the amount of water that is currently being withdrawn from the ground-water system. The current and projected withdrawal values may be totalled and compared to estimates of ground-water discharge and recharge within the CIA, and thereby, allow an assessment of cumulative dewatering impacts.

Approximately 38,700 acres within the CIA overlie the coal resource and represent a potential recharge area (Figure 6). Average annual precipitation is approximately 20 inches over the potential recharge area and hence, the total annual precipitation over the outcropping recharge area is 67,725 acre-feet.

The total annual discharge for springs from water-bearing rock units that overlie the coal resource is 31 gpm.

Discharge also occurs directly to perennial streams where channels intersect ground water within Blackhawk Formation/Star Point Sandstone and Castlegate Sandstone. The North Fork of Quitchupah Creek, South Fork of Quitchupah Creek, Box Canyon, Greens Canyon, South Fork of Muddy Creek, and Spring Canyon are all perennial and intersect the Blackhawk Formation/Star Point Sandstone and Castlegate Sandstone within the CIA. Surface water flow data from Box Canyon, North Fork of Quitchupah Creek and South Fork of Quitchupah Creek indicate base flow recharge to a perennial stream is approximately 100 gpm. Accordingly, total base flow recharge to streams within the CIA is estimated to be 600 gpm.

No additional ventilation fans are planned for the Convulsion Canyon Mine. At the current ventilation rate of 575,000 cfm, the approximate discharge rate is 38 gpm; i.e., the amount of ground water discharged to the atmosphere by mine ventilation systems. Psychrometric formulas were utilized to derive ventilation discharge values and extrapolated to the mine elevations - average relative humidity data from the Central Weather Station in the Manti-LaSal National Forest were also used in the psychrometric calculations.

Total ground-water discharge within the CIA is currently about 1,320 gpm, where 48 percent (630 gpm) of the total represents natural discharge to streams and springs and 52 percent (690 gpm) results from mining activities.

Lines (1985) investigated the Trail Mountain area, located approximately 30 miles northeast of the CIA, and indicated regional aquifer inflow to mines is derived from aquifer storage (80 percent) and aquifer discharge (20 percent). Extrapolating these values to the Quitchupah and Muddy Creeks CIA allows depletion due to present mining activities (4,775 acres mined) of regional aquifer storage and discharge to be estimated at 550 gpm and 140 gpm, respectively. Assuming future mining encompasses 7,062 acres and will continue to encounter steady-state inflow from the regional aquifer, then depletion would increase by 820 gpm for storage and 200 gpm for discharge.

Future mining-induced dewatering is projected to encompass 1020 gpm, and hence, the cumulative dewatering total would be approximately 1,700 gpm. Following the cessation of mining, the discharge of ground water to the North Fork of Quitchupah Creek, Convulsion Canyon and the atmosphere will cease and workings will begin to flood.

The impact associated with the reduction in surface flow is considered temporary. Mine flooding will conceivably recharge regional aquifer storage and re-establish the natural ground-water conduit system that was operational prior to mining. The maximum time span required for complete mine flooding may be derived by assuming that the area of final workings (11,800 acres) will remain open (average five-foot height) and caving will not occur.

Accordingly, for workings that experience inflow, an upper limit of 20 years may be derived for complete mine flooding. It should be noted that complete flooding will, undoubtedly, never be achieved because the hydraulic head generated as flooding proceeds will increase until the hydraulic properties of the roof, floor, and rib are exceeded and flow within the rocks initiates.

Subsidence. Subsidence impacts are largely related to extension and expansion of the existing fracture system and upward propagation of new fractures. Inasmuch as vertical and lateral migration of water appears to be partially controlled by fracture conduits, readjustment or realignment in the conduit system will inevitably produce changes in the configuration of ground-water flow. Potential changes include increased flow rates along fractures that have "opened", and diverting flow along new fractures or within permeable lithologies. Subsurface flow diversion may cause the depletion of water in certain localized aquifers such as the Castlegate aquifer. Increased flow rates along fractures would reduce ground-water residence time and potentially improve water quality.

Mining has not occurred and will not occur beneath any springs within the CIA. Accordingly, diversion of spring flow is considered to be at an overall very low risk.

#### Surface Water

No surface disturbance will occur in the Quitchupah Lease Tract Addition permit area. Therefore, any impacts to the surface water regime will be associated with the underground mining activities and/or existing surface facilities at the Convulsion Canyon Mine.

Approximately four miles downstream of the mine facilities, surface flow originating from the mine lease area crosses the Mancos Shale formation. At this point, water quality rapidly deteriorates to poor conditions resulting from lithologic influences. Therefore, any impacts to surface water quality will likely be limited to localized regional effects.

All existing surface facilities associated with the mining operations are required to maintain sediment treatment facilities. Mine water is also treated for suspended sediments before being discharged. Therefore, potential impacts to the surface water system from additional sediment contributions are not anticipated.

Surface water runoff from the main mine facilities in Spring Canyon is diverted to a sedimentation pond prior to being discharged into East Spring Creek. Water quality monitoring records show that this structure has seldom discharged during the life of the operation. Discharge has occurred only during major storm events when the receiving stream is flowing at relatively high levels or

during controlled decanting of the pond. Samples collected during discharge events indicate treated water quality to be fair to good. Constituent concentrations of the discharged water are generally less than the receiving water.

Ground-water inflow to the mine workings is collected and diverted to an underground sump for treatment. Mine water is then discharged from an access portal into the North Fork of Quitchupah Creek. Data collected upstream of the discharge point and at the mine portal were analyzed using mass balance techniques. Results presented in Table 1 show that some localized water quality degradation occurs from mine discharge into the stream system. However, water quality downstream of the mine discharge point remains good with respect to TDS values and regional water quality in the area.

	<u>TDS</u>	<u>Sulfate</u>	<u>Sodium</u>	<u>Magnesium</u>	<u>cfs</u>
above portal (calculated)	378.1	79.2	35.0	29.1	3.14
mine discharge	578.2	222.8	48.0	45.5	1.58
below portal (calculated)	445.1	127.3	39.4	34.6	4.72

Table 1. Mass Balance Analysis of Mine Water Discharge to Surface Waters.

## VI. SUMMARY

It has been established using all existing data from current mining operations that future development of the Quitchupah Lease Tract Addition permit area will have no significant impact to the regional surface water system.

All existing surface facilities at the SUFCO mine site are required to maintain sediment treatment facilities. All sediment control measures have been designed and implemented to prevent contamination of surface water. Therefore, potential impacts to the surface water system from additional sediment contributions are not anticipated.

Mine operations within the CIA currently intercept regional aquifer flow at an approximate rate of 690 gpm. Of this total, approximately 40 gpm are consumptively lost to mine ventilation. The remaining 650 gpm are discharged without interbasin transfer of water to streams. Mine water discharge meets required effluent limitations.

During future mining operations, inflow from the regional aquifer is estimated to increase from 960 gpm to 1,700 gpm. Approximately 80 percent of the flow will be derived from storage and 20 percent from discharge. Consumptive use is not anticipated to increase. Mine water discharge (1,660 gpm) and ventilation losses (40 gpm) will be discontinued upon cessation of mining. Concomitantly, flooding of abandoned workings will initiate. An upper limit of 20 years has been estimated for complete flooding of workings and reestablishment of the premining ground-water system.

Diversion of spring flow is considered to be at overall very low risk.

The designs proposed for all anticipated mining operations within the CIA are herein determined to be consistent with preventing damage to the hydrologic balance outside the proposed mine plan areas.

## VII. REFERENCES

- Cronquist, A., Holmgren, A.H., Holmgren, N.H., and Reveal, J.L., 1972. Intermountain Flora, Volume I. Hafner Publishing Company.
- Danielson, T.W., Re Millard, M.D., and Fuller, R.H., 1981. Hydrology of the Coal-Resources Areas in the Upper Drainages of Huntington and Cottonwood Creeks, Central Utah; U.S. Geological Survey, Water-Resources Investigations Report 81-539.
- Doelling, H.H., 1972, Central Utah Coal Fields: Sevier, Sanpete, Wasatch Plateau, Book Cliffs and Emery; Utah Geological and Mineral Survey, Monograph Ser. No. 3.
- Lines, G., 1985. The Ground-Water System and Possible Effects of Underground Coal Mining in the Trail Mountain Area. Central Utah: U.S. Geological Survey, Open-File Report 84-067.
- Southern Utah Fuel Company, Convulsion Canyon Mine, Permit Application Package, 1980.
- Southern Utah Fuel Company, Convulsion Canyon Mine - Quitchupah Lease Tract Addition, Permit Application Package, 1989.
- Southern Utah Fuel Company, Annual Hydrologic Monitoring Report for 1988.

LETTERS  
OF  
CONCURRENCE

NOV 13 1989



# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
FISH AND WILDLIFE ENHANCEMENT  
UTAH-COLORADO FIELD OFFICE  
2060 ADMINISTRATION BUILDING  
1745 WEST 1700 SOUTH  
SALT LAKE CITY, UTAH 84104-5110

In Reply Refer To

(FWE)

November 9, 1989

## MEMORANDUM

TO: Chief, Federal Lands Branch, Office of Surface Mining,  
Denver, Colorado

FROM: Acting Field Supervisor, U.S. Fish and Wildlife Enhancement, Salt  
Lake City, Utah

SUBJECT: SUFCO/Convulsion Canyon Mine-Section 7 Consultation

The Fish and Wildlife Service has examined the information provided by your memorandum of August 21, 1989 requesting a status review of Section 7 Consultation relating to the subject mine and planned operational expansion. Based upon this information, the Service position presented in our memorandum of May 15, 1985 relating to this mining operation is still valid.



# State of Utah

Division of State History  
(Utah State Historical Society)  
Department of Community and Economic Development

Norman H. Bangerter  
Governor  
Max J. Evans  
Director

300 Rio Grande  
Salt Lake City, Utah 84101-1182  
801-533-5755

July 18, 1989

RECEIVED  
JUL 21 1989

Mr. Richard V. Smith  
Permit Supervisor  
Division of Oil, Gas and Mining  
355 West North Temple  
3 Triad Center, Suite 350  
Salt Lake City, Utah 84180-1203

DIVISION OF  
OIL, GAS & MINING

RE: Quitchupah Lease Tract Addition, Permit Application Package, Southern Utah  
Fuel Company, Convulsion Canyon Mine, ACT/041/002 (89-1), Folder #2,  
Sevier County, Utah

In Reply Please Refer to Case No. L905

Dear Mr. Smith:

The Utah State Historic Preservation Office received the above referenced report on July 10, 1989. The report states that no cultural resources were located during the survey of this project area. We, therefore, concur with your recommendation that no historic properties will be impacted by the project.

This information is provided on request to assist the Division of Oil, Gas and Mining with its Section 106 responsibilities as specified in 36 CFR 800. If you have questions or need additional assistance, please contact me at (801) 533-7039.

Sincerely,

*Janice Reed Campbell*  
for James L. Dykman  
Regulation Assistance Coordinator

JLD:L905/7289V OR/NP

# United States Department of the Interior

3481  
U-63214  
(U-067)

## BUREAU OF LAND MANAGEMENT

Moab District  
P.O. Box 970  
Moab, Utah 84532

RECEIVED  
SEP 14 1989

SEP 12 1989

Mr. Richard V. Smith  
Permit Supervisor  
State of Utah  
Division of Oil, Gas and Mining  
355 West North Temple Street  
3 Triad Center, Suite 350  
Salt Lake City, Utah 84180-1203

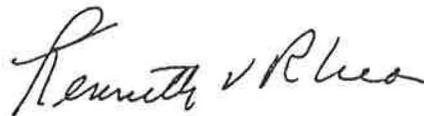
DIVISION OF  
OIL, GAS & MINING

Dear Mr. Smith:

We have received and reviewed a copy of Southern Utah Fuel Company's (SUFCo) Quitchupah lease tract addition to the Permit Application Package (PAP). We found no concerns relative to the protection of surface resources on public land under the Bureau's jurisdiction. The application is also in conformance with current land use plans. Within the limits of our authority, the Bureau recommends approval of the addition to the PAP. SUFCo is in the process of submitting a separate document to us containing a complete and detailed resource recovery and protection plan (R2P2) which will be a part of the PAP. When we have reviewed the expected R2P2, a separate response will be directed to the Division.

If you have any questions, please contact Stephen Falk of the San Rafael Resource Area office in Price, Utah at 637-4584.

Sincerely yours,



District Manager

cc: AM, SRRA  
SD, Utah (U-921)  
SUFCo

ACTING

United States  
Department of  
Agriculture

Forest  
Service

Manti-LaSal  
National Forest

599 West Price River Dr.  
Price, Utah 84501

---

Reply to: 2820

Date: October 4, 1989

Richard V. Smith, Permit Supervisor  
Utah Division of Oil, Gas, and Mining  
355 West North Temple  
3 Triad Center, Suite 350  
Salt Lake City, Utah 84180-1203

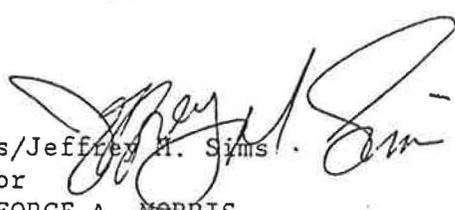
RE: Quitchupah Lease Addition, Lease U-63214, Permit Application Package (PAP), Southern Utah Fuel Company (SUFCO), Convulsion Canyon Mine, ACT/041/002 - Forest Service Review as the Federal Land Management Agency under 30 CFR Subchapter D.

Dear Mr. Smith:

SUFCO's updated materials (received October 2, 1989) satisfactorily address our concerns stated in letters to the Division dated September 1 and September 28, 1989. The Manti-LaSal and Fishlake National Forests consent to approval of the PAP for the Quitchupah Addition to the SUFCO Convulsion Canyon Mine.

SUFCO must still commit to collecting complete baseline water quality and quantity data for all water monitoring sites. We accept your assurance, provided in your telephone discussion with Pete Kilbourne on September 27, 1989, that baseline data collection for all water monitoring sites will be required.

Sincerely,

  
/s/Jeffrey A. Sims  
for  
GEORGE A. MORRIS  
Forest Supervisor  
Manti-LaSal National Forest

---

/s/J. Kent Taylor  
J. KENT TAYLOR  
Forest Supervisor  
Fishlake National Forest

**RECEIVED**  
OCT 06 1989

Utah  
Oil, Gas & Mining

File ACT/041/002



# United States Department of the Interior

BUREAU OF LAND MANAGEMENT

3482  
U-63214  
SL-062583  
(U-067)

Moab District  
P.O. Box 970  
Moab, Utah 84532

OCT 27 1989

Richard V. Smith, Permit Supervisor  
State of Utah  
Division of Oil, Gas and Mining  
355 West North Temple  
3 Triad Center, Suite 350  
Salt Lake City, Utah 84180-1203

**RECEIVED**  
OCT 30 1989

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

Dear Mr. Smith:

We have received and reviewed Southern Utah Fuel Company's (SUFCo) Permit Application Package (PAP), Quitchupah Lease Tract Addition, that was forwarded from you to our San Rafael Resource Area office in Price. In addition, we have received directly from the company a resource recovery and protection plan (R2P2) for the SUFCo Mine No. 1 that addresses the mining plans for this new lease. The PAP regarding surface resources managed by BLM was reviewed and concurred with by memo to you dated September 12, 1989. Our review of the R2P2 follows:

The R2P2 meets the requirements of 43 CFR 3482.1(b), as the required items are included in the R2P2 or can be referenced in the original SUFCo Mine R2P2. The mine plan calls for SUFCo to extend the North Main entries of the existing mine onto the new lease and develop main headings to the north and the east. This will separate the tract into three major mining areas. The first or northeast portion of the tract underneath the heart of the plateau will be mined by longwall mining panels running north and south over a 5-square-mile area. Twelve longwall panels are planned in this area, with many of the panels 9,000 feet long and 750 feet wide capable of producing 3 million tons of coal each. Most of the mining for the next 10 years will be concentrated in this area. The panels and barrier pillars are designed for maximum recovery with due regard for protection of access to the southeast portion of the property.

The second area of mining to be developed after Area 1 is the southeast portion of the lease. This includes the south peninsular area of the plateau formed by Quitchupah Creek Canyon on the west and Link Canyon on the east. This area is to be mined by a combination of longwall and continuous miner panels due to the irregular shape of the peninsula. The mining plans call for

first mining only in panels that are under the Castle Gate escarpment. The planned panel layout depicts recovery in areas best estimated as minable, but recognizes the uncertainty of minable coal from the limited data points and uncertain outcrop burn line.

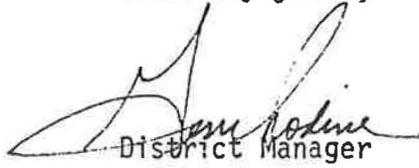
The third mining area is the remaining lands west of North Mains. This area is planned to be mined by longwall mining methods after the year 2010. This is the only area of multiple seam mining. The interburden between the upper Hiawatha seam (where current mining is taking place) and the lower Hiawatha seam is of sufficient thickness (30+ feet) to be considered minable. The lower Hiawatha seam also has sufficient thickness in this area to be considered minable. Rock slopes that will access the lower Hiawatha seam will be driven down from the upper Hiawatha seam near the Main West entries located in Section 19. The mining plan for the two seams superimposes longwall panels, main entries, and barrier pillars. The upper seam will be extracted first. The mining layout conforms to standard industry and engineering standards. Two large zones in the upper Hiawatha seam are addressed as possible coal-want areas (or areas of thin coal) and fault zones. SUFCo's original submittal showed no planned mining in this area. As a result of BLM's concerns with the nonrecovery of this area, SUFCo submitted amended mining plans on October 19, 1989, showing longwall panels projected through the coal-want areas. Should future exploration show no minable coal, SUFCo is required to submit proposed mine changes, along with justification, to the BLM for approval.

The mining plans for all areas were designed using standard industry practices and known technologies with due regard for safety and the surface environment. BLM does have areas of concern. There are some areas planned for first mining to protect escarpments and perennial streams from damage due to the effects of mining-induced subsidence. Many areas with first mining will have recovery rates on the order of 40 percent and below. While we are committed to the established lease terms and conditions, the BLM must assure MER of all minable coal on a lease with due regard to the surface environment. We reserve the right to further evaluate panels that are limited to first mining only where increased recovery can occur with limited impact to the surface environment. There are joint agency and industry studies being done on the issue of subsidence. The mining plans for the Quitchupah tract show that areas to be protected from subsidence damage are not due to be mined until well after the year 2000. These studies may bring new understanding to all concerned and mining plans can be modified to the betterment of all involved.

In summary, the BLM finds the R2P2 for lease U-63214 to be added to the SUFCo Mine PAP complete and technically adequate. The submitted mine plan is in conformance with the Mineral Leasing Act of 1920, as amended, and satisfies the regulations promulgated from the Act. The plan is also in compliance with the lease terms and conditions. The BLM finds the R2P2 will achieve MER for the mine property. We hereby recommend the R2P2 be approved and coal lease U-63214 be included into the SUFCo Mine permit.

If you have any questions, please contact Brent Northrup of my staff or Stephen Falk at the San Rafael Resource Area in Price.

Sincerely yours,



Sam Rodine  
District Manager

cc: SD, Utah (U-921)  
SUFCo, Salina  
Manti-LaSal NF, Price



State of Utah  
OFFICE OF PLANNING AND BUDGET

Norman H. Bangertter  
Governor

Dale C. Hatch, C.P.A., J.D.  
Director

Michael E. Christensen, Ph.D.  
Deputy Director

116 State Capitol Building  
Salt Lake City, Utah 84114  
(801) 538-1027

RECEIVED  
SEP 20 1989

DIVISION OF  
OIL, GAS & MINING

September 13, 1989

Mr. Richard Smith  
Division of Oil, Gas and Mining  
3 Triad Center, Suite 350  
355 West North Temple  
Salt Lake City, Utah 84180-1203

SUBJECT: Quitchupah Coal Lease Tract Addition - Convulsion Canyon Mine  
State Application Identifier #UT890901-020

Dear Richard:

The Resource Development Coordinating Committee of the State of Utah has reviewed this proposed action, and has no comments at this time.

The Committee appreciates the opportunity to review this proposal. Please direct any other written questions regarding this correspondence to the Utah State Clearinghouse, at the above address, or call Carolyn Wright at (801) 538-1535, or John Harja at (801) 538-1559.

Sincerely,

*Michael E. Christensen*

Michael E. Christensen  
State Planning Coordinator

MEC/cw



# State of Utah

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING

Norman H. Bangerter  
Governor

Dee C. Hansen  
Executive Director

Dianne R. Nielson, Ph.D.  
Division Director

355 West North Temple  
3 Triad Center, Suite 350  
Salt Lake City, Utah 84180-1203  
801-538-5340

August 31, 1989

TO: Susan C. Linner

FROM: Joseph C. Helfrich 

RE: Compliance Review for Section 510(c) Finding, Coastal States Energy Company (Southern Utah Fuel Company), Convulsion Canyon Mine, ACT/041/002, Sevier County, Utah

As of the writing of this letter, there are no NOV's or CO's which are not corrected or in the process of being corrected. Any NOV's or CO's that are outstanding are in the process of administrative or judicial review. There are no finalized Civil Penalties which are outstanding and overdue in the name of Coastal States Energy Company (Southern Utah Fuel Company).

Finally, they do not have a demonstrated pattern of willful violations, nor have they been subject to any bond forfeitures for any operation in the state of Utah.

jb  
MN47/49

UNITED STATES

DEPARTMENT OF THE INTERIOR

This mining plan approval document is issued by the United States of America to:

Southern Utah Fuel Company  
P.O. Box P  
Salina, Utah 84654

for the Convulsion Canyon mine mining plan for Federal lease U-63214 subject to the following conditions. Southern Utah Fuel Company is hereinafter referred to as the lessee.

1. Statutes and Regulations.--This mining plan approval is issued pursuant to Federal coal lease U-63214; the Mineral Leasing Act of 1920, as amended (30 U.S.C. 181 et seq.); and in the case of acquired lands, the Mineral Leasing Act for Acquired Lands of 1947, as amended (30 U.S.C. 351 et seq.). This mining plan approval is subject to all applicable regulations of the Secretary of the Interior which are now or hereafter in force; and all such regulations are made a part hereof. The lessee shall comply with the provisions of the Water Pollution Control Act (33 U.S.C. 1151 et seq.), the Clean Air Act (42 U.S.C. 7401 et seq.) and other applicable Federal laws.
2. This document approves the Convulsion Canyon mine mining plan for Federal coal lease U-63214 and authorizes coal development or mining operations on Federal lease U-63214 within the area of mining plan approval. This authorization is not valid beyond:

Lease No. U-63214

T.21S., R.4E., S1M, Utah;

Sec. 12: E1/2 SE1/4;  
Sec. 13: E1/2 NE1/4, S1/2;  
Sec. 14: E1/2 SW1/4, SE1/4;  
Sec. 23: E1/2, E1/2 W1/2;  
Sec. 24: All;

T.21S., R.5E., S1M, Utah;

Sec. 15: W1/2;  
Secs. 16 through 21: All;  
Sec. 22: W1/2;  
Sec. 26: W1/2 NW1/4 SW1/4, SW1/4 SW1/4;  
Sec. 27: All;

T.21S., R.5E., SLM, Utah (cont.);

Sec. 28: N1/2, N1/2 SW1/4, SE1/4 SW1/4, SE1/4;  
Sec. 29: E1/2 NE1/4, NE1/4 SE1/4;  
Sec. 30: Lot 1, N1/2 NE1/4;  
Sec. 33: Lots 2-4, NE1/4, E1/2 NW1/4, NE1/4 SW1/4,  
N1/2 SE1/4;  
Sec. 34: All;  
Sec. 35: Lots 1, 2, W1/2 NW1/4, N1/2 SW1/4;

T.22S., R.5E., SLM, Utah;

Sec. 3: Lots 1-4, S1/2 N1/2, NE1/4 SW1/4, S1/2 SW1/4,  
N1/2 SE1/4, SW1/4 SE1/4;  
Sec. 4: Lots 1, 2, S1/2 NE1/4, SE1/4 SE1/4;  
Sec. 9: NE1/4 NE1/4;  
Sec. 10: W1/2 NE1/4, NW1/4, N1/2 SW1/4.

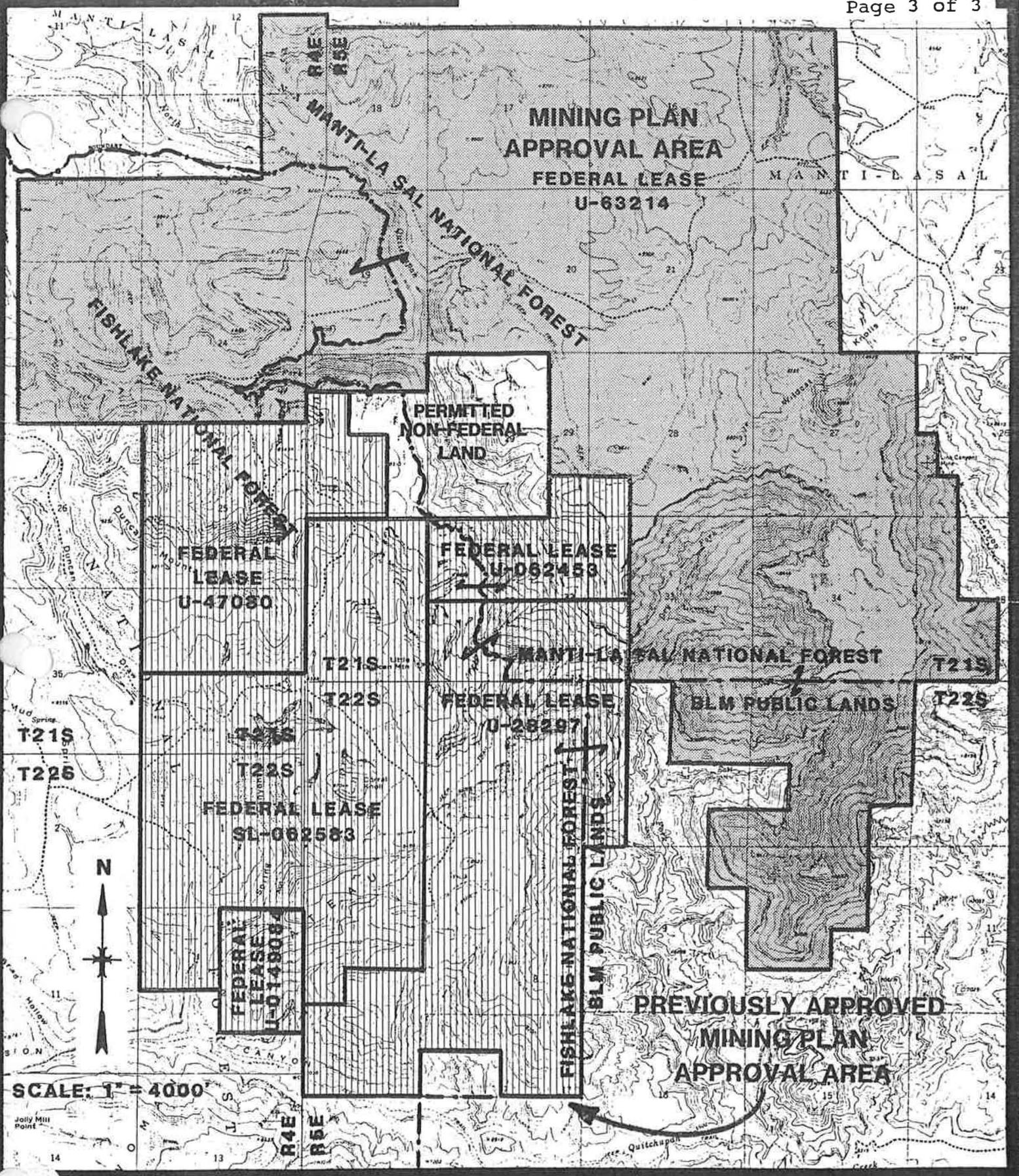
as shown on the map appended hereto as Attachment A.

3. The lessee shall conduct coal development and mining operations only as described in the complete permit application package, approved by the Utah Division of Oil, Gas and Mining, except as otherwise directed in the conditions added to this mining plan approval.
4. The lessee shall comply with the terms and conditions of the leases, this mining plan approval, and the requirements of the Utah Permit number ACT/041/002 issued under the Utah State program, approved pursuant to the Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1201 et seq.).
5. This mining plan approval shall be binding on any person conducting coal development or mining operations under the approved mining plan and shall remain in effect until superseded, cancelled, or withdrawn.
6. If during mining operations unidentified prehistoric or historic resources are discovered, the lessee shall ensure that the resources are not disturbed and shall notify Utah Division of Oil, Gas and Mining and OSM. The lessee shall take such actions as are required by Utah Division of Oil, Gas and Mining in coordination with OSM.

*Scott Sewell*

Deputy Assistant Secretary--Land and Minerals Management

*2/19/89*  
Date



Attachment A  
MINING PLAN APPROVAL AREA MAP  
Convulsion Canyon Mine  
Sevier County, Utah

Appendix C - Public Notices



Division of State History  
 (Utah State Historical Society)  
 Department of Community and Economic Development

Norman H. Bangerter  
 Governor  
 Max J. Evans  
 Director

300 Rio Grande  
 Salt Lake City, Utah 84101-1182

MANTI-LASAL N.F.	
SEP 22 1988	
FS	ROUTE
RG	
TM	
ENG	
PLN	
AO	
RANGER COPY	
CARTER	

September 19, 1988

~~cc: D-2  
 Les Willy (D-5)  
 C. Reed~~

George A. Morris  
 Forest Supervisor  
 Manti-LaSal National Forest  
 599 West Price River Drive  
 Price, Utah 84501

RE: Lease of the Quitchupah Coal Tract to Coastal States Energy Company,  
 Sevier County, Utah

In Reply Please Refer to Case No. L753

Dear Mr. Morris:

The staff of the Utah State Historic Preservation Office has received the documentation on the above referenced project. According to the archaeological cultural resource attachment approximately 15% of the proposed coal lease area has been surveyed for cultural resources. This is sufficient to supply the Forest Service with an assessment of what kinds and how many cultural resources are located within the proposed coal lease tract. We also understand that 100% survey will be conducted on areas prior to impact such as mine portals and roads. At that time, the specific requirements as specified in Section 106 of the National Historic Preservation Act of 1966, as amended, would be followed by the Forest Service. We look forward to working with the Manti-LaSal National Forest during its compliance with this law.

The above is provided on request as outlined by 36 CFR 800 or Utah Code, Title 63-18-37. The Utah SHPO makes no regulatory requirement in this matter. If you have questions or need additional assistance, please contact me at (801) 533-7039, or 533-6017.

Sincerely,

Diana Christensen  
 Regulation Assistance Coordinator

DC:L753/6106V FS

United States  
Department of  
Agriculture

Forest  
Service

Manti-LaSal  
National Forest

599 West Price River Dr.  
Price, Utah 84501

---

Reply to: 2820

Date: September 9, 1988

Max J. Evans  
State of Utah Division of State History  
Utah State Historical Society  
300 Rio Grande  
Salt Lake City, Utah 84101-1182

Dear Mr. Evans:

The Bureau of Land Management and Forest Service are presently evaluating an application by Coastal States Energy Co. to lease a new coal tract, known as the Quitchupah Tract. The tract was originally delineated in 1982 for Round 2 coal leasing consideration by the Uinta-Southwestern Utah Coal Region. The surface of the subject lands are all Federal, including lands administered by the Moab District of the Bureau of Land Management and the Manti-LaSal and Fishlake National Forests. The lease tract has been cleared for further consideration for coal leasing, subject to application of site-specific coal lease unsuitability criteria, through planning documents by the two agencies. The attached map shows the location of the proposed tract.

The majority of the surface of the tract is administered by the Manti-LaSal National Forest, therefore the Manti-LaSal National Forest is taking the lead in preparing the Environmental Assessment. If offered, the tract will be leased competitively. If Coastal States Energy Co. obtains the lease, the coal will be mined by underground methods through the facilities at the existing Convulsion Canyon Mine. If another company obtains the lease, new portal facilities may need to be developed. Link Canyon and Dry Fork Canyon provide the only potential sites for portal development.

The Coal Lease Unsuitability Criteria and the process for their application are discussed in Federal Regulations 43 CFR 3461.1. Criterion Number 7 (3461.1.g.1) involves cultural and historic resources defined as "all publicly owned places on Federal lands which are included in the National Register of Historic Places".

Because the coal will be mined using underground methods, the Bureau of Land Management and Forest Service have determined that the underground mining exemption (3461.2) would apply to Criterion 7. In addition, the agencies feel that lease stipulations and the Federal and State regulations for mining will adequately provide for protection of any such resources. No national register sites are known to exist within Dry Fork and Link Canyons and the area must be surveyed and cleared through the surface management agency and the State Historic Preservation Office before surface disturbing operations can be approved. Based on this determination, we feel that the exception listed under this criterion (3461.1.2) would apply to the tract, therefore, the tract should be considered suitable for leasing.

Based on existing cultural resources survey coverage of the lease tract, Les Wikle, Forest Archeologist, has determined that further cultural resource field work should not be needed for the purpose of determining suitability of the tract for leasing. Enclosed is a copy of his report on the lease application for National Forest System lands. Approximately 15 percent of the lands in the lease tract which are administered by the Manti-LaSal National Forest have been surveyed, which totals approximately 10 percent of the entire tract.

Please review the information in your files and let us know as soon as possible if you concur with this determination. Please make any necessary contacts with Les Wikle at our Monticello Ranger District Office in Monticello, Utah and send a copy of your written response to the Forest Supervisor's Office in Price, Utah. Please respond by September 15, 1988.

Sincerely,

/s/ Aaron L. Howe

for  
GEORGE A. MORRIS  
Forest Supervisor

Enclosures

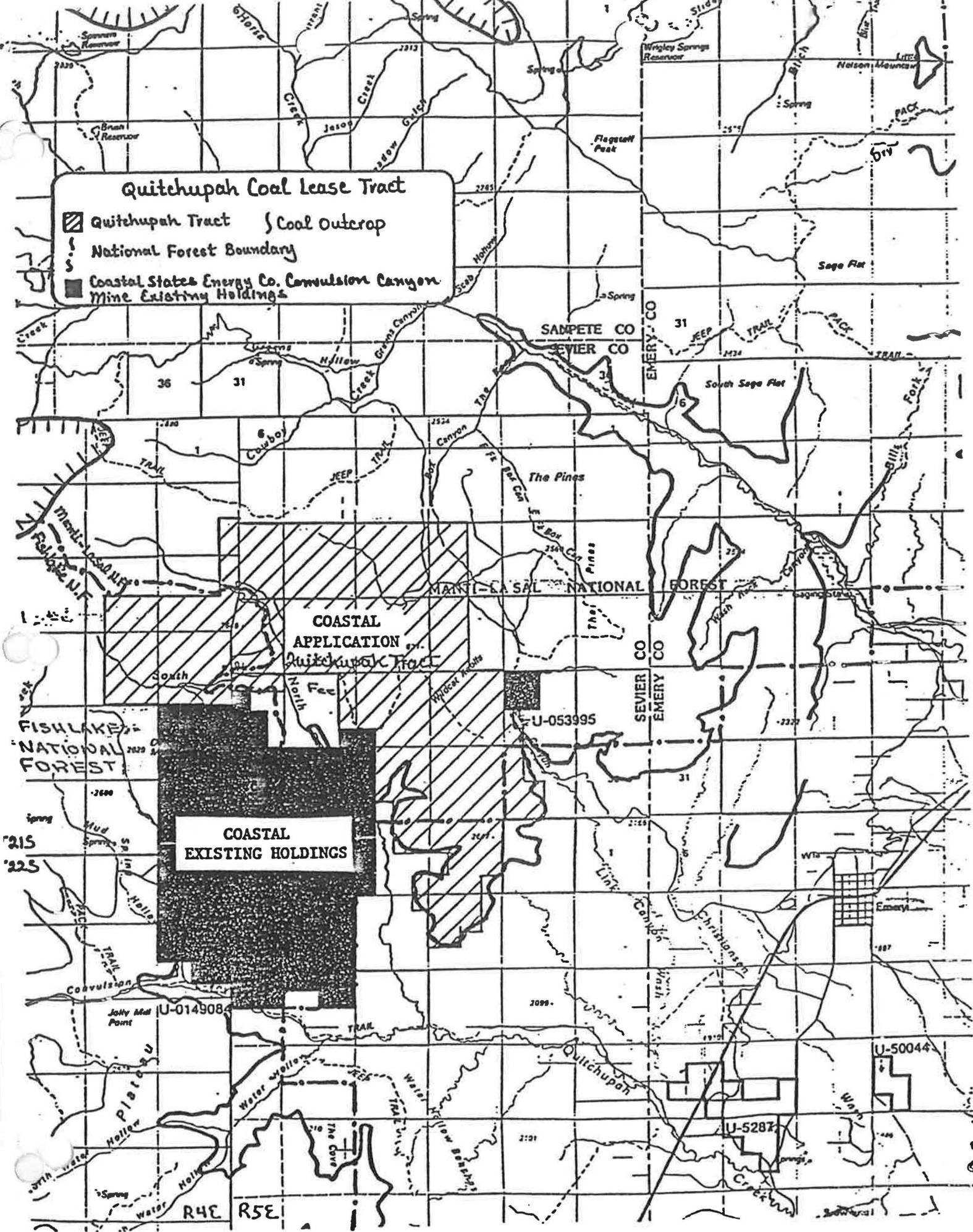
cc:  
D. Trotter, BLM-Moab District  
L. Findlay, Fishlake N.F.  
L. Wikle  
C. Reed

CRreed:jn

*CP*

# Quitcupah Coal Lease Tract

-  Quitcupah Tract
-  National Forest Boundary
-  Coastal States Energy Co. Convulsion Canyon Mine Existing Holdings
-  Coal Outcrop



CULTURAL RESOURCE RESPONSE  
TO  
COASTAL STATES ENERGY LEASE APPLICATION U-63214

BACKGROUND

Coastal States Energy Company has filed a coal lease application (U-63214) for approximately 6300 acres in the general Quitcupah Creek area of the Manti-LaSal National Forest. The tract is just to the northeast of the head of the creek, bounded on the east by Wildcat Knolls, and to the northeast by the head of Box Canyon. (Additional areas to the southwest are in the Fishlake National Forest.)

Generally speaking, coal leases have been required to be covered by at least a 10% sample survey for cultural resources for the initial lease itself, with 100% surveys later required for specific impact areas, such as mine portals, road construction, etc. To complete this requirement for the lease itself, a Class I inventory (literature search) is to be conducted, and, if necessary, a Class II inventory (survey sample) completed to the extent that at least 10% of the area has been searched for cultural resources.

PREVIOUS RESEARCH

In the area of the proposed coal lease two major cultural resource surveys have been completed, one in 1977 and one in 1983. The 1977 survey was conducted by Archeological-Environmental Research Corporation for the Central Utah Coal Project that covered many thousands of acres on the Manti Division, 160 of which is in the present coal lease area (the southeast quarter-section of section 17 of Township 21 S, Range 5 E). The survey in 1983, also a large-scale survey throughout the Forest, covered approximately 800 acres within the proposed coal lease, and was done by Centuries Research, Incorporated.

CULTURAL RESOURCES IN THE PROJECT AREA

The two major survey projects found 8 archeological sites and 15 isolated artifacts within the boundaries of the proposed coal lease. Six of the sites were basically simple lithic working locations, while one site had two bifaces present along with the flakes and the other site revealed more activity, as shown by its two projectile points, use flakes, two knives, and some limited amounts of Emery Grey pottery sherds. Two of the eight sites have been considered eligible for registration to the National Register, due to some limited research value yet to recover, two of the sites are as yet unevaluated as to National Register potential, and the remaining six sites have been determined to not have qualities sufficient for nomination.

Of the isolated artifacts (individual locations of ancient man-made material that is not of sufficient number to qualify as a "site"), eight are of common flakes (although in three instances the flakes have been slightly used as tools

of some sort for a short period of time). Three of the locations had projectile points, and three had biface fragments of some sort. Two of the projectile points show similarities to the Elko series (an Archaic type of point), while one had strongly serrated edges.

The following tables show the breakdown of the cultural materials found in the two surveys in the coal lease area. ("ML-" is a prefix to indicate a cultural resource location on the Manti-LaSal National Forest, "IA" indicates an isolated artifact.)

	SITES (ML-nnnn)							
	2419	2420	2717	2719	2720	2721	2722	2727
Quarry			x					x
Flaking		x		x	x	x	x	
Hunting						x		
Camp	x				x			
NR qualities					x	x		
Unevaluated			x	x			x	
Not significant	x	x						x

#### ISOLATED ARTIFACTS (ML-IA:nnn)

	flake	knife	biface	proj	pr	remarks
222	1					
223				1		Elko series (?)
224				1		serrated edges
225	1					use flake
226	1					use flake
231				1		Elko series (?)
232	4					
233	1					
234	1					use flake
235	1		1			tip only of biface
236		1				
237			1			biface fragment
238	1					
239	2					
240			2			biface fragments

The nature of the cultural resources found indicates that the area was used very lightly in prehistoric times, and mostly for flaking and hunting, although some very little camping may have been done. The discovered resources are scattered (the most concentrated are three resources -- one site and four isolated artifacts -- in one 20 acre area on the east rim of Quitchupah Creek).

Four resources (two sites and two isolated artifacts) were found in an 80-acre area at the head of Box Canyon at the northeast corner of the lease area. Further to the southeast about one mile, but out of the lease area, the 1983 survey found in another 80-acre block also at the drainage of Box Canyon, four sites and four isolated artifacts. One site and one isolated artifact were found near the base of Wildcat Knolls, and one site and two isolated artifacts near the base of an unnamed knoll to the southwest of this.

The pattern seems to be, according to the sample survey done so far, of lithic sites tending to "cluster" in a sparse way around creek drainages and knolls. Future surveys done in this area should take special care in geographical areas similar to these.

#### MANAGEMENT RECOMMENDATIONS

Since approximately 15.2% of the potential lease area has already been surveyed (960 acres out of 6320 acres), there is at this time more than sufficient sampling completed to give us a good overall picture of the potential of cultural resources in the area, as far as leasing itself goes.

On the basis of the findings so far, it can be projected that cultural resource concerns will probably be generally minimal in complexity, and that mitigation in the event of future proposed surface-disturbing projects will also be somewhat minimal in difficulty. The exceptions to this might be the head of Box Canyon, the bases of knolls (and possibly the tops that haven't been surveyed yet), and the extreme edges of Quitcupah Creek.

At the present time, there seems to be no further cultural resource field work needed to be done to complete this portion of the review of the proposed Coastal States Energy Company lease application. The two survey reports mentioned, that cover the 15.2% sample of this area, have previously been reviewed by the State Historic Preservation Officer (Utah).

#### REFERENCES

Copeland, James M. and Laurie D. Webster

1983 "Class II Cultural Resource Inventory and Test Excavation Program of the Trough Hollow - Emery Coal Lease Tracts Within the Ivie Creek - Emery Area, Emery and Sevier Counties, Utah". Centuries Research, Inc. Montrose, Colorado.

Hauck, F. R. and L. M. Harmon

1977 "The Central Coal Project of Utah". Archeological-Environmental Research Corporation. Salt Lake City, Utah.

Les Wikle  
Monticello District Archeologist

18 May 1988

MESSAGE DISPLAY

TO c.reed:r04f10a

From: Leslie D. Wikle:R04F10D05A  
Postmark: May 19,88 8:42 AM  
Status: Certified  
Subject: COAL LEASE CR INFO

---

Message:

Carter: my report is already slightly out of date. There are two more sites to report within the lease area. I can't right now make the changes, since today is a mandatory field day (District work session). But here is the basic info. ML-2191 = site with considerable flaking + (important) a nearby cave with some Fremont style red painting (NATIONAL REGISTER POTENTIAL). ML-2728 = lithic flaking area with 15 tools, including bifaces and Elko Corner-notched projectile point making it Archaic in time (possible NR POTENTIAL). SORRY ABOUT THE ADDITIONS...I'LL PUT IN TEXT TOMORROW...LES

-----X-----

10-26-88 Richfield Hearing

10-27-88

FYE  
John

ENVIRONMENTAL ASSESSMENT  
FOR

COASTAL STATES ENERGY COMPANY COAL LEASE APPLICATION U-63214  
QUITCHUPAH TRACT

USDA, FOREST SERVICE, MANTI-LASAL AND FISHLAKE NATIONAL FORESTS  
USDI, BUREAU OF LAND MANAGEMENT, MOAB DISTRICT

October 1988

VJM  
BAF  
KMP  
GAZ  
KLY  
KWW  
KF  
File

Responsible Officials:

J.S. Tixier, Regional  
USDA, Forest Service  
Intermountain Region  
Federal Building  
324 25th. Street  
Ogden, Utah 84401

James M. Parker, State Director  
USDI, Bureau of Land Management  
Utah State Office  
324 South State, Suite 301  
Salt Lake City, Utah 84111-2303

For Further Information Contact:

George A. Morris, Forest Supervisor  
USDA, Forest Service  
Manti-LaSal National Forest  
599 West Price River Drive  
Price, Utah 84501

Kent J. Taylor, Forest Supervisor  
USDA, Forest Service  
Fishlake National Forest  
115 East 900 North  
Richfield, Utah 84701

Gene Nodine, District Manager  
USDI, Bureau of Land Management  
Moab District  
P.O. Box 970  
Moab, Utah 84532

TABLE OF CONTENTS

Page No.

TITLE PAGE

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
A.	Purpose and Need for Action.....	1
	Map 1 - Tract Location Map.....	3
B.	Authorizing Actions.....	2
C.	History, Background and Potential Mining Scenarios.....	2
D.	Public Issues, Management Concerns and Opportunities.....	5
E.	Negative Declaration.....	6
II.	ALTERNATIVES.....	6
A.	Alternative 1 - No Action.....	6
B.	Alternative 2 - Offer Tract for Leasing as Proposed.....	6
	1. Description.....	6
	2. Management Requirements, Constraints and Mitigations...	7
III.	DESCRIPTION OF THE EXISTING/AFFECTED ENVIRONMENT.....	7
A.	General Setting.....	7
B.	Geology/Topography and Mining.....	7
C.	Access/Facilities.....	9
D.	Wildlife.....	9
	Map 2 - Golden Eagle Nest Locations.....	10
E.	Range/Vegetation.....	11
F.	Recreation.....	11
G.	Surface Hydrology.....	11

TABLE OF CONTENTS CONTINUED

H.	Ground Water Hydrology.....	13
I.	Socioeconomics.....	14
IV.	EFFECTS OF IMPLEMENTATION.....	15
A.	Alternative One - No Action.....	15
B.	Alternative Two - Offer the Tract for Leasing as Proposed..	16
1.	Short-term and Residual Impacts.....	16
a.	Geology/Topography and Mining.....	16
b.	Access/Facilities, Range, Recreation.....	16
c.	Wildlife.....	17
d.	Ground and Surface Hydrology.....	17
e.	Socioeconomics.....	19
2.	Short-term Use vs. Long-term Productivity.....	19
3.	Irretrievable and Irreversible Commitment of Resources	20
4.	Cumulative Impacts.....	20
V.	PERSONNEL AND PUBLIC INVOLVEMENT.....	22
A.	Interdisciplinary Team and Consultants.....	22
B.	Public Contacts.....	22
C.	Intensity of Public Interest.....	23
VI.	REFERENCES.....	23
VII.	APPENDICES.....	25
A.	Tract Delineation Review Report	
B.	Special Lease Stipulations	
C.	Public Notices	

## ENVIRONMENTAL ASSESSMENT

### I. INTRODUCTION

#### A. Purpose and Need for Action

On February 2, 1988, Coastal States Energy Company submitted Coal Lease Application U-63214 to the Bureau of Land Management, Utah State Office. The proposed lease tract, known as the Quitchupah Tract, encompasses 9,905.46 acres of Federal Coal Lands in Sevier County, Utah (Map 1). The surface of the involved lands are administered as follows:

Manti-LaSal National Forest	- 6,682.16 acres (67%)
Fishlake National Forest	- 1,860.36 acres (19%)
BLM, Moab District	- 1,362.94 acres (14%)

The legal description of the tract is as follows:

T. 21 S., R. 4 E., SLM.	
Sec. 12: E1/2SE1/4;	80.00 acres
Sec. 13: E1/2NE1/4, S1/2;	400.00 acres
Sec. 14: E1/2SW1/4, SE1/4	240.00 acres
Sec. 23: E1/2, E1/2W1/2	480.00 acres
Sec. 24: All.	640.00 acres
T. 21 S., R. 5 E., SLM;	
Sec. 15: W1/2;	320.00 acres
Sec. 16: All;	640.00 acres
Sec. 17: All;	640.00 acres
Sec. 18: Lots 1-4, E1/2;	395.38 acres
Sec. 19: Lots 1-4, E1/2;	461.73 acres
Sec. 20: All;	640.00 acres
Sec. 21: All;	640.00 acres
Sec. 22: W1/2;	320.00 acres
Sec. 26: W1/2NW1/4SW1/4, SW1/4SW1/4;	60.00 acres
Sec. 27: All.	640.00 acres
Sec. 28: N1/2, N1/2SW1/4, SE1/4SW1/4, SE1/4;	600.00 acres
Sec. 29: E1/2NE1/4, NE1/4SE1/4	120.00 acres
Sec. 30: Lot 1, N1/2NE1/4;	119.23 acres
Sec. 33: Lots 2-4, NE1/4, E1/2NW1/4, NE1/4SW1/4, N1/2SE1/4;	473.62 acres
Sec. 34: Lots 1-4, N1/2, N1/2S1/2;	632.56 acres
Sec. 35: Lots 1,2, W1/2NW1/4, N1/2SW1/4.	236.42 acres

## Legal Description Continued:

T. 22 S., R. 5 E., SLM;	
Sec. 3: Lots 1-4, S1/2N1/2, NE1/4SW1/4; S1/2SW1/4, N1/2SE1/4, SW1/4SE1/4;	564.32 acres
Sec. 4: Lots 1,2, S1/2NE1/4, SE1/4SE1/4;	202.20 acres
Sec. 9: NE1/4NE1/4;	40.00 acres
Sec. 10; W1/2NE1/4, NW1/4, N1/2SW1/4.	<u>320.00 acres</u>
	TOTAL 9,905.46 acres

Since the proposed lease tract involves public lands administered by BLM and National Forest System lands, this environmental analysis was conducted jointly between the two agencies. The Manti-LaSal National Forest is the lead in preparation of the Environmental Assessment because the majority of the lands are administered by the Manti-LaSal National Forest.

B. Authorizing Actions

The coal lease application was submitted and will be processed and evaluated under the following authorities: Mineral Leasing Act of 1920 as amended; Federal Coal Leasing Amendments Act of 1976 (FCLAA), Federal Land Policy and Management Act of 1976 (FLPMA), Surface Mining Control and Reclamation Act of 1977 (SMCRA), Multiple-Use Sustained Yield Act of 1960; National Forest Management Act of 1976 (NFMA), National Environmental Policy Act of 1969 (NEPA) and Federal Regulations 43 CFR 3400.

The lease application will be processed under the procedures set forth under Federal Regulations 43 CFR 3425, Leasing on Application.

C. History, Background and Potential Mining Scenarios

The Quitchupah Tract was originally delineated and evaluated in the Round Two Coal Leasing Effort of the Uinta-Southwestern Utah Coal Region initiated on June 12, 1982. It was delineated following receipt of expressions of interest from private industry and evaluation by the Tract Delineation Team. The tract was evaluated in the Forest Service Environmental Assessment for the Quitchupah Coal Lease Tract completed on July 13, 1982. The Uinta-Southwestern Utah Coal Region Round Two Final Environmental Impact Statement was completed on October 7, 1983. The Round Two leasing effort evaluated 27 tracts in Utah and Colorado. The Quitchupah Tract was one of 22 tracts recommended for competitive leasing under the preferred alternative (Alternative Two, High Level). Due to a re-evaluation and major changes in the Federal coal management program in 1984, the Quitchupah tract was not offered for leasing.

In January of 1988, the Uinta-Southwestern Utah Coal Region was decertified and as a result, new coal leasing within the Region will be conducted under the Lease on Application Process set forth in Federal Regulations 43 CFR

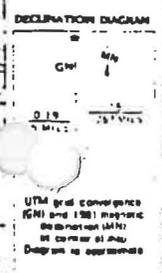
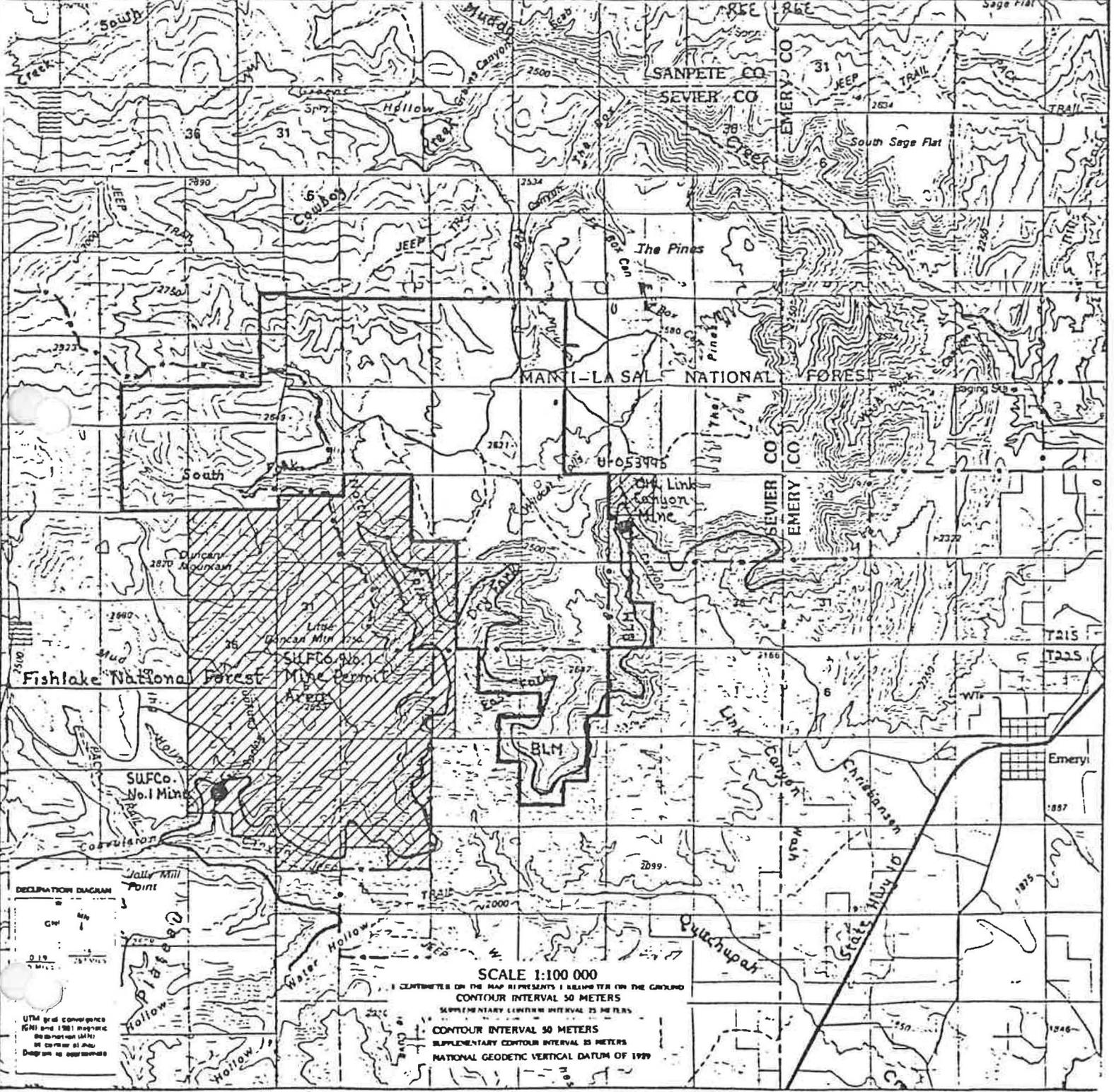
QUITCHUPAH COAL LEASE TRACT

MAP 1 - Tract Location Map

R4E R5E

BLM EDITION-1982  
 ACE MANAGEMENT STATUS  
 Edited and published by the Bureau of Land Management  
 1:100 000-scale metric  
 topographic map of

- Quitchupah Tract Boundary
- - - National Forest Boundary
- ▨ Coastal States Energy Co. Holdings
- ~ Coal Outcrop
- SUFCo. No.1 Mine
- Old Link Canyon Mine



SCALE 1:100 000  
 1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER FOR THE GROUND  
 CONTOUR INTERVAL 50 METERS  
 SUPPLEMENTARY CONTOUR INTERVAL 25 METERS  
 CONTOUR INTERVAL 50 METERS  
 SUPPLEMENTARY CONTOUR INTERVAL 25 METERS  
 NATIONAL GEODETIC VERTICAL DATUM OF 1929

R4E

R5E

R5E

R6E

3425. Coal Lease Application U-63214 was the first application submitted in the Region under this process since decertification of the Region.

A tract delineation team, consisting of personnel from BLM and the Manti-LaSal National Forest, evaluated the tract configuration as submitted by Coastal States Energy Co. in the application. The team determined that the tract configuration, as submitted, is acceptable from a geologic and coal reserves standpoint and provides for adequate competitive interest for leasing. The Tract Delineation Review Report was completed on June 15, 1988. A copy of this report is included in this EA as Appendix A.

An initial analysis was conducted by the surface management agencies and it was determined that the tract is suitable for further consideration for coal leasing, subject to site-specific analysis, under the following planning documents:

Manti-LaSal National Forest Land and Resource Management Plan, November 1986.

Fishlake National Forest Land and Resource Management Plan, June 1986.

Forest Planning Unit Coal Unsuitability Study, October 1980, prepared by BLM - Richfield District and the Fishlake National Forest.

It was also determined by the surface management agencies that there is information available to generally meet the Data Adequacy Standards for Federal Coal Leasing adopted by the Uinta-Southwestern Utah Regional Coal Team on June 16, 1988.

This information was presented to the Regional Coal Team on June 16, 1988 and the team decided to proceed with evaluation of the tract for leasing.

Information on coal reserves and mining used in this assessment was obtained from the Bureau of Land Management Geologic Report/Tract Development and Engineering Report dated August 15, 1988.

The Coal Lease Unsuitability Criteria (Federal Regulations 43 CFR 3461) have been applied on a site-specific basis and no areas within the tract have been determined to be unsuitable for leasing.

New coal leases are issued competitively. If Coastal States Energy Co. acquires the lease, it will be mined through the existing portal facilities associated with the Southern Utah Fuel Company (SUFCo.) Mine Number One which lies directly adjacent to the tract along the south and east boundaries. If another company acquires the lease and it is mined independent of the SUFCo. Mine, there is potential for new portal facilities to be developed at the coal outcrop in Link Canyon or Dry Fork Canyon. More information is presented in Section III.B. of this EA.

#### D. Public Issues, Management Concerns and Opportunities

The following is a discussion of the issues, concerns and opportunities identified by the Interdisciplinary Team through analysis of the application and public notifications:

##### 1. Public Issues

No public issues were raised during the public comment period. All comments received from the general public were supportive of issuing the lease with appropriate consideration of environmental concerns.

An issue was raised in 1982 during the Round Two Coal Leasing Effort that development of the evaluated tracts and the increased population associated with mining, would adversely impact local communities. Considering the current depressed coal industry and associated mine layoffs in the local area, this issue is no longer of consequence. Letters from Sevier County and the Southeastern Utah Association of Local Governments support leasing due to the need to stimulate the local economies and provide additional jobs.

A letter was received from the Utah Division of Wildlife resources regarding potential impacts to wildlife from mining induced subsidence. These will be discussed under management concerns.

##### 2. Management Concerns

- a. If portal facilities are constructed in Dry Fork Canyon, there is potential for disturbance to three golden eagle nests which lie within the 1/2 mile buffer zone of potential surface facilities. One of the nests was active in 1988.
- b. There is potential for mining induced escarpment failure to increase erosion, cause safety hazards and destroy golden eagle nests which are located on the canyon escarpments at the outcrop of the Castlegate Sandstone Formation. Ten nests have been inventoried. Two of them were active and two others were tended in 1988.
- c. Development of coal access/haul roads and new portal facilities in Link Canyon would destroy the riparian vegetation/habitat at the portal area and drainage bottom (approximately 0.1 acre). The riparian area is associated with water which is flowing from the old portals.
- d. Development of portal facilities and reconstruction of the Link Canyon Road for mining operations could conflict with other access needs along this road and use of the road as a livestock driveway.
- e. Underground mining and mining induced subsidence could result in changes to ground water and surface water flow on and adjacent to the undermined area. This could result in the alteration of soil moisture, vegetation and wildlife

habitat on the surface, above and adjacent to the mined area. In addition, mining operations could affect water quality of ground water in aquifers which lie within and below the mine workings. Operations could also affect water quality in drainages downstream of the facilities.

### 3. Opportunities

- a. Leasing and production of coal reserves in the tract would result in increased rent and royalties paid to the Federal Government and will supplement State and Local Government revenues.
- b. The coal reserves in the tract would be mined and made available for energy production/industry.
- c. If the tract is mined through the existing SUFCO. Mine, the life of the mine would be extended approximately 30 years by providing additional coal reserves.
- d. If a new mine is developed for access to the coal reserves in this tract, the presently depressed local economies would be stimulated and unemployment in the area would be reduced.

### E. Negative Declaration

There are no prime farmlands, rangelands or timber lands nor alluvial valley floors within the proposed lease area. Leasing of the tract should not result in significant impacts to cultural or paleontological resources; threatened, endangered or sensitive plant or animal species; nor floodplains. Protection of these resources is provided under the lease stipulations and Federal and State laws and regulations.

## II. ALTERNATIVES

### A. Alternative 1 - No Action

Under this alternative, the coal lease application would be denied and the tract would not be offered for leasing.

### B. Alternative 2 - Offer Tract for Leasing as Proposed

#### 1. Description

Under this alternative the tract would be offered for competitive leasing subject to standard and special lease stipulations. The boundaries of the tract would remain unchanged from the configuration submitted in Coastal States Energy Company's Coal Lease Application and as identified and evaluated in the Round Two Leasing effort.

## 2. Management Requirements, Constraints and Mitigations

The required mitigations which are attached as Appendix B will be included in the lease as special stipulations in addition to standard BLM lease stipulations. They are consistent with the planning documents for the BLM and Forest Service and require necessary special measures for protection and mitigation of the affected resources.

### III. DESCRIPTION OF THE EXISTING/AFFECTED ENVIRONMENT

#### A. General Setting

The lease tract is located near the south end of the Wasatch Plateau within the Wasatch Plateau Coal Field and adjacent to the permit area for the SUFCo. Number One Mine. The Wasatch Plateau is a north-south trending high plateau which is bounded by Sanpete Valley to the west and Castle Valley to the east. Salina Canyon and Ivie Creek separate the Wasatch Plateau from the high plateaus to the south. Emery, Utah, which is the nearest town, lies approximately 6 miles to the southeast in Castle Valley. The next largest town is Salina, Utah which lies approximately 30 miles to the west in Sevier Valley.

Utah State Highway 10 runs north-south in Castle Valley, connecting the small communities which lie in the valley. Interstate 70 lies in Salina Canyon and runs east-west connecting the valleys to the east and west of the plateau.

#### B. Geology/Topography and Mining

The Wasatch Plateau lies within Basin and Range-Colorado Plateau Transition Physiographic Province. The east flank rises almost 3,000 feet above Castle Valley. The upper 1,500 to 2,000 feet of this rise is a near vertical erosional escarpment or cliff. The sedimentary rock layers dip gently to the northwest throughout the central and eastern portions the plateau. The plateau top is dissected by east-west trending drainages and north-south trending fault zones which form east-west and north-south trending ridges and canyons. Along the west flank of the plateau, the rock layers bend downward, dipping steeply to the west, and form the west flank. The west flank slope is controlled by the dip of the rock layers and is not as steep and abrupt as the east flank. This monoclinial fold of the rock layers is known as the Wasatch Monocline. Both the east and west flanks are deeply incised by east-west trending drainages and their canyons. North-south trending normal faults and extensive fault zones are common.

The topography of the tract is rugged, consisting of the flat plateau area which is deeply dissected by steep, narrow canyons. The elevation ranges from approximately 7,000 ft. to 9,000 ft. above sea level. The rock layers dip northwestward approximately 2 degrees. The Accord Lakes Fault and Musinia Fault Zone lie to the west and the Joe's Valley Fault Zone lies to the east. No faults have been identified within the tract, however, faults trending N 30° W have been projected into the tract using increment

analysis and the apparent offset of coal seams between drill holes. The predominant fracture system within the tract trends northwest.

The stratigraphic units exposed on the tract range from mid-Cretaceous to early Tertiary in age. The units, from oldest to more recent, include the Masuk Member of the Mancos Shale Formation, Star Point Sandstone, Blackhawk Formation, Castlegate Sandstone, Price River Formation, and North Horn Formation.

The significant seams in the tract occur within the lower 300 feet of the Blackhawk Formation. There are many seams in the formation, however, there are only 3 seams which are 4 feet or more in thickness. Of these seams, only the Upper and Lower Hiawatha Seams are considered minable. In the original tract report (Albee, 1982), a parting of the Upper Hiawatha Seam was considered minable and was named the Muddy Creek No. 1. The Muddy Creek No. 1 extends laterally across the entire tract but averages only 2.1 feet in thickness and is, therefore, not considered minable. The interburden between the Hiawatha Upper and Lower Seams ranges from 10 to 60 feet. Only the Upper Hiawatha Seam will be mined where the interburden is less than 30 feet.

The coal seams crop out in the southeastern portion of the tract along the steep escarpments of Quitchupah Canyon, Dry Fork Canyon, East Fork Canyon and Link Canyon. Certain portions of the coal outcrop are known to be burned and are not minable. In general, the zone between the outcrop and 500 feet back into the plateau is not considered minable. The overburden depth increases rapidly from the outcrop into the plateau due to the steepness of the canyon escarpments. The overburden above the Upper Hiawatha Seam increases to approximately 1,400 feet in the northwest portion of the tract.

The average rank for both the Upper and Lower Hiawatha Seams is high volatile C bituminous coal. The preliminary recoverable reserve base for coal in these seams on the tract is calculated by BLM to be 72,800,200 tons considering using a 50% recovery factor for the Upper Hiawatha Coal Seam and a 40% recovery factor for the Lower Hiawatha Coal Seam. These calculations take into account mining constraints.

Two scenarios for access and development of coal in the tract have been developed. The first involves mining the coal through workings developed in conjunction with the existing SUFCo. Mine Number One which lies to the southwest in Convulsion Canyon. No new portal facilities or roads would be developed.

The second scenario involves development of an independent mining operation to mine the Quitchupah Tract. Potential locations for development of portal facilities include Link Canyon and Dry Fork Canyon where the coal crops out. The Link Canyon location is the most feasible location. There is already an existing abandoned coal mine at this location and a low standard access road which could be upgraded to accommodate a mine. The canyon bottom is broader and flatter than Dry Fork Canyon. The Dry Fork Canyon location is feasible but would be a difficult and expensive location for development of new facilities. The canyon is narrow and the coal outcrop lies high up on the escarpment at locations in the canyon which are

wide enough to accommodate surface facilities. Extensive full bench cuts and earth fills would be necessary.

### C. Access/Facilities

The Link Canyon Road (Forest Development Road 50044) and the Quitchupah Road (Forest Development Road 50007) provide access to the lease area. They are both low standard, primitive, single lane, native surface roads. There are other non-system roads and tracks throughout the tract which are used for recreation and range purposes.

The Link Canyon Road provides access from Castle Valley (State Highway 10) to the lease area from the southeast through Link Canyon and from other areas on the plateau north of the tract. The Quitchupah Road provides access to the tract from Salina Canyon (Interstate 70) and Convulsion Canyon from the southwest.

Other than the roads, there are several fences, stockponds and developed springs within the tract. They are discussed in Section III.E. (Range) below. There are no other facilities or structures within the tract which could be impacted by mining and subsidence.

### D. Wildlife

A helicopter survey to locate raptors and migratory bird species was conducted in 1982 by the U.S. Fish and Wildlife Service and Utah Division of Wildlife Resources in consultation with the BLM and Forest Service. Another helicopter survey of the tract was conducted on June 7, 1988 by personnel of the Utah Division of Wildlife Resources, BLM and Forest Service in consultation with the U.S. Fish and Wildlife Service. The nest locations found during the 1988 survey and their status are shown on Map 2. Ten golden eagle nests are located within the tract boundary. Two of the nests were active with one young observed in each nest and two others were determined to be tended. The other six nests were inactive. One additional inactive nest was found outside but within 1/4 mile of the tract boundary.

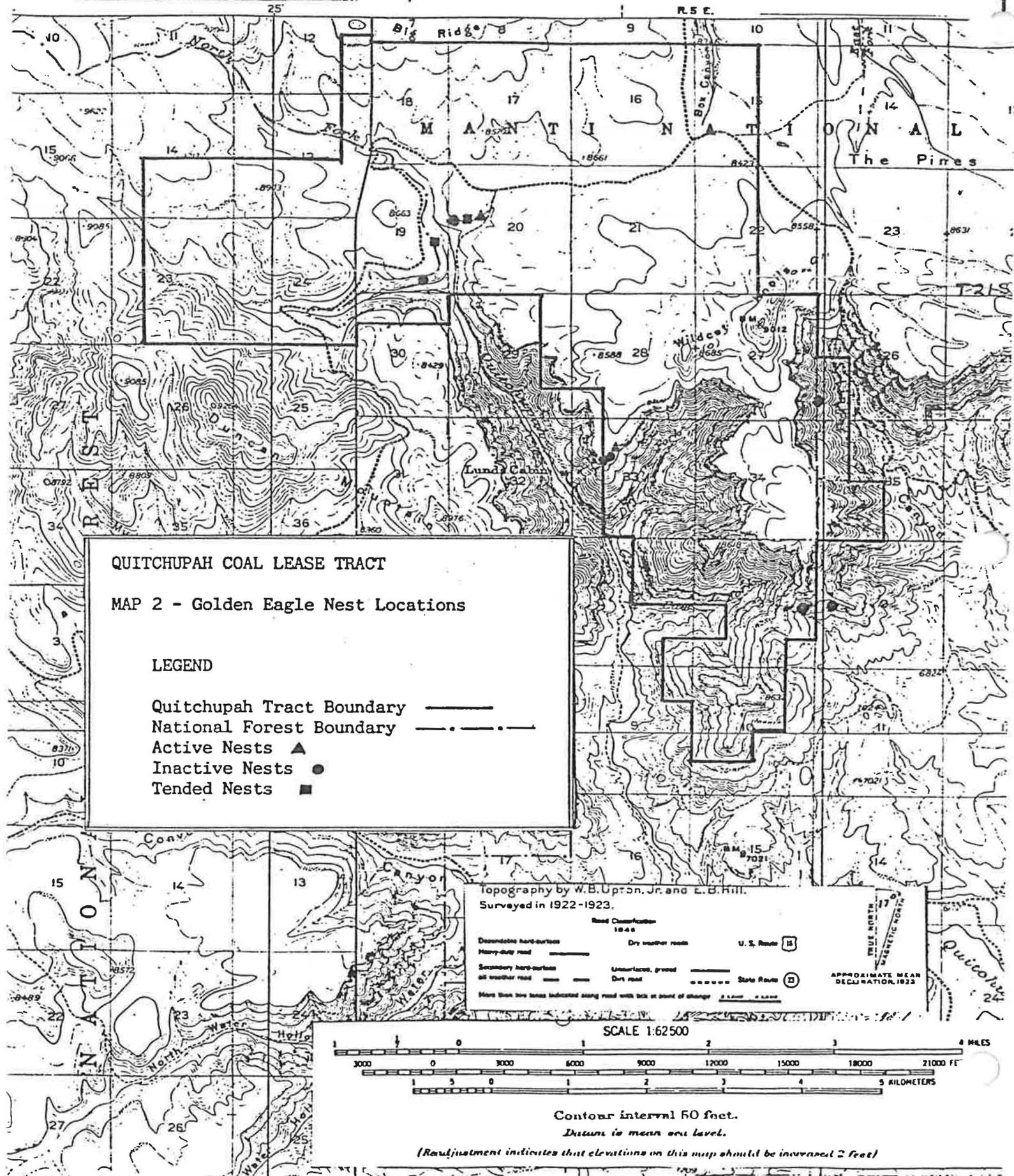
The southern portion of the lease area is considered crucial/key winter range for deer and elk. The escarpment area in the southeastern portion of the tract which lies between Quitchupah Canyon and Link Canyon is a known elk migration route, providing access to and from the winter range from the plateau top.

Bald eagles, an endangered species, are annual winter visitors in the region between November and March, however, no critical habitat has been identified within the tract. No other threatened, endangered or sensitive species are known to inhabit the tract.

Riparian habitat exists near all perennial waters within the tract. These areas include the stream channels and spring areas. A small riparian

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

ACORD LAKES, UTAH.  
Edition of 1925.  
reprinted 1947  
N3845-W11115/15



community exists in the areas immediately adjacent to the Old Link Canyon Mine portals and along the Link Canyon drainage bottom for a short distance (less than 800 feet with an average width of 4 feet) down canyon. Water which flows from each of the two portals supports the riparian community. The vegetation consists of sandbar willow, wood rose, skunkbush, and various grasses, sedges and forbs. The riparian areas are considered important habitat for wildlife due to their limited extent. There are no fisheries within or directly adjacent to the tract.

#### E. Range/Vegetation

The tract lies within the Emery and Quitchupah Cattle and Horse Allotments. The entire lease area, with the exception of the steep escarpment areas is considered suitable for grazing. The allotment is considered to be in good to fair condition and is improving. The Link Canyon Road is an important livestock driveway for trailing livestock to and from the allotment area at the top of the plateau.

Range improvements within the tract include 12 stockponds, 1 water trough, several miles of range fences, approximately 1,000 acres of sagebrush burning and spraying and approximately 600 acres of reseeding.

Vegetation communities on the tract are categorized into vegetation types. The vegetation types on the tract include; Grassland, Sagebrush, Mountain Brush, Ponderosa Pine, Douglas Fir/White Fir/Bristlecone Pine, Pinyon/Juniper and Aspen.

#### F. Recreation

Recreation in the lease area includes camping, fuelwood gathering, hunting and sight seeing during the spring/summer/fall seasons. The greatest recreation use is in the fall during the big-game hunting seasons. The Recreation Opportunity Spectrum (ROS) classifications for the lease area include Roded Natural Appearing (1700 Recreation Visitor Days), Semi-Primitive Motorized (220 Recreation Visitor Days) and Semi-Primitive Nonmotorized (40 Recreation Visitor Days). There are no developed or inventoried recreation campgrounds on the tract.

#### G. Surface Hydrology

The mean annual precipitation is 20 to 25 inches per year. The May through October precipitation is 6 to 8 inches leaving 12 to 19 inches which occurs in the winter mainly as snow (Jeppson, 1968).

The mean annual water yield (Jeppson, 1968) is estimated to be 1.5 inches per year.

Surface waters from the tract drain into Muddy Creek which flows into the Dirty Devil River. The Dirty Devil River is tributary to the Colorado River.

The North Fork of Quitchupah Creek, the South Fork of Quitchupah Creek, Dry Fork and Link Canyon drain the southern and western portions of the tract. Box Canyon drains the northeastern portion of the tract.

The North Fork of Quitchupah Creek, the South Fork of Quitchupah Creek, Dry Fork and Link Canyon flow to the southeast into the main channel of Quitchupah Creek. Quitchupah Creek drains southeastward into Ivie Creek which in-turn flows eastward into Muddy Creek. Box Canyon flows to the northeast into Muddy Creek well above the confluence of Muddy Creek and Ivie Creek.

The North Fork of Quitchupah Creek is perennial as indicated by data collected by SUFCo. at Station 7 at the road crossing in Section 13, T.21S., R.4E., SLM. Station 7 measures a drainage area of 3.23 square miles or 2,066 acres. Streamflow was measured three times per year for a period of 1983 through the 1987 in conjunction with water quality samples. Streamflow declines from June to August to October. Water was flowing at the time of each sample. The mean of the flows measured 6.6 CFS in June, 0.7 CFS in August and 0.6 in October.

Box Canyon is assumed to be perennial at the lease tract boundary. Link Canyon is intermittent except for a short distance in the channel from the perennial spring at the old mine portals to a point downstream approximately 800 ft. from the portals. A unit hydrograph analysis of the North Fork of Quitchupah Creek, Dry Fork, Link Canyon and Box Canyon drainages shows that the drainages are very flashy and can rise to hazardous flows very quickly in response to rainstorms. Any activity in the channels should consider hazards of flash flooding.

The beneficial use standards for waters on and near the lease tract are 2b, 3a and 4 (Standards for Quality of Water for the State of Utah, 1987). All waters within the outer boundaries of National Forests, including public and private lands, are considered to be antidegradation segments for water quality. Category 2a is protected for boating, water skiing and similar uses excluding recreational bathing. Category 3a is protected for cold water species of Game Fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain. Category 4 is protected for agricultural uses including irrigation of crops and livestock watering. Muddy Creek and Quitchupah Creek are used for irrigation near the town of Emery. Muddy Creek is listed as a municipal watershed for Emery. Emery does not presently use water from Muddy Creek for domestic purposes, however, they are in the process of developing a water treatment facility to use Muddy Creek as a domestic water supply.

SUFCo. has been monitoring surface water stations in the North and South Forks of Quitchupah Creek in conjunction with their water quality monitoring program for their SUFCo. Mine Number One. The stations which are within the Quitchupah Tract lie upstream of the mining operations and are therefore not affected by mining. The reported results were used to determine baseline water quality. Twenty eight parameters have been monitored based on possible affects of mining. Six of these parameters (maximum temperature, pH, dissolved Iron, Total Dissolved Solids, Nitrate and Phosphate) have direct State of Utah Numeric Water Quality Standards

which apply. The average values for these parameters, except for phosphate, are generally within the standards. The average value for phosphate consistently exceeds the advisory standard for in-stream recreational uses, excluding swimming, and for cold water fish. The natural waters of the Wasatch Plateau commonly exceed the numeric standards for phosphate. Occasionally in August, the maximum temperature reported exceeds the standard for cold water fish. A sample taken further downstream by the USGS in 1987 shows that Boron, Cadmium, Copper, Iron, Lead, and Zinc are within the standards.

Danielson (1983) listed data for Muddy Creek and some of its tributaries which shows temperature, pH, dissolved Iron, Nitrate, dissolved Oxygen, and Total Dissolved Solids to be within applicable State Numeric Water Quality Standards.

Salt loading is a concern for the Colorado River Basin. In some nearby mines the ground water intercepted in the mine workings has a higher concentration of Total Dissolved Solids (TDS) than the nearby surface streams. Total Dissolved Solids for the North Fork of Quitcupah Creek (SUFCo. Station 7) ranges from 204 to 904 mg/l with an average of 356 mg/l. Mundorff (1979) concluded that the upper reaches of Muddy Creek have TDS concentrations of less than 300 mg/l and that TDS concentrations become much higher just downstream from the National Forest boundary. TDS values increase downstream as the water flows across the outcrop of the saline Mancos Shale.

#### H. Ground Water Hydrology

Ten springs are known to occur within the tract and several other springs occur within 1 mile of the tract boundary. Five of the springs within the tract emerge along the Castlegate Sandstone outcrop. The other five springs emerge from the overlying Price River Formation. The Forest Service has claimed water rights on eight of the springs, two of which have been developed for livestock/wildlife use. All of the springs are considered to have high resource value for livestock and wildlife due to the general dry nature of the tract area.

The coal bearing Blackhawk Formation is a complex sequence of laterally discontinuous layers of sandstone, shale and coal. The lower Blackhawk Formation intertongues with the underlying Star Point Sandstone. The permeable Star Point Sandstone is a regional aquifer and in many areas the Star Point Sandstone and lower Blackhawk Formation are saturated. Many hydrologic reports refer to this regional aquifer as the Star Point/Blackhawk Regional Aquifer. Ground water in the Star Point Sandstone is blocked from downward movement by the impermeable, saline Masuk Shale Member of the Mancos Shale. Some studies show that the regional aquifer is saturated except near the plateau escarpment, deeply incised canyons where ground water can drain naturally and at the SUFCo. Mine where the lower Blackhawk Formation is dewatered. Ground water in the Blackhawk Formation above the regional aquifer occurs predominantly in fractured and faulted rock and to a lesser degree in sandstone lenses.

SUFCo. reports that they discharge approximately 650 gpm from the Lower Blackhawk Formation at the SUFCo. Mine Number One. The working faces in the mine are almost always a source of water. Water also leaks from boltholes. In some cases, discharge lasts for several days and in other cases water flows continuously depending on the extent and amount of water stored and the extent of the hydrologic contact with recharge areas. Older workings produce progressively less water as mining progresses.

Ground water is also known to be contained locally within perched aquifers of the overlying Castlegate Sandstone and Price River Formation. The upper Blackhawk Formation is fine grained and tends to impede downward movement of ground water from the overlying Castlegate Sandstone.

Ground water probably flows downdip to the northwest except where intercepted by fractured rock, faults and deep canyons, therefore, recharge should be from the east. The Flagstaff and North Horn Formations are recharged at high elevations and provide much of the ground water of the Wasatch Plateau. There are no outcrops of the Flagstaff Sandstone on the tract and the North Horn Formation is only exposed along the northwestern area of the tract. Considering the northwesterly dip and the tendency of shale beds in the North Horn Formation to impede downward filtration, it is not likely that these units contribute significant recharge to the underlying units of the tract. The Castlegate Sandstone and Price River Formation have plateau exposure and are likely to be recharged locally from surface water and snowmelt. The Star Point Sandstone and Blackhawk Formation crop out along steep canyon slopes and have limited surface exposure within the vicinity of the tract, therefore, recharge is likely to be from overlying units through faults and fractures.

SUFCo. has reported that spring and well flow at the SUFCo. Mine Number One rarely exceeds 3 gallons per minute. Ions present in ground water of the area are calcium, magnesium and bicarbonate. Quality is generally within EPA drinking water standards and varies little from one formation to the other except that the North Horn Formation contributes relatively large amounts of sodium.

## I. Socioeconomics

The area of influence for the proposed lease and development varies with whether the tract is developed from the existing SUFCo. Mine or as an independent operation. Sevier, Sanpete, Emery and Carbon Counties encompass both development options.

The study area has an estimated population of 66,400. The area is typical rural Utah with sparse population located in a few communities along major roads and along major drainages. Price and Richfield are the largest communities and are major local trade centers.

The population peaked in 1983 and has experienced a steady decline since that time. Overall, the area has experienced a 5.5% population decline.

Carbon County has the highest personal and per capita income followed by Sevier County. Farm earnings are insignificant in the counties except in

Sanpete County where almost 20% is from farming. Mining is the dominant earning factor in Carbon and Emery Counties. Combining mining with the transportation/utility component, shows the dominance of these two categories particularly in Emery County where they comprise about 73% which is primarily due to mining and coal fired electric power generation. Sanpete and Sevier Counties have more balanced economies with government being the most significant factor.

In regard to employment, government dominates all counties in the study area except in Emery County where mining is the most significant at 25.4%. Mining provides 13.7% of the employment in the study area overall which is number 3 in importance. Mining jobs have much higher wages than other categories so they have higher relative importance. Unemployment for 1987 was 10.2% in Carbon County, 14.9% in Emery County, 13.5% in Sanpete County and 7.4% in Sevier County. The average unemployment rate for the study area exceeds 10%.

The following discussion reveals statistics for average monthly employment in coal mining from 1975 to 1987. The study area would encompass this employment trend. Employment peaked in 1982 at 5,151 when record level coal production occurred. Within a period of one year from this peak, employment fell to 3,163 in 1983. Moderate decline has continued in recent years to the present level of 2,577. It is particularly significant that in the period from 1983 to 1987, coal production went from 12,182,000 tons to 16,200,000 tons, a 33% increase while employment went from 3,163 to 2,577, a 19% reduction. The productivity of Utah coal mining has increased significantly in the last 4 years due to longwall installation and other efficiency factors.

Projections that were made in the early 1980's showed dramatic projected increases in population and in the general economy of the area based on a continued energy boom. This has not been the case. Declines in population, employment, and real income have occurred.

Baseline projections show that the downward trend is stabilizing and very moderate growth will occur by 1989 or 1990. The area should experience a 1% growth rate through the mid 1990's assuming modest growth in coal production through 1995 and construction of no additional power generation units in the study area. After 1995, coal production in the State will be near existing capacity and expansion is likely to take place at a moderate pace (estimated 2% to 3% range) through the year 2000. The population of the study area should increase proportionately.

#### IV. EFFECTS OF IMPLEMENTATION

##### A. Alternative One - No Action

Under this alternative the tract would not be offered for lease, therefore, the tract would not be mined.

There would be no environmental consequences to the tract area and surrounding vicinity and there would be no economic benefit to the Federal, State and local governments from coal lease fees and coal royalties. In

addition, there would be no boost to the local economies and to the present unemployment rates in the area.

B. Alternative Two - Offer the Tract for Leasing as Proposed

1. Short-term and Residual Impacts

a. Geology/Topography and Mining

Underground mining will result in fracturing of the overburden and subsidence of the ground surface above and adjacent to the underground workings. In some areas surface cracks may develop. Forest Service Special Lease Stipulation No. 9 (Appendix C) which requires that mining be conducted such that failures of the escarpment are not induced, will protect the steep canyon slope areas from mining induced slope failures and instability. This stipulation, however, allows for exceptions. Exceptions will only be considered if it can be determined that resources will be adequately protected in accordance with applicable laws, regulations and resource management plans and impacts can be mitigated to acceptable levels. The amount of subsidence in some areas where two overlapping seams are mined could reach 16 feet. The lateral extent of subsidence may be less or greater than the area of coal extraction depending on the amount of coal extracted, the mining configuration and the depth and characteristics of the overburden. The angle-of-draw monitored in areas mined by the SUFCo. Number One Mine ranges from 12 to 21 degrees measured from vertical. This means that the area of subsidence at the surface exceeds the area of coal extracted underground where extraction is sufficient to cause measurable subsidence. The BLM uses an average angle-of-draw of 15 degrees for the Wasatch Plateau for subsidence predictions.

If an independent operation is developed in either Link Canyon or Dry Fork Canyon, approximately 40 acres will be disturbed by construction of the new portal facilities.

Access for portal development at the Link Canyon Site would require the reconstruction of the existing Link Canyon Road from State Route 10 to the mine for a distance of approximately 7.0 miles with a surface disturbance of approximately 80 acres.

Access for portal development at Dry Fork Canyon would require construction of approximately 3.2 miles of new road in the North Fork of Quitchupah and reconstruction of approximately 4.4 miles of existing road in Quitchupah Creek for a total distance of 7.6 miles and a surface disturbance of approximately 116 acres.

b. Access/Facilities, Range, Recreation

Upgrading of the existing Link Canyon Road for access to an independent mining operation and the increased use of this road

by mining related traffic (440 vehicles per day), including commercial vehicles such as coal haul trucks, would impact the existing recreation use of this road and would interfere with livestock trailing. If the Link Canyon site is developed, the mining operator must provide for continued access beyond the mine along the Link Canyon Road to access the plateau top. Even though the coal road would be constructed to a standard necessary to accommodate existing and mine traffic, there would be safety problems presented by mixing traffic. Coordination of the recreation, livestock and mining traffic will involve delays for all traffic involved and could result in accidents.

#### c. Wildlife

If the Link Canyon site is developed, the riparian community (approximately 0.1 acre) at the old portals and in the drainage bottom would be damaged. Reclamation of the disturbed areas using riparian vegetation, once the roads are completed, could reduce the amount of riparian vegetation/habitat lost.

The activity associated with construction and operation of new road and portal facilities in Dry Fork could prevent use of the three golden eagle nests which are located on the west canyon escarpment. It is not known if the eagles would occupy the nests during construction and operations. It is, however, anticipated that the eagles would avoid use of the nests during construction activities but would become accustomed to operations after construction is completed and again use the nests.

The location and flow of springs above mined areas could be altered by subsidence. Flow of some springs could be reduced and new springs could be created. Vegetation and wildlife habitat could be altered according to the changes in soil moisture. If water sources identified for protection are damaged, the lessee will be required to replace the water by some means such as developing alternative water sources.

#### d. Ground and Surface Water Hydrology

Rock fracturing associated with subsidence tends to divert some snowmelt and rainfall underground increasing the ground water recharge at the expense of overland runoff. Fracturing could divert ground water and either reduce or increase the flow of springs that provide baseflow to headwater streams. Subsidence induced fracturing could divert streamflow directly underground if fractures intersect a stream channel and remain open. Perennial stream channels will be protected from dewatering by not allowing mining which would result in subsidence and fracturing of their channels. Streamflow diverted underground by fracturing would not be lost from the hydrologic system and may or may not be lost from the subbasin in which it originates. Diversion of the flow of ground water could result in drying of

some springs and potentially increasing flow in others or could result in emergence of new spring and seep locations. If ground water is encountered in the mine workings, mine water will be discharged to streams or dry drainages.

Experience at the SUFCo. Mine suggests that wet conditions will be encountered as water stored in fracture zones within the Blackhawk Formation is intercepted. Some dewatering of saturated zones of the Blackhawk Formation associated with the Star Point/Blackhawk regional aquifer could occur. It is not known if any baseflow derived from the Blackhawk Formation would be diminished, but it is unlikely that the net surface flow from the tract would be significantly affected. The effects on the perched Castlegate Sandstone and Price River Formation aquifers due to subsidence and fracturing of rock will depend on the hydrologic connection of the sandstone and the mine workings below in the Blackhawk Formation. Hydrologic monitoring of a spring at the Blackhawk/Castlegate contact above the workings at the SUFCo. Mine suggests little or no effect. The degree of hydrologic connection will be determined by overburden thickness and the degree of self-healing that occurs within the Blackhawk shales. The effect of fracturing would be to intercept overland and perched aquifer flow and increase recharge within the Star Point/Blackhawk aquifer. Spring flow could be diminished or altered. Initial losses could be restored if shale in the upper part of the Blackhawk Formation heals or seals the fractures.

Water quality could be altered due to changes in the route of flow and the location of convergence of springs which feed surface drainages. The dissolved constituents of the water may change due to changes in contact time of the water in rock formations which are the sources of the dissolved constituents. These changes, however, are not considered to be significant or quantifiable at this time.

Water quality may be altered by discharging mine water into the drainages. Due to the volume of discharged water, dilution could occur resulting in an improvement of water quality for some parameters. The discharged water could also result in decreasing water quality due to lower quality of the discharged water. The quality of discharged water depends on contact with certain rock formations and the workings within the mine. As the water flows through mine workings, it could be contaminated with oil and grease, metals, coal dust, sulfates and other materials. Total Dissolved Solids could also increase, however, before mine water is discharged, it must be diverted into in-mine sumps and/or sediment ponds, treated, and tested. Discharge of mine water which exceeds State standards for discharge is prohibited under the required NPDES permits.

If all regulations and mitigations are properly implemented, mining is not expected to cause significant impairment of beneficial use of the perennial drainages.

e. Socioeconomics

The applicant proposes to develop the tract from their existing SUFCo. Mine. In 1987 the mine produced 2,250,000 tons with a workforce of about 210. The mine capacity is 2.5 million tons which could be mined with about 225 employees. This is a modest increase of 15 miners to the existing workforce or 7% at the mine. In view of the fact that miners in the region have declined by 586 in the last 5 years and unemployment exceeds 10%, this modest increase will easily be absorbed into the existing economy. It is likely that most of the impact will be in Sevier County including a 1% increase in income and a 0.5% increase in employment. The SUFCo. Mine life could be extended by another 30 years with the attendant benefit to the Sevier County economy from the early 1990's well into the 21st. Century. At current mining efficiency, coal in the tract will provide 12.25 million employee hours of direct employment and over \$242,000,000 in wages at current rates.

If an independent mining operation is developed, the effects would be quite different. The most likely development scenario is from Link Canyon. At a 30 year mine life, a 2,500,000 ton per year mine is likely. Production is not likely until 1995 based on potential markets such as additional units at IPP, the planned Harry Allen Plant near Las Vegas, White Pine near Ely, Nevada and extension of existing plants in eastern Utah.

Using the nearest mine as a model, the following profile is likely. Contract construction is assumed to begin 3 years before production. Production will begin in 1995 at 20% increase per year until full production in 1999. Design capacity is 2.5 million tons per year. At full production, the study area will have 450 jobs created which is a 2.3% increase in employment. Due to relatively high historic unemployment, many of the jobs will be filled by people living in the area which would decrease the potential population impact. Using the most likely population change scenario, the maximum change to the area population is expected to be 1,000 or 1.3% of the projected baseline. At full development, \$13,000,000 of additional annual income will be generated. The development of a new mine, such as in Link Canyon, is likely to concentrate impacts in Emery and Sevier Counties. Carbon County would be impacted to a lesser degree and Sanpete County very minimally. Certain towns such as Emery, Ferron and Salina are expected to receive relatively greater impacts.

2. Short-term Use vs. Long-term Productivity

If an independent mining operation is developed, involving new portal facilities, the short-term use of the environment for coal production would result in long-term loss of soil and vegetation productivity and wildlife habitat. The disturbed area for portal facilities would be approximately 40 acres. The life of the mine is estimated to be

approximately 30 years. Development of access for the Link Canyon site would involve approximately another 83 acres of disturbance. The Dry Fork Canyon site would involve approximately 116 acres of additional disturbance. The duration of the loss of productivity would include the life of the mine plus an additional 5-10 years for completion of reclamation and revegetation.

Extraction of the estimated 72,800,200 tons of recoverable coal reserves would render the remaining unmined 79,599,800 tons of minable reserve base unrecoverable over the long-term considering present technology.

### 3. Irretrievable and Irreversible Commitment of Resources

If a new independent mine is developed, soil and vegetation productivity and wildlife habitat on the disturbed area would be irretrievably lost for the life of the mine or until reclamation is successful.

The estimated 72,800,200 tons of coal mined would be irreversibly lost as a resource for future generations and the 79,599,800 tons of minable coal left in the ground would be rendered irreversibly unrecoverable considering present technology.

Any change in aquifers, ground water storage potential, or point of discharge due to subsidence and underground mining would be irreversible.

### 4. Cumulative Impacts

Man's activities in the Quitchupah/Pines vicinity include livestock grazing, timber sales, recreation and mineral exploration and development. The impacts discussed for the proposed action would be added to those impacts which already exist from these activities.

Livestock grazing since the late 1800's combined with range improvements, timber sales and watershed improvement projects have caused changes in vegetation types present in the area and plant diversity and density. Some decreases in soil productivity and watershed conditions have also occurred. Range and watershed improvements are resulting in some improvement of conditions.

The construction of roads to meet access needs and off-road travel from recreation activities have resulted in removal of some vegetation and increased erosion.

Mineral exploration in the area includes coal and oil and gas exploration drill holes and geophysical exploration. All of the roads and drill pads associated with these activities have been successfully reclaimed. The only mineral production in the area is coal mining.

The SUFCo. Mine Number One permit area lies directly adjacent to the proposed tract along the south and east boundaries. The SUFCo. Mine is the only active coal mine in the area. The portal facilities are located in East Spring Canyon, a small tributary to Convulsion Canyon (Map 1). The surface facilities have disturbed approximately 20 acres of National Forest System lands administered by the Fishlake National Forest. The permit area includes approximately 6,713 acres of leased National Forest System lands administered by the Fishlake and Manti-LaSal National Forests and approximately 640 acres of private lands with private coal. Approximately 6,000 acres of this area will be mined by underground methods.

Subsidence and hydrologic monitoring at the mine, which was initiated in 1977, shows that extensive subsidence has occurred above both longwall and room-and-pillar areas. Surface cracking over some of the extracted areas is evident. Maximum subsidence which has occurred to date is 8 feet. Monitoring of surface cracks has shown that some tend to self heal over time.

At the present time subsidence, surface cracks and some cliff spalling have occurred, however, impacts to surface resources are minimal.

Mining has encountered significant ground water flows in the Upper Hiawatha Coal Seam. Hydrologic data from ground water observation wells shows that some dewatering of the coal seam and zones above the workings has occurred. Water encountered in the mine is retained in sediment ponds, monitored and discharged in accordance with NPDES permits.

SUFCo. has reported an average discharge of intercepted ground water from the mine in the last two years to be 600 to 700 gpm. Average salinity, as measured by TDS, is about 525 mg/l. Assuming a flow of 650 gpm, the total salt load from the mine is 2.0 tons per day which is discharged into North Fork Quitchupah Creek. SUFCo. reports that the reduction of downward movement of ground water into deeper more saline strata (Mancos Shale Formation) and the interception of some ground water that naturally would have discharged to Quitchupah Creek, results in a net salt load from the mine discharge that would be considerably less than one ton per day. This load would meet the Colorado River Basin Salinity Control Forum requirement of one ton per day and should not create any localized problems.

Development of a new mine on the tract is not expected to cause a significant increase in runoff and sediment yield. The potential sites for portal facilities and access are on steep, rocky terrain. The natural conditions for these areas involve low infiltration, and high runoff and sediment yield. Implementation of required sediment control measures should also minimize sediment yield from disturbed areas.

V. PERSONNEL AND PUBLIC INVOLVEMENT

A. Interdisciplinary Team and Consultants

The following are Interdisciplinary (ID) Team members and consultants who participated in the environmental analysis:

<u>Specialist</u>	<u>Specialty</u>	<u>Role</u>
Manti-LaSal National Forest		
Carter Reed	Geology/Minerals	ID Team Leader
Dennis Kelly	Hydrologist	ID Team Member
Rod Player	Wildlife Biologist	"
Brent Barney	Engineer	"
Bill Dye	Forester	"
John Healy	Range Conservationist	"
Bob Thompson	Range Conservationist	ID Team Consultant
Dan Larsen	Soil Scientist	"
James Jensen	Landscape Architect	"
Les Wikle	Archeologist	"
Pete Kilbourne	Geologist	"
Fishlake National Forest		
Lynn Findlay	Minerals	ID Team Member
Bureau of Land Management		
Daryl Trotter	Range Conservationist	ID Team Member
Max Nielson	Economist	"

In addition to the ID team, the following agencies were contacted in regard to application of the Unsuitability Criteria and in compiling resource data:

U.S. Fish and Wildlife Service  
 Utah Division of Wildlife Resources  
 State of Utah Division of State History, Utah State Historical Society  
 Coastal States Energy Co. and Southern Utah Fuel Co.

B. Public Contacts

News releases which notified the general public that the Forest Service and Bureau of Land Management would be evaluating the coal lease application and requested public comment were published in the Sun Advocate, Richfield Reaper and Emery County Progress.

Letters were sent to identified interested publics requesting comments. Appendix C contains a copy of the letter and a list of individuals and publics contacted.

### C. Intensity of Public Interest

Public interest was identified to be low based on the responses received. The three letters received were generally in favor of leasing of the tract. A brief discussion follows:

#### State of Utah Division of Natural Resources, Division of Wildlife Resources

The letter from the Division, dated July 11, 1988, voices concerns regarding effects to wildlife from mining induced subsidence. The Division specifically addresses the potential for subsidence to cause escarpment failures and to cause changes in ground and surface water flow. Measures which could be required for mitigation of such effects are discussed.

#### Southeastern Utah Association of Local Governments

The letter from the Association, dated July 13, 1988, states that issuance of the lease is consistent with their desire to have the lands made productive for jobs and economic return while giving appropriate consideration to environmental concerns.

#### Sevier County

The letter from Sevier County, dated July 28, 1988, states that Sevier County is in favor of leasing the tract.

## VI. REFERENCES

- Albee, Howard, 1982. Quitcupah Tract Summary Report, Sevier County, U.S. Department of Interior, Minerals Management Service, Coal Resource Evaluation as a memo to the MMS District Supervisor.
- BLM, 1983. Uinta-Southwestern Utah Coal Region Round Two Final EIS; U.S. Department of Interior, Bureau of Land Management, Salt Lake City, Utah.
- BLM/FS, 1980. Forest Planning Unit Coal Unsuitability Study; U.S. Department of Interior, Bureau of Land Management, Richfield District, Richfield, Utah; U.S. Department of Agriculture, Fishlake National Forest, Richfield, Utah.
- BLM, 1988. Geologic Report, Tract Development and Engineering Report, Coal Lease Application U-63214, Quitcupah Tract, Sevier County, Utah, Coastal States Energy Company; U.S. Department of Interior, Bureau of Land Management, Salt Lake City, Utah.
- Coastal States Energy Co., 1980. Southern Utah Fuel Company (SUFCo) Coal Mine Permit Application Package; Volume 4, Hydrology.
- Coastal States Energy Co., 1988. Southern Utah Fuel Company (SUFCo) Mine, Water Quality Data, Annual Report.

- Danielson, T.W. and Sylla, D.A., 1983. Hydrology of Coal-Resource Areas in the Southern Wasatch Plateau, Central Utah; USGS, Water-Resources Investigations Report 82-4009.
- Doelling, H.H., 1972. Central Utah Coal Fields: Sevier-Sanpete, Wasatch Plateau, Book Cliffs and Emery; USGS, Monograph Series No. 3, Wasatch Plateau.
- Hayes, P.T. and Sanchez, J.D., 1979. Geologic Map and Coal Resources of the Emery West Quadrangle, Emery and Sevier Counties, Utah; USGS Coal Investigations Map C-82.
- Hydrometrics, Inc. 1987. Evaluation of Salinity Loads Discharged from the Southern Utah Fuel Company No. 1 Mine Near Salina, Utah; for Southern Utah Fuel Company, Salina, Utah and Coastal States Energy Company, Salt Lake City, Utah.
- Hydrometrics, Inc. 1987. Hydrological Assessment 1977 - 1987, Southern Utah Fuel Company Mine No. 1, Salina, Utah; for Southern Utah Fuel Company, Salina, Utah and Coastal States Energy Company, Salt Lake City, Utah.
- FS/BLM, 1982. Environmental Assessment for Quitchupah Coal Lease Tract; U.S. Department of Agriculture, Manti-LaSal National Forest, Price, Utah; Fishlake National Forest, Richfield, Utah; U.S. Department of Interior, Moab District BLM Office, Moab, Utah.
- FS, 1986. Manti-LaSal National Forest Land and Resource Management Plan; U.S. Department of Agriculture, Manti-LaSal National Forest, Price, Utah.
- FS, 1986. Fishlake National Forest Land and Resource Management Plan; U.S. Department of Agriculture, Fishlake National Forest, Richfield, Utah.
- Jeppsen, et.al. 1968. Hydrologic Atlas of Utah; Report wg 35-1, Utah Water Research Laboratory, Utah Agricultural Experiment Station, Utah State University, Logan, Utah
- Mundorff, James C., 1979. Reconnaissance of Chemical Quality of Surface Water and Fluvial Sediment in the Dirty Devil River Basin, Utah; State of Utah Department of Natural Resources, Technical Paper No. 65, Salt Lake City, Utah.
- Pearson, Eugene, 1982. Resource Recovery Report, Quitchupah Coal Lease Tract, About 10,000 acres, Sevier County, Utah; Minerals Management Service to MMS District Supervisor.
- Price, D. and Plantz, G.G., 1987. Hydrologic Monitoring of Selected Streams in Coal Fields of Central and Southern Utah - Summary of Data Collected, August 1978-September 1984; USGS Water-Resources Investigations Report 86-4017.

Sanchez, D.J., Blanchard, L.F., and August, L.L., 1983. Stratigraphic Framework and Coal Resources of the Upper Cretaceous Blackhawk Formation in the Convulsion Canyon and Wash Rock Canyon Areas of the Wasatch Plateau Coal Field, Salina 30' X 60' Quadrangle, Sevier and Emery Counties, Utah; USGS Coal Investigation Map C-93B.

VII. APPENDICES

- A. Tract Delineation Review Report
- B. Forest Service Special Lease Stipulations
- C. Public Notices

Appendix A - Tract Delineation Review Report

UINTA-SOUTHWESTERN UTAH COAL REGION  
BUREAU OF LAND MANAGEMENT

TRACT DELINEATION REVIEW REPORT

Leasing by Application - U-63214  
- Coastal States Energy

I. APPLICATION DATA

Date Filed - February 2, 1988  
Legal Description - (see Attachment 1)  
Acreage - 9905.46 acres (80 acres of State land were eliminated from the original application)

Surface Ownership - All Federal

Surface Administration

Manti-LaSal National Forest - 64%  
Fishlake National Forest - 22%  
Bureau of Land Management - 14%

Preliminary Coal Resource Information

Minable Seams - Hiawatha, Upper Hiawatha  
In-place Coal Reserves - 217,000,000 Tons  
Minable Reserves - 172,000,000 Tons  
Recoverable Reserves - 86,000,000 Tons

II. ANALYSIS FOR ENHANCING COMPETITION

A. Tract Configuration

1. Comparison with Prior Delineated Tracts.

The tract applied for is identical to a parcel delineated in 1982 by the Minerals Management Service as the "Quitcupah Tract" for Round II Regional Coal Lease Consideration. The configuration was based on: Expressions of interest, land use planning considerations, available coal data, access considerations to the tract, and the extent of unleased coal.

2. Size Consideration

The tract under application is very large and would provide 35 to 40 years supply to the existing mine or an independent operation. In this case, the tract appears logical because of the large potential reserve of unleased coal in the area and the limited number of economic access points to the reserve. It would appear to be in the government's interest to offer a large parcel in this area.

3. Industry Interest

There were five expressions of interest to lease the Quitchupah tract in 1982. In 1981, Mobil Oil drilled nine drill holes. In 1984, Getty Coal Company acquired two exploration licenses in the area, and drilled three holes on the tract. The applicant, Coastal States Energy, is the only existing operation on the southern end of the Wasatch Plateau Coal Field. Other companies have holdings in the area and may have interest in the tract.

4. Planning/Environmental Considerations

No land on the tract or in the vicinity is unsuitable for coal leasing consideration. Protective stipulations for specific resources such as golden eagles may, however, limit maximum economic recovery in the escarpment area of the proposed lease tract.

5. Captive/Bypass Situation

No part of the tract under application is in a captive or bypass situation, and the tract configuration does not create a captive or bypass situation for other unleased coal.

B. Ownership Pattern/Control

1. Surface/Minerals

The surface and minerals on the tract are all controlled by the Federal Government and administered by the BLM or U.S. Forest Service. Existing coal holdings adjoining the tract include the Coastal States SUFCO property to the south and west of the tract, and a 160-acre Federal coal lease on the east side of the parcel currently held jointly by Coastal States and the McKinnon Estate (U-053995). (See attached map.)

2. Access

The tract under application has been determined to have potential economic access from the following:

- a. Existing SUFCO mine. Present workings are adjacent to the tract's south central boundary.
- b. Dry Fork Canyon. Located in Sec. 33, T. 21 S., R. 5 E., SLM on a tributary to Quitchupah Canyon in the southern portion of the tract. Access would be across private and BLM land and mine facilities would be on the Manti-LaSal National Forest.

- c. Link Canyon. Located in the upper end of Link Canyon on the east edge of the tract (Section 26, T. 21 S., R. 5 E., SLM). A 160-acre coal lease is in the area. Surface in area is Manti-LaSal National Forest. A county road across private and BLM land goes to the area.

### 3. Extent of Unleased Coal

In 1982, the Minerals Management Service studied about 30,000 acres of unleased Federal coal lying generally south of Muddy Creek and north and west of Quitchupah Creek in the Wasatch Plateau Coal Field in Sevier and Sanpete Counties. In consultation with BLM and the Forest Service, the large unleased block of coal was divided into three approximately equal parcels. The Quitchupah Tract has a common boundary with "The Pines Tract" on the east and "Muddy Tract" on the north. Considerable effort was made at that time to logically divide this significant unleased coal block into three large potential mining units.

## C. Coal Resources

### 1. Coal Data

Coal data available on or near the tract consist of three holes drilled by Getty Coal Company, twelve holes drilled by Southern Utah Fuel Company, nine holes drilled by Mobil, and ten holes drilled by USGS. The USGS drill hole data are available to all parties, having been published as an open-file report. Other drilling data are available on a varying basis to between one and three companies. In general, adequate information is available for any company to make a good analysis of the coal resources.

## D. Marketability

The two minable seams in the tract have high-volatile C bituminous rank coal with a high Btu/lb. (10,800-11,500) and low sulfur content (0.5-1.5%). Mining conditions, if comparable to the SUFCO Mine as are suspected, would be favorable. The SUFCO mine has high productivity and is a low cost underground mining producer. The adverse feature of the tract is its location to a rail shipping point. Depending on the development point and shipping site, between 65 and 80 miles of truck haulage will be required. At present costs, this will add up to \$6.00 per ton to cover truck transportation. In comparison to other existing producers in Utah, the tract has potential to be a mid-range cost producer; there are several mines with both higher and lower potential costs for production and delivery to a shipping point.

### III. Conclusion

The Quitchupah tract is a competitive tract for the following reasons: (1) The tract contains reserves of sufficient quality and quantity to allow development by room and pillar or longwall mining methods; (2) the property can be developed from an existing operation (SUFCO) or as an independent property; (3) In past years, there have been a significant number of expressions of interest in the property; (4) no coal will be bypassed; (5) the ten government drill holes allow sufficient data to all parties of interest; and (6) the coal is potentially marketable. This is evidenced by the SUFCO mine, which ships coal 80 miles to Levan, Utah, from where it is transported to markets in Utah, Nevada, and California.

#### Tract Delineation Team

<u>Name</u>	<u>Date</u>
<u>Barbara Korzendorfer</u> Barbara Korzendorfer, Geologist BLM, Utah State Office	<u>June 9, 1988</u>
<u>Terry McParland</u> Terry McParland, Geologist BLM, Moab District Office	<u>June 13, 1988</u>
<u>Shannon Hoefeler</u> Shannon Hoefeler, Mining Engineer BLM, Moab District Office	<u>June 13, 1988</u>
<u>Max Nielson</u> Max Nielson, Economist BLM, Utah State Office	<u>June 9, 1988</u>
<u>Carter E. Reed</u> Carter Reed, Geologist Manti-LaSal National Forest	<u>June 15, 1988</u>

OFFICIAL LAND DESCRIPTION FOR COAL LEASE APPLICATION U-63214

T. 21 S., R. 4 E., SLM, Utah

- Sec. 12, E $\frac{1}{2}$ SE $\frac{1}{4}$ ;
- Sec. 13, E $\frac{1}{2}$ NE $\frac{1}{4}$ , S $\frac{1}{2}$ ;
- Sec. 14, E $\frac{1}{2}$ SW $\frac{1}{4}$ , SE $\frac{1}{4}$ ;
- Sec. 23, E $\frac{1}{2}$ , E $\frac{1}{2}$ W $\frac{1}{2}$ ;
- Sec. 24, all.

T. 21 S., R. 5 E., SLM, Utah

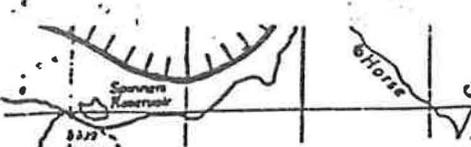
- Sec. 15, W $\frac{1}{2}$ ;
- Secs. 16, 17, 18, 19, 20, and 21, all;
- Sec. 22, W $\frac{1}{2}$ ;
- Sec. 26, W $\frac{1}{2}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ , SW $\frac{1}{4}$ SW $\frac{1}{4}$ ;
- Sec. 27, all;
- Sec. 28, N $\frac{1}{2}$ , N $\frac{1}{2}$ SW $\frac{1}{4}$ , SE $\frac{1}{4}$ SW $\frac{1}{4}$ , SE $\frac{1}{4}$ ;
- Sec. 29, E $\frac{1}{2}$ NE $\frac{1}{4}$ , NE $\frac{1}{4}$ SE $\frac{1}{4}$ ;
- Sec. 30, lot 1, N $\frac{1}{2}$ NE $\frac{1}{4}$ ;
- Sec. 33, lots 2-4, NE $\frac{1}{4}$ , E $\frac{1}{2}$ NW $\frac{1}{4}$ , NE $\frac{1}{4}$ SW $\frac{1}{4}$ , N $\frac{1}{2}$ SE $\frac{1}{4}$ ;
- Sec. 34, all;
- Sec. 35, lots 1, 2, W $\frac{1}{2}$ NW $\frac{1}{4}$ , N $\frac{1}{2}$ SW $\frac{1}{4}$ .

T. 22 S., R. 5 E., SLM, Utah

- Sec. 3, lots 1-4, S $\frac{1}{2}$ N $\frac{1}{2}$ , NE $\frac{1}{4}$ SW $\frac{1}{4}$ , S $\frac{1}{2}$ SW $\frac{1}{4}$ ,  
N $\frac{1}{2}$ SE $\frac{1}{4}$ , SW $\frac{1}{4}$ SE $\frac{1}{4}$ ;
- Sec. 4, lots 1, 2, S $\frac{1}{2}$ NE $\frac{1}{4}$ , SE $\frac{1}{4}$ SE $\frac{1}{4}$ ;
- Sec. 9, NE $\frac{1}{4}$ NE $\frac{1}{4}$ ;
- Sec. 10, W $\frac{1}{2}$ NE $\frac{1}{4}$ , NW $\frac{1}{4}$ , N $\frac{1}{2}$ SW $\frac{1}{4}$ .

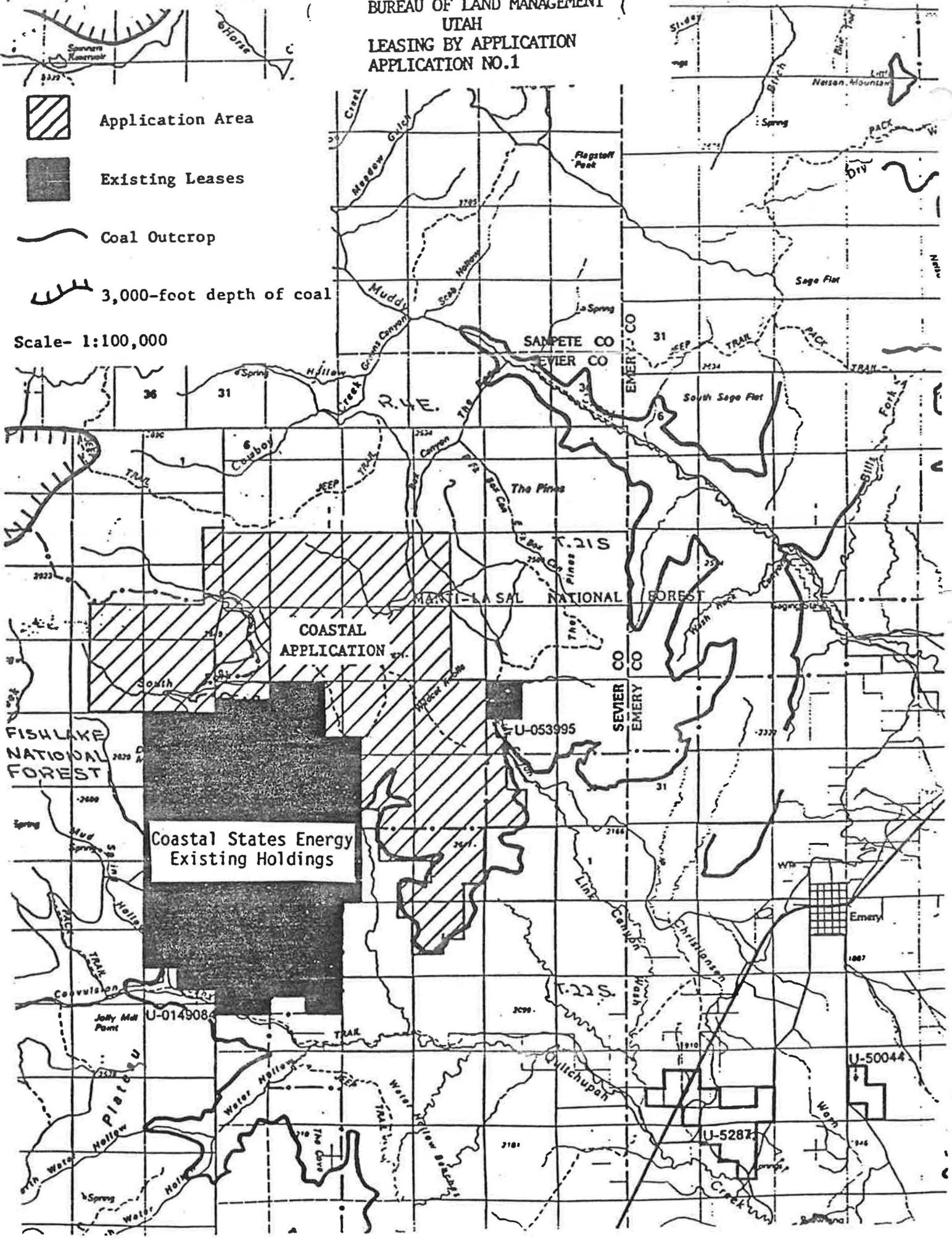
Containing 9,905.46 acres

BUREAU OF LAND MANAGEMENT  
UTAH  
LEASING BY APPLICATION  
APPLICATION NO.1



-  Application Area
-  Existing Leases
-  Coal Outcrop
-  3,000-foot depth of coal

Scale- 1:100,000



Coastal States Energy  
Existing Holdings

COASTAL  
APPLICATION

MANTI-LA SAL NATIONAL FOREST

FISHLAKE  
NATIONAL  
FOREST

U-0149084

U-053995

U-5287

U-50044

Appendix B - Special Lease Stipulations

Sec. 15. SPECIAL STIPULATIONS.

1. The Regulatory Authority shall mean the State Regulatory Authority pursuant to a cooperative agreement approved under 30 CFR Part 745 or in the absence of a cooperative agreement, Office of Surface Mining. The Authorized Officer shall mean the State Director, Bureau of Land Management. The Authorized Officer of the Surface Management Agency shall mean the Forest Supervisor, Forest Service. Surface Management Agency for private surface is the Bureau of Land Management. For adjoining private lands with Federal minerals and which primarily involve National Forest Service issues, the Forest Service will have the lead for environmental analysis and, when necessary, documentation in an environmental assessment or environmental impact statement.
2. The Authorized Officers, of the Bureau of Land Management, Office of Surface Mining (Regulatory Authority), and the Surface Management Agency (Forest Service) respectively, shall coordinate, as practical, regulation of mining operations and associated activities on the lease area.
3. In accordance with Sec. 523(b) of the "Surface Mining Control and Reclamation Act of 1977," surface mining and reclamation operations conducted on this lease are to conform with the requirements of this Act and are subject to compliance with Office of Surface Mining Regulations, or as applicable, a Utah program equivalent approved under cooperative agreement in accordance with Sec. 523(c). The United States Government does not warrant that the entire tract will be susceptible to mining.
4. Federal Regulations 43 CFR 3400 pertaining to Coal Management make provisions for the Surface Management Agency, the surface of which is under the jurisdiction of any Federal agency other than the Department of Interior, to consent to leasing and to prescribe conditions to insure the use and protection of the lands. All or part of this lease contain lands the surface of which are managed by the United States Department of Agriculture, Forest Service Manti-LaSal National Forest.

The following stipulations pertain to the Lessee responsibility for mining operations on the lease area and on adjacent areas as may be specifically designated on National Forest System lands.

5. Before undertaking activities that may disturb the surface of previously undisturbed leased lands, the Lessee may be required to conduct a cultural resource inventory and a paleontological appraisal of the areas to be disturbed. These studies shall be conducted by qualified professional cultural resource specialists or qualified paleontologists, as appropriate, and a report prepared itemizing the findings. A plan will then be submitted making recommendations for the protection of, or measures to be taken to mitigate impacts for identified cultural or paleontological resources.

If cultural resources or paleontological remains (fossils) of significant scientific interest are discovered during operations under this lease, the Lessee prior to disturbance shall, immediately bring them to the attention of the appropriate authorities. Paleontological remains of significant scientific interest do not include leaves, ferns, or dinosaur tracks commonly encountered during underground mining operations.

The cost of conducting the inventory, preparing reports, and carrying out mitigating measures shall be borne by the Lessee.

6. If there is reason to believe that threatened or endangered (T&E) species of plants or animals, or migratory bird species of high Federal interest occur in the area the Lessee shall be required to conduct an intensive field inventory of the area to be disturbed and/or impacted. The inventory shall be conducted by a qualified specialist and a report of findings will be prepared. A plan will be prepared making recommendations for the protection of these species or action necessary to mitigate the disturbance.

The cost of conducting the inventory, preparing reports, and carrying out mitigating measures shall be borne by the Lessee.

7. The Lessee shall be required to perform a study to secure adequate baseline data to quantify the existing surface resources on and adjacent to the lease area. Existing data may be used if such data is adequate for the intended purposes. The study shall be adequate to locate, quantify, and demonstrate the inter-relationship of the geology, topography, surface hydrology, vegetation, and wildlife. Baseline data will be established so that future programs of observation can be incorporated at regular intervals for comparison.

8. Powerlines used in conjunction with the mining of coal from this lease shall be constructed so as to provide adequate protection for raptors and other large birds. When feasible, powerlines will be located at least 100 yards from public roads.

9. The limited area available for mine facilities at the coal outcrop, steep topography, adverse winter weather, and physical limitations on the size and design of the access road, are factors which will determine the ultimate size of the surface area utilized for the mine. A site specific environmental analysis will be prepared for each new mine site development and for major modifications to existing developments to examine alternatives and mitigate conflicts.

10. Consideration will be given to site selection to reduce adverse visual impacts. Where alternative sites are available, and each alternative is technically feasible, the alternative involving the least damage to the scenery and other resources shall be selected. Permanent structures and facilities will be designed, and screening techniques employed, to reduce visual impacts, and where possible achieve a final landscape compatible with the natural surroundings. The creation of unusual, objectionable, or unnatural land forms and vegetative landscape features will be avoided.

11. The Lessee shall be required to establish a monitoring system to locate, measure, and quantify the progressive and final effects of underground mining activities on the topographic surface, underground and surface hydrology and vegetation. The monitoring system shall utilize techniques which will provide a continuing record of change over time and an analytical method for location and measurement of a number of points over the lease area. The monitoring shall incorporate and be an extension of the baseline data.

12. The Lessee shall provide for the suppression and control of fugitive dust on haul roads and at coal handling and storage facilities. On Forest Development Roads (FDR), Lessees may perform their share of road maintenance by a commensurate share agreement if a significant degree of traffic is generated that is not related to their activities.

13. Except at specifically approved locations, underground mining operations shall be conducted in such a manner so as to prevent surface subsidence that would: (1) cause the creation of hazardous conditions such as potential escarpment failure and landslides, (2) cause damage to existing surface structures, or (3) damage or alter the flow of perennial streams. The Lessee shall provide specific measures for the protection of escarpments, and determine corrective measures to assure that hazardous conditions are not created.

14. In order to avoid surface disturbance on steep canyon slopes and to preclude the need for surface access, all surface breakouts for ventilation tunnels shall be constructed from inside the mine, except at specifically approved locations.

15. If removal of timber is required for clearing of construction sites, etc., such timber shall be removed in accordance with the regulations of the surface management agency.

16. The coal contained within, and authorized for mining under this lease, shall be extracted only by underground mining methods.

17. Existing Forest Service owned or permitted surface improvements will need to be protected, restored, or replaced to provide for the continuance of current land uses.

18. In order to protect big game wintering areas, elk calving and deer fawning areas, sagegrouse strutting areas, and other critical wildlife habitat and/or activities, specific surface uses outside the mine development area may be curtailed during specific periods of the year.

19. Support facilities, structures, equipment, and similar developments will be removed from the lease area within 2 years after the final termination of use of such facilities. This provision shall apply unless the requirement of Section 10 of the lease form is applicable. Disturbed areas and those areas previously occupied by such facilities will be stabilized and rehabilitated, drainages reestablished, and the areas returned to a premining land use.

20. The lessees at the conclusion of the mining operations, or at other times as surface disturbance related to mining may occur, will replace all damaged, disturbed, or displaced corner monuments (section corners, quarter corners, etc.) their accessories and appendages (witness trees, bearing trees, etc.), or restore them to their original condition and location, or at other locations that meet the requirements of the rectangular surveying system. This work shall be conducted at the expense of the lessee, by a professional land surveyor registered in the State of Utah and to the standards and guidelines found in the manual of surveying instruction, U.S. Department of Interior.

21. The Lessee at his expense will be responsible to replace any surface water identified for protection, that may be lost or adversely affected by mining operations, with water from an alternate source in sufficient quantity and quality to maintain existing riparian habitat, fishery habitat, livestock and wildlife use, or other land uses.

22. The lessee must comply with all the rules and regulations of the Secretary of Agriculture set forth at Title 36, Chapter II, of the Code of Federal Regulations governing the use and management of the National Forest System (NFS) when not inconsistent with the rights granted by the Secretary of the Interior in the lease. The Secretary of Agriculture's rules and regulations must be complied with for (1) all use and occupancy of the NFS prior to approval of a permit/operation plan by the Secretary of Interior, (2) uses of all existing improvements, such as Forest Development Roads, within and outside the area licensed, permitted or leased by the Secretary of Interior, and (3) use and occupancy of the NFS not authorized by a permit/operation plan approved by the Secretary of the Interior.

All matters related to this stipulation are to be addressed to:

Forest Supervisor  
Manti-LaSal National Forest  
599 West Price River Drive  
Price, Utah 84501

Telephone No.: 801-637-2817

who is the authorized representative of the Secretary of Agriculture.

Appendix C - Public Notices

United States  
Department of  
Agriculture

Forest  
Service

Manti-LaSal National Forest  
Ferron Ranger District

P.O. Box 310  
Ferron, Utah 84523

---

Reply to: 2820

Date:

ADDRESS TO BE MERGED USING  
A MAILING LIST SET UP AS A  
MERGE DOCUMENT - MERGE DOCUMENT  
WILL BE LIST OF INTERESTED PUBLICS  
FOR MINERAL ACTIVITIES

Dear :

The Bureau of Land Management and Forest Service will be evaluating an application by Coastal States Energy Co. to lease Federal lands in Sevier County for coal development. The proposed lease tract, known as the Quitcupah Tract, lies adjacent to the north and east boundaries of Coastal Energy Company's existing Convulsion Canyon Mine Permit Area, as shown on the enclosed map. Coastal States Energy Company's application states that they intend to mine the proposed lease using existing portal facilities associated with the Convulsion Canyon Mine.

The application will be processed under the Lease on Application procedure recently adopted by the Uinta-Southwestern Utah Coal Region. The proposed tract encompasses 9905.46 acres of Federal coal lands. The surface of the lease area is under Federal management including lands administered by the Bureau of Land Management, Moab District and the USDA Forest Service, Manti-LaSal and Fishlake National Forests.

The subject lands have been determined to be suitable for further consideration for coal leasing under existing Bureau of Land Management and Forest Service Land Use Plans. The Bureau of Land Management and Forest Service will jointly evaluate the tract on a site-specific basis for leasing in accordance with the requirements of Federal Regulations 43 CFR 3400 and the National Environmental Policy Act of 1969 (NEPA). If offered for lease, the tract will be leased on a competitive basis.

Further information can be obtained at the Bureau of Land Management, Moab District Office in Moab, Utah; the Fishlake National Forest Supervisor's Office in Richfield, Utah; and the Manti-LaSal National Forest Supervisor's Office in Price, Utah.

Public comments will be accepted at the Manti-LaSal National Forest, Supervisor's Office, 599 West Price River Drive, Price, Utah, 84501, until July 13, 1988.

Sincerely,

JOHN NIEBERGALL  
District Ranger

cc: S.O.

NEWS RELEASE

#25



The Bureau of Land Management and Forest Service will be evaluating an application by Coastal States Energy Co. to lease Federal lands in Sevier County for coal development. The proposed coal lease tract, known as the Quitchupah Tract, lies just north of and adjacent to Coastal States Energy Company's existing Convulsion Canyon Mine Permit Area.

According to George Morris, Forest Supervisor of the Manti-LaSal National Forest, the application will be processed under the Lease on Application procedure recently adopted by the Uinta-Southwestern Utah Coal Region. The proposed tract encompasses 9905.46 acres of Federal coal lands. The surface of the involved lands are under management by the Bureau of Land Management, Moab District, and the USDA Forest Service, Manti-LaSal and Fishlake National Forests.

The subject lands have been determined to be suitable for further consideration for coal leasing under existing Bureau of Land Management and Forest Service Land Use Plans. The Bureau of Land Management and Forest Service will jointly evaluate the tract for leasing. For further information, contact the BLM Moab District Office in Moab, Utah; the Manti-LaSal National Forest Supervisor's Office in Price, Utah or the Fishlake National Forest Supervisor's Office in Richfield, Utah.

Public comments will be accepted at the Manti-LaSal National Forest Supervisor's Office, 599 West Price River Drive, Price, Utah, 84501, until July 13, 1988.

/s/ Ted V. Fitzgerald

June 23, 1988

\_\_\_\_\_  
for  
GEORGE A. MORRIS  
Forest Supervisor  
Manti-LaSal National Forest

\_\_\_\_\_  
Date

/s/ J. Kent Taylor

June 24, 1988

\_\_\_\_\_  
KENT J. TAYLOR  
Forest Supervisor  
Fishlake National Forest

\_\_\_\_\_  
Date

Appendix C - Public Notices



Division of State History  
 (Utah State Historical Society)  
 Department of Community and Economic Development

Norman H. Bangertter  
 Governor  
 Max J. Evans  
 Director

300 Rio Grande  
 Salt Lake City, Utah 84101-1182

MANTI-LASAL N.F.		
SEP 22 1988		
FS		ROUTE
RG	<i>[initials]</i>	
TM	<i>[initials]</i>	
ENG	<i>[initials]</i>	
PLN		
AO		
RANGER COPY		
<i>[Signature]</i>		

September 19, 1988

~~cc: D-2  
 Leswick (D-5)  
 C. Reed~~

George A. Morris  
 Forest Supervisor  
 Manti-LaSal National Forest  
 599 West Price River Drive  
 Price, Utah 84501

RE: Lease of the Quitchupah Coal Tract to Coastal States Energy Company,  
 Sevier County, Utah

In Reply Please Refer to Case No. L753

Dear Mr. Morris:

The staff of the Utah State Historic Preservation Office has received the documentation on the above referenced project. According to the archaeological cultural resource attachment approximately 15% of the proposed coal lease area has been surveyed for cultural resources. This is sufficient to supply the Forest Service with an assessment of what kinds and how many cultural resources are located within the proposed coal lease tract. We also understand that 100% survey will be conducted on areas prior to impact such as mine portals and roads. At that time, the specific requirements as specified in Section 106 of the National Historic Preservation Act of 1966, as amended, would be followed by the Forest Service. We look forward to working with the Manti-LaSal National Forest during its compliance with this law.

The above is provided on request as outlined by 36 CFR 800 or Utah Code, Title 63-18-37. The Utah SHPO makes no regulatory requirement in this matter. If you have questions or need additional assistance, please contact me at (801) 533-7039, or 533-6017.

Sincerely,

*[Signature]*

Diana Christensen  
 Regulation Assistance Coordinator

DC:L753/6106V FS

United States  
Department of  
Agriculture

Forest  
Service

Manti-LaSal  
National Forest

599 West Price River Dr.  
Price, Utah 84501

---

Reply to: 2820

Date: September 9, 1988

Max J. Evans  
State of Utah Division of State History  
Utah State Historical Society  
300 Rio Grande  
Salt Lake City, Utah 84101-1182

Dear Mr. Evans:

The Bureau of Land Management and Forest Service are presently evaluating an application by Coastal States Energy Co. to lease a new coal tract, known as the Quitcupah Tract. The tract was originally delineated in 1982 for Round 2 coal leasing consideration by the Uinta-Southwestern Utah Coal Region. The surface of the subject lands are all Federal, including lands administered by the Moab District of the Bureau of Land Management and the Manti-LaSal and Fishlake National Forests. The lease tract has been cleared for further consideration for coal leasing, subject to application of site-specific coal lease unsuitability criteria, through planning documents by the two agencies. The attached map shows the location of the proposed tract.

The majority of the surface of the tract is administered by the Manti-LaSal National Forest, therefore the Manti-LaSal National Forest is taking the lead in preparing the Environmental Assessment. If offered, the tract will be leased competitively. If Coastal States Energy Co. obtains the lease, the coal will be mined by underground methods through the facilities at the existing Convulsion Canyon Mine. If another company obtains the lease, new portal facilities may need to be developed. Link Canyon and Dry Fork Canyon provide the only potential sites for portal development.

The Coal Lease Unsuitability Criteria and the process for their application are discussed in Federal Regulations 43 CFR 3461.1. Criterion Number 7 (3461.1.g.1) involves cultural and historic resources defined as "all publicly owned places on Federal lands which are included in the National Register of Historic Places".

Because the coal will be mined using underground methods, the Bureau of Land Management and Forest Service have determined that the underground mining exemption (3461.2) would apply to Criterion 7. In addition, the agencies feel that lease stipulations and the Federal and State regulations for mining will adequately provide for protection of any such resources. No national register sites are known to exist within Dry Fork and Link Canyons and the area must be surveyed and cleared through the surface management agency and the State Historic Preservation Office before surface disturbing operations can be approved. Based on this determination, we feel that the exception listed under this criterion (3461.1.2) would apply to the tract, therefore, the tract should be considered suitable for leasing.

Based on existing cultural resources survey coverage of the lease tract, Les Wikle, Forest Archeologist, has determined that further cultural resource field work should not be needed for the purpose of determining suitability of the tract for leasing. Enclosed is a copy of his report on the lease application for National Forest System lands. Approximately 15 percent of the lands in the lease tract which are administered by the Manti-LaSal National Forest have been surveyed, which totals approximately 10 percent of the entire tract.

Please review the information in your files and let us know as soon as possible if you concur with this determination. Please make any necessary contacts with Les Wikle at our Monticello Ranger District Office in Monticello, Utah and send a copy of your written response to the Forest Supervisor's Office in Price, Utah. Please respond by September 15, 1988.

Sincerely,

/s/ Aaron L. Howe

for  
GEORGE A. MORRIS  
Forest Supervisor

Enclosures

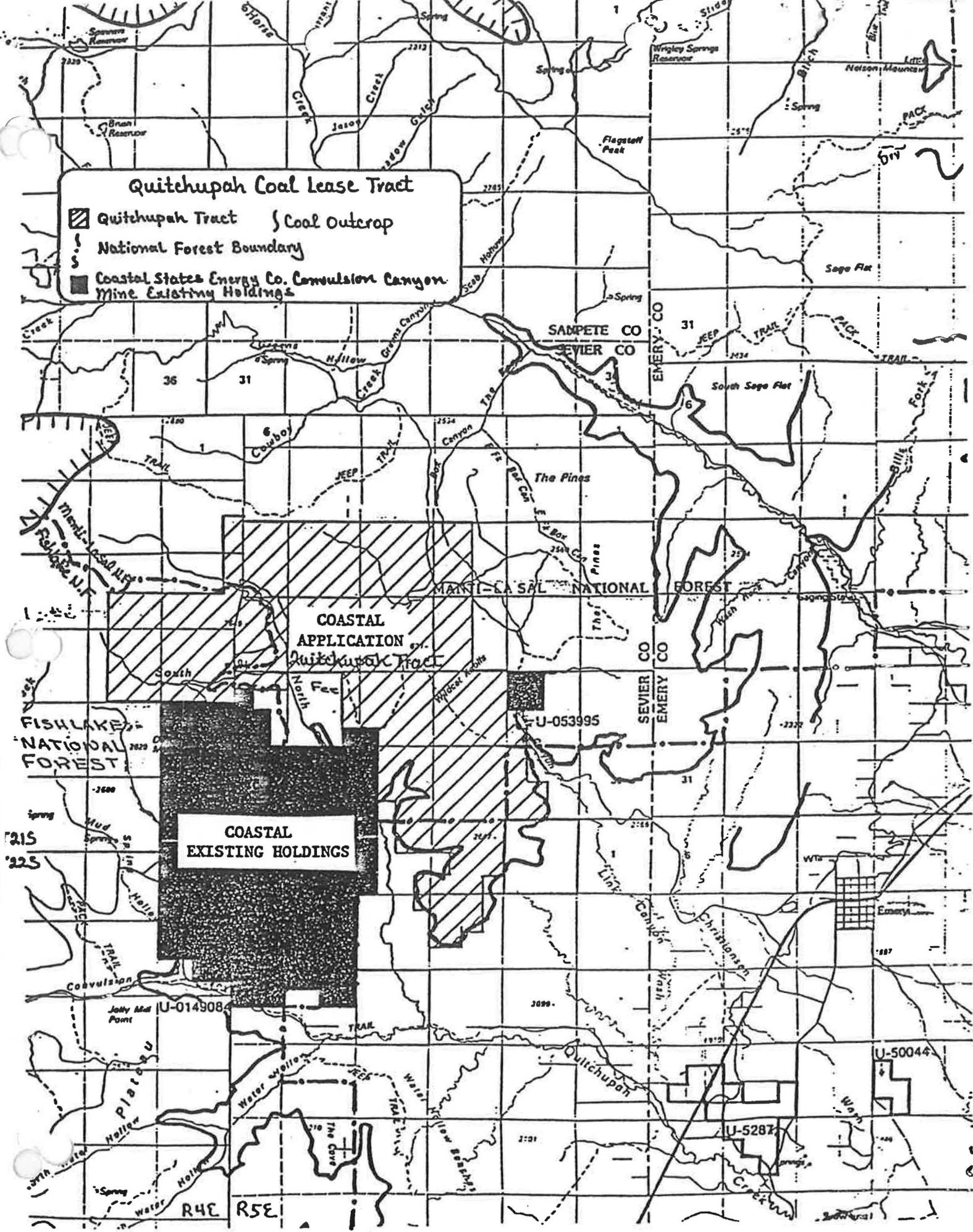
cc:  
D. Trotter, BLM-Moab District  
L. Findlay, Fishlake N.F.  
L. Wikle  
C. Reed

CREed:jn

*CP*

# Quitichupah Coal Lease Tract

-  Quitichupah Tract
-  Coal Outcrop
-  National Forest Boundary
-  Coastal States Energy Co. Convulsion Canyon Mine Existing Holdings



CULTURAL RESOURCE RESPONSE  
TO  
COASTAL STATES ENERGY LEASE APPLICATION U-63214

BACKGROUND

Coastal States Energy Company has filed a coal lease application (U-63214) for approximately 6300 acres in the general Quitcupah Creek area of the Manti-LaSal National Forest. The tract is just to the northeast of the head of the creek, bounded on the east by Wildcat Knolls, and to the northeast by the head of Box Canyon. (Additional areas to the southwest are in the Fishlake National Forest.)

Generally speaking, coal leases have been required to be covered by at least a 10% sample survey for cultural resources for the initial lease itself, with 100% surveys later required for specific impact areas, such as mine portals, road construction, etc. To complete this requirement for the lease itself, a Class I inventory (literature search) is to be conducted, and, if necessary, a Class II inventory (survey sample) completed to the extent that at least 10% of the area has been searched for cultural resources.

PREVIOUS RESEARCH

In the area of the proposed coal lease two major cultural resource surveys have been completed, one in 1977 and one in 1983. The 1977 survey was conducted by Archeological-Environmental Research Corporation for the Central Utah Coal Project that covered many thousands of acres on the Manti Division, 160 of which is in the present coal lease area (the southeast quarter-section of section 17 of Township 21 S, Range 5 E). The survey in 1983, also a large-scale survey throughout the Forest, covered approximately 800 acres within the proposed coal lease, and was done by Centuries Research, Incorporated.

CULTURAL RESOURCES IN THE PROJECT AREA

The two major survey projects found 8 archeological sites and 15 isolated artifacts within the boundaries of the proposed coal lease. Six of the sites were basically simple lithic working locations, while one site had two bifaces present along with the flakes and the other site revealed more activity, as shown by its two projectile points, use flakes, two knives, and some limited amounts of Emery Grey pottery sherds. Two of the eight sites have been considered eligible for registration to the National Register, due to some limited research value yet to recover, two of the sites are as yet unevaluated as to National Register potential, and the remaining six sites have been determined to not have qualities sufficient for nomination.

Of the isolated artifacts (individual locations of ancient man-made material that is not of sufficient number to qualify as a "site"), eight are of common flakes (although in three instances the flakes have been slightly used as tools

of some sort for a short period of time). Three of the locations had projectile points, and three had biface fragments of some sort. Two of the projectile points show similarities to the Elko series (an Archaic type of point), while one had strongly serrated edges.

The following tables show the breakdown of the cultural materials found in the two surveys in the coal lease area. ("ML-" is a prefix to indicate a cultural resource location on the Manti-LaSal National Forest, "IA" indicates an isolated artifact.)

	SITES (ML-nnnn)							
	2419	2420	2717	2719	2720	2721	2722	2727
Quarry			x					x
Flaking		x		x	x	x	x	
Hunting						x		
Camp	x				x			
NR qualities					x	x		
Unevaluated			x	x			x	
Not significant	x	x						x

	ISOLATED ARTIFACTS (ML-IA:nnn)					
	flake	knife	biface	proj	pr	remarks
222	1					
223				1		Elko series (?)
224				1		serrated edges
225	1					use flake
226	1					use flake
231				1		Elko series (?)
232	4					
233	1					
234	1					use flake
235	1		1			tip only of biface
236		1				
237			1			biface fragment
238	1					
239	2					
240			2			biface fragments

The nature of the cultural resources found indicates that the area was used very lightly in prehistoric times, and mostly for flaking and hunting, although some very little camping may have been done. The discovered resources are scattered (the most concentrated are three resources -- one site and four isolated artifacts -- in one 20 acre area on the east rim of Quitcupah Creek).

Four resources (two sites and two isolated artifacts) were found in an 80-acre area at the head of Box Canyon at the northeast corner of the lease area. Further to the southeast about one mile, but out of the lease area, the 1983 survey found in another 80-acre block also at the drainage of Box Canyon, four sites and four isolated artifacts. One site and one isolated artifact were found near the base of Wildcat Knolls, and one site and two isolated artifacts near the base of an unnamed knoll to the southwest of this.

The pattern seems to be, according to the sample survey done so far, of lithic sites tending to "cluster" in a sparse way around creek drainages and knolls. Future surveys done in this area should take special care in geographical areas similar to these.

#### MANAGEMENT RECOMMENDATIONS

Since approximately 15.2% of the potential lease area has already been surveyed (960 acres out of 6320 acres), there is at this time more than sufficient sampling completed to give us a good overall picture of the potential of cultural resources in the area, as far as leasing itself goes.

On the basis of the findings so far, it can be projected that cultural resource concerns will probably be generally minimal in complexity, and that mitigation in the event of future proposed surface-disturbing projects will also be somewhat minimal in difficulty. The exceptions to this might be the head of Box Canyon, the bases of knolls (and possibly the tops that haven't been surveyed yet), and the extreme edges of Quitcupah Creek.

At the present time, there seems to be no further cultural resource field work needed to be done to complete this portion of the review of the proposed Coastal States Energy Company lease application. The two survey reports mentioned, that cover the 15.2% sample of this area, have previously been reviewed by the State Historic Preservation Officer (Utah).

#### REFERENCES

Copeland, James M. and Laurie D. Webster

1983 "Class II Cultural Resource Inventory and Test Excavation Program of the Trough Hollow - Emery Coal Lease Tracts Within the Ivie Creek - Emery Area, Emery and Sevier Counties, Utah". Centuries Research, Inc. Montrose, Colorado.

Hauck, F. R. and L. M. Harmon

1977 "The Central Coal Project of Utah". Archeological-Environmental Research Corporation. Salt Lake City, Utah.

Les Wikle  
Monticello District Archeologist

18 May 1988

MESSAGE DISPLAY

TO c.reed:r04f10a

From: Leslie D. Wikle:R04F10D05A

Postmark: May 19,88 8:42 AM

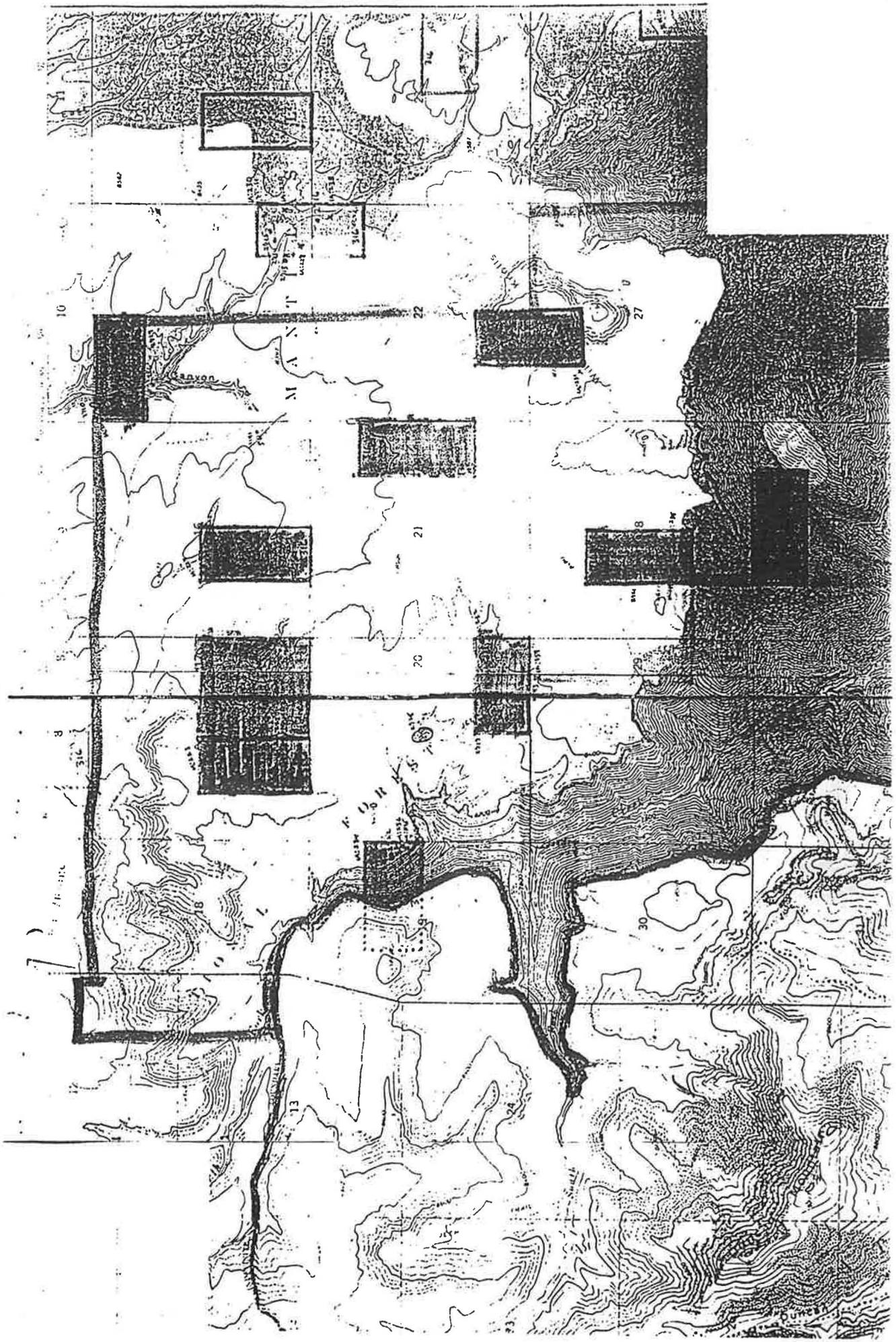
Status: Certified

Subject: COAL LEASE CR INFO

-----  
Message:

Carter: my report is already slightly out of date. There are two more sites to report within the lease area. I can't right now make the changes, since today is a mandatory field day (District work session). But here is the basic info. ML-2191 = site with considerable flaking + (important) a nearby cave with some Fremont style red painting (NATIONAL REGISTER POTENTIAL). ML-2728 = lithic flaking area with 15 tools, including bifaces and Elko Corner-notched projectile point making it Archaic in time (possible NR POTENTIAL). SORRY ABOUT THE ADDITIONS...I'LL PUT IN TEXT TOMORROW...LES

-----X-----



U.S. DEPARTMENT OF THE INTERIOR  
OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT  
FINDING OF NO SIGNIFICANT IMPACT  
for  
Convulsion Canyon Mine  
Federal Lease U-63214  
Mining Plan Decision Document

A. Introduction

Southern Utah Fuel Company submitted a permit application package (PAP) for a permit revision for the Convulsion Canyon mine to the Utah Division of Oil, Gas and Mining (DOGM) under the Utah State program (30 CFR Part 944). The PAP proposes extending underground mining operations into approximately 9,905 acres in Federal lease U-63214 (Quitcupah Lease Tract). The proposed extension would not cause any new surface disturbance other than mining-induced subsidence which could affect surface resources and groundwater.

Under the Mineral Leasing Act of 1920, the Assistant Secretary--Land and Minerals Management must approve, conditionally approve, or disapprove the mining plan for Federal lease U-63214. Pursuant to 30 CFR Part 746, the Office of Surface Mining Reclamation and Enforcement (OSM) recommends approval without conditions.

B. Statement of Environmental Significance of the Proposed Action

The undersigned person has determined that approval of the mining plan would not have a significant impact on the quality of the human environment under section 102(2)(C) of the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. 4332(2)(C), and therefore, an environmental impact statement is not required. This finding of no significant impact is based on the attached environmental assessment jointly prepared by OSM and Utah DOGM. The environmental assessment has been independently evaluated by OSM and determined to assess the environmental impacts of the proposed action adequately and accurately and to provide sufficient evidence and analysis for this finding of no significant impact. OSM takes full responsibility for the accuracy, scope, and content of the attached environmental assessment. OSM also bases this finding on the following reasons.

C. Reasons

1. Mining-induced subsidence of surface lands within remote plateau areas elsewhere in the Wasatch Plateau Coal Field has not resulted in observable impacts. Accordingly, the lowering of surface lands within the

Quitichupah Lease Tract would most likely not result in adverse impacts.

2. The development of main access entries beneath perennial streams pose low risk for causing adverse impacts to surface water. Mine flooding at the end of mining operations would result in recharging of regional aquifer storage and re-establishment of the natural ground water system that operated prior to mining. The mining plan incorporates mitigation measures to replace water if spring flows are reduced due to mining.



Chief, Federal Programs Division  
Western Field Operations

11/17/89

Date

**CHAPTER 3**

**BIOLOGY**

## LIST OF APPENDICES

(Appendices appear in Volume 5)

### Appendix

- 3-1 Report of 1983 Field Investigations
- 3-2 Aquatic Resource Inventory of Southern Utah Fuel Company Permit Area
- 3-3 Wildlife Assessment of the Southern Utah Fuel Company Mining Property and Adjacent Areas
- 3-4 Raptor and General Avifauna Studies**
- 3-5 Fauna of Southeastern Utah and Life Requisites Regarding their Ecosystems
- 3-6 Vegetation Information Guidelines, Appendix A
- 3-7 Power Line Correspondence
- 3-8 Bat Survey for the SUFCO Mine
- 3-9 Vegetation and Wildlife of the Pines Tract Project.
- 3-10 Monitoring and Mitigation Plan for Mining Under the East Fork of Box Canyon
- 3-11 Muddy Creek Technical Report-Wildlife
- 3-12 Mexican Spotted Owl Survey Muddy Tract
- 3-13 Vegetation and Wildlife of the West Coal Lease Modifications
- 3-14 Monitoring and Mitigation Plan for Undermining the South Fork of Quitchupah 2R2S Block "A" and 3R2S Block "B"
- 3-15 3R4E & 4R4E Reports (Confidential)**

## CHAPTER 3 BIOLOGY

### 3.10 Introduction

This chapter presents a description of the biological resources found on the SUFACO Mine site. The mine is located approximately 30 miles east of Salina, Utah.

Several consultant reports will be referenced in this M&RP, so for simplicity purposes the report titles will appear as the following abbreviations:

- EPS - Report of Studies of Vegetation and Soils for SUFACO Mine - 1980 (Appendix 2-2)
- INV - Report of 1983 Field Investigations - 1983 (Appendix 3-1)
- AQU - Aquatic Resource Inventory of Southern Utah Fuel Company Permit Area - 1980 (Appendix 3-2)
- WIL - Wildlife Assessment of the Southern Utah Fuel Company Mining Property and Adjacent Areas - 1980 (Appendix 3-3)
- RAP - Raptor and General Avifauna Studies - 1980 (Appendix 3-4)
- FSW - Fauna of Southeastern Utah and Life Requisites Regarding their Ecosystems - 1990 (Appendix 3-5)
- VWP - Vegetation and Wildlife of the Pines Tract Project - 1999 (Appendix 3-9).

Reports in the appendices are provided only to present Baseline Data in support of the Mining and Reclamation Plan. Proposals or recommendation presented by consultants were duly considered in preparation of the Mining and Reclamation Plan chapter commitments but not all of them were determined to be appropriate or advisable.

#### 3.1.1 Vegetative, Fish and Wildlife Resources

Vegetative, fish and wildlife resource conditions in and adjacent to the SUFACO Mine are discussed in Section 3.20.

### **3.1.2 Potential Impact to Vegetative, Fish and Wildlife Resources**

Potential impact to vegetative, fish and wildlife resources and the associated mitigation plan are presented in Sections 3.30 and 3.40 of this application.

### **3.1.3 Description of Reclamation Plan**

The reclamation plan used to restore the vegetative, fish and wildlife resources to a condition suitable for the postmining land use is presented in Section 3.40.

## **3.20 Environmental Description**

### **3.2.1 Vegetation Information**

This section contains the environmental descriptions for the vegetation for the permit and adjacent areas.

#### **3.2.1.1 Plant Communities Within the Proposed Permit Area**

"Vegetation changes from one landform to another. On the benches landform, there is a combination of sagebrush-grass community and ponderosa pine stands. Intermixed are patches of low quality Quaking Aspen, Mountain Mahogany, and Manzanita brush. Ground cover is composed of several native grasses, forbs, and low brush species. Density is generally good.

The steep slopes and scarp faces landform is sparsely vegetated. Pinyon, Juniper, and Mountain Mahogany are scattered over the landform. The site is very harsh and ground vegetation is limited to light quantities of native grasses and forbs in cracks and shelves where soil can accumulate. Composition includes a few drought resistant grasses, annual forbs, Mountain Mahogany and other brush.

Narrow stringers in canyon bottoms are the most productive in the area. Vegetation is primarily native grass, low brush and forbs growing together to form a heavy sod. Brush types include willow, rose, rabbit brush, sand brush and others. Carex grows in some of the wetter spots. Only an occasional tree occurs in the bottoms.

The rolling hills landform is covered by an occasional small patch of trees which include Ponderosa pine, Douglas-fir, Alpine-fir, Spruce and Aspen. More common are brush species including oak,

snowberry, and sagebrush. Grasses and forbs are very sparse and include several native species." (Blumer, 1979)

The plant communities identified within the proposed permit area are (see Plate 3-1):

- Sagebrush-grass
- Grass-black sagebrush
- Mountain Brush (oak, serviceberry, mountain mahogany, etc.)
- Aspen
- Aspen-oak
- Aspen-Douglas fir-limber pine
- Mountain mahogany-oak-ponderosa pine
- Douglas fir-spruce-limber pine
- Pinyon-juniper-mountain mahogany
- Limber pine
- Ponderosa pine-mountain mahogany-manzanita
- Pinyon-juniper-Douglas fir
- Wiregrass-foxtail-haplopappus
- Douglas fir-spruce-limber pine-aspen
- Limber pine-mountain mahogany-serviceberry
- Mountain mahogany
- Pinyon-juniper
- Douglas fir & other
- Riparian
- Ponderosa pine-douglas fir-aspen-serviceberry
- Grassland-perennial forbs
- Sagebrush
- Mountain brush
- Conifer timber
- Mixed
- Barren ground
- Aspen-deciduous forest

Additional plant communities are designated on Plate 3-1.

Field sampling of these plant communities was initially done in July of 1983 and the findings were documented in the INV report. A Level II riparian inventory has been conducted along portions of East Fork of Box Canyon (USDA-USFS, 1993). The plant communities and reference areas are outlined on Plate 3-1. In 1999, another vegetation (and wildlife) report (VWP) was prepared for the proposed mine expansion called the Pines Tract Project. Vegetation communities were described and shown on a map included in that document, most of which are also listed in the plant communities shown above. The vegetation types in the SITLA Muddy Tract were identified by Cirrus and reported in EIS documents for the entire BLM and SITLA Muddy Tract. The vegetation types in the SITLA Muddy Tract are illustrated on Plate 3-1. This plate will be updated in the appropriate season of 2006 to more clearly indicate types and extent of vegetation in the SITLA Muddy Tract. As of October 2005, the available Forest Service information used to create the map is essentially correct but Sufco has agreed the vegetation boundaries and descriptions can be further refined. The work to be performed in 2006 will include the evaluation of available aerial photos of the area by a qualified person who then will create an updated vegetation map of the tract. The updated version of the plate will be submitted to the Division before the end of 2006.

A description of the potential impacts of mining on vegetation is included in Section 3.3.3.3 of this permit.

#### **4 Right 4 East Panel(s)**

In the summer of 2017 an environmental specialist documented vegetation types contained within the potential subsidence impact area above the 4R4E panel and adjacent areas (See the 4R4E Projected Subsidence Map in Appendix 6-4). These include the pinyon-juniper, sagebrush/grass, and mountain sagebrush types of the desert shrub biome. These findings are verified in an environmental assessment and a supplemental environmental assessment completed in 1988 and 1989 respectively. Appendix 2-7 contains the aforementioned EA and supplemental EA associated with the Quitchupah Lease. Refer to Plates 5-6 and 5-7 of the M&RP for information regarding the location of both the Quitchupah Lease and the 4R4E panel.

In October of 1988 an environmental assessment of the Quitchupah Lease area was performed by personnel from the Forest Service and Bureau of Land Management. During the assessment 6 Golden Eagle nests were located.

The SUFCO Mine portions of the annual raptor surveys conducted by UDWR are located in Appendix 3-4 in the Sufco Mine MRP Confidential file. Future annual raptor surveys will be submitted each year in the annual report to the Division.

Most raptor nest locations are located outside the current planned mining subsidence areas. Any raptor nest that has a potential to be disturbed by subsidence will be evaluated with DWR and FWS. An appropriate plan of action will be developed on a case by case basis.

The Prairie Falcon has also been reported by U.S. Forest Service and Bureau of Land Management personnel for the planning unit that encompasses the SUFCO Mine area.

The Quitchupah Drainage, of which Link Canyon is a tributary, was identified in the Quitchupah Creek Road DEIS (2001) as not likely to contain Mexican Spotted Owls and dedicated surveys were not necessary. However, the Manti-La Sal National Forest reported that a Mexican Spotted Owl survey of the area was being conducted as part of their Muddy Creek EIS Data Adequacy study. Results of surveys conducted in 2002 and 2003 indicated no Mexican Spotted Owls were found in the Link Canyon Portal area or the Muddy Tract area (Appendix 3-12). Additionally, Sufco does not plan to conduct construction activities during the nesting and rearing times (February 1 through August 31) of the owl.

The lack of permanently running water has an effect on raptors. Many species, such as accipiters, appear to rely on streams and the associated riparian vegetation (Hennessy, 1978).

Known raptor nests are shown on Plate 3-3, refer to Section 3.3.3.3 for additional raptor information.

Information about raptors specific to the Pines Tract Project area is provided in the VWP report (Appendix 3-9). Information about raptors specific to the Muddy Tract area is provided in the Cirrus report (Appendix 3-11). Information about raptors specific to the West Coal Lease Modifications and the area of the 2016 2RWL sinkhole repair are summarized in Appendix 3-13 and Section 3.2.2.2.

#### 4 Right 4 East Panel(s)

The 4R4E panel is located in sections 27 and 34, Township 21 South, Range 5 East. It is located in Dry Fork Canyon perpendicular and west of the North Fork of Quitchupah Creek. A helicopter survey to locate raptors and migratory bird species was conducted in 1982 and 1988 by UDWR, USFWS, BLM, and USFS. In 1988 ten golden eagle nests were located within the Quitchupah lease boundary, two were active, two were tended and the remaining six were inactive. There were no nests located within a 0.5 mile radius around the current location of the 4R4E panel during these surveys. The nests in Dry Fork Canyon were re-surveyed in April, May and June of 2017. Four inactive Golden Eagle nests were found (793GoEa, 794GoEa, 795GoEa, 315GoEa) within a 1.5 mile radius around the 4R4E panel. These surveys show that there are no active or in-active nests within 0.25 miles from the area of potential subsidence above the 4 Right 4 East panel (See the 4R4E Projected Subsidence Map in Appendix 6-4). The permittee will perform raptor surveys before during and after mining as required by the division. These reports will be submitted annually to the division. The 2017 raptor survey reports are found in Appendix 3-4 and 3-15. Areas surveyed in these reports designated for the 3 Right 4 East panel also apply to the 4 Right 4 East panel.

Richfield. The amount of snow is probably the determinant, with the elk wintering wherever there is available forage from the rim to the low brush areas in the southeast.

The fact that elk utilize the entire area of concern during some time of the year means that all aspects and timing of the actions must be considered. However, since the SUFCA Mine has been operational since the early 1940's and since there are no plans for additional surface facilities other than ventilation portals along the cliffs, there should be little additional disturbance to the elk. The animals have already accommodated the human disturbance associated with the mining and hauling of coal.

Information about elk winter-range and migration routes specific to the Pines Tract Project area is provided in the VWP report (Appendix 3-9). Information about elk winter-range and migration specific to the Muddy Tract area is provided in the Cirrus report (Appendix 3-11). Information about elk winter-range and migration specific to the West Coal Lease Modifications and the area of the 2016 2RWL sinkhole repair are summarized in Appendix 3-13.

#### **4 Right 4 East Panel(s)**

The 4R4E panel is located in the southern portion of the Quitchupah Lease (See Plates 5-6 and 5-7 of the M&RP). The panel is located just outside of what is considered crucial or critical winter range for deer and elk. The escarpment in the southeastern portion of the tract which lies between Quitchupah Canyon and Link Canyon is known as an elk migration route, providing access to and from the winter range from the plateau top (See Plates 3-2 and 3-3 of the M&RP). It is determined that subsidence associated with the 4R4E panel will not adversely affect elk and deer winter range or their migration routes.

#### **Mule Deer**

Mule deer on the mine area are considered part of Herd Unit 43 by the UDWR. The animals in the environs of concern utilize the entire assessment area but seasonally concentrate in and more heavily utilize specific habitat types.

striped skunk. The breeding and rearing activities of these non-migratory species occurs within the area and their dens and burrow systems are important to maintenance of their populations, but it is unlikely that the proposed actions will seriously impact them for any length of time. Subsidence will be localized and new burrows will be built or old ones reconstructed after it occurs. These species are widespread and adaptable to the activities of man.

#### Small Mammals

Small mammals represent a significant part of the ecosystem. The majority are herbivores and are the primary source of food for higher trophic levels, particularly raptorial birds, canids and felids. The potential exists for caving burrows in and/or changing burrow continuity due to fracturing of the strata. Should this occur, it is likely that young mammals in the nest would be crushed or cut off from parental care. Although this would temporarily alter the population density and age structure, recovery would be imminent and rapid. The 1997 Bat Survey for the SUFCO Mine conducted by J. Mark Perkins & Joshua R. Peterson is included in Appendix 3-8.

Information about small mammals specific to the Pines Tract Project area is provided in the VWP report (Appendix 3-9). General information about small mammals specific to the Muddy Tract area is provided in the Cirrus report (Appendix 3-11). General information about small mammals specific to the West Coal Lease Modifications and the area of the 2016 2RWL sinkhole repair are summarized in Appendix 3-13 and Section 3.2.2.2.

**Threatened and Endangered Plant and Wildlife Species.** Passage of the Endangered Species Act of 1973 (Public Law 23-20S) 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: 2782 427924, 1975; and 41: 2452 4 24572, 1976). The region under investigation was included in a report on threatened and endangered species of the Central Coal lands of Utah (Welsh 1976). An inventory of endangered wildlife species performed in 1989 by the Division of Wildlife Resources recorded no species within the proposed permit area (conversation with Pamela Hill, DWR, Cedar City, 1991). **Table 3-1 provides a list of Federally listed Threatened and Endangered Species that have been**

identified in the Utah counties in which Sufco lies. However, this list does not necessarily indicate these species are found within the mine permit boundaries.

A survey of the literature has failed to indicate the presence of any 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. The region was searched by walking parallel transects on a quarter-section by quarter-section basis, with each community type within each quarter-section being traversed. No endangered or threatened species were encountered in the lease area or in the adjacent areas.

There are no federally listed threatened or endangered fish species inhabiting the aquatic habitat.

A discussion about threatened, endangered or otherwise sensitive plant and animal species of the Pines Tract Project area is given in Appendix 3-9. A discussion about threatened, endangered or otherwise sensitive plant and animal species of the Muddy Tract area is provided in the Cirrus report (Appendix 3-11). A discussion about threatened, endangered or otherwise sensitive plant and animal species of the West Coal Lease Modifications and the area of the 2016 2RWL sinkhole repair are summarized in Appendix 3-13 and Section 3.2.2.2.

**Habitats of Unusually High Value.** The area of potential impact contains a variety of important habitats for several species that are considered of "high interest" to various management agencies because these species are of economic or recreational value. There are ten recognizable vegetation habitats from a faunal standpoint: chaparral (ponderosa pine, curl-leaf mountain mahogany, manzanita, aspen), spruce-fir (englemann spruce, douglas fir, sub-alpine fir, white-fir), aspen, sagebrush, mountain brush (oak, curl-leaf mountain mahogany, smooth-leaf mountain mahogany, service berry sagebrush), streamside, pinyon-juniper, ponderosa pine, grass, and scotch pine-spruce. Conifer, aspen, high sage and meadow areas on Duncan Mountain are used as summer range and calving areas for elk and summer range for mule deer. Ponderosa pine along ridge tops are heavily used by elk during the late winter, early spring and occasionally during the summer. The cliff areas harbor mountain lion, bobcat and bear. Mountain brush habitats are heavily utilized by deer and elk during the winter and spring. Deer and elk winter on the lower elevation areas, particularly in the vegetation communities traversed by the access road (WIL, pgs. 2-3, Appendix 3-3).

Literature and field data were summarized for all terrestrial vertebrates of concern, and the species categorized to determine habitat affinities and high interest species status. These results are reported in tabular form (WIL, Tables 3 through 5, Appendix 3-3). They are listed according to their various ecological classifications. All species whose ranges appear to overlap any or all of the potential area of impact are listed. Generally speaking, the project area could potentially be inhabited by 64 mammalian, 8 amphibian and 14 reptilian species (Wasatch Plateau, Appendix 3-5). Some of these are considered high interest species for the habitats and local area of concern.

Since the immediate area of the mine portal, access roads, loading and storage facilities has already been lost as habitat, concern will be given to revegetation with species that will not only benefit, but promote wildlife.

The cliffs in Quitchupah Canyon are habitat for cougar. The observed animals seem to use them for denning activities. Therefore care has been taken to avoid placement of portal openings where there are caves or other natural denning sites. There are a limited number of trails going from the

plateau area through the cliffs to the valley floor to the southeast. It appears that these trails are important to elk migration from summer to winter range, and therefore construction of ventilation portals has not been allowed to interrupt this limited number of access routes.

No endangered or threatened mammal species occur within the mine boundary as recorded in a study performed by H. Duane Smith and Clyde L. Pritchett (WIL, Appendix 3-3).

A peregrine falcon eyrie existed in 1997 about one half mile from the site but during aerial surveys conducted in 1998 and 1999 no falcons were sighted. Discussion about threatened, endangered or otherwise sensitive plant and animal species of the Pines Tract Project area is given in Appendix 3-9.

The disturbed area of the Link Canyon Mine Portals contains approximately 0.05 acres (2000 square feet) of riparian vegetation typified by willow, alder, stinging nettle, rose, horsetail, carex, Kentucky Bluegrass, rush, and clematis (Zobell, 2000). A vegetation study of the western portal area was conducted by Mt. Nebo Scientific in July 2002 and September 2013. The 2002 report of this study includes a detailed map of the western portal area vegetation. A copy of the reports are included in Appendix 2-9. The vegetation is supported by discharge from the abandoned Link Canyon Mine and subsurface moisture within the Link Canyon Drainage. Only the western-most portal area will be disturbed as part of Sufco's plan to re-open Link Canyon portals to establish an escape-way and ventilation for mining in the Pines Tract and access to the Link Canyon substation. The natural discharge of water from the portals will be maintained at rates similar to those that existed prior to reopening of the western portal. Only water from the existing abandoned works will be allowed to discharge from the portals. Thus, no harm due to a reduction in flow is anticipated to the riparian areas downstream of the portals. Additionally, the discharges from the portals have the potential to remain after the western Link Canyon Portal is reclaimed.

A vegetation study was performed by Keith Zobell from 2000 through 2013(discontinued). The reports identified the vegetation and their associated vigor at the Link Canyon Mine portal which has been similar for the past thirteen years. The primary impacts to the vegetation have been from grazing and drought conditions. Discharge for the portal has been discussed in these reports, the

water discharge has been low to non-existent the majority of the years. The drainage adjacent to the portals runs with waters associated with storm events. Refer to Appendix 2-9 for a copy of the study information collected in 2013, study information from previous years is located in the annual reports for the corresponding years.

**Species of High Federal or State Interest.** The species of interest to the state of Utah are listed on Table 3-2. The species are divided into eight categories (extinct, extirpated, endangered, threatened, declining populations, limited distribution, declining populations/limited distribution and conservation). The Western Bluebird classified as sensitive, appears to be restricted to the Ponderosa Pine as a nesting bird. It can be locally common and its habitat is widespread over the state. It therefore does not represent any special problem in the lease area.

**Sensitive Species of High Federal Interest.** The species of interest to the federal Forest Service are listed on Table 3-3. The species are all sensitive as determined by the FS MLS Sensitive Species List and have the potential to occur within the permit area.

The Link Trail Columbine is the only Forest Service Region 4 sensitive species known to exist on the mine areas called the Pines Tract and Muddy Tract. SUFCO monitors populations of the Link Trail Columbine within the East Fork of the Box Canyon where it has been determined that mining might negatively affect the populations within the permit area. A discussion about threatened, endangered or otherwise sensitive plant and animal species of the Pines Tract Project area and Muddy tract is given in Appendices 3-9 and 3-11.

**150-Acre Incidental Boundary Change.** Sensitive species listed in Table 3-3 may be found within the boundary area. Species of most concern are the Link Trail columbine, Northern Goshawk, Northern Three-Toed Woodpecker, Flammulated Owl, and the Spotted Bat.

- Link Trail columbine - No populations have been found within the 150 acre IBC area. The boundary area is located on a plateau. Adjacent to the boundary area is Box Canyon that has suitable habit for this vegetation. A survey of the canyon

was also a part of an Environmental Assessment in 1981 as part of the lease application package.

### **3.2.2.3 Fish and Wildlife Service Review**

If requested, the applicant authorizes the release of information pertaining to Section 3.2.2 and 3.3.3 to the U.S. Fish and Wildlife Service Regional and Field office for their review.

### **3.2.3 Maps and Aerial Photographs**

The lease area was mapped by use of a mosaic of aerial photographs and assured by ground inspection. Vegetation sampling locations/reference areas are shown on Plate 3-1.

#### **3.2.3.1 Location and Boundary of Proposed Reference Area**

The locations of the vegetative reference areas are found on Plate 3-1. Area 13 shown on Plate 3-1 is to be used as a mapping unit only and not a reference area or validation site. Site 12 will be used as the reference area for the minesite sedimentation pond area.

#### **3.2.3.2 Elevations and Locations of Monitoring Stations**

Raptor nest locations and elk and deer range are shown on Plate 3-2 and 3-3. The permit area contains no fish monitoring stations.

#### **3.2.3.3 Facilities for Protection and Enhancement**

Sections 3.3.3.3 and 3.5.8.5 contain additional discussion pertaining to protective measures taken by the applicant in behalf of wildlife.

Power lines within the SUFCO Mine permit area were modified during the summer of 1981 to comply with the guidelines of REA Bulletin 61-10, "Power Line Contacts by Eagles and Other Large Birds" (see Plate 5-5 for the power pole locations).

#### **3.2.3.4 Vegetation Type and Plant Communities**

Vegetative types and plant communities are outlined on Plate 3-1 of this application.

Table 3-3

USDA-FS Region 4 Sensitive Species - Fishlake and Manti-LaSal  
 February 2013-June 2016

<u>Plants</u>		<u>Status</u>
Link Trail Columbine	<u>Aquilegia flavescens var. rubicunda</u>	K
Cruetzfeldt-flower Cryptanth	<u>Cryptantha creutzfeldii</u>	K
Carrington Daisy	<u>Erigeron carringtoniae</u>	K
Canyon Sweetvetch	<u>Hedysarum occidentale var. canone</u>	K
Maguire Campion	<u>Silene petersonii</u>	K/P
Musinea Groundsel	<u>Senecio musinensis</u>	K
Arizona Willow	<u>Salix arizonica</u>	K
Wonderland Alice Flower	<u>Aliciella caespitosa</u>	K
Chatterley Onion	<u>Allium geyeri var. chatterleyi</u>	K
Sweet-flower Rock Jasmine	<u>Androsace chamaejasme ssp. Carinata</u>	K
Bicknell Milkvetch	<u>Astragalus consobrinus</u>	K/P
Isely's Milkvetch	<u>Astragalus iselyi</u>	K
Deseret Milkvetch	<u>Astragalus desereticus</u>	P
Heliotrope Milkvetch	<u>Astragalus limnocharis var. montii</u>	K
Tushar Paintbrush	<u>Castilleja parvula var. parvula</u>	K
Pinnate Spring-parsley	<u>Cymopterus beckii</u>	K
Abajo Peak Draba	<u>Draba abajoensis</u>	K
Mt. Belknap Draba	<u>Draba ramulosa</u>	K
Creeping Draba	<u>Draba sobolifera</u>	K
Nevada Willowherb	<u>Epilobium nevadense</u>	K
Abajo Daisy	<u>Erigeron abajoensis</u>	K
Kachina Daisy	<u>Erigeron kachinensis</u>	K
Maguire Daisy	<u>Erigeron maguirei</u>	K
LaSal Daisy	<u>Erigeron mancus</u>	K
Elsinore Buckwheat	<u>Eriogonum batemanii var. ostlundii</u>	K
Canyonlands Lomatium	<u>Lomatium latilobum</u>	K
Fish Lake Naiad	<u>Nafas caespitosa</u>	K
Beaver Mountain Groundsel	<u>Packera castoreus</u>	K
Little Penstemon	<u>Penstemon parvus</u>	K
Ward Beardtongue	<u>Penstemon wardii</u>	K

Bicknell Thelesperma	<u>Thelesperma subnudum var. alpinum</u>	K
Barneby Woody Aster	<u>Tonestus kingii var. barnebyana</u>	K
Sevier Townsendia	<u>Townsendia jonesii var. lutea</u>	K
Last Chance Townsendia	<u>Townsendia aprica</u>	K
San Rafael Cactus	<u>Pediocactus despainii</u>	K
Winkler Cactus	<u>Pediocactus winkleri</u>	P
Clay Phacelia	<u>Phacelia argillacea</u>	P
Ute Ladies' Tresses Orchid	<u>Spiranthes diluvialis</u>	K

**Mammals**

Townsend's Western Big-eared Bat	<u>Corynothinus townsendii townsendii</u>	K
Spotted Bat	<u>Euderma maculatum</u>	K
Bighorn Sheep	<u>Ovis canadensis</u>	K
Pygmy Rabbit	<u>Brachylagus idahoensis</u>	K
Utah Prairie Dog	<u>Cynomys parvidens</u>	K

**Birds**

Northern Goshawk	<u>Accipiter gentilis</u>	K
Flammulated Owl	<u>Otus flammeolus</u>	K
Northern Three-toed Woodpecker	<u>Picoides tridactylus</u>	K
Bald Eagle	<u>Haliaeetus leucocephalus</u>	K
Greater Sage-grouse	<u>Centrocercus urophasianus</u>	K
Peregrine Falcon	<u>Falco peregrinus anatum</u>	K
Yellow-billed Cuckoo	<u>Coccyzus americanus</u>	K/P
Southwestern Willow Flycatcher	<u>Empidonax traillii extimus</u>	K
Mexican Spotted Owl	<u>Strix occidentalis lucida</u>	K

**Fish**

Colorado River Cutthroat Trout	<u>Oncorhynchus clarki pleuriticus</u>	K
Bonneville Cutthroat Trout	<u>Oncorhynchus clarki utah</u>	K
Southern Leatherside Chub	<u>Lepidomeda aliciae</u>	K
Greenback Cutthroat Trout	<u>Oncorhynchus clarki stomiua</u>	K

**Amphibians**

Columbia Spotted Frog	<u>Rana luteiventris</u>	K
-----------------------	--------------------------	---

Boreal Toad

: Bufo boreas

K

Sensitive: Any species which, although still occurring in numbers adequate for survival, has been greatly depleted or occurring in limited areas and/or numbers due to a restricted or specialized habitat.

K - Known distribution species and or habitat

P - Suspected species or potential habitat

USDA-Manti-LaSal National Forest, 599 Price River Dr., Price , Utah 84501

Noise, created from operation of the mine, is not expected to increase in the existing areas of disturbance associated with the mining activity, not even with the addition of any ventilation intake portals along the cliffs. These portals are only for intake air. The ~~present~~ existing exhaust fans are at the mine site and at the 4 East Portal in Quitchupah Canyon (for location refer to Plate 5-2C).

Efforts have already been made to minimize wildlife loss and/or harassment associated with operation of the mine. Speed limits are set and posted on the county controlled access road to the mine to alert drivers to the presence of wildlife. Although the danger of road strikes is more harmful to wildlife than transportation vehicles, there is the potential for loss of human life and equipment damage. Therefore avoiding collisions has become a practical company policy. Wildlife crossing areas or sites of limited visibility are adequately marked. The applicant has instituted the use of a commuter bus to reduce traffic and emissions on the access road from Salina, Utah to the mine. SUFCO prohibits the discharge of firearms by employees on the road in East Spring Canyon (portal site). In conjunction with this restriction, the Applicant has initiated an employee education program to reduce harassment and disturbance of wildlife during sensitive stages in their life history.

Perhaps the most promising mitigation action is that of enhancement or maintenance of wildlife habitat. Enhancing wildlife habitat away from the mine area will improve habitat, possibly increase wildlife numbers, and attract wildlife away from impacted areas. Since much of the area is public domain, wildlife habitat enhancement is a viable management tool. However, any such effort should be carefully coordinated among appropriate regulatory agencies. Some examples of these measures include:

1. Development of springs, wells or other water supplies outside the mine area.
2. Fencing of developed water sources to restrict cattle trampling of vegetation, control erosion, and provide non-game habitat;
3. Altered livestock management policies, to avoid potential competition with wildlife.
4. Control of other human-related impacts, including recreation and timber harvest.

Revegetation of disturbed areas, as part of the reclamation effort, will include a mixture of grasses, forbs, shrubs and trees.

The total disturbed area acreage to be revegetated is small enough that fencing is considered to be an economically feasible means of protection, if deemed necessary. If grazing animals do prove

### **3.3.3.1 Minimized Disturbance to Endangered or Threatened Species**

The applicant will apply all methods necessary to minimize disturbances or any adverse effects to species listed on Tables 3-1 and 3-2. Potentially adverse impact on wildlife and related environmental values will be avoided or minimized through the implementation of mitigation measures. The Applicant will operate and maintain all transportation systems and support facilities under its control in a manner that minimizes impacts.

### **3.3.3.2 Species and Habitats**

All species and habitats within the permit area will be protected to the best of the applicants ability. Wildlife habitat protection will be considered in the construction of all future facilities. For additional information, see Section 3.3.3.3.

### **3.3.3.3 Protective Measures**

The county access road traverses known deer winter range where deer feed along and readily cross the road making them vulnerable to the coal hauling trucks. Although deer can habituate to traffic thus reducing road strikes, more deaths occur than are desirable.

In the construction of the ventilation portals along canyon walls consideration is given to potential cougar denning and resting sites. When portals are opened to the outside from the underground mine and not from the outside in, little actual habitat is lost to the wildlife of the area.

During breeding seasons, disturbance by man can negatively affect reproductive success by disrupting territorial selection or defense, interrupting courtship displays and disturbing mating animals.

Young animals need to be undisturbed during parturition, lactation and the early rearing process. It is during this time that young animals gain the strength and ability to elude predators and man. Undisturbed habitats allow the young animals to develop in a relatively unstressed situation and to utilize habitats that are secure from predators.

The company will make every effort to educate all employees associated with the SUFCA Mine operation to the intricate values of the wildlife resources associated with the mine area. Each employee will be advised not to unnecessarily or without proper permits or licenses harass or take any wildlife. It is especially important that wildlife not be harassed during sensitive periods in their life history. During winter, wildlife are often in a delicate energy state and unnecessary disturbance by man causes them to use up critical and limited energy reserves that may result in mortality. In less severe cases the fetus being carried by gestating mammals may be reabsorbed or aborted thus reducing reproductive success and productivity of the population. Surface activities are curtailed from November 1 through April 1, and between May 1 and July 1 in the calving area, except in the portal areas, so as not to disturb wintering elk. Employees will be encouraged to report violators to the proper company and management authorities for reprimand or prosecution. Employees should be impressed that they as hunting and recreation users stand to gain the most by preserving what they have in proximity to their places of work and abode.

Livestock and wildlife will be protected from the effects of mining related subsidence to the extent possible. Surface cracks that open to the point of creating a physical hazard to livestock and wildlife will be mitigated. This mitigation may include but not limited to backfilling the cracks with available local native materials and soil, partially backfilling with imported fill, or simply reshaping of the nearby ground surface to lessen the offset or abruptness of the crack faces and depth. The repaired areas will then be reseeded with a seed mix appropriate to the area and one approved by the Division and land owner/agency. Several such mitigation efforts have already been successfully conducted in the Quitcupah and Pines Tract areas.

Subsidence induced seismicity has not been noted to have an adverse impact on livestock or wildlife in the existing mined portions of the Sufco permit area. It is not anticipated the impact to wildlife and livestock due to mining induced seismicity will change or increase as the permit area is expanded into new lease areas.

Areas with suitable habitat for raptor nesting that have a potential to be disturbed by subsidence caused by mining will be surveyed using aerial or ground surveys prior to mining. Raptor nests that have a potential to be disturbed by subsidence will be evaluated with the Division of Oil Gas and Mining and with DWR/FWS if required. Following the evaluation an appropriate plan of action will be developed on a case by case basis. The applicant will obtain any permits necessary for disturbance of the nest if this is the course of action decided upon.

A summary of the information reported in the raptor survey (annual) and the survey will be provided to the Division within three months following the receipt and review of the survey by the permittee. The summary will include a drawing correlating the surveyed nest locations with the areas of potential subsidence anticipated at the time of report submittal.

The Link Canyon Substation No. 1 pad area has an old historic golden eagle nest (#31) that was not found during the 1997 Raptor Survey and a tended falcon scrape (#33) within the buffer zone. These two nests will not be disturbed with the planned mining activity. To protect these nests during the construction of the Substation No. 1 pad the nests will be avoided, and the timing of the construction activity will be after the nesting period of August 15, 1998.

In Link Canyon during the 1998 Raptor Survey a new tended golden eagle nest was found (#321) and the other old historic golden eagle nest sites (#31, and #32) and the falcon scrape (#33) were not found.

In Link Canyon during the 1999 Raptor Survey the golden eagle nest (#321) was inactive and the other old historic golden eagle nest sites (#31, and #32) and the falcon scrape (#33) were not found. Golden eagle site #32 was renumbered in the 1999 survey as #799 and the old historic site #31 shown next to the Link Canyon road and Substation No. 1 pad was deleted.

To protect these nests during the construction of the Substation No. 2 pad the nests will be avoided. The timing of the construction activity started on October 15, 1999 with the construction of a small 20'x 30' pad for drilling the power cable boreholes out from within the mine, casing the boreholes, and pulling power cables into the boreholes. The construction of the proposed Substation No. 2 pad and substation will be started right after the drilling and power cables are completed in February, weather permitting. Construction activities began before and continues into the nesting season, any birds wanting to use these old nests in the area would be able to choose if they can tolerate the disturbance. These nests will be monitored during the construction period to see if they are being used.

After the Link Canyon Substation is in place very little mining activity will occur in the area with only emergency maintenance and monthly electrical inspections required. This maintenance and inspection activity will be similar to general public access on the road. Minor maintenance and monthly inspections will only require a pickup truck, ATV or snowmobile going up the canyon for access to the substation. Any major maintenance requiring heavy construction equipment will

require monitoring from December 1 to April 15 for big game winter range and from January 1 to August 15 for raptors and will require a clearance from the DWR and USFS.

Construction associated with the reopening of the western Link Canyon Mine portal, will require minimizing activities that disturb big game from December 1 to April 15. Construction activities from January 1 to August 15 will require a clearance from the DWR and US Fish and Wildlife Service because of potential disturbance to nesting raptors. This proposed project is located in a MMA (Minerals Management Area) in the Manti-La Sal forest plan (Figure 3-15, Management Area Direction, Manti-La Sal National Forest Pines Tract Project, Final Environmental Impact Statement, January 1999). A GWR (General Big-Game Winter Range) Management Unit is located adjacent to the MMA Management Unit. Although this direction does not apply to the adjacent MMA Management Unit where the current proposal is located, the Manti-La Sal National Forest Record of Decision considered this management direction. Direction for operations in adjacent GWR Management Units calls for minimizing potential conflicts. The current proposal will have negligible effects to wintering big game because there will be very little activity at the site following the initial short-term construction activity (pages 14-15, Manti-La Sal National Forest, SUFCO Mine Link Canyon Portal Record of Decision, Oct. 10, 2002). The area will be surveyed for raptor nests. If any are found within the prescribed buffer zone, they will be monitored for activity and work at the portal site will occur following the same guidelines as those described for the Link Canyon Substation.

Mining within the SITLA Muddy Tract will be limited to underground activities; no surface disturbance, other than exploration drilling, is anticipated in this area. Exploration drilling is typically handled by the Division under a separate permit application process. No known raptor nests are known to exist within the SITLA Muddy tract where subsidence will occur. However, if future raptor monitoring finds any raptor nest that has a potential to be disturbed by subsidence, the nest and potential damage will be evaluated with DWR and FWS. An appropriate plan of action will be developed on a case by case basis. The Division of Oil Gas and Mining will be informed in advance when such an evaluation is necessary. The applicant will obtain any permits necessary for disturbance of the nest if this is the course of action decided upon.

Generally, vegetation within the lease and permit areas outside of disturbed areas is protected from mining related impacts, such as subsidence, by the depth of overburden and depth of soil. Experience in mining the Pines and Quitcupah leases has shown that upland vegetation does not appear to be significantly affected by subsidence. Cracks that form in the soil tend to heal quickly and the majority of the vegetation in the area of surface cracks does not appear to be suffering

from undue stress. The only cases of damage to vegetation related to mining appears to occur when subsidence cracks form in areas where a brittle sandstone body is near the surface with little soil cover and a crack either visibly bifurcates a plants root system or opens wide enough for soils and small plants to fall into. In a few locations, tree roots have been weakened by surface cracks and have resulted in the trees toppling shortly after the cracking occurs. This impact appears to be typically limited to areas near a canyon rim such as in the West and East Forks of Box Canyon. In areas where there are at least a few feet of soils over bedrock, such as in the previously mined portions of the Quitchupah Lease, this phenomenon has not been observed. Significant impacts to upland vegetation from subsidence are not anticipated in the SITLA Muddy Tract since most of the tract area has a relatively thick mantle of soils.

The depth of overburden in the SITLA Muddy Tract ranges from 900 to nearly 2200 feet. Areas projected to be undermined are covered by a minimum of 1000 feet to a maximum of 2100 feet. Most of the vegetation in the tract is found to be growing in the Price River and the North Horn Formations where the depth of cover is at least 1000 feet. Where these formations are exposed to mining induced subsidence in the Sufco area, the formations tend to react more plastic than brittle and subsidence crack formation is often muted. Subsidence cracks in thick soils and heavily weathered bedrock near the ground surface will frequently heal or fill in a relatively short period of time. Because of the depth and type of cover, Sufco anticipates there will be little impact to upland vegetation due to the subsidence. Subsidence cracks that form that are determined to be a safety hazard will be mitigated as discussed previously in this section.

The applicant has implemented a program to monitor the effect of subsidence on the vegetative communities. The applicant uses color infrared photography (CIR) to document changes to vegetation. This CIR coverage was begun in 1987 and will be updated at least every 5 years.

Willows intermixed with the remainder of the seedlings will be planted adjacent to the reclaimed channel and within the protective riprap. Willow cuttings from existing plants in the drainage will be cut and planted early in the first spring following reclamation construction activities. The slopes away from the channel will be reseeded with the standard seed mix at prescribed rates of application where coverage consists of at least 50 to 100 seeds per square foot. The seed mix for the Link Canyon Portal will not include alfalfa seed. Horsetail and clematis occur naturally in the area and will be allowed to invade the reclaimed area. Plugs of existing sedges in the eastern portal area will be obtained and transplanted to the reclaimed western portal.

Reclamation of the portal access road and portal area will include transplanting Creeping Oregon Grape. Creeping Oregon Grape will be transplanted to the topsoil pile during site construction and it is anticipated a portion of these plants will be used during reclamation of the access road.

#### **4 Right 4 East Panel(s)**

Should a seed mix be required to be used on soil filled subsidence cracks the seed mix previously used for the sinkhole repair and reclamation project will be used. See section 3.4.1.2 for information regarding the sinkhole project seedmix. Soils used to fill subsidence cracks which receive seed will not receive mulch or fertilizer. Refer to Section 5.2.5.2 (Correction of Material Damage) for additional information.

**2RWL Sinkhole Repair and Reclamation:** At the request of the Fishlake Forest the seed mix for reclamation of the site in 2016 included the following seed mix which was broadcast in October immediately following the placement of soil and pocking/gouging of the site. Mulch was not used to discourage impact from livestock and large mammal browsing the mulch on the reclaimed sinkhole area. Refer to Sections 5.2.1.1 and 5.4.1.1 of Chapter 5 for additional information.

<u>Scientific Name</u>	<u>Common Name</u>	<u>PLS lbs/acre</u>
Elymus trachycaulus	Slender Wheatgrass	3
Achnatherum nelsonii	Columbia needle grass	1
Elymus glaucus	Blue Wildrye	1
Aster glaucodes	Blueleaf Aster	0.25

**CHAPTER 4**

**LAND USE AND AIR QUALITY**

## TABLE OF CONTENTS

Section	Page
4.10 Land Use	4-1
4.1.1 Environmental Description	4-1
4.1.1.1 Premining Land Use	4-1
4.1.1.2 Previous Mining Activity	4-12A
4.1.2 Reclamation Plan	4-13
4.1.2.1 Postmining Land Use Plan	4-13
4.1.2.2 Land Owner or Surface Manager Comments	4-16
4.1.2.3 Suitability and Capability	4-16
4.1.3 Performance Standards	4-16
4.1.3.1 Postmining Land Use	4-16
4.1.3.2 Determining Premining Uses of Land	4-17
4.1.3.3 Criteria for Alternative Postmining Land Uses	4-17
4.1.4 Alternative Land Use	4-17
4.20 Air Quality	4-18
4.2.1 Air Quality Standards	4-18
4.2.2 Compliance Efforts	4-18
4.2.3 Monitoring Program	4-20
References	4-21

## LIST OF PLATES

Plate
4-1A Land Uses - Quitchupah Tract
4-1B Land Uses - Pines Tract & SITLA Muddy Tract

## LIST OF APPENDICES

(Appendices appear in Volume 6)

Appendix
4-1 Utah Big Game Annual Report, 1991, Deer Herd Unit #43, Elk Herd Unit #14
4-2 Cultural and Historical Resources
4-3 Assessment of Particulate Emissions Report
4-4 Division of Air Quality Approval Order
4-5 Cultural Resource Memorandum of Agreement
4-6 Cultural Resource Documentation

## CHAPTER 4 LAND USE AND AIR QUALITY

### 4.10 Land Use

This section of the permit application includes descriptions of the premining and proposed postmining land use(s).

#### 4.1.1 Environmental Description

A statement of the conditions and capabilities of the land to be affected by coal mining and reclamation operations follows in this section.

##### 4.1.1.1 Premining Land Use

The surface lands within the lease and permit areas (except for 640 acres privately owned) are owned by the U.S. Government and are either parts of the Fishlake National Forest, the Manti-La Sal National Forest or lands administered by the Bureau of Land Management. These lands have been inventoried by the respective regulatory agencies who are responsible for the administration and use of these government lands. Federal comprehensive land use plans have been prepared by the U.S. Forest Service Offices.

**Land Use Map.** Plates 4-1A & 4-1B presents these Federal comprehensive land use plans information in the lease and permit areas.

**Land Capability.** The SUFCO Mine area's recreational use (excluding hunting) is approximately 427 days annually. Most of this use is dispersed among horseback riding, snowmobiling, hiking, camping, four wheeling and fuel wood gathering (Billy Dye, Ferron Ranger District; Bob Tuttle, Fishlake National Forest).

The major plant communities in the SUFCO Mine area are identified in Section 3.2.1.1.

The pinyon/juniper woodland occurs on steep unstable slopes and is considered unsuitable for grazing although it is grazed within the allotment. The vegetation condition within the pinyon/juniper woodland type was considered good. Forage production (mainly Indian rice-grass

and bluebunch wheatgrass) is low. Arnold et. al. (1964), Jameson and Dodd (1964), and Jameson (1971) found that as tree canopy increased, understory vegetation decreased. Phillips (1965) found that mature stands with a 74 per unit crown canopy produced 96 pounds of forage per acre while stands with 1-2 percent cover produced from 418-577 pounds per acre. Lewis et. al. (1965-1967) found production values between 40 and 460 pounds per acre in stands sampled. Areas where trees had been removed produced as much as 900 pounds per acre. Canopy cover of pinyon and juniper in the SUFACO Mine Quitchupah lease area fairly dense and forage production in the type would generally be less than 100 lbs./acre in an average year. Assuming 50 percent utilization and 25 lbs./animal/day, it would take 15 acres to carry an animal for a month (WESTECH, 1978).

A large part of the flatter upland area is dominated by sagebrush/ grassland. The U.S. Forest Service (unpublished, 1971) has mapped this area as suitable rangeland with vegetation condition. The sagebrush/grassland type within the SUFACO Mine Quitchupah lease area is the most desirable type for grazing, producing the most available forage per acre for livestock. It generally has lower vegetation condition than other types indicating it receives heavier grazing pressure. Three transects established in 1971 by the U.S. Forest Service on the SUFACO Mine Quitchupah lease area averaged 1100 lbs/acre (dry weight). Of this, about 940 lbs/acre was perennial grasses and sedges. The transects established, however, are in areas where shrub coverage is low and forage production would probably be lower for most of the sagebrush/grassland type where shrub coverage is higher. For this type, it would take 2-3 acres to carry an animal for a month. The U.S. Forest Service estimates a carrying capacity of 0.5 animal units per month (AUM) per acre (B. Bass personal correspondence, 1979).

The aspen type is an important producer of forage for big game and domestic stock. A high percentage of the production is forbs which makes this type more desirable to big game and sheep. Mature aspen with a herbaceous understory in good to excellent condition will produce from 1,000 to 1,800 lbs/acre air dry forage (Lewis, 1971). The U.S. Forest Service estimates that in this area, aspen type produces 1,000 to 1,500 lbs/acre with 0.6 to 0.65 AUM/acre (M. Stubbs personal correspondence, 1979). Most of the aspen stands in the SUFACO Mine Quitchupah lease area serial with vegetation condition (U.S. Forest Service, unpublished, 1971).

The ponderosa pine, mountain shrub and coniferous forest types are generally lower forage producers although the extent of these types on the study area makes them an important component of the grazing system. Portions of these types, especially along the steep canyon walls, have been rated unsuitable for grazing and receive little grazing pressure due to limited accessibility to livestock. Areas of these types on more gentle slopes receive heavier grazing as indicated by lower vegetation condition. These areas provide some forage for livestock and are valuable forage producers for big game. Julander (1955) estimated forage production for mountain brush and oak types. He found that the mountain brush type produced 723 lbs/acre (green weight) of which 11 lbs/acre were grasses. He found that grasses are preferred forage for cattle and are selected as their key forage species. Where grasses were unavailable, however, cattle used forb and shrub species resulting in competition with big game species.

Valley bottoms receive little grazing pressure except in the vicinity of water sources where pressure is locally heavy. Valley bottoms are generally narrow and represent limited available forage. Steep slopes receive limited grazing pressure from livestock because of the steep inclines and lack of water. Flatter mesa tops and rolling terrain receive heavier pressure because of easier movement by livestock and more available forage. Grazing pressure is heaviest around water sources in these more accessible areas.

Very little of the SUFCO Mine area is in vegetation communities capable of producing timber products. The pinyon/juniper woodland community generally occurs on steep, unstable slopes making it undesirable for accessibility.

The coniferous forest type also occurs on steep slopes and generally in small stands. Economics of harvesting these stands would result in a high cost/benefit ratio. Other than very limited consumption for posts and poles, this type receives no use in the area as a timber producer. Christmas tree cutting, however, is higher in this community type than others in the area.

The ponderosa pine type is the only vegetation community receiving substantial use for timber production. This type generally occurs on flatter sandy sites and is readily accessible. Large, mature (250 + years) trees have been harvested on a selective basis. Pine regeneration in cut over stands is sparse and mountain mahogany and manzanita appear to be increasing in the understory. Within the SUFCO Mine Quitchupah lease area approximately 528 thousand board

feet (MBF) have been harvested between 1977 and 1978 with average volumes of 1.3 average net volume/acre (M. Stubbs personal correspondence, 1979). Quaking aspen stands receive limited local pressure for posts and poles.

The vegetation communities supported in the Pines Tract area and SITLA Muddy Tract area are discussed in Chapter 3 of this M&RP.

**Land Use Description.** The leased areas lie within the Manti-La Sal and Fishlake National Forests and are subject to the Land and Resource Management plans prepared by the agency. These plans identify the principle use of the lease areas as rangeland with small areas set aside for timber harvesting and as general big game range. Recreation in the lease areas includes camping, firewood gathering, hunting, some snowmobiling, and sight seeing from late spring to late fall. Yearly recreation use is light, but during deer and elk hunts, use is extremely heavy.

There are no developed or inventoried recreation campgrounds on the lease areas. The mining operation will not impact any of these uses and will preserve the uses into the postmining period.

The timber on the lease areas are open grown Ponderosa pine. All commercial stands occur on the benches. Trees are of low quality because of the poor tree growing site. Cutting is limited to older over-matured trees and occurs infrequently. No adverse timber impacts are anticipated.

The aesthetic value of the area has been categorized by the U.S. Forest Service as follows:

"The mesa rim and deep canyons can be seen as background from Emery (Dog Valley). They are classified as distinctive with variety. Activity from the proposal will not be visually evident from the valley. The lease area is seen as middle ground from a few remote spots on the Duncan Mountain Road. This scene area is presently classified in Sensitivity Level 2 (Average Sensitivity). The visual objective as recommended by the Land Use Plan is 2 (Modification). This permits activities to visually dominate the characteristic landscape. Very few people visit the area and those that do, come for something other than scenic attractions."

With the inclusion of the Pines Tract into the SUFCO lease and permit areas "changes in the existing landscape could include escarpment failures. This is not expected to change the visual character of the region."

shelters/overhangs, some with associated pictographs. Of the 15 sites identified within the West Coal Lease Modification Areas, six sites are recommended eligible for the National Register of Historic Places. These sites include 42SV3209, 42SV3211, 42SV3212, 42SV3213, 42SV3247 and 42SV3248 which consist of small rock shelters and rock shelters with pictographs. Site 42SV3209 will be the only site undermined under the present mine plan. This shelter is more of a terrace overhang that extends 6 meters long, with a 1.5 meter overhang or width.

**2RWL Sinkhole** - In 2016 an additional cultural resource review/inventory was performed by Tetra Tech a consulting firm, for the area of the sinkhole. The inventory included information from the EarthTouch report previously mentioned and from other previously prepared reports. A copy of the inventory results have been included in Appendix 4-2. Within the inventory area, no cultural resources had been recorded. Thus, no impacted were anticipated during the repair of the sinkhole. Clearance for the repair of the sinkhole was give by SHPO from documentation prepared by Tetra Tech and Jessica Montcalm of the Division of Oil, Gas and Mining. The area of the sink hole is part of the West Lease Modification Area previously permitted in 2011. An EA prepared for the West Lease Modification is located in Appendix 3-13.

#### **4 Right 4 East - Quitchupah Tract**

In the area of the Quitchupah lease two major cultural resource surveys were completed, one in 1977 (AERC) and one in 1983 by Centuries Research, Incorporated. The nature of the cultural resources found indicates that the area was used very lightly in prehistoric times, and mostly for flaking and hunting (Environmental Assessment, Coal Lease U-63214, October 1988). The U.S. Forest Service and State Historic Preservation Officer determined that mining induced subsidence will have minimal impact on cultural resources (UDOGM Environmental Assessment, October 27, 1989).

During the 2017 Paleontology Resource Appraisal of the 4 Right area the Castlegate and Price River formations were determined to have little potential for the preservation of vertebrate fossils. Based on reports from local mines the general rarity of significant vertebrate fossil particularly in the Castlegate Sandstone supports the lack of potential to expose or damage paleontological resources due to escarpment subsidence impacts. (Paleontology Resource Appraisal 2017, Appendix 4-2).

Because the Mine has no plans to cause surface disturbance within the project area, a Class III cultural resource inventory was only required by the USFS in areas with a high potential for subsidence where cultural resources existed and could be adversely impacted. Historically, the areas include canyon walls and their associated rims. The inventory was conducted in portions of Sections 27 and 34. Two new sites were recorded adjacent to the 4 Right panel in Section 27

(42SV3786 and 42SV3787) neither was considered to be eligible to be listed by SHPO as recommended by the USFS. The cultural resource inventory and SHPO concurrence letter agreeing with USFS in not listing the new sites are located in Appendix 4-2 (Confidential). Two isolated objects were also located in Section 34 during the inventory. There are no known cultural and paleontological resources above the 4 Right 4 East panel and within the potential subsidence angle-of-draw.

**South Fork of Quitchupah Area of 2R2S Block "A" and 3R2S Block "B"**

**Cultural and Historic Information.** Cultural resource information and maps identifying cultural and historical study areas are located in Appendix 4-2 in the Confidential folder of the M&RP. Canyon Environmental conducted an evaluation of the South Fork of Quitchupah in and adjacent to the 2R2S Block "A" panel Area.

The results of the cultural resource inventory for the project resulted in the identification of 4 cultural resource sites, which included one previously recorded site (42SV2690), and 3 new sites (42SV3462, 42SV3463 and 42S3464). Overall, the identified cultural resource sites consist of lithic scatters and a small rock shelter/overhang. Of the 4 sites identified within the South Fork of Quitchupah Area, two sites are recommended eligible for the National Register of Historic Places.

**CHAPTER 5**  
**ENGINEERING**

**5-2C Detail of Portal Surface Facilities**

**LIST OF PLATES**

- 5-2D Detail of Link Canyon Surface Facilities
- 5-2E Detail of Link Canyon Surface Facilities No. 2
- 5-2F Detail of Link Canyon Portal Facilities
- 5-3A Post-Reclamation Surface Configuration
- 5-3B Extended Post-Reclamation Surface Configuration
- 5-4 Post-Reclamation Cross Sections
- 5-5 Existing Surface and Subsurface Facilities and Features
- 5-6 Land Ownership and Permit Area Map
- 5-7 Upper Hiawatha Mine Plan - 5 Year Projection**
- 5-8 Lower Hiawatha Mine Plan - 5 Year Projection
- 5-9 Transportation Facility Cross Sections
- 5-10 Potential Subsidence Limits Sufco Mine**
- 5-10B Potential Subsidence Limits - Pines Tract
- 5-10C Potential Subsidence Limits - SITLA Muddy Tract & Greens Hollow Tract
- 5-11 Overburden Isopach Map**

**LIST OF APPENDICES**

(Appendices appear in Volume 6)

Appendix

- 5-1 Primary Road Certification
- 5-2 Approximate Original Contour Variance Request
- 5-3 Sevier County Landfill Disposal Agreement

- o No subsidence or caving operations will be conducted to affect any portion of the right-of-way of this road within 100 feet of the underground entry system,
- o Surface activities will be conducted in a manner that will not block the road, and
- o Water bars have been constructed on that portion of the road bordering the disturbed area adjacent to the mine surface facilities. Regular inspections of that portion of the road are conducted by mine personnel to ensure that erosion does not become a problem. In the event that material damage due to erosion as a result of mining activities is discovered on or along the side of this road, SUFCA Mine will repair this damage and implement additional runoff-control measures as needed.

Subsidence from underground mining operations may affect public-access dirt roads throughout the lease and permit areas . As part of the subsidence monitoring program, these roads will be regularly inspected. If material damage occurs to these roads as a result of mine subsidence, the roads will be repaired by SUFCA Mine.

**Mining Sequence and Planned Subsidence.** The mine plan for the SUFCA Mine is presented in Plate 5-7 (Upper Hiawatha seam) and Plate 5-8 (Lower Hiawatha seam). These maps show the boundaries of all areas proposed to be affected over the estimated total life of the coal mining and reclamation operations, including the size, sequence, and timing of mining of subareas to be affected beyond the present permit term. No surface disturbances are currently anticipated within the permit area beyond that presented in this M&RP.

Plates 5-7 and 5-8 also shows the location and extent of underground workings in which planned-subsidence mining methods will be used as well as areas where measures will be taken to prevent, control, or minimize subsidence and subsidence-related damage. The location of the waste-rock disposal area in relation to the underground mine workings, is discussed in Volume 3 of this M&RP.

**Land Surface Configuration.** Slope measurements for undisturbed areas adjacent to disturbed areas associated with the mine are shown on Plate 5-2A&B. Surface facilities at the site have been in existence since 1941. Pre-mining topographic maps do not exist. Therefore, the slope

will not allow mining to occur at the minimum height without putting quality at unacceptable levels. Much of the seam height in these areas is between 4-6 feet. Reserves are also lost to burn in these areas as a result of several promontories in the area which allow greater exposure of the outcrop to the atmosphere.

Mining is not planned on the northern portion of the SITLA Muddy Tract Lease ML 49443-OBA in the Upper Hiawatha Seam as a result of a sand channel and seam height that will not allow mining to occur.

The Lower Hiawatha seam will be mined in the northwest portion of the lease area where the interburden thickness between the Upper and Lower Hiawatha seams exceeds 30 feet. The mine plans are columnized or stacked where both seams are to be extracted. The Duncan seam does not contain sufficient minable reserves to warrant mining within the lease area.

The Duncan seam occurs about 100 to 130 feet above the Upper Hiawatha seam in a small portion of lease U-28297. The unsplit area of the Duncan seam is of small extent, probably less than 50 acres. Federal Lease U-28297 grants Canyon Fuel Company, LLC SUFCO Mine only the right to mine the Upper Hiawatha seam.

The Quitchupah Tract Resource Recovery and Protection Plan (R2P2) for Canyon Fuel Company, LLC SUFCO Mine is on file with the Bureau of Land Management. The R2P2 contains detailed mine plan and reserve calculations for all of the Quitchupah Tract leases operated by Canyon Fuel Company, LLC SUFCO Mine.

The Pines Tract Resource Recovery and Protection Plan (R2P2) for Canyon Fuel Company, LLC SUFCO Mine is on file with the Bureau of Land Management. The R2P2 contains detailed mine plan and reserve calculations for the Pines Tract lease operated by Canyon Fuel Company, LLC SUFCO Mine.

The SITLA Muddy Tract Plan of Operations Resource Recovery and Protection Plan (R2P2) for Canyon Fuel Company, LLC SUFCO Mine is on file with the State of Utah, School and Institutional

Trust Lands Administration. The Plan of Operations Resource Recovery and Protection Plan (R2P2) contains detailed mine plan and reserve calculations for the SITLA Muddy Tract lease operated by Canyon Fuel Company, LLC SUFCO Mine.

### **5.2.3 Mining Methods**

A combination of room-and-pillar and longwall mining methods are used in the SUFCO Mine. The use of these two mining methods has been selected to maximize coal recovery and enhance production rates within the specific geologic constraints of the lease area.

collected over continuous-miner areas to date indicate that the average draw angle is 15 degrees. Individual measurements over continuous-miner areas have ranged from 10 to 21 degrees. New longwall draw angle data obtained in 1995 indicates an angle of 15 degrees for the longwall areas. Draw angle study completed in 1999 over 13L4E LW panel indicates 15 degrees is valid. Summary results of the LW panel studies are shown in Figures 5-0A and 5-0B.

Tension cracks have occurred over most of the subsidence areas. These cracks tend to be most pronounced in areas where pillars have been extracted (as compared to areas overlying longwall panels). The lengths of the cracks vary from a few feet to nearly 200 feet. Most are oriented either parallel to the natural jointing pattern or parallel to the boundaries of the underground excavation. Cracks with the longest continuous length appear to be natural joints which have been intensified by subsidence action. Vertical displacement along the cracks is uncommon and horizontal displacement varies from hairline to several inches in width. Follow-up observations of individual tension cracks indicate that the cracks tend to close (either partially or fully) following initial development (see Appendix 5-4).

Monitoring data collected to date indicate that subsidence above the SUFCO Mine occurs rapidly after initial movement. Approximately 80 percent of maximum subsidence occurs within about four months. The remainder of subsidence occurs slowly over a period of a few years. These monitoring data have been presented and summarized annually in reports submitted to the UDOGM by SUFCO Mine. Refer to Appendix 5-13 for description of 2RWL repaired sinkhole, Section 5.2.1.1 and Section 5.4.1.1 provide additional information.

#### **4 Right 4 East Panel(s)**

The 4R4E panel is located within Lease U-63214 which is referred to as the Quitchupah Tract throughout the M&RP text, appendices and drawings. This lease was issued to the permittee in 1989, the tract was originally delineated in 1982. See Appendix 5-14, Plate 5-6, and Plate 5-7 for the 4R4E mine plan, lease locations, and mine timing respectively. Mining will occur only in the Upper Hiawatha coal seam. Overburden ranges approximately from 300-900 feet. The projected subsidence across the 4R4E panel ranges from 1-5 feet and the projected average subsidence is approximately 2 feet. See the 4R4E Projected Subsidence Map in Appendix 6-4. No surface disturbance, new surface

facilities or infrastructure will be associated with the mining of the 4R4E panel therefore no bonding with be needed.

#### 5.2.5.1 Subsidence Control Plan

**Potential Areas of Subsidence.** Structures that are present above the existing or planned mine workings that may be affected by mining are shown on Plate 5-5. Renewable resource lands within the lease and permit areas are shown on Plate 4-1.

**Mining Methods.** As noted in Section 5.2.3, both room-and-pillar and longwall mining methods are used in the SUFCA Mine. The size, sequence, and timing for the development of the underground workings are shown on Plates 5-7 and 5-8.

**Physical Conditions Affecting Subsidence.** A detailed description of the physical conditions in the lease and permit areas that influence subsidence (i.e., overburden lithology and thickness, coal seam thickness, etc.) is provided in Chapter 6.

**Subsidence Control Measures.** Most of the land within the lease area will eventually be affected by subsidence. Anticipated areas of subsidence and those areas planned for protection from subsidence are shown on Plates 5-10A, 5-10B & 5-10C. The primary areas where subsidence is not anticipated are the areas overlying the pre-1977 workings in Lease SL-062583 shown on Plate 5-1 (referred to herein as the "Old Mine") and certain lease areas underlying Quitcupah Canyon, Box Canyon, and Muddy Creek.

The "Old Mine" area was mined in such a manner that coal pillars were left for support throughout the entire workings. Since these pillars are large enough to support the overburden and further mining is not anticipated in these workings, the surface area above the workings should not experience any subsidence.

Where perennial streams are not undermined they will be protected from subsidence by establishing stream buffer corridors within the mine from which only limited coal recovery will occur. Support pillars will be left in these locations to preclude subsidence. Underground stream buffers will only be crossed to the extent necessary to allow access to reserves. This access will consist of entries and cross cuts with support pillars. Entries that cross through the underground stream buffer corridors with less than 300 feet of cover will be sealed and/or backfilled upon abandonment using the best available technology to prevent disturbance of the overlying streams.

Protected cultural resource sites (see Plates 5-10AC, 5-10BC & 5-10CC located in the Sufco Mine MRP Confidential file) will be designed to include a buffer zone to protect the area from the effects of subsidence caused by underground full extraction mining. The width of the corridor will be

calculated as follows: the depth of overburden to the coal seam will first be established. This depth will be multiplied by  $\tan 15^\circ$  to obtain the distance underground mining needs to be away from the area to not cause subsidence effects. An additional 25 foot buffer will be added to this calculated distance to account for minor irregularities in the course of the stream or cultural resource site.

Surface structures overlying the area to be subsided consist of trails, unimproved dirt roads, fences, runoff catchment ponds, and streams. The applicant will repair any subsidence caused damage to these or other structures to the extent economically and technically feasible, and will comply with R645-301-525.160 and R645-301-525.230. Additional mediation and remedial measures are described in Section 5.2.5.2 Subsidence Control.

Monitoring within the lease area has shown that subsidence rarely exceeds 50 percent of the mining height where the overburden thickness is greater than 800 feet. This overburden thickness is generally achieved above the rim of the Castlegate Sandstone (see Plates 5-10A, 5-10B & 5-10C). Topography above the Castlegate Sandstone is gently sloping while that within and below the sandstone outcrop contains cliffs and steep slopes. With the exception of the experimental mining practice described below, future subsidence is typically planned only for those areas above the rim of the Castlegate Sandstone where the overburden thickness exceeds 800 feet.

**Experimental Mining and Subsidence.** To protect the environmental resources associated with escarpments, SUFCA Mine currently has a general policy of precluding subsidence below the rim of the Castlegate Sandstone. This requires that significant quantities of coal remain unrecovered.

Pillars were extracted from room-and-pillar workings beneath two areas of escarpment. The location of these areas is shown on Plate 5-1. These areas involved a 5,000-foot section of escarpment on Federal lease (SL-062583) in East Spring Canyon (1977-78) and 2,000 feet of escarpment on Fee property (1983-88) on the east side of Quitcupah Canyon. The East

Three longwall panels were completed in 1987 as part of the project. The area of proposed escarpment subsidence (the "Experimental Mining Practice" area) is shown on Plate 5-1. The north ends of two of the longwall panels extended beyond the escarpment toward the canyon. The third longwall panel was located entirely beyond the cliff beneath the canyon wall.

To date, monitoring efforts associated with the experimental mining practice have established that subsidence has occurred in a predictable manner varying from one foot to seven feet with minimal surface disturbance. One of the independent sandstone blocks fell from the escarpment during subsidence and a few tension cracks were created along the cliff face. No other visible signs of mining were found even though the surface elevations have dropped several feet in some areas of the experiment. Monitoring stations have moved horizontally from a few tenths of a foot to nearly three feet. Post-mining monitoring of the surface above the longwall panels is continuing. A report which describes the experimental project and its results in greater detail has been prepared for submittal to the UDOGM.

**Subsidence Monitoring.** In 1976 (i.e., prior to the onset of subsidence), SUFCO Mine began collecting baseline topographic data from the lease area using conventional survey methods. The use of conventional survey methods for subsidence monitoring continued until 1985 (i.e., at the beginning of longwall mining), when the lease area was flown to establish a set of baseline photography and a grid of surface elevations. Where possible, elevations were photogrammetrically determined from this baseline photography on an approximate 200-foot grid. These original horizontal and vertical data, together with the original conventional-survey data, serve as the comparative database for determining ground movement in subsequent years. A baseline was also established to monitor changes in vegetative cover with the use of color infrared aerial photography (CIR). The first baseline was done in 1987 for the existing leases. The baseline for the Quitcupah lease was flown in 1988 with CIR. The applicant will follow up with CIR coverage of the leases at least every five years. The CIR photographs are stored at the SUFCO Mine. CIR photography was taken in 1990, 1995, 1999, 2003 (East Fork Box Canyon only), and 2004. The next projected CIR flight dates will be in 2008, 2013, and 2018.

Additional aerial photography of the lease area is currently obtained on an annual basis. New elevations are then determined at each of the previously-selected horizontal coordinates and the differences between the original and the new elevation measurements are used to generate a subsidence contour map. This map and supporting narrative are submitted annually to the UDOGM in the form of a subsidence report. This subsidence report outlines the history of subsidence at SUFCO Mine as well as the status of subsidence during the previous year.

Numerous control points have been established within the lease area to assist in the subsidence surveys (see Plates 5-10A, 5-10B & 5-10C). Current (2005) coordinates and elevations of these control points are provided in Table 5-2. Additional control points will be added as necessary when existing points become influenced by subsidence. Future points will typically consist of 3-foot lengths of No. 4 rebar embedded in concrete with a stamped brass cap for identification. Since geologic and mining uncertainties often force a change in planned mining sequences, future control points will be installed only after the mine panels are in their development phase.

All subsidence areas will be monitored and reported in the Annual Subsidence Report for a minimum of three years after no additional subsidence is detected within the area. The applicant will map and report areas 3 and 4 in the 1993 Subsidence Report as required by Division Order #93A issued May 11, 1993.

A annual monitoring program was developed to analyze the subsidence cracks related to undermining of the West Fork of Box Canyon. Mining in the area in 1999 did produce visible fracturing at the surface on both the northwest and southeast walls of the canyon in this area. The monitoring program includes measuring the offset and/or width of portions of selected subsidence cracks. Similar data will also be collected from specified segments of subsidence cracks that have occurred away from the walls of the canyon and do not appear to be influenced by the lack of bedrock support created by the canyon. Information gathered from this monitoring program, along with previous studies that SUFCO has performed, will be used to predict the effects of subsidence within other areas of the Pines Tract and other areas of the

mine where similar geomorphologic and geologic conditions occur. This program was developed and implemented by the Fall of 2000. Subsidence cracks in the area of the West Fork of Box Canyon were surveyed for their location. However, in the years 2000 through 2003 the width and/or offset of the cracks were not measured or the records were not kept. Width and/or offset measurements were made in the Fall of 2004 and will again be made in the Fall of 2005 and every year thereafter. It is believed by the permittee that any change in the width of the cracks can easily be tracked on an annual basis rather than a semi-annual basis. The permittee has observed that most subsidence cracks that develop in the mining area do not change significantly after the first 4 to 6 months following their creation. The crack measurement records will be reported in the mines annual report. Subsidence cracks in the area of the West Fork of Box Canyon are located in Longwall area 10 that has been mined out since 2001, and the area is now assumed to be dormant. 2008 will be the last year these cracks will be monitored since there will not be anymore movement in this area.

**Anticipated Effects of Subsidence.** Future subsidence in the lease area is anticipated to be similar to that which has occurred in the past. Subsidence is expected to average about 4 feet above longwall panels, with a draw angle of about 15 degrees. Tension cracks are expected to occur in areas of subsidence with these cracks healing to some degree following formation. Tension cracks are anticipated to be less pronounced above longwall workings than above continuous-miner workings.

Previous surveys have indicated that no substantial damage has occurred to vegetation as a result of subsidence within the lease area. The only effects observed have been exposed plant roots where tension cracks have formed.

It is anticipated that subsiding under portions of East Fork Box Canyon and South Fork Quitcupah will result in a slight flattening of the stream gradient, which will increase pooling of the stream through a stretch of several hundred feet of the stream. Cracks will also likely develop across the East Fork Box Canyon Creek directly above the longwall panels and along the gate roads. These crack zones will form shortly after undermining of the stream bed. They are anticipated to be 1 to 2 inches or less in width with these cracks healing to some degree following formation. Details of

appropriated waters, within the SITLA Muddy Tract has been completed. The results of the area survey are included in the PHC for the SITLA Muddy Tract and included in Appendix 7-20. Ground and surface waters in the tract that have attached rights are listed in Appendix 7-1.

A discussion regarding the methods Sufco would employ to mitigate and replace an adversely affected State appropriated water supply is provided in Chapter 7, Section 7.3.1.8.

#### 4 Right 4 East Panel(s)

Should cracks develop in the surface above the panel the sealing of these cracks will be done with inert materials such as soil, rock, road base, etc. and seeded. Information regarding the seed mix that will be used is under the 4R4E Panel in Section 3.4.1.2. A drawing showing the potential subsidence with the mining of the 4R4E panel is located in Appendix 6-4 (Confidential). Refer to Section 5.2.5.2 (Correction of Material Damage) and Section 7.2.8.3 for additional information.

#### 5.2.5.2 Subsidence Control

**Adopted Control Measures.** As indicated above, SUFACO Mine has adopted subsidence-control measures in areas where surface resources are to remain protected. These controls consist primarily of leaving support pillars in place in those areas designated on Plates 5-10A, 5-10B & 5-10C as not planned for subsidence. Based on experience and data collected from the lease area, the design of support pillars for those areas where subsidence is not planned has been based on the following equations:

$$SF = SD/OS \quad (5-1)$$

where SF = safety factor against pillar failure (fraction)

SD = support strength density (psi)  
=  $(Y_c)(1-ER)$

$Y_c$  = average compressive yield strength of the coal (psi)  
= 3090 psi for the Upper Hiawatha seam

ER = extraction ratio (fraction)  
=  $1-(A_p/A_t)$

$A_p$  = pillar area (ft<sup>2</sup>)

$A_t$  = area supported by pillar (ft<sup>2</sup>)

$$\begin{aligned} OS &= \text{overburden stress (psi)} \\ &= (d)(D_o)/144 \end{aligned}$$

$$d = \text{overburden depth (ft)}$$

$$\begin{aligned} D_o &= \text{overburden density (lb/ft}^3\text{)} \\ &= 160 \text{ lb/ft}^3 \text{ for the lease area} \end{aligned}$$

Based on these equations and data, the support pillar designs summarized in Table 5-3 have been derived. This equation does not take into account either size effect or shape effects and is based on a one-dimensional stress field. Historically this equation has provided good results when used in areas where a number of uniform pillars are extracted. One area (5 North panels) of the mine experienced pillar failure when the area was flooded with water after mining of the panels had been completed. This particular area was mined using a double pass technique and the mining height was from 14 to 18 feet. The resulting pillars varied from 25 feet x 25 feet to 40 feet x 40 feet. The underlying floor was a weak mudstone that lost its cohesive strength when wet. When the 1R5N and 2R5N panels were flooded the underlying mudstone became saturated and lost its cohesive strength. This allowed the pillars in the area with SF < 2.5 to fail, because frictional confinement on the bottom of the pillar was lost. To prevent reoccurrence the Applicant will commit to not flood areas of the mine that have small pillars and a weak mudstone floor in areas where subsidence is to be prevented.

**Compliance With Control Plan.** SUFCA Mine will comply with all provisions of the approved subsidence control plan.

**Correction of Material Damage.** SUFCA Mine will try to plan mining operations so that no material damage occurs as a result of subsidence in the lease area. However, should material damage occur, SUFCA Mine will correct any material damage resulting from subsidence caused to surface lands to the extent technologically and economically feasible by restoring the land to a condition capable

of maintaining the value and reasonably foreseeable uses which it was capable of supporting before the subsidence. In addition, SUFCO Mine will either correct material surface damage resulting from subsidence caused to any structure or facilities by repairing the damage or compensate the owner of such structures or facilities in the full amount of the diminution in value resulting from the subsidence.

**Protection of Significant Surface Resources.** None of the following exist within the area of potential subsidence associated with the SUFCO Mine:

- o Public buildings or facilities,
- o Churches, schools, and hospitals,
- o Impoundments with a storage capacity of 20 acre-feet or more or bodies of water with a volume of 20 acre-feet or more,
- o Aquifers or bodies of water that serve as a significant water source for any public water supply system, or
- o Urbanized areas, cities, towns, or communities.

Hence, no special control measures are required to preclude subsidence impacts to these resources.

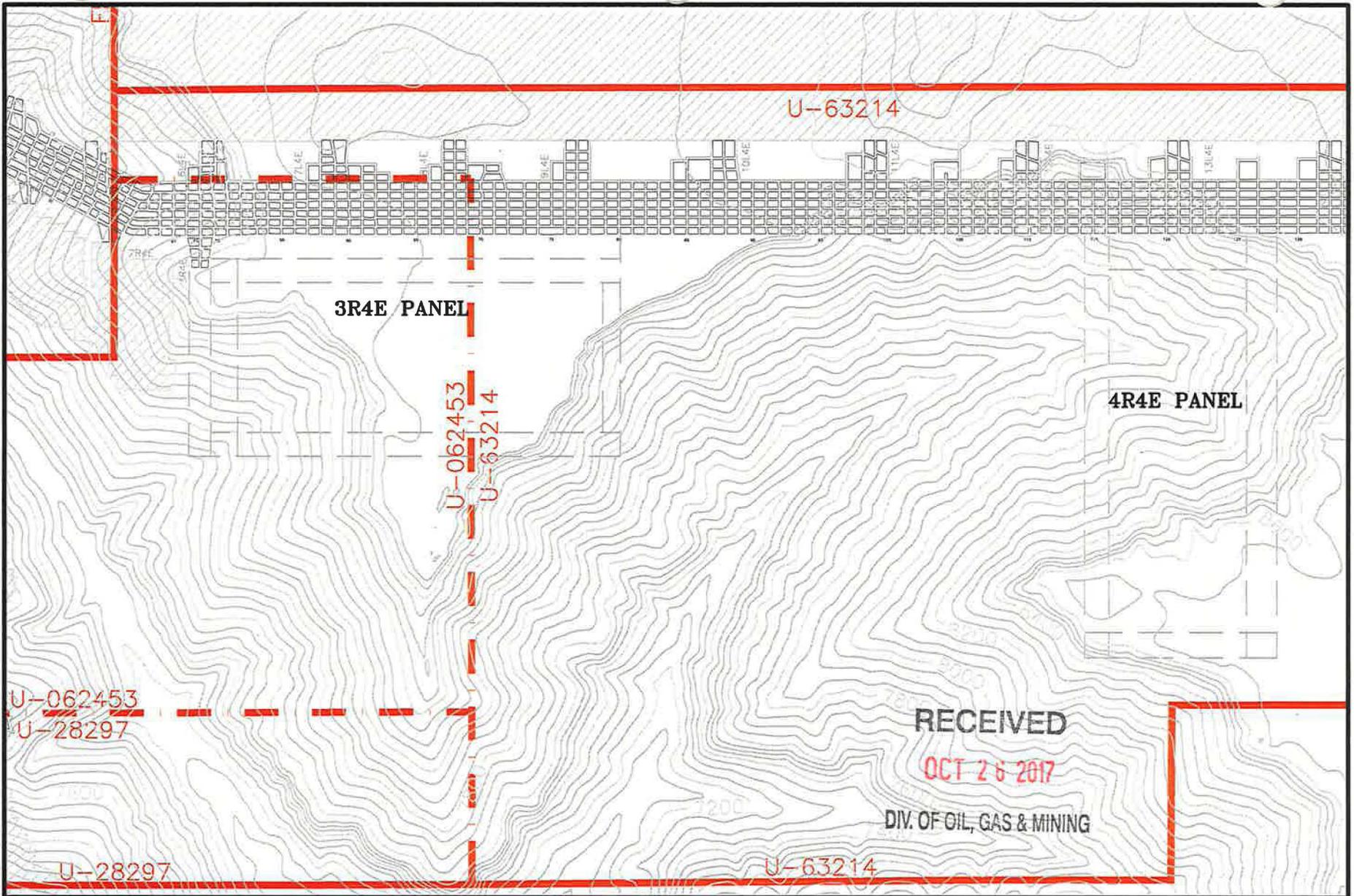
### **5.2.5.3 Public Notice of Proposed Mining**

Should new lease areas be added to the SUFCO Mine, a public notice of proposed mining will be mailed to all owners and occupants of the affected surface property and structures above the proposed underground workings. This notification will include identification of specific areas in which mining will occur, dates that specific areas will be undermined, and the location or locations where SUFCO Mine's subsidence control plan may be examined.

## **5.2.6 Mine Facilities**

### **5.2.6.1 Mine Structures and Facilities**

**Appendix 5-14**  
**4R4E Panel Location**



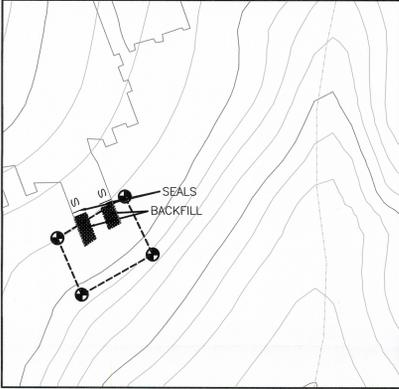
Amrnt: Rtd:rcv: 10/25/2017 9:11 AM



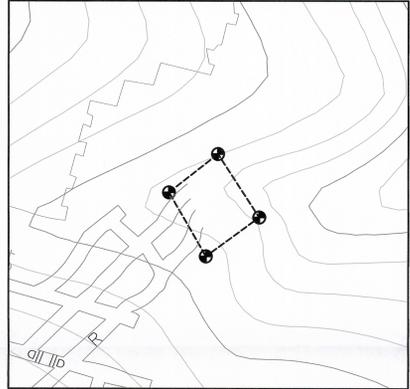
**Canyon Fuel Company, LLC**  
**SUFCA Mine**  
 597 South SR 24 - Salina, UT 84654  
 (435) 286-4880 Phone  
 (435) 286-4499 Fax

<b>SUFCA MINE</b>		
<b>4R4E PANEL LAYOUT</b>		
SCALE: 1" = 1000'	DATE: 9/25/2017	DRAWN BY: AMR
ENGINEER: AMR	CHECKED BY: BB	PROJ:
FILE NAME: J:\Mine Plans\2018\Budget\22nd Run\SufProd18_22ndRun.dwg		

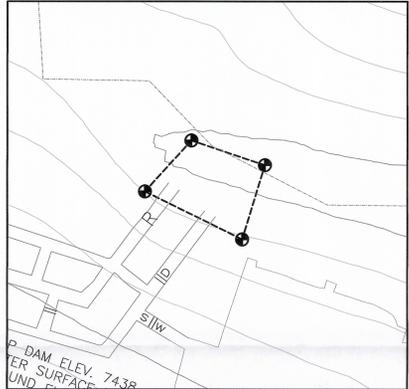
SHEET NO.  
**1**



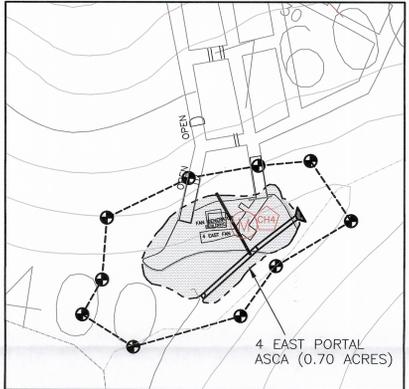
**SOUTH PORTALS**  
SCALE: 1" = 100'



**3 EAST PORTALS**  
SCALE: 1" = 100'

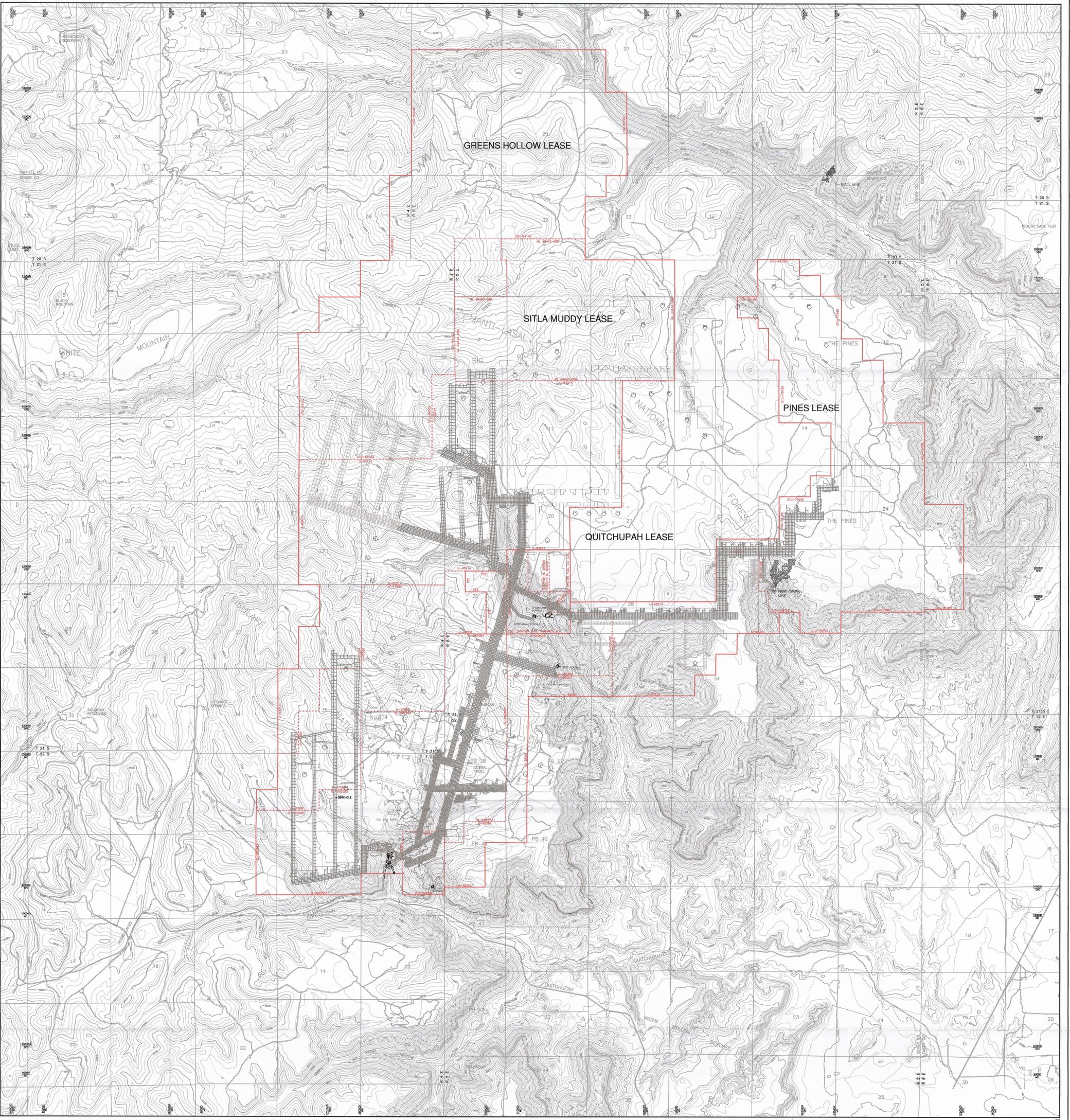


**QUITCHUPAH PORTALS**  
SCALE: 1" = 100'



**4 EAST FAN PORTALS**  
SCALE: 1" = 100'

**SURFACE PORTAL FACILITIES – PRE MINING AND POST MINING TOPOGRAPHY**



**EXPLANATION**

- SUFCO EXTERIOR LEASE BOUNDARY
- SUFCO INTERIOR LEASE BOUNDARY
- MINE COORDINATES
- STATE PLANE COORDINATES
- STREAM
- ESCARPMENT
- OUTCROP
- PERENNIAL STREAM
- DISTURBED AREA BOUNDARY
- DISTURBED AREA BOUNDARY MARKER
- DRAIN LINE
- ALTERNATE SEDIMENT CONTROL AREA (ASCA)



I CERTIFY THE ITEMS SHOWN ON THIS DRAWING ARE ACCURATE TO THE BEST OF MY KNOWLEDGE



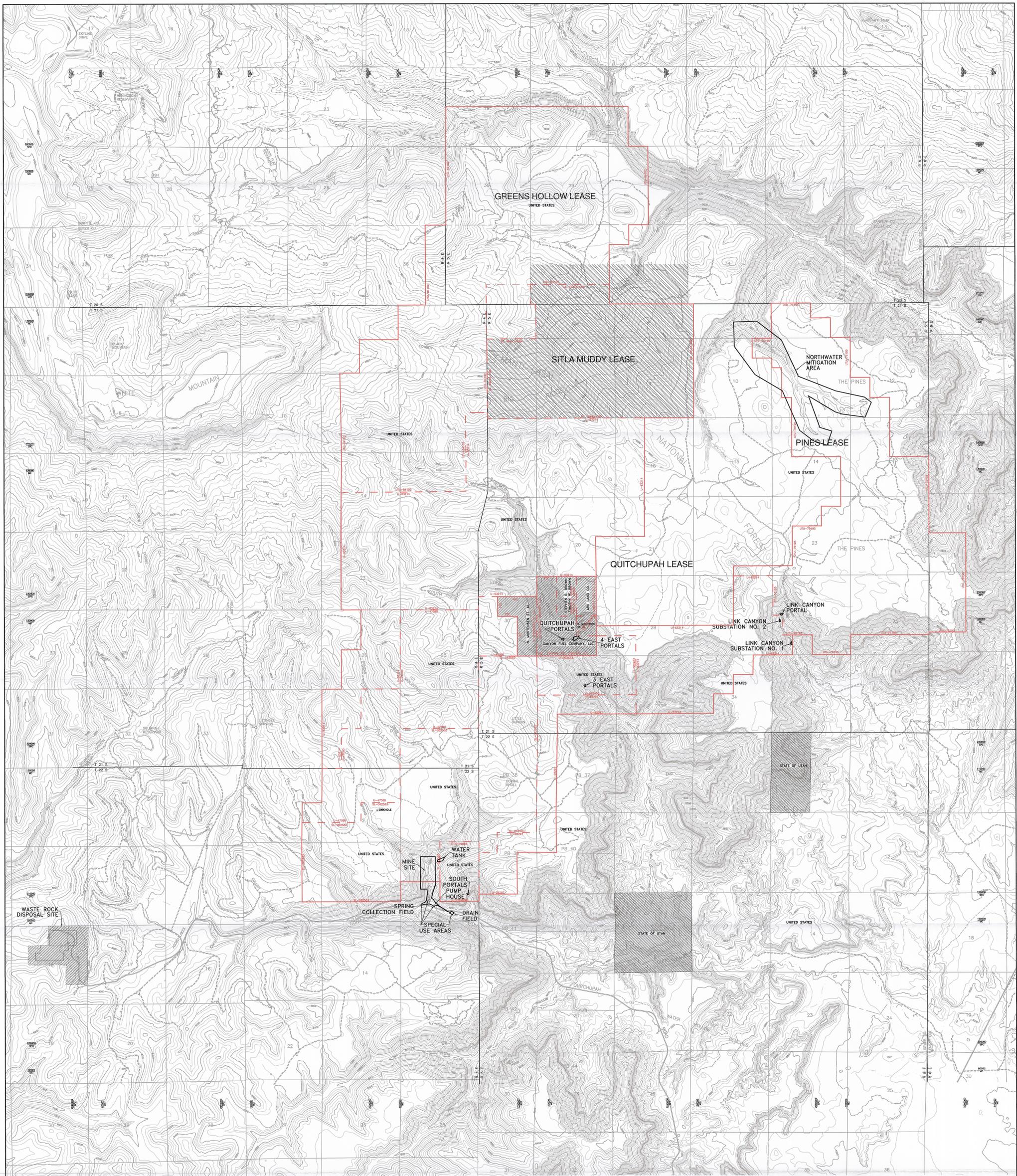
NO.		DATE		REVISED BY		REVISIONS		REMARKS	
10	12/22/20	J.D.S.	J.D.S.	ADD	ADD	ADD	ADD	ADD	ADD
11	07/13/18	J.D.S.	J.D.S.	ADD	ADD	ADD	ADD	ADD	ADD
12	12/15/16	J.D.S.	J.D.S.	ADD	ADD	ADD	ADD	ADD	ADD
13	4/13/2017	J.D.S.	J.D.S.	ADD	ADD	ADD	ADD	ADD	ADD
14	10/16/2017	J.D.S.	J.D.S.	ADD	ADD	ADD	ADD	ADD	ADD

**Canyon Fuel Company, LLC**  
**SUFCO Mine**  
 597 South 200 West • Salt Lake, UT 84154  
 (435) 286-4880 Phone  
 (435) 286-4499 Fax

**DETAIL OF PORTAL SURFACE FACILITIES**

PROJECT NUMBER: <b>###</b>	DATE: <b>03/01/2000</b>	SCALE: <b>1" = 2,000'</b>	DRAWN BY: <b>B.D.H.</b>	ENGINEER: <b>J.D.S.</b>	CHECKED BY: <b>M.L.D.</b>	SHEET NO.:
<b>PLATE 5-2C</b>						

RECEIVED



- NOTES:
1. "LEASE AREA" INCLUDES ALL FEDERAL COAL LEASES, STATE COAL LEASES, FEE LANDS AND U.S.F.S. SPECIAL USE PERMIT (SUP) AREAS SHOWN ON THIS MAP.
  2. SEE VOLUME 3 REGARDING OWNERSHIP AT WASTE ROCK DISPOSAL SITE.
  3. SEE PLATE 5-2A REGARDING MINESITE AREA DETAIL.
  4. SEE PLATE 5-2B REGARDING U.S.F.S. SPECIAL USE AREA DETAIL.
  5. SEE PLATE 5-2C REGARDING PORTAL AREA DETAIL.
  6. SEE PLATE 5-2D REGARDING LINK CANYON SUBSTATION NO. 1 AREA DETAIL.
  7. SEE PLATE 5-2E REGARDING LINK CANYON SUBSTATION NO. 2 AREA DETAIL.
  8. SEE PLATE 5-2F REGARDING LINK CANYON PORTAL AREA DETAIL.

**EXPLANATION**

- SUFCO EXTERIOR LEASE BOUNDARY
- SUFCO INTERIOR LEASE BOUNDARY
- PERMIT BOUNDARY
- SPECIAL USE PERMIT BOUNDARY
- MINE COORDINATES
- STATE PLANE COORDINATES
- DISTURBED AREA BOUNDARY MARKER
- DISTURBED AREA BOUNDARY

**LEASE AREA**  
 16,954.56 ACRES FEDERAL COAL LEASES  
 2,294.19 ACRES UTAH STATE COAL LEASES  
 640.00 ACRES FEE COAL LEASES  
 240.00 ACRES WASTE ROCK DISPOSAL SITE  
 28.50 ACRES U.S.F.S. SPECIAL USE PERMITS  
 70.00 ACRES B.L.M. RIGHT-OF-WAY  
 20,227.25 ACRES TOTAL LEASE AREA

- ADJACENT AREA**
1. BIOLOGY ADJACENT AREA IS A 0.5 MILE BUFFER AROUND ALL SURFACE DISTURBANCES.
  2. SEE CHIA FOR HYDROLOGIC ADJACENT AREA BOUNDARY.

**LAND AND MINERAL OWNERSHIP**

LAND	MINERAL
	UNITED STATES
	STATE OF UTAH
	UNITED STATES
	UNITED STATES
	VARIOUS OWNERS (AS SHOWN)
	CANYON FUEL COMPANY, LLC
	STATE OF UTAH
	UNITED STATES
	U.S.F.S. SPECIAL USE AREA
	UNITED STATES



I CERTIFY THE ITEMS SHOWN ON THIS DRAWING ARE ACCURATE TO THE BEST OF MY KNOWLEDGE.



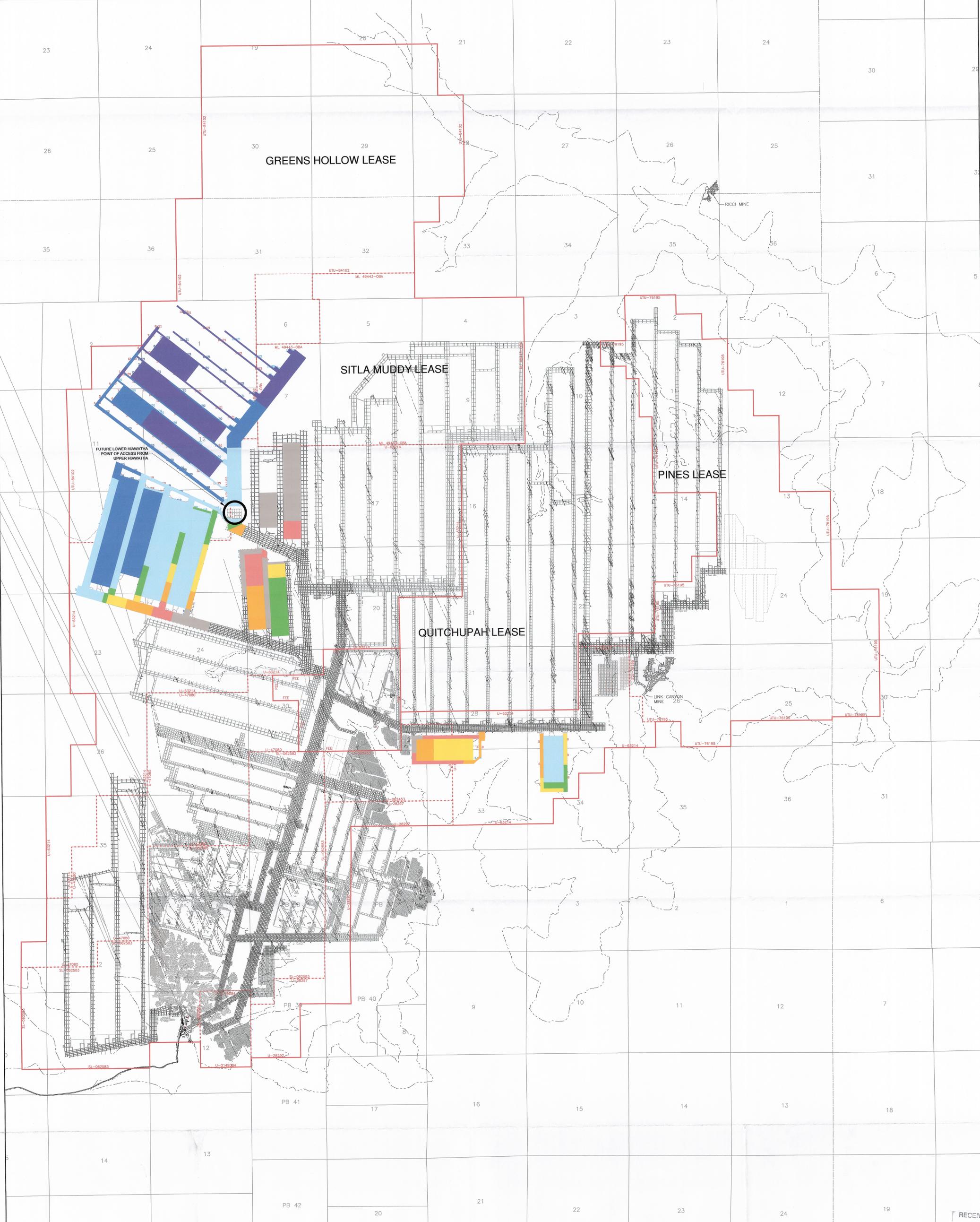
NO.	DATE	REV. BY	DWG. BY	REVISIONS	REMARKS
20	03/02/13	J.S.	J.S.	J.S.	ADDED TO ACRE 2.0 MW AREA FOR 5 WEST
21	07/16/16	V.M.	J.S.	J.S.	ADD GREENS HOLLOW & SOUTH FROM LEASE
22	12/14/16	V.M.	T.L.M.	T.L.M.	REMOVE SOUTH FORK LEASE BOUNDARY
23	02/28/17	V.M.	J.S.	J.S.	UPDATED WASTE ROCK POINT BOUNDARY
24	04/13/2017	V.M.	J.S.	J.S.	GREENS HOLLOW

RECEIVED  
OCT 25 2017  
DIV. OF OIL, GAS & MINING

**Canyon Fuel Company, LLC**  
SUFCO Mine  
597 South SR 24 - Safford, UT 84654  
(435) 286-4000 Phone  
(435) 286-4499 Fax

**LAND OWNERSHIP, LEASE, AND PERMIT AREA MAP**

SHEET NO. **PLATE 5-6**



FUTURE LOWER HAWATHA  
POINT OF ACCESS FROM  
UPPER HAWATHA

RICCI MINE

LINK CANYON MINE

**EXPLANATION**

- SUFCO EXTERIOR LEASE BOUNDARY
- - - SUFCO INTERIOR LEASE BOUNDARY
- - - ESCARPMENT
- - - OUTCROP

**MINING LEGEND**

- REMAINING 2017
- 1ST QUARTER 2018
- 2ND QUARTER 2018
- 3RD QUARTER 2018
- 4TH QUARTER 2018
- 2019
- 2020
- 2021
- 2022



I CERTIFY THE ITEMS SHOWN ON THIS DRAWING ARE ACCURATE TO THE BEST OF MY KNOWLEDGE



REVISIONS			
NO.	DATE	REQ. BY	DWG. BY
12	4/13/2017	YM	B.K.
13	10/23/2017	BB	B.K.

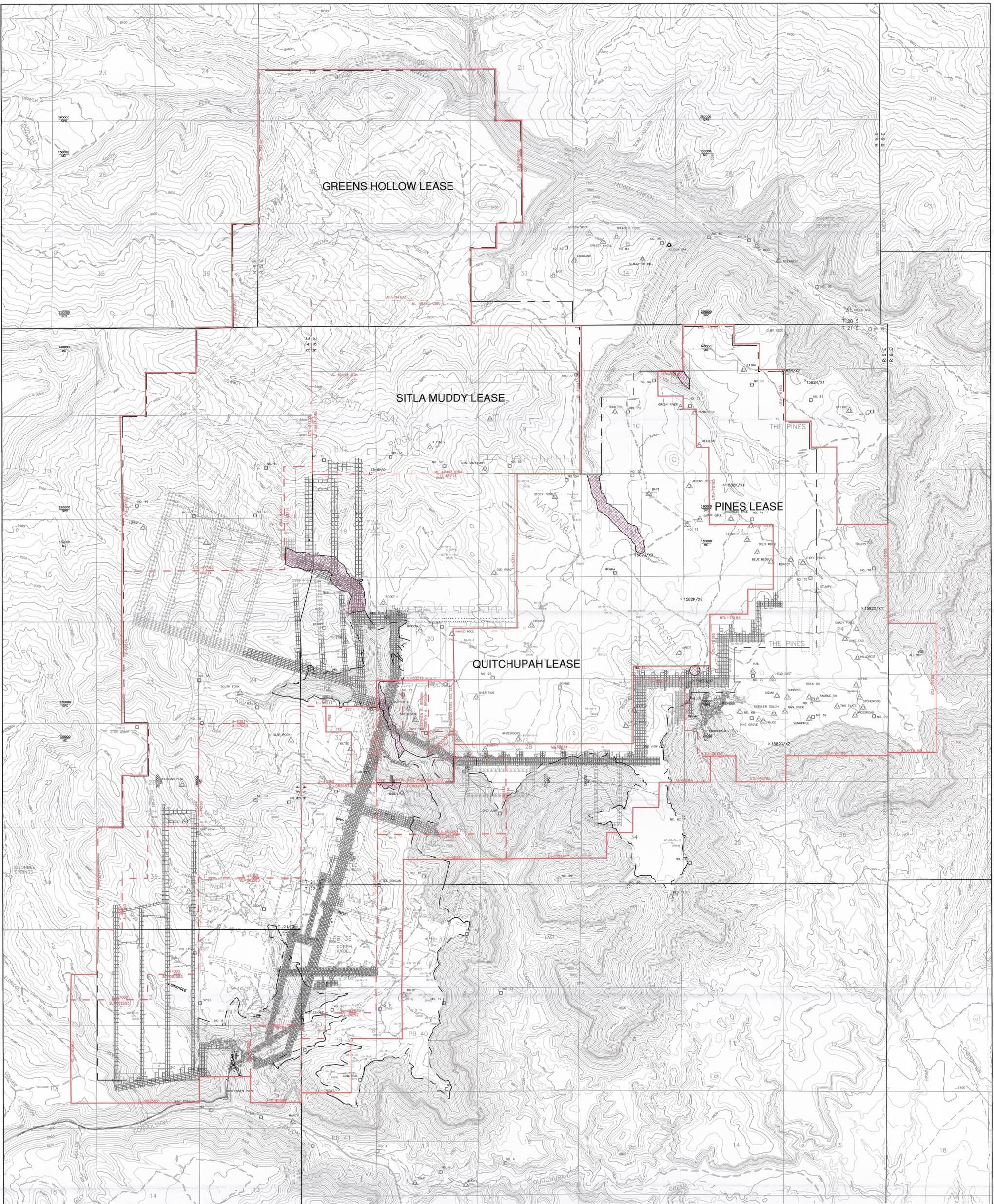


Canyon Fuel Company, LLC  
SUFCA Mine  
597 South SR 24 - Salt Lake, UT 84054  
(435) 286-4580 Phone  
(435) 286-4499 Fax

**SUFCA MINE PLAN  
5 YEAR PROJECTION**

PEN. NO.	DATE	SCALE	DATE	DRAWN BY	ENGINEER	CHECKED BY	SHEET NO.
2844-SUFCA	03/01/2020	1" = 1,500'	03/01/2020	J.G.C.	J.D.B.	YM	PLATE 5-7

RECEIVED  
OCT 2 2017  
DIV. OF OIL, GAS & MINING



GREENS HOLLOW LEASE

SITLA MUDDY LEASE

PINES LEASE

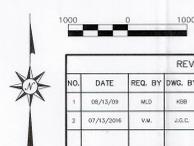
QUITCHUPAH LEASE

EXPLANATION

- SUFCO EXTERIOR LEASE BOUNDARY
- - - SUFCO INTERIOR LEASE BOUNDARY
- MINE COORDINATES
- STATE PLANE COORDINATES
- ▲ CONTROL POINT
- AERIAL TARGET
- LIMIT OF POTENTIAL SUBSIDENCE
- ▨ UNDERGROUND PERENNIAL STREAM AND PROTECTED CULTURAL SITE BUFFER CORRIDOR



I CERTIFY THE ITEMS SHOWN ON THIS DRAWING ARE ACCURATE TO THE BEST OF MY KNOWLEDGE



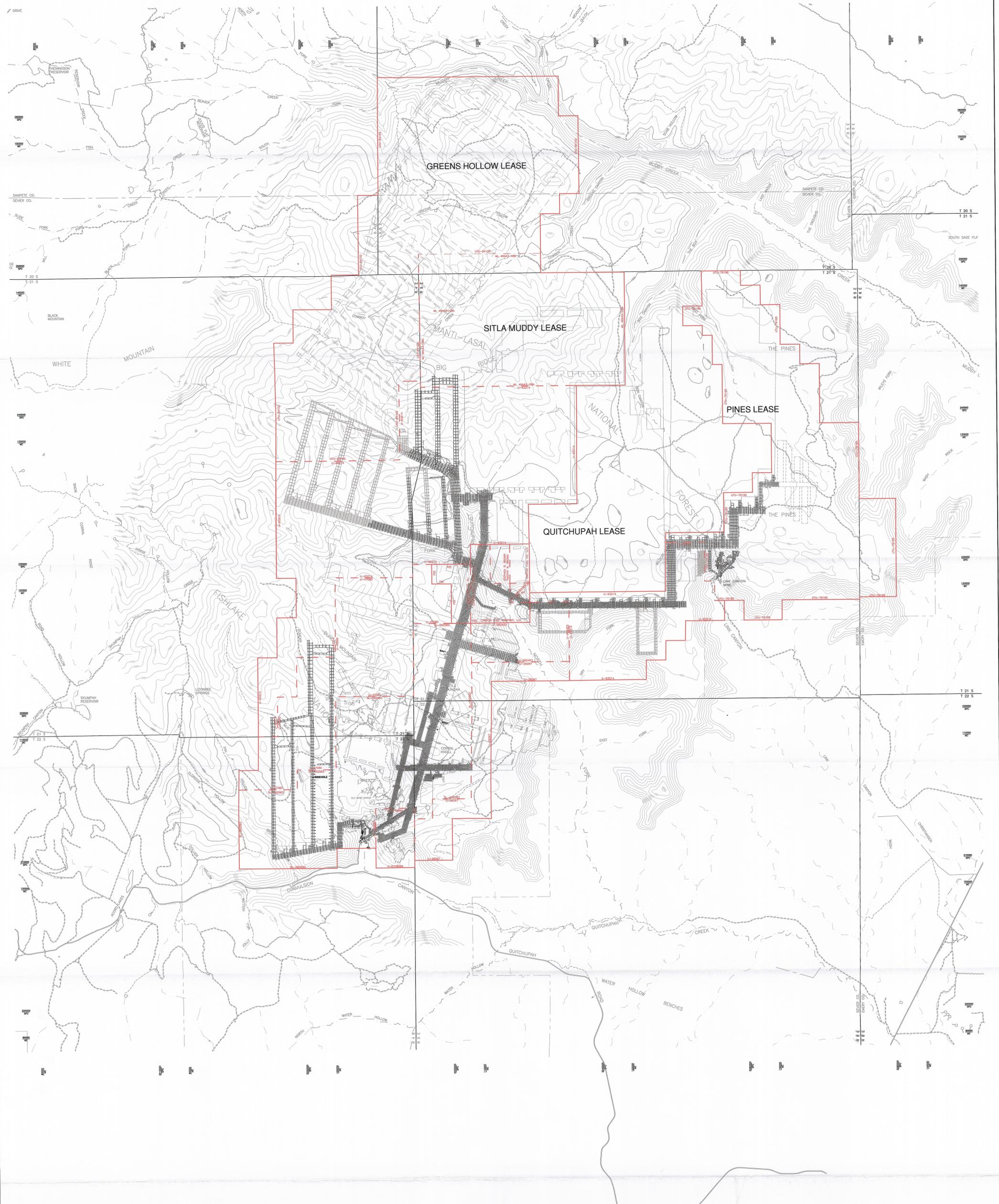
REVISIONS				
NO.	DATE	REQ. BY	DWG. BY	REMARKS
1	08/13/09	MKS	KSB	
2	07/15/2014	VA	J.C.C.	ADD GREENS HOLLOW & SOUTH FORK LEASE BOUNDARIES
3	4/18/2017	VA	B.R.	GREENS HOLLOW
4	10/18/2017	B.B.	B.R.	ADD 484E PANEL

RECEIVED  
OCT 2 8 2017  
DIV. OF OIL, GAS & MINING

Canyon Fuel Company, LLC  
SUFCO Mine  
597 South SR 24 - Sallis, UT 84654  
(435) 286-4800 Phone  
(435) 286-4439 Fax

**POTENTIAL SUBSIDENCE LIMITS  
SITLA MUDDY & GREENS HOLLOW TRACT**

SCALE: 1" = 1000'  
DATE: 08/13/09  
DRAWN BY: JWS  
ENGINEER: JWS  
SHEET NO.: 5-10  
FILE NAME: H:\DRAWINGS\MPP\PLATES\PLATE 5-10.dwg

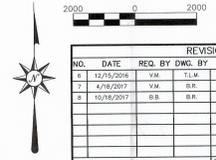


**EXPLANATION**

- SUFCO EXTERIOR LEASE BOUNDARY
- - - - SUFCO INTERIOR LEASE BOUNDARY
- MINE COORDINATES
- STATE PLANE COORDINATES



I CERTIFY THE ITEMS SHOWN ON THIS DRAWING ARE ACCURATE TO THE BEST OF MY KNOWLEDGE



REVISIONS			
NO.	DATE	REQ. BY	DWG. BY
1	12/15/2016	J.M.	T.L.M.
2	4/18/2017	J.M.	B.B.
3	10/18/2017	B.B.	B.B.

**Canyon Fuel Company, LLC**  
**SUFCO Mine**  
 597 South 150th 24th - St. George, UT 84654  
 (435) 286-4880 Phone  
 (435) 286-4499 Fax

**OVERBURDEN ISOPACH MAP**

PEN. NO.	DATE	SCALE	BY	CHECKED BY	SHEET NO.
#####	10/20/2017	1" = 2,000'	BOH/TRB	J.M.	5-11

RECEIVED  
 OCT 26 2017  
 DIV. OF OIL, GAS & MINING

**CHAPTER 6**  
**GEOLOGY**

### **LIST OF PLATES**

#### Plate

- 6-1 Geology and Drillhole Location Map With Proposed Drill Holes
- 6-2 Geologic Cross Section A-A'
- 6-3 Geologic Cross Section B-B'
- 6-4 Geologic Cross Section C-C'

### **LIST OF APPENDICES**

(Appendices appear in Volume 6)

#### Appendix

- 6-1 Drill Logs (Confidential)
- 6-2 Chemical Analyses
- 6-3 Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining
- 6-4 4 East Panels (Confidential)

The Applicant has a Resource Recovery and Protection Plan (R2P2) on file with the Bureau of Land Management. This R2P2 contains a detailed description of the two mineable coal seams on the SUFCO Mine leasehold. The overlying Duncan Seam is not considered mineable (see Section 5.2.2).

There is a plugged and abandoned gas well located in Section 23, T21S, R5E in the Pines Tract. No other oil or gas wells are known to exist within a quarter mile of the mine area. No other water wells have been drilled in the lease area except those drilled by the applicant for the purpose of monitoring the groundwater.

#### **4 Right 4 East Panel(s)**

The 4R4E panel is located within Lease U-63214 which is referred to as the Quitchupah Tract. This tract is located within the southern region of the Wasatch Plateau which lies within the Basin and Range-Colorado Plateau Province. The topography of the tract consists of a flat plateau that is deeply dissected by narrow canyons. The coal seams crop out in the southeastern portion of the tract along the steep escarpments of Quitchupah Canyon, Dry Fork Canyon, East Fork Canyon and Link Canyon. The 4R4E panel is located in Dry Fork Canyon. See Appendix 5-14, Plate 5-6, and Plate 5-7 for the 4R4E mine plan, lease locations, and mine timing respectively. Mining will occur only in the Upper Hiawatha coal seam. Overburden ranges approximately from 300-900 feet. The projected subsidence across the 4R4E panel ranges from 1-5 feet and the projected average subsidence is approximately 2 feet. See the 4R4E Projected Subsidence Map in Appendix 6-4.

#### **6.2.3 Geologic Determinations**

The information required by UDOGM to make a determination of the acid or toxic forming characteristics of the site strata is presented in Section 6.2.4.3 of this M&RP.

The information required by UDOGM to make a determination as to whether the reclamation plan, described in Section 5.40, can be accomplished is presented in Section 6.2.4.

The information required to prepare the subsidence control program is addressed in Section 6.2.4.

**Geomorphology.** The Old Woman Plateau is a gently rolling plateau which is dissected by canyons incised by Quitchupah Creek and its tributaries (Plate 6-1). These canyons are steep-walled and adjacent plateau areas are capped by the Castlegate Sandstone. In the southern part of the mine area, there are areas on the plateau where the nearly flat-lying bedrock forms the surface of the plateau. This structural plain feature is common in the Colorado Plateau. There are also erosional remnants above the plateau surface such as Duncan Mountain and Little Duncan Mountain that are comprised of the Price River Formation and the North Horn Formation. Range terraces were developed on one of the slopes of Little Duncan Mountain during the 1930's.

Tension cracks were developed during the 1970's near East Spring Canyon due to subsidence. These cracks are now mostly healed at the surface by the soil filling them in. Additional subsidence-related tensions cracks have formed within the Pines Lease. Those occurring in soil have healed over time, however, those occurring in the Castlegate Sandstone outcrop are still visible.

Quitichupah and Box Canyon Creeks are perennial and are supplied by springs and ephemeral streams.

**Surface and Groundwater Impact.** Surface and groundwater impact are discussed in Chapter 7 of this M&RP.

**Coal Geology.** The coal which is extracted from the SUFCO Mine occurs in the lower portion of the Blackhawk Formation of the Mesa Verde Group of rocks of Upper Cretaceous age. Doelling (1972) identifies the seam as being the Upper Ivie bed while the SUFCO Mine calls it the Upper Hiawatha. The Blackhawk is overlain by the Price River Formation, including the Castlegate Sandstone, and is underlain by the Star Point Sandstone, all being members of the Mesa Verde Group.

The Upper Hiawatha coal seam has quite uniform thickness from southwest to northeast as shown in the Cross-Sections (Plates 6-2, 6-3 and 6-4). North and west of section 7, T22S, R5E, the thickness is also uniform and averages approximately 15 feet. Drillhole information (Appendix 6-1)

and Spieker (1931) indicate that the coal thins from Section 7 toward Convulsion Canyon to the southeast. Drillhole data show 6.3 feet of coal in Section 7.

The as-mined quality of the Upper Hiawatha coal seam averages 11,400 BTU, 9.4% ash, 9.5% moisture, 38% volatile matter and 44% fixed carbon.

The Duncan Coal Seam will not be mined as a part of the SUFCA Mine operations because it is discontinuous and has insufficient minable reserves. The Lower Hiawatha Coal Seam will only be mined in the western portion of the Quitcupah lease because this is the only area where the coal is thick enough to mine and there is sufficient interburden between the Upper and Lower Hiawatha seams to allow mining. The Lower Hiawatha seam may also occur in minable thickness at the northern edge of the SITLA lease but it is not currently under lease (only the Upper Hiawatha seam is under lease).

**Cross-Sections, Maps and Plans.** The cross-sections and maps are discussed in Section 6.2.4 and are located at the end of this chapter. The applicant request's that this information remain confidential.

**Drill Logs and Chemical Analyses.** See Section 6.2.4.3 and Appendices 6-1 and 6-2. The applicant requests that this information remain confidential and that public access to these sections be limited to only persons with an interest which is or may be adversely affected as provided under Section 40-10-10(4) of the Act.

#### **6.2.4.2 Test Boring and Drillhole Data (overburden removed)**

SUFCA Mine does not plan to remove any overburden above the coal seam to be mined. Regulations related to overburden removal do not apply to this M&RP.

#### **6.2.4.3 Test Boring and Drillhole Data (overburden not removed)**

The drill logs and chemical analyses required by regulations R645-301-624.310 through R645-301-624.330 are presented in Appendices 6-1 and 6-2.

**Lithologic Logs.** Lithologic logs of drillholes are presented in Appendix 6-1. The applicant requests that this information be kept confidential and that public access to these sections be limited to only persons with an interest which is or may be adversely affected as provided under Section 40-10-10(4) of the Act.

**Acid, Toxic, and Alkaline Chemical Analyses (above and below the coal seam).** Chemical analyses for acid- and toxic-forming and alkalinity-producing materials from the waste rock disposal site and roof and floor rock material from drill cores is presented in Appendix 6-2. Using Table 2 in the Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining (Appendix 6-3), only two unacceptable values have been reported. Samples of material placed in the waste rock disposal site are taken regularly and analyzed quarterly and are considered to be representative of the coal, roof, floor, and partings. The boron concentration of the waste rock disposal site sample taken in the second quarter of 1991 exceeds the acceptable level of 5.0 ppm by only 0.44 ppm; therefore, this boron value is not of significant concern. Secondly, the SAR value of 19.30 for the Upper Hiawatha coal seam in drillhole 89-20-2 is unacceptable. However, as there have been no other unacceptable SAR values since this sample was taken, it is probably due to contamination, lab error or sampling error. Analytical results of all other samples are acceptable.

**Acid, Toxic, and Alkaline Chemical Analyses (coal seam).** The chemical analyses discussed above are also representative of the coal seam mined. Additionally, analyses of pyrite and sulfur forms have been performed on roof, parting, and floor samples taken from various core holes. The results of these analyses are reported in Appendix 6-2.

**Properties of Rocks in Room and Pillar Areas.** Room and pillar mining is now only used in the stream buffer zones and beneath escarpments to prevent subsidence. Pillars are not removed in these areas.

The clay content of floor and roof rock samples from two drill holes was determined analytically (see Appendix 6-2) but otherwise clay content is based on description of cores. The lithology of

## **6.30 Operation Plan**

### **6.3.1 Casing and Sealing of Exploration Holes**

The information addressing regulations for casing and sealing of exploration holes is found in Section 7.6.5 of this M&RP. This includes both the temporary and permanent casing and sealing of exploration holes. The applicant believes all exploration boreholes that have not been used for piezometers have been plugged properly prior to abandonment as required by the regulatory authority. This plugging was the final step in the drilling process prior to abandonment of the well.

### **6.3.2 Subsidence Monitoring**

Subsidence and subsidence monitoring points are discussed in detail in Section 5.2.5 of this M&RP. The extent of the subsidence is shown on Plate 5-10. Subsidence monitoring is performed on an annual basis and the results of the monitoring are reported in the annual report.

Surface cracking related to mine subsidence has occurred above the existing mine workings at the Sufco mine. The cracks are surveyed and illustrated on the Mine Subsidence Map included in the annual report. Subsidence cracks that form due to mining generally occur over mined panels and above the inside edges of the gateroads. Where the overlying topography is relatively flat, such as in the Pines tract, cracks will form in the soils and bedrock parallel, sub-parallel and perpendicular to the long axis of the panel. In this type of area, the cracks will typically have minimal aperture and minor vertical offset. Subsidence in areas of the Quitcupah and Pines Tract where a deep drainage with steep canyon walls capped by Castlegate Sandstone exist, cracks have formed parallel to the drainage rim and may or may not be parallel to the axis of the panel. Occasionally, these cracks remain open after subsidence is complete. Sufco has repaired several cracks on the rim above the East Fork of Box Canyon where it was determined they presented a safety hazard.

Where bedrock is exposed at the surface and the local joint pattern is evident, subsidence fractures appear to be parallel or sub-parallel to the orientation of the panel. The cracks typically form an en echelon pattern on either side of the joint and may intersect with the joint. After the crack intersects the joint, it will travel within the joint itself for a short distance. However, the crack will

reappear in the bedrock again outside of the joint as the en echelon pattern continues. In the Pines Tract and Quitchupah areas, jointing generally does not appear to have significant effect on the location or propagation of subsidence related fractures. Exceptions to this occur where the Castlegate Sandstone has been subsided at or near the rim of steep drainages or canyons. In these areas, large blocks of sandstone have been observed to rotate toward the drainage during subsidence. Often, after subsidence is complete, the blocks remain at their new attitudes leaving an opening between the block and the in-place sandstone. Where the aperture is deemed hazardous, Sufco has backfilled the openings.

Subsidence in the Muddy tract area will occur in the Price River and North Horn Formations. Because these formations consist of ledge/slope forming interbedded sandstone, siltstone, shale and limestone and are typically overlain by a mantle of soil, little bedrock is exposed at the surface. Therefore, it would be difficult to determine the relationship of subsidence crack formation and bedrock jointing. It would be appropriate to assume, however, that subsidence cracks will form in this tract similarly to those found in the previously mined and subsided areas of the Sufco mine.

### **6.3.3 Exploration Drilling**

The purpose of exploration drilling is to obtain stratigraphic and coal quality information to make for more accurate mine planning and maintain a high level of miner safety. The exploration area is located within the current mining lease boundary of Permit C/041/0002 as shown on Plate 6-1. The SUFCA Mine is planning to drill approximately 10 drill holes over the next 5 years. In the case of the SITLA lease, drilling will be conducted as approved under a Division-approved Minor Coal Exploration Permit. As in the past, drilling on federal leases with USFS administered surface will continue to be permitted through the BLM Exploration Plan process. The SUFCA Mine understands that UDOGM, the BLM, and the USFS all have a important roles in approval of drilling and will continue to work diligently to ensure requirements of all involved agencies are met prior to conducting surface exploration work.

Drill site preparation, drilling, and final reclamation work will last approximately two weeks per year. Reclamation will be concurrent with drilling to minimize the duration of the project.

**CHAPTER 7**

**HYDROLOGY**

## LIST OF PLATES

### Plate

- 7-1 (Revisions have eliminated this plate)
- 7-2 Surface and Groundwater Rights - Quitchupah Tract
- 7-2B Surface and Groundwater Rights - Pines Tract & SITLA Muddy Tract
- 7-3 Hydrologic Monitoring Stations
- 7-4 Sedimentation Pond Topography
- 7-4A Overflow Pond Topography
- 7-5 Sedimentation Pond Cross Sections
- 7-5A Overflow Pond Cross Sections and Details
- 7-5B Overflow Pond Details
- 7-5B Overflow Pond Details
- 7-6 East Spring Canyon Drainage Details
- 7-7 (Revisions have eliminated this plate)
- 7-8 Watersheds Draining to The East Spring Canyon Surface Facilities
- 7-9 Link Canyon Watershed

## **7.20 Environmental Description**

### **7.2.1 General Requirements**

This section presents a description of the premining hydrologic resources within the permit area and adjacent areas that may be affected or impacted by the proposed coal mining and reclamation operation.

### **7.2.2 Cross Sections and Maps**

#### **7.2.2.1 Location and Extent of Subsurface Water**

Groundwater occurs in perched zones of limited areal extent within the lease area. The PHC studies conducted by Mayo and Associates (Appendix 7-17 and Appendix 7-18) have determined that none of the formations down through the Blackhawk support a continuous aquifer. According to Mayo's research all of the aquifers within the permit area and adjacent areas are perched and discontinuous so it is not possible to represent a potentiometric surface for the area.

Seasonal variations in well water levels are discussed in Section 7.2.4.1.

#### **7.2.2.2 Location of Surface Water Bodies**

A map showing the location of surface water bodies (such as streams, ponds, and springs) for which water rights exist or for which there are pending water rights applications is provided as Plate 7-2. A listing of water rights data (names, locations and ownership) is presented in Appendix 7-1. Other than for the indicated springs, no water rights exist for groundwater in the permit and adjacent areas.

#### **7.2.2.3 Locations of Monitoring Stations**

Surface water and groundwater monitoring stations associated with the SUFCO operation are located as shown on Plate 7-3. Approximate surface elevations of the monitoring stations are also indicated on Plate 7-3.

#### **7.2.2.4 Location and Depth of Water Wells**

No water-supply wells exist in the permit or adjacent areas. Groundwater monitoring wells in the area are located as shown on Plate 7-3. Depths of these wells and other completion details are summarized in Table 7-1.

#### **7.2.2.5 Surface Topography**

Surface topographic features in the permit and adjacent areas are shown on the base maps used for Plate 7-3.

### **7.2.3 Sampling and Analysis**

All water samples collected for use in this M&RP have been analyzed according to methods in either the "Standard Methods for the Examination of Water and Wastewater" or 40 CFR parts 136 and 434. Where feasible, these same references have been used as the basis for sample collection.

### **7.2.4 Baseline Information**

Surface water, groundwater, and climatic resource information is presented in this section to assist in determining the baseline hydrologic conditions which exist in the area of the mine. This information provides a basis to determine if mining operations have had, or can be expected to have, a significant impact on the hydrologic balance of the area.

#### **7.2.4.1 Groundwater Information**

This section presents a discussion of baseline groundwater conditions in the mine area. A discussion of the groundwater conditions in the SUFCO lease area is presented in this section and appended by Appendix 7-17. A discussion of groundwater conditions in the Pines Tract is presented in Appendix 7-18 of this Chapter. A discussion of groundwater conditions in the West Coal Lease Modifications is presented in Appendix 7-24 of this Chapter. A discussion of groundwater conditions at the waste rock disposal site is provided in Volume 3 of this M&RP. The locations of wells and springs in the mine area are presented on Plate 7-3. The wells in the mine area are all water monitoring wells, not water supply wells. Water rights for the mine and

adjacent areas are addressed in Section 7.2.2.2 of this M&RP. With the exception of the potable use of source 94-87 by SUFACO, all other groundwater use (seeps and springs) is confined to stock watering. The hydrology in the area of the 2RWL sinkhole are discussed in the PHC located in Appendix 7-24.

Castlegate Sandstone. The Castlegate Sandstone consists of an estimated 120 to 260 feet of medium to coarse-grained sandstone with a few thin interbedded mudstones or shales near the base. The sandstone is conglomeratic, forms prominent cliffs along the outcrop, and is well cemented with calcarious cement.

A limited number of springs issue from the Castlegate Sandstone in the Quitcupah lease area, with flow generally less than 1 gpm. In the Pines Tract area, several springs issue from and near the base of the Castlegate Sandstone. The waters from these springs feed the Main Fork and East Fork of Box Canyon Creek. Base flow from these springs is generally less than 1 to 2 gpm with a few flowing at rates of 5 to 6 gpm.

Based on information from the exploration drill holes and observation wells in the lease area, the Castlegate Sandstone contains small quantities of groundwater. No significant quantities of groundwater (more than 2 gpm) were encountered in any of the exploration holes nor was groundwater identified in all drill holes.

Of the observation wells completed in the Castlegate Sandstone in the lease area, two (US-77-9 and 89-16-1W) have been dry during their entire period of record. Two additional wells (US-77-8 and 89-20-2W) have only a brief period of record (due to lack of water or time since installation, respectively). Hydrographs of the remaining two Castlegate Sandstone observation wells (US-80-2 and US-80-4) are presented in Figure 7-2. Water-level data for all wells are provided in Appendix 7-3. Seasonal fluctuations of groundwater levels in these wells have typically been less than one foot.

Coal exploration holes drilled in and near the Pines Tract by the USGS, have geophysical logs indicating similar conditions for the Castlegate Sandstone. Exploration Hole W-TP-4-EW found fluids present at a depth of 82 feet below ground surface, within the Castlegate Sandstone.

averaged 0.11 and 0.01 mg/l, respectively. None of the chemical data have exhibited consistent seasonal trends.

Historical data collected from stations SUFCA-047 and SUFCA-062 are considered representative of the Blackhawk-Star Point aquifer. Although station SUFCA-047 consists of seepage collected from alluvium and used for the mine domestic water supply, it is regarded as being fed by outflow from the adjacent Blackhawk-Star Point aquifer. Station SUFCA-062 represents inflow to the mine from the surrounding Blackhawk Formation.

Groundwater from these two sources is a calcium bicarbonate type, with historical TDS concentrations averaging 373 to 492 mg/l and pH values averaging 7.2 to 7.5. Between the two sources, average total iron concentrations range from 0.08 to 0.15 mg/l while average dissolved iron concentrations are both equal to 0.02 mg/l. Total manganese concentrations average 0.05 to 0.06 mg/l between the two sources, while dissolved manganese concentrations average 0.02 to 0.05 mg/l. The data have not exhibited consistent seasonal trends.

As a general point of comparison, the ground water quality analyses were compared to the primary drinking water standards (40 CFR 141) and the secondary drinking water standards (40 CFR 143).

These comparisons indicate that there were no exceedances of the primary drinking water standards for any of the groundwater samples. Exceedances of the secondary drinking water standards were found in groundwater samples only for sulfate and TDS concentrations (with recommended standards of 250 mg/l and 500 mg/l, respectively). All of the sulfate exceedances and most of the TDS exceedances occurred in groundwater collected from monitoring wells at the waste-rock disposal site. These exceedances are probably due to the natural dissolution of marine salts known to exist in the local strata (Waddell et al., 1981).

**4R4E Panel** - The area of the panel was initially surveyed for surface and ground water resources in the late 1980's and early 1990's to provide information for the USFS and BLM Environmental Assessment of the Quitcupah Lease (U-63214) and the US Geological Survey Water Resources Investigation Report 90-4084. In 2017 a walking survey of the surface above and immediately

adjacent to the panel was done to locate surface and groundwater sources. There were no surface or groundwater sources identified in any of the surveys. Several exploration wells were drilled, in 2017, water was not encountered during the drilling. However, there is an established natural pond approximately 3/4 mile northwest of the panel in T21S, R5E, Section 28.

#### 7.2.4.2 Surface Water Information

##### WATER QUANTITY

Major surface drainages in the permit and adjacent areas are depicted in Figure 7-4. As indicated, the lease area exists entirely within the Muddy Creek watershed. Most of the lease area drains southward into Quitchupah Creek via the North Fork of Quitchupah Creek and various ephemeral tributaries. Quitchupah Creek flows southeastward into Ivie Creek which in turn flows eastward into Muddy Creek. The northeast portion of the lease area, including the majority of the Pines Tract, drains into Muddy Creek via Box Canyon.

Based on flow data obtained during the collection of water-quality samples, the following streams are considered perennial within the lease area:

- North Fork of Quitchupah Creek (as measured at stations SUFCA-007 and SUFCA-042)
- South Fork of the North Fork of Quitchupah Creek (as measured at station SUFCA-006)
- Quitchupah Creek (as measured at stations SUFCA-041 and SUFCA-046)
- Box Canyon, including East Fork Box Canyon (as measured at stations SUFCA-090, Pines 403, Pines 407 and Pines 408)
- Muddy Creek (as measured at stations Pines 405 and Pines 406)

Figure 7-6, it is estimated that long-term discharge of groundwater from the mine will average approximately 2.6 cfs (1,200 gpm).

It should be noted that the discharge of mine water to a stream probably results only in a local increase in flow and not a basin-wide increase. As noted on Plate 6-1, the Mancos Shale outcrops in the North Fork of Quitchupah Creek just upstream from the mine-water discharge point and in Quitchupah Creek above the confluence with East Spring Canyon. The shales of this formation have a low permeability (Waddell et al., 1981), thus forcing groundwater to the surface as streamflow. Thus, although the discharge of water from the mine may result in a local loss of groundwater and gain in surface water, this discharge does not disrupt the hydrologic balance of the basin.

The long-term mean mine discharge to North Fork Quitchupah Creek is 980 gpm and discharge varies between 460 and 1760 gpm. The mean upstream flow during high-flow conditions (June) is 2,650 gpm and during low-flow conditions (October) the flow is 290 gpm. Thus, mine discharge represents a mean increase in creek discharge of 37% and 337% for June and October, respectively. The mean low flow discharge measured at site 042, 5 miles downstream from the mine discharge point, is 950 gpm. This suggests that the lower reaches of North Fork Quitchupah Creek could go dry in late summer and early fall without the contribution of mine water to the stream.

Subsidence has occurred in the lease area (Plate 5-10). More subsidence is expected to occur in the future as longwall mining progresses. Fractures that remain open or fill with permeable material would locally increase the hydraulic conductivity of the strata. However, when tension fractures intercept mudstones or shale units that contain bentonitic or montmorillonite clays, these fractures become sealed, stopping vertical flow (Thiros and Cordy, 1991). When tension fractures intercept strata that are more brittle or less amenable to sealing by clays, such as the Castlegate Sandstone, these fractures will heal naturally by filling in with silt and organic material such as sticks, pine needles, pine cones, and pine cone fragments. This natural healing could take longer to seal the cracks with the potential to impact water resources for a period of time. A discussion of the potential impacts to water resources due to subsidence is provided in Section 7.2.8.3 of this

M&RP and in Appendix 7-17. DeGraff (Appendix 5-4) indicates that tension cracks in the lease area typically heal quickly. There are no sustained above normal inflows in the mine due to mining or subsidence. Thus, most fractures in the lease area appear to become sealed in a relatively short period of time. Intersection of locally perched aquifers by subsidence cracks could divert groundwater from a spring. Water will not be lost from a specific basin, but may become diverted within the basin.

The discharge from the abandoned Link Canyon Mine was to be maintained during and after utilization of the western portal for Sufco Mine access. The water naturally discharging from the abandoned mine is not considered to be a UPDES mine discharge point by the Utah Division of Water Quality so long as the water is not contaminated or comes in contact with Sufco mining related activities. The initial plan by Sufco was to maintain the flow of water from the flooded old works to the abandoned eastern portal and out the rehabilitated western portal. However, when the old works were accessed, both from inside the Sufco Mine and the surface, very little water was encountered and the old works did not appear to be flooded. The majority of water encountered during rehabilitation efforts was located just inside the western portal. A small pond of water had formed behind a roof fall in the old mine. It was apparent that shallow ground water or surface water entered the mine just in by the portals and upgradient of the roof fall, forming the small pond. Once the roof fall was removed and the water drained, water ceased discharging from the western portal. The volume of water discharging from the eastern portal area also appeared to decrease. It further appears that most of the water that currently seeps into the old workings near the portal evaporates before it can accumulate and discharge out the western portal. Small volumes of runoff and ground water still accumulates in the eastern portal area and can be seen in the spring and fall discharging over the rock ledges below the portal.

The riparian vegetation in the area of the Link Canyon portals is feed not only by the discharge from this portal but also by subsurface flow discharged by springs above the mine in the Castlegate Sandstone. Thus, the riparian vegetation above and below the west portal was sustained during site construction by subsurface flows from the upgradient springs and flows from the east portal.

**Sedimentation Pond Sludge Plan.** Sludge contained in the sediment ponds will be cleaned from the ponds and temporarily stockpiled upstream of the pond to allow water to drain from the sludge back into the pond. The sludge will be sampled for acid and toxic forming substances prior to be transported to the waste rock disposal site. Sedimentation pond sludge will be incorporated into the fill as described in Part 3.2.6 of Volume 3.

### 7.3.1.2 Water Monitoring

**Groundwater Monitoring.** Groundwater monitoring is proposed to be conducted in the SUFCO permit and adjacent areas according to the water monitoring plans presented in Tables 7-2 through 7-5A and for the rock waste disposal site in Section 4.7.2 in Volume 3 of this M&RP. These tables are based on the studies done by Mayo and Associates (Appendices 7-17 and 7-18) and supersede previous plans.

The location of the monitoring points are presented on Plate 7-3. The location of the monitoring wells for the rock waste disposal site are presented on Map 2, Volume 3 of this M&RP. The monitoring plans were developed based on information presented in the PHC determinations, the baseline hydrologic data, and the geology chapter of this M&RP.

The monitoring programs provide data that are reviewed and compared to the baseline data. Any significant changes are evaluated to determine their impact on the hydrologic balance. These comparisons have taken the form of reports prepared by Hydrometrics early in the permit term (1978-1987). Results of these evaluations are submitted periodically to the UDOGM. The annual Water Quality Report submitted to the Division contains the monitoring data.

Baseline data collected for the Pines Tract area included performing field surveys to identify existing springs. Additionally, springs identified in the USGS publication "Hydrology and Effects of Mining in the Quitcupah and Pines -Coal Lease Tracts, Central Utah" (Thiros and Cordy, 1991) were searched for and, when found, included in the baseline survey. Those springs identified and found within the Pines Tract in the above referenced publication are labeled on Plate 7-3 with the

exclusively the product of bicarbonate and carbonate alkalinity. Both bicarbonate and carbonate alkalinity are included in the operational monitoring plans. Contributions to alkalinity from hydroxide, silicate, borate, and organic ligands are trivial.

- Mayo did not include dissolved iron and dissolved manganese in the operational monitoring plan because iron and manganese do not readily exist in dissolved form in basic ( $\text{pH} > 7$ ) waters but exist instead as hydroxide complexes. All waters in the lease area are basic. Measurements of total iron and manganese quantify both the dissolved and complex forms of these elements.

Equipment, structures, and other devices used in conjunction with monitoring the quality and quantity of the surface water in the permit and adjacent areas have been installed, maintained, and operated in accordance with accepted procedures. This equipment will be removed by SUFCO when no longer needed.

#### Stock Water Ponds

Several stock watering ponds are located in the Pines Tract and Quitchupah Lease area. Surface cracking due to mining related subsidence within the Quitchupah Lease has apparently adversely affected a few of the ponds. Action has been taken by SUFCO in the past to mitigate the damage, including applying bentonitic seals to the pond floors and hauling water for livestock. However, ranchers and State and Federal agencies have erroneously claimed that subsidence has adversely affected several ponds outside of the mining areas. In order to more adequately monitor the effects of mining on the stock watering ponds, SUFCO has been negotiating with DOGM, USFS, and the local rancher's association to create a workable monitoring plan for the ponds that can be agreed upon by all participants. DOGM has taken the lead in this process, and as of May 2000, a plan had not yet been finalized. In the interim, SUFCO commits to visiting the ponds within the Pines Tract and Quitchupah Lease area as soon as they are accessible in the spring of each year (typically late April to early May), photographing the condition of each pond, observe the pond for evidence of cracking, estimate

the depth and surface area of water contained in the pond, inspect the immediate drainage area for evidence of surface cracking, note general soil moisture conditions, and note the general condition of the pond. Additional monitoring visits will be made in the late summer (late July to early August) and in the fall (late September to early October) of each year. This information will be kept on file at the mine.

It is assumed a new monitoring plan can be agreed upon by the State, USFS, and rancher's association and will be in place prior to the end of 2000. This plan will include the aforementioned monitoring efforts, as well as determining the functionality and water holding capacity of each potentially affected pond and the determination of the water shed area for each pond. Mitigation requirements in the event of proven mine related effects will also be agreed upon as part of the new monitoring plan.

#### East Fork of Box Canyon Monitoring and Mitigation Plan

Sufco anticipates undermining and subsiding a portion of the East Fork of Box Canyon beginning in November of 2003 when the mine starts longwalling panel 3LPE. Additional subsidence under the East Fork will occur when the 4LPE panel is mined in 2005. A surface and ground water monitoring and mitigation program more intensive than the general monitoring plan described previously in this Section will be initiated in this area prior to subsidence occurring within the 15-degree angle-of-draw of the stream channel. This monitoring program has included conducting a pre-mining subsidence survey of the East Fork of Box Canyon over the 3LPE and 4LPE panels that incorporated video taping the stream channel from Joe's Mill Ponds downstream to a point above the western-most gate road of the 3LPE panel. The purpose of the video will be to provide a visual record of the stream channel prior to subsidence. Fourteen sites were identified within the portion of the East Fork video taped where the monitoring of surface and/or ground water flows, channel width, channel substrate, vegetation, soils, and general geomorphology will occur. The general area in which these sites will be located are illustrated on Figure 7-8.

Stream monitoring sites will be monitored specifically for stream flow, channel width, channel substrate changes, and channel convergence. The geology of spring sources will be identified

The locations of water rights for current users of surface water flowing into, out of, and within the permit and adjacent areas is provided on Plate 7-2. Discharges associated with the permit and adjacent areas are located as presented on Plate 7-3.

The locations of each water diversion, collection, conveyance, treatment, storage, and discharge facility to be used in the East Spring Canyon area are presented on Plate 7-6. Similar information for the waste-rock disposal site is presented in Volume 3 of this M&RP. Similar information for the Link Canyon Substation No. 1 and No. 2 facility areas is presented on Plates 5-2D and 5-2E. Similar information for the Link Canyon Portal facility area is presented on Plate 5-2F.

Locations and elevations of each station to be used for water monitoring during coal mining and reclamation operations are presented on Plate 7-3.

The construction details and cross sections for the concrete sediment trap are located in the "Alternate #1 Drainage Facilities and Sediment Control Plan" (Appendix 7-8). The existing topography and cross sections for the primary sedimentation pond are located on Plates 7-4 and 7-5. The design topography and cross sections for the overflow pond are located on Plates 7-4A and 7-5A. The design topography and cross sections for the waste rock disposal site sedimentation pond are located in Volume 3 of this M&RP.

**Other Cross Sections and Maps.** Other relevant cross sections or maps are presented and discussed in Chapter 5 of this M&RP.

#### **7.3.1.8 Water Rights and Replacement**

Ground and surface water rights do exist within the Sufco Mine lease area. Mitigation has been performed at stock pond locations where claims have been made that the available surface water has been impacted by subsidence. Mitigation at these locations has been performed by the placement of bentonite in the bottom of stock ponds and by hauling replacement water to the ponds for livestock use during summer months.

The Permittee will mitigate and replace the water supply of any land owner or adversely affected State appropriated water if such a water supply proves to be contaminated, diminished or interrupted as a result of mining operations. First, a determination will be made by the Division in accordance with R645-301-731.800 as to whether or not material damage has occurred. Then, in accordance with Regulation R645-301-525.510, the operator will correct any material damage resulting from subsidence caused to surface lands (which includes water rights), to the extent technologically and economically feasible. Negotiations will be held immediately with the impacted party to determine the appropriate mitigation activities. The restoration of water flows to impacted sources will be accomplished using the Best Technology Currently Available (BTCA). These activities may include, but not necessarily be limited to: piping or trucking water to the location of the loss; sealing surface fractures to prevent further losses (i.e., stream floors on bed rock or in shallow alluvium), and; construction of a ground water well and the installation of pumps to restore flows. If the above efforts are not successful, then the operator will explore the transferring of water rights to the injured party in flow equal to the determined loss and/or monetary reimbursement for proven material damages.

The water supply in the East Fork of Box Canyon is of special concern to Sufco and the regulatory authorities. In an effort to protect the minimal surface flows in this area, an intense monitoring and mitigation plan will be implemented prior to full extraction mining taking place under the East Fork. If changes in the quantity and quality of the water in the East Fork are noted, the Division will be immediately notified. A determination of the amount of water, if any, that is lost due to mining activities will be made using surface and ground water flow and climatic data. If a loss of flow is confirmed, the loss will be addressed as described in the proceeding text of this section.

### **7.3.2 Sediment Control Measures**

The existing sediment control measures within the permit area have been designed, constructed, and maintained to prevent additional contributions of sediment to streamflow or to runoff outside the permit area. In addition, they have been designed to meet applicable effluent limitations, and minimize erosion to the extent possible.

Mining in the Trail Mountain Area, Central Utah. U.S. Geological Survey Water-Supply Paper 2259. Washington, D.C.

Mayo and Associates, 1997a, Investigation of surface and groundwater systems in the vicinity of the SUFCO Mine, Sevier County, Utah: Probable hydrologic consequences of coal mining at the SUFCO Mine and recommendations for surface and groundwater monitoring. Unpublished consulting report prepared for Southern Utah Fuel Company, 7 January 1997.

Mayo and Associates, 1997b, Probable impacts from longwall coal mining at the SUFCO Mine to the hydrologic balance of Box Canyon Creek, Sevier County, Utah. Unpublished consulting report prepared for Canyon Fuel Company, LLC, 1 December 1997.

National Weather Service. 1989. Climatological Data Annual Summary - Utah. volume 91, Number 13. National Oceanic and Atmospheric Administration. Asheville, North Carolina.

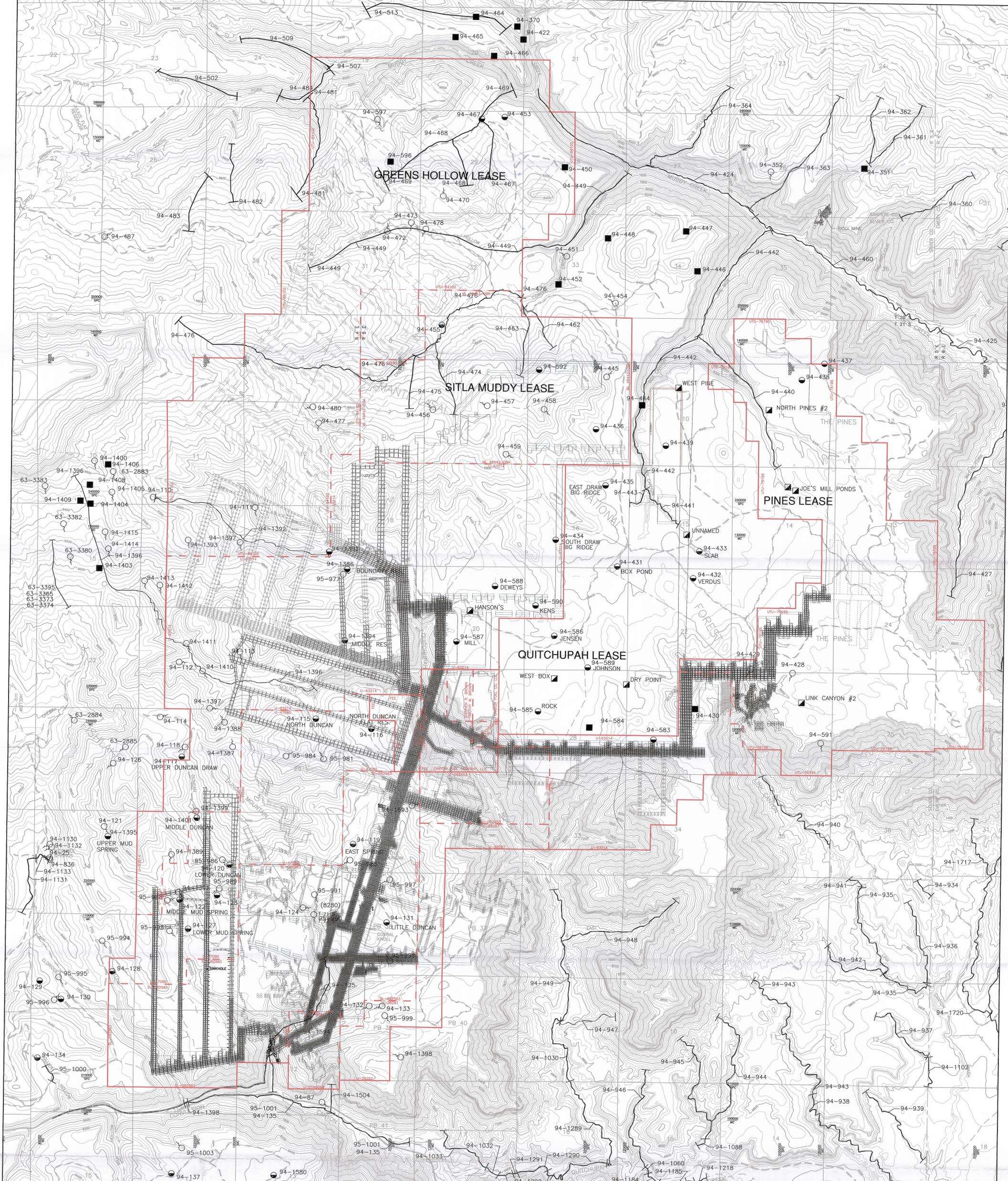
SUFCO. 1992. Chris Kravitz, SUFCO, personal communication with Mindy Rosseland, EarthFax Engineering. Salt Lake City, Utah.

Thiros, S.A. and Cordy, G.E. 1991. Hydrology and Potential Effects of Mining in the Quitchupah and Pines Coal-Lease Tracts, Central Utah. U.S. Geological Survey Water-Resources Investigations Report 90-4084. Salt Lake City, Utah.

Utah Division of Water Resources. 1977. Hydrologic Inventory of the Dirty Devil Study Unit. Utah Department of Natural Resources. Salt Lake City, Utah.

Waddell, K.M., Vickers, H.L., Upton, R.T., and Contratto, P.K., 1979. Selected hydrologic data, Wasatch Plateau-Book Cliffs coal fields area, Utah: Utah Basic-Data Release 31. Utah Water Resources. Salt Lake City, Utah.

Waddell, K.M., P.K. Contratto, C.T. Sumsion, and J.R. Butler. 1981. Hydrologic



**EXPLANATION**

- SUFCO EXTERIOR LEASE BOUNDARY
- SUFCO INTERIOR LEASE BOUNDARY
- MINE COORDINATES
- STATE PLANE COORDINATES
- WATER RIGHT SPRING
- RUNOFF CATCHMENT POND W/ WATER RIGHT
- RUNOFF CATCHMENT POND W/O WATER RIGHT
- SURFACE WATER RIGHT POINT TO POINT
- SURFACE WATER RIGHT NOTES:
- 1. SEE APPENDIX 7-1 FOR DETAILED LISTING OF WATER RIGHTS

QUITCHUPAH TRACT		
CATCHMENT PONDS WITH WATER RIGHTS NUMBER	CURRENT COMMON NAME USED BY USFS, CATTLEMEN AND OTHERS	OTHER HISTORICAL NAMES USED FOR CATCHMENT PONDS
94-115	NORTH DUNCAN RES.	
94-116	NORTH DUNCAN FLAT RES.	
94-117	UPPER DUNCAN DRAW RES.	
94-119	EAST SPRING RES.	
94-120	LOWER DUNCAN RES.	
94-122	MIDDLE MUD SPRING RES.	
94-123	SHORT HOLLOW RES.	
94-127	LOWER MUD SPRING RES.	
94-128	PA HOLLOW RES.	
94-129	ELDRIDGE HOLLOW RES. #1	
94-130	ELDRIDGE HOLLOW RES. #2	
94-131	LITTLE DUNCAN RES.	
94-134	COLLIER RES.	
94-137	JULY MILL POINT RES.	
94-430	UNNAMED RES.	LINK CANYON #1
94-431	UNNAMED RES.	BOX POND
94-434	UNNAMED RES.	SOUTH DRAW BIG RIDGE
94-435	UNNAMED RES.	EAST DRAW BIG RIDGE
94-436	UNNAMED RES.	
94-439	UNNAMED RES.	

QUITCHUPAH TRACT		
CATCHMENT PONDS WITH WATER RIGHTS NUMBER	CURRENT COMMON NAME USED BY USFS, CATTLEMEN AND OTHERS	OTHER HISTORICAL NAMES USED FOR CATCHMENT PONDS
94-444	UNNAMED RES.	
94-583	DRY POINT RES.	SEEPS POND
94-584	SEEPS RES.	ROCK POND
94-585	WHITE KNOLL RES.	JENSEN
94-586	BOX CANYON RES.	MILL POND
94-587	MILL RES.	DEWYS POND
94-588	DEWYS RES.	JOHNSON POND
94-589	SAGE CREEK RES.	JENSEN SAGE GRAZE POND
94-590	HENS RES.	
94-592	BIG RIDGE RES.	
94-1290	QUITCHUPAH RES. #1	QUITCHUPAH RES. #1
94-1304	MIDDLE RES.	
94-1305	UPPER MUD SPRINGS RES.	
94-1402	MIDDLE DUNCAN RES.	
94-1500	JULY MILL QUODDER RES.	



I CERTIFY THE ITEMS SHOWN ON THIS DRAWING ARE ACCURATE TO THE BEST OF MY KNOWLEDGE.



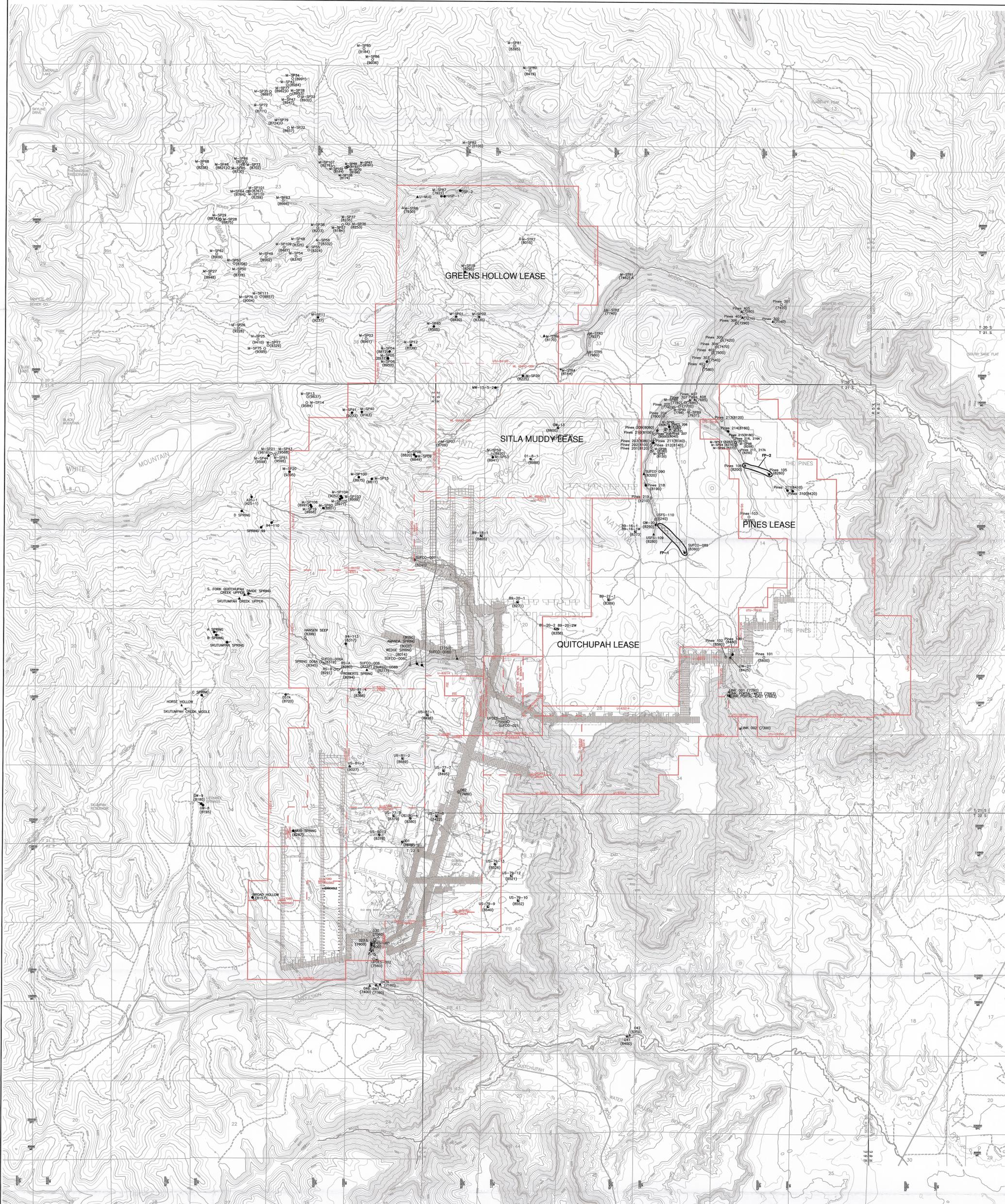
REVISIONS			
NO.	DATE	REQ. BY	DWG. BY
1	7/25/2016	J.G.C.	J.G.C.
2	4/18/2017	V.M.	B.R.
3	10/18/2017	B.B.	B.R.



**SURFACE AND GROUNDWATER RIGHTS-QUITCHUPAH TRACT**

PEN. TR.:	DATE:	SCALE:	DRAWN BY:	ENGINEER:	CHECKED BY:	SHEET NO.:
###	07/13/2016	1" = 1,500'	J.G.C.	V.M.	V.M.	7-2

RECEIVED  
OCT 26 2017  
DIV. OF OIL, GAS & MINING



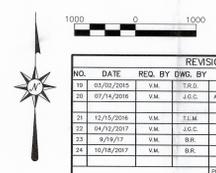
NOTES:  
 1. HISTORIC STREAM, SPRING AND WELL MONITORING SITES ARE OLD BASELINE MONITORING SITES OR SITES THAT HAVE BEEN DISCONTINUED OR MINED THROUGH THAT ARE NOT CURRENTLY BEING MONITORED.

**EXPLANATION**

- SUFCO MINE EXTERIOR LEASE BOUNDARY
- - - SUFCO MINE INTERIOR LEASE BOUNDARY
- 10000 MINE COORDINATES
- 10000 STATE PLANE COORDINATES
- △ HISTORIC STREAM
- ▲ STREAM MONITORING
- HISTORIC MONITORING WELL
- MONITORING WELL SITE
- HISTORIC SPRING MONITORING SITE
- SPRING MONITORING
- UPDES MONITORING POINT
- IN MINE MONITORING SITE
- (7600) ELEVATION OF SITE
- PERENNIAL FLOW LOCATION MONITORING POINT
- PERENNIAL FLOWS
- SPRING NOT MONITORED



I CERTIFY THE ITEMS SHOWN ON THIS DRAWING ARE ACCURATE TO THE BEST OF MY KNOWLEDGE.



REVISIONS			
NO.	DATE	REQ. BY	DWS. BY
12	03/02/2016	V.M.	J.D.C.
20	07/14/2016	V.M.	J.D.C.
21	12/15/2016	V.M.	S.L.M.
22	04/12/2017	V.M.	J.D.C.
23	07/19/17	V.M.	B.R.
24	10/26/2017	V.M.	B.R.

**Canyon Fuel Company, LLC**  
**SUFCO Mine**  
 597 South 200 W. • Solms, UT 84654  
 (435) 286-4500 Phone  
 (435) 286-4499 Fax

**HYDROLOGIC MONITORING STATIONS**

RECEIVED  
**OCT 26 2017**  
 DIV. OF OIL, GAS & MINING

PROJECT NO.:	DATE:	DRAWN BY:	ENGINEER:	CHECKED BY:	SHEET NO.
0000	10/26/2017	JMB/TTB	J.D.B.	V.M.	7-3
PROJECT NAME:	FILE NAME:				
HYDROWINGS\WRP\PLATES\PLATE 7-3.dwg					