C/041/002 Incoming

#5501

Canyon Fuel Company, LLC
A Subsidiary of Bowie Resources Partner, LLC

Sufco Mine
Kenneth E. May
General Manager
597 South SR24
Salina, Utah 84654
(435) 286-4400
Fax (435) 286-4499

July 27, 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
JUL 31 2017
DIV. OF OIL, GAS & MINING

Re: 3 Right 4 East Panel(s) Amendment, Task ID#5360, 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 more specific information for the 3 Right 4 East panel(s).

The 3 Right 4 East Panel(s) are located on existing leases U-63214 and U-62453 which are part of the Quitchupah Tract/Lease. Mining of this panel(s) will straddle Leases U-63214 and U-62453 which are referred to as the Quitchupah Tract/Lease throughout the M&RP in text, appendices and on drawings. Both leases were issued to the permittee in 1989, the tract was originally delineated in 1982. The mine plan is shown on Plate 5-7 and mining will occur only in the Upper Hiawatha coal seam. Overburden is approximately 900 feet or more. 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(s) 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. Jeff Jewkes reports that nest 795 was tended in 2014 and active in 2015 and tended in 2016. Mr. Jewkes did comment that the nest was difficult to see from the ground and that is the method used to survey this nest in the past years. The conditional use of the nest is thus to the best of the DWR visual vantage point. Copies of the confidential surveys are on file with the Division, two additional surveys done in 2017 are provided with this amendment.

The panel(s) have been approved for mining as included previously on Plates 5-7, 5-10A, 5-10C, 5-11, 7-2A & B, and 7-3. The orientation of the panel(s) has changed in this submittal.

Water data has been collected in the South Fork of Quitchupah Creek at monitoring site Sufco 06D above the panel(s) since 2012. Sufco monitoring site 007 above the panel(s) and site 042 below the panel(s) 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(s). Locations of monitoring locations are shown on Plate 7-3. A discussion of a study adjacent to the proposed mining panel is discussed in Section 7.2.8.3, the information from the study was submitted to the Division in the 1991 annual report.

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. Chapter 7 text discusses hydrologic information for the area of the proposed 3 Right 4 East panel(s).

There are several ponds, troughs and guzzlers north and east of the panel(s). 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.

Pagination will be adjusted to fit into the approved permit once the amendment has been reviewed and accepted for incorporation into the existing permit.

The application for the Eagle Take Permit has been submitted, an email from Linda Downey of the USFWS has been included with their potential schedule for issuing the permit (Appendix 3-15).

The archeological survey has been provided to Charmaine Thompson of the Manti-La Sal Forest for submittal to SHPO. A concurrence letter will follow the SHPO review.

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

CANYON FUEL COMPANY
SUFCO Mine

Vicky A Miller for

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: Sufco Mine **Permit Number:** C/041/0002
Title: Amendment to MRP to Address the Mining of the 3Right 4East Panel(s), Task ID#5360
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 four (4) review copies of the application. If the mine is on or adjacent to Forest Service land please submit five (5) copies, thank you. (These numbers include a copy for the Price Field Office)

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.

Jacob D. Smith
Print Name

Sign Name, Position, Date: Eng. Mgr., 7/27/17

Subscribed and sworn to before me this 27 day of July, 2017

Jacquelyn Nebeker
Notary Public

My commission Expires: _____, 20___}
Attest: State of _____} } ss:
County of _____

JACQUELYN NEBEKER
Notary Public
State of Utah
My Commission Expires 03/24/2018
COMMISSION NUMBER 681827

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining
		RECEIVED JUL 31 2017 DIV. OF OIL, GAS & MINING

Form DOGM- C1 (Revised March 12, 2002)

APPLICATION FOR COAL PERMIT PROCESSING
Detailed Schedule Of Changes to the Mining And Reclamation Plan

Permittee: Canyon Fuel Company, LLC
Mine: Sufco Mine **Permit Number:** C/041/002
Title: Amendment to MRP to Address the Mining of the 3Right 4East Panel(s), Task ID#5360

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

			DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
☒ Add	☒ Replace	☐ Remove	Chapter 1, Page 1-iii and add information to the back of Appendix 1-4
☐ Add	☒ Replace	☐ Remove	Chapter 2, Pages2-iv and 2-8
☒ Add	☐ Replace	☐ Remove	Chapter 2, add information to the back of Appendix 2-7
☐ Add	☒ Replace	☐ Remove	Chapter 3, TOC, Pages 3-9, 3-10, 3-12, 3-48A and 3-48B
☐ Add	☒ Replace	☐ Remove	Chapter 3, replace the Raptor drawing in Appendix 3-4
☒ Add	☐ Replace	☐ Remove	Chapter 3, Appendix 3-15- Raptor Reports
☐ Add	☒ Replace	☐ Remove	Chapter 4, Pages 4-7, 4-8 and 4-13- Yellow highlighting denotes significant change
☒ Add	☐ Replace	☐ Remove	Chapter 4,add information to the back of Appendix 4-2
☐ Add	☒ Replace	☐ Remove	Chapter 5, Pages 5-vi, 5-23 and 5-39G
☐ Add	☒ Replace	☐ Remove	Plates 5-2C, 5-7, 5-10** (replaces Plate 5-10A) and 5-11**
☐ Add	☒ Replace	☐ Remove	Chapter 6, Pages 6-iii and 6-4
☒ Add	☐ Replace	☐ Remove	Chapter 6, Appendix 6-4
☒ Add	☒ Replace	☐ Remove	Chapter 7, Pages 7-vii and 7-38F
☐ Add	☒ Replace	☐ Remove	Plates 7-2 (replaces Plate 7-2A)** and 7-3
☐ Add	☐ Replace	☐ Remove	
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Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.

July 27, 2017

** Plates were updated, approved and incorpated with Task ID# 5438

Received by Oil, Gas & Mining

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JUL 31 2017
DIV. OF OIL, GAS & MINING

CHAPTER 1

GENERAL CONTENTS

LIST OF APPENDICES

(Appendices appear in Volume 4)

Appendix

1-1 Legal Right-of-Entry Documents

1-2 Lease Documents

1-3 Newspaper Advertisement

1-4 Filing Fee Receipt

APPENDIX 1-4

Filing Fee Receipt

RECEIPT Date 19 July 1989 No 4289

Received From Southern Utah Fuel Company

Address

Dollars $ 5.00

For Quitchupah Fleece Addition Permit Fee

ACCOUNT			HOW PAID		
AMT. OF ACCOUNT			CASH	5 00	
AMT. PAID			CHECK		
BALANCE DUE			MONEY ORDER		

By Mereda Surbaugh Fitting

8K 816 REDIFORM®

This page revised as of July 27, 1989.

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)~~ Quitchupah Tract Supplemental Environmental Assessment 1989

2-8 Pines Tract Soils Types

2-9 Link Canyon Portal Vegetation, Aquatic Fauna, and Soil Investigations

2-10 Muddy Tract Soils Types

by volume. An organic matter value of 3.8%, a pH level of 7.48, and an EC of 6340 mmhos/cm characterize this soil horizon. Solubilities of Ca, Mg, and Na are 517, 279, and 317 ppm, respectively.

The basal soil horizon, Cca, a light brownish gray clay, typically extends to depths of 34 inches where bedrock is encountered. Cca is composed of 52% clay, 37% silt, and 11% sand. Rock fragments comprise 40% (10% gravel, 20% cobbles, 10% stones) of this horizon. Percent organic matter is only 1.7. PH and EC values are 7.87 and 9590 mmhos/cm, respectively.

Overflow Pond Soils

A general description of the soils located in the Overflow Pond area will be provided in Appendix 2-2.

Link Canyon Soils

A description of the soils located in the Link Canyon Substation Nos. 1 and 2 disturbed areas is provided in Appendix 2-6.

Link Canyon Mine Portals

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.

3 Right 4 East - Quitchupah Tract

The general description of the soils within in the Quitchupah Tract is provided in the Supplemental Environmental Assessment prepared by UDOGM October 27, 1989, included in Appendix 2-7. No surface disturbance as in the construction of facilities, etc. is associated with the mining of the 3 Right 4 East panel(s).

APPENDIX 2-7

Quitchupah Tract Supplemental Environmental Assessment 1989

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

October 27, 1989

Mr. Peter A. Rutledge, Chief
Division of Federal Programs
Western Field Operations
Office of Surface Mining
Brooks Towers, 1020 15th Street
Denver, Colorado 80202

Dear ~~Mr.~~ Pete Rutledge:

Re: **Environmental Assessment and State Decision Document (Technical Analysis and Supporting Documentation), Quitchupah Lease Tract Addition, Southern Utah Fuel Company, Convulsion Canyon Mine, ACT/041/002, Folder #2, Sevier County, Utah**

Enclosed are the above-referenced materials for the Quitchupah Lease Tract Addition at the Convulsion Canyon Mine in Sevier County, Utah. Southern Utah Fuel Company has requested that this lease addition be approved as soon as possible to maintain production at the mine. Therefore, it is my hope that your office will expedite in every manner possible the approval of this permit.

If there is anything the Division can do to assist your office in processing this permit action, please contact me or Lowell Braxton.

Best regards,

Dianne

Dianne R. Nielson
Director

RVS/djh
Enclosures
cc: K. Frame, SUFCO
L. Braxton, DOGM
R. Smith, DOGM
AT64/127

an equal opportunity employer

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 (DOGM) 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 (^{o}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:

Location	1980 Census Population	Number Employees	Percent
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

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CHAPTER 3

BIOLOGY

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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.

3 Right 4 East Panel(s) - Township 21 South, Range 5 East

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. One active nest and two inactive nests were located in Section 33 (Dry Fork Canyon) during these surveys. During a conversation with Jeff Jewkes it was reported that the raptor nests in the canyon located in Section 33 were surveyed in 2014, 2015 and 2016 by the DWR. One of the three nests in the canyon was active in 2015, and the same nest appeared tended in 2014 and 2016. The other nests were inactive during the three-year survey period. The nests in Dry Canyon ~~will be~~ were re-surveyed in 2017, in April, May and June, during the surveys the nests were inactive. ~~should mining be approved for the 3 Right 4 East Panel(s)~~. An application for a "nest take permit" for nests 793, 794 and 795 ~~will be~~ was submitted to the USFWS prior to the mining of the 3 Right 4 East panel. An e-mail from the USFWS is included in Appendix 3-15, documenting the schedule of review and the potential date of issuance of the "nest take permit." The permittee's intention is to be given permission by the USFWS permit to take the nests, provide and have an approved mitigation plan for the taking of the nests. The permittee will have the obligation of following the requirements of the USFWS permit. The location of the three nests is shown on confidential raptor nest drawing within Appendix 3-15 of this M&RP. Once the "nest take permit" has been granted the Manti-La Sal biologist and the UDOGM biologist will be informed of the requirements and stipulations associated with the"nest take permit" and will be provided a copy. .

Other than golden eagles, no TES species are known to inhabit the area of the panel. According to the DWR in a 1989 assessment the southern portion of the lease area is considered crucial winter range for deer and elk. ~~The escarpment in the southeastern portion of the Quitchupah tract which lies between Quitchupah Canyon and Link Canyon is known as a elk migration route, providing access to and from the winter range from the plateau top.~~

Although no surface facilities are planned for construction above the 3 Right 4 East underground panel, as requested by the Manti-La Sal Forest Biologist and Forest Service Supervisor the following standard has been included in the requirements pertaining exclusively to the lands above the 3 Right 4th East underground panel. "To protect sage-grouse habitat, locate new appurtenant surface facilities outside priority habitat management areas, unless no technically feasible alternative exists. If new appurtenant surface facilities cannot be located outside of priority habitat management areas, locate them with and existing disturbed areas, if possible. If location with and existing disturbed area is not possible, the construct new facilities to minimize disturbed area while meeting mine safety standards and requirements in the established mine-plan approval process and locate the facilities in and area least harmful to greater sage-grouse habitat based on vegetation topography, or other habitat features. (Greater Sage-grouse Record of Decision, GRSG-M-CML-ST-093)"

Elk

The elk herd (#14) is a significant wildlife resource to the citizens of Utah and there is considerable hunting pressure. Winter and summer range is in generally good conditions, but drought is an immediate concern (Big Game Annual Report, 1991).

Although the potential area of impact is not critical to the continued existence and perpetuation of the herd, it is important to maintenance of current population levels, and portions of the entire lease area are used annually on a seasonal basis. The aspen areas of Duncan Mountain serve as calving areas for the small herd, (10-20 animals observed during the 1980 summer in that area) but based on pellet counts (WIL, Table 7) the major portion of the lease area is utilized in late fall, winter, and early spring.

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 SUFCO 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.

3 Right 4 East Panel(s)

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

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.

During the summer the mule deer generally utilize all of the habitats near watering areas. The most heavily used communities were the sage, mountain brush and the composite of aspen, mountain mahogany, manzanita and ponderosa. This is as expected since there is considerably more browse in these communities than in the others sampled.

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.

3 Right 4 East Panel(s)

Pertaining exclusively to the potential subsidence disturbance associated with the 3 Right 4th East mining panel the following will apply:

* The mortality of ponderosa pines on the surface above the panel will be monitored during the annual subsidence survey while the panel is being mined and during the annual subsidence survey two years following the completion of mining.

* Should a seed mix be required to be used on soil filled subsidence cracks or to replace a ponderosa pine(s), the following seed mix will be used. Soils used to fill subsidence cracks which receive seed will not receive mulch or fertilizer.

3Right 4th East Seed Mixture		
Scientific Name	Common Name	Rate PLS/Ac
TREE & SHRUBS		
Artemisia tridentata	Big sagebrush	0.10
Pinus ponderosa	Ponderosa Pine	0.50
GRASSES		
Bromus carinatus	Mountain brome	2.00
Elymus smithii	Western wheatgrass	2.00
Elymus spicatus	Bluebunch wheatgrass	2.00
Elymus trachycaulus	Slender wheatgrass	1.50
TOTALS		8.1

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.

Scientific Name	Common Name	PLS lbs/acre
Elymus trachycaulus	Slender Wheatgrass	3
Achnatherum nelsonii	Columbia needle grass	1
Elymus glaucus	Blue Wildrye	1
Aster glaucodes	Blueleaf Aster	0.25
Sanguisorbia minor	Small burnet	1
Lupinus argenteus	Silvery lupine	1
Total		**7.25**

CHAPTER 4

LAND USE AND AIR QUALITY

were officially accepted as roadless. This action is being taken to preserve, where possible, unroaded characteristics of portions of the Forest.

The SITLA Muddy Tract area is part of the Emery C&H grazing allotment. The SITLA Muddy Tract unit supports 1,387 head of cattle during the early grazing season. Three ponds for livestock and wildlife use have been developed in the SITLA Muddy Tract area.

The limited amount of perennial water within the analysis area reduces the potential for many species of fish to be present. However, Muddy Creek and the lower portion of Box Canyon Creek support fish populations.

There are no oil or gas leases associated with the SITLA Muddy Tract area.

3 Right 4 East Panel(s)

In the area of the Quitchupah lease two major cultural resource surveys were competed, 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.

In 1992 a cultural survey (UT-92-AF-381f) was performed by AERC on the north canyon rim above North Fork Quitchupah Creek. Three sites were identified, one in each of two adjoining sections and one straddling the section line of the two. According to SHPO and National Register of Historic Place, these sites have not been listed with the National Register (Beth Karpinski, Archeologist, Tetra Tech, December 15, 2016). The sites are north of the 3R4E panel(s), but lie over existing mains.
~~The three sites will be re-surveyed in 2017 should mining be approved for the 3 Right 4 East Panel(s).~~ Cultural and paleontological resources above the 3 Right 4 East panel and within the potential subsidence angle-of-draw will be surveyed and the reported findings will be submitted to the Manti-La Sal Forest Archeologist for processing for clearance. A copy in the reports are located in confidential Appendix 4-2. Due to heavier snows in 2016/2017 the survey will be delayed until the area can be accessed. Longwall mining of this panel will not be started until the archeological clearances have been obtained.

During the 2017 Class III cultural survey two of the previously recorded sites were re-inventoried, one was determined to be eligible (42SV2310), the other was not eligible (42SV2309). Improved GPS equipment has placed the eligible site over the mine entries with the potential for 8" of subsidence. " The site does not have any architectural or unique features...The site is stable with

no significant impact or threats currently facing it.....The observed surface scatter is the result of ...eroding...anchored lee side dune." The recommendation as eligible is due to the "potential for intact buried cultural deposits" (Tetra Tech, June 23, 2017, Appendix 4-2). Two additional sites were found and two IOs were located, none of these sites were determined to be eligible during this survey.

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).

Land uses include mining, firewood collection, livestock grazing, wildlife habitat, watershed, exploration and recreation. These uses existed in the early 1900's and would be expected to continue without disruption by continued mining in the lease tract.

Cultural and Historic Resources Information. Cultural resource information and maps identifying cultural and historical study areas are located in Appendix 4-2. An intensive cultural resource evaluation of five coal exploration well locations has been conducted on the Quitchupah Lease by Dr. Richard Hauck of AERC (see Appendix 4-2). As part of this evaluation he also made a record search at the State Historic Preservation office and the National Register of Historic Places. No sites were found that would be effected by the drilling activity. A ten percent cultural resource potential survey was completed by Les Sikle, Forest Archeologist, Manti-La Sal National Forest. A copy of his report is included in Appendix 4-2 along with the Utah State Historical Society's concurrence letter.

An intensive cultural resource evaluation of a proposed breakout, substation and power line in the Link Canyon Locality conducted by Dr. Richard Hauck of AERC is included in Appendix 4-2. No cultural or paleoentological resources were observed within the proposed Link Canyon development area during the archaeological survey.

A cultural resource evaluation of the Link Canyon Mine portals area in Link Canyon was conducted by John Senulis of Senco-Phoenix. A copy of his report is included in Appendix 4-2. The conclusion of his evaluation of the portal site was that no cultural or paleoentological resources are present. Many of his conclusions were based on work previously performed in the immediate portal area and surrounding areas by Dames and Moore, AERC, JBR, and the BLM.

There are no cemeteries, public parks, historic places, or areas within the boundaries of any units of the National System of Trails or the Wild and Scenic Rivers System located in areas to be

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.

3 Right 4 East - Quitchupah Tract

In 1989 more than 960 acres of the tract had been surveyed for cultural resources. The survey indicated that the area was used lightly in prehistoric times (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)

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

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5-10C Potential Subsidence Limits - SITLA Muddy Tract & Greens Hollow Tract

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Appendix

5-1 Primary Road Certification

5-2 Approximate Original Contour Variance Request

5-3 Sevier County Landfill Disposal Agreement

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.

3 Right 4 East Panel(s)

Mining of this panel(s) will straddle Leases U-63214 and U-62453 which are referred to as the Quitchupah Tract throughout the M&RP in text, appendices and on drawings. Both leases were issued to the permittee in 1989, the tract was originally delineated in 1982. The mine plan is shown on Plate 5-7, mining will occur only in the Upper Hiawatha coal seam. Overburden is approximately 900 feet or more. 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.

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.

3 Right 4 East Panel(s)

Should cracks develop in the surface above the panel (s) the sealing of these cracks will be done with inert materials such as soil, rock, road base, etc. and seeded with the mix in Section 3. 4.1.2 (3 Right 4 East Panel(s). A drawing showing the potential subsidence with the mining of the 3R4E panel is located in Appendix 6-4 (Confidential). Potential subsidence beneath the 42SV2310 archeological site could be 0 to 8 inches (Appendix 6-4 and 4-2) . 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, SUFCO 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:

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

where SF = safety factor against pillar failure (fraction)

SD = support strength density (psi)
= $(Y_c)(1\text{-}ER)$

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

ER = extraction ratio (fraction)
= $1\text{-}(A_p/A_t)$

A_p = pillar area (ft^2)

A_t = area supported by pillar (ft^2)

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 3 Right 4 East Panel (Confidential)

3 Right 4 East Panel(s)

Refer to Section 5.2.1.1 for reference to various maps, including those containing topography of the 3 Right 4 East panel. Additional geology maps requested by the Manti-La Sal forest geologist are located in Appendix 6-4 (Confidential). The maps are of subsidence, geology and overburden superimposed over the panel(s) mine plan and cross-sections of longwall panel within the coal seam. The information on the geology maps within Appendix 6-4 with the label "Panel 3R4E" are specific and more comprehensive than generalized information presented within this chapter.

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.

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.

6.2.4 Geologic Information

6.2.4.1 Regional Setting

CHAPTER 7

HYDROLOGY

LIST OF PLATES

Plate

7-1 (Revisions have eliminated this plate)

7-2~~A~~ 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

a runoff event. Possible impacts to the surface water are increased total suspended solids and turbidity from the fine coal particulates. The probability of a spill occurring in an area sufficiently close to a stream channel to introduce coal to the stream bed is considered small.

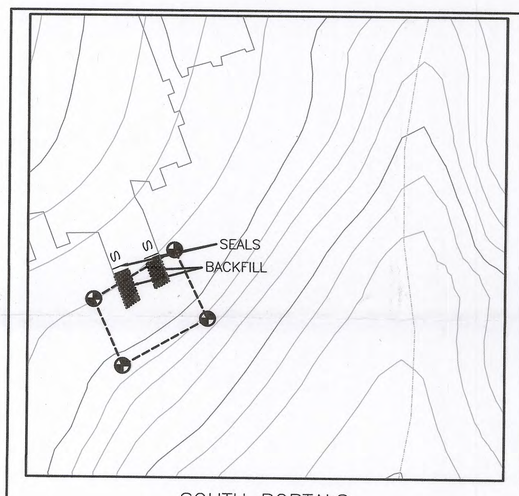
In order to minimize fugitive coal dust haulage trucks are either covered or modified to reduce the amount of coal dust blown off the trucks. The impact from fugitive coal dust is therefore considered to be insignificant due to the small amounts lost during haulage in the permit and adjacent areas.

3 Right 4 East Panel(s)

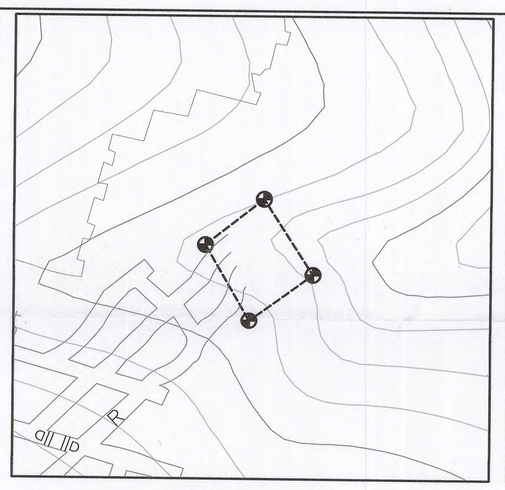
In 1986/1987 an experimental practice of subsiding escarpments on the west side of Quitchupah Canyon containing the North Fork of Quitchupah Creek in Section 32, Township 21 South, Range 5 East and Section 5, Township 22 South, Range 5 East was approved by the Division. The planned 3 Right 4 East panel straddles Sections 28, 29, 32 and 33, Township 21 South, Range 5 East on the east side of Quitchupah Canyon. The planned panel (northern) and the experimental area (southern) are both in Section 32, across the canyon from one another. The objective of the practice was to ascertain whether or not the escarpment could be undermined by a longwall while causing minimal surface damage.

In 1991 a report was written discussing the observations, the information collected was submitted to the Division in annual reports. The escarpment test area was monitored visually, by photography and by reliable survey measurements for horizontal and vertical movement. The conclusion of the report state the "One independent block of rock fell 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 were reduced several feet."

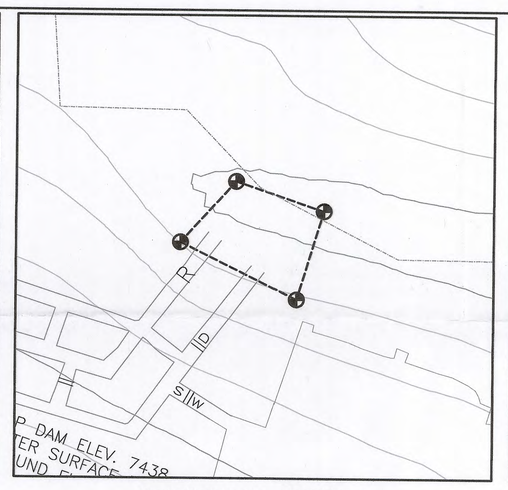
Because spalling is considered a natural feature of the Castlegate Formation it is anticipated that cliff spalling may occur, since the entire area of the Quitchupah Canyon escarpment is heavily fractured by natural jointing and in some areas is highly sculpted where the combined effects of jointing and erosion are the most severe. The slopes are littered with block of stone which have eroded way from the Castlegate and other small sandstone members to the Blackhawk Formation. The channel grade in the North Fork of Quitchupah Creek which lies to the west of the panel to be mined should be sufficient to allow the flow to continue should rocks from spalling enter the creek channel. It is not anticipated that enough rock from spalling will enter the North Fork to block flow, but the surface flow at water monitoring site 042 downstream of the panel will be checked during the mining of the 3 Right 4 East panel to determine if an action is required. There are no known groundwater sites in the area of the 3 Right 4 East panel.



SOUTH PORTALS
SCALE: 1" = 100'



3 EAST PORTALS
SCALE: 1" = 100'



QUITCHUPAH PORTALS
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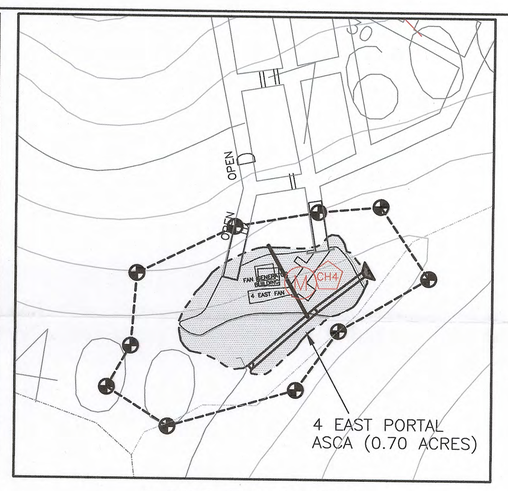
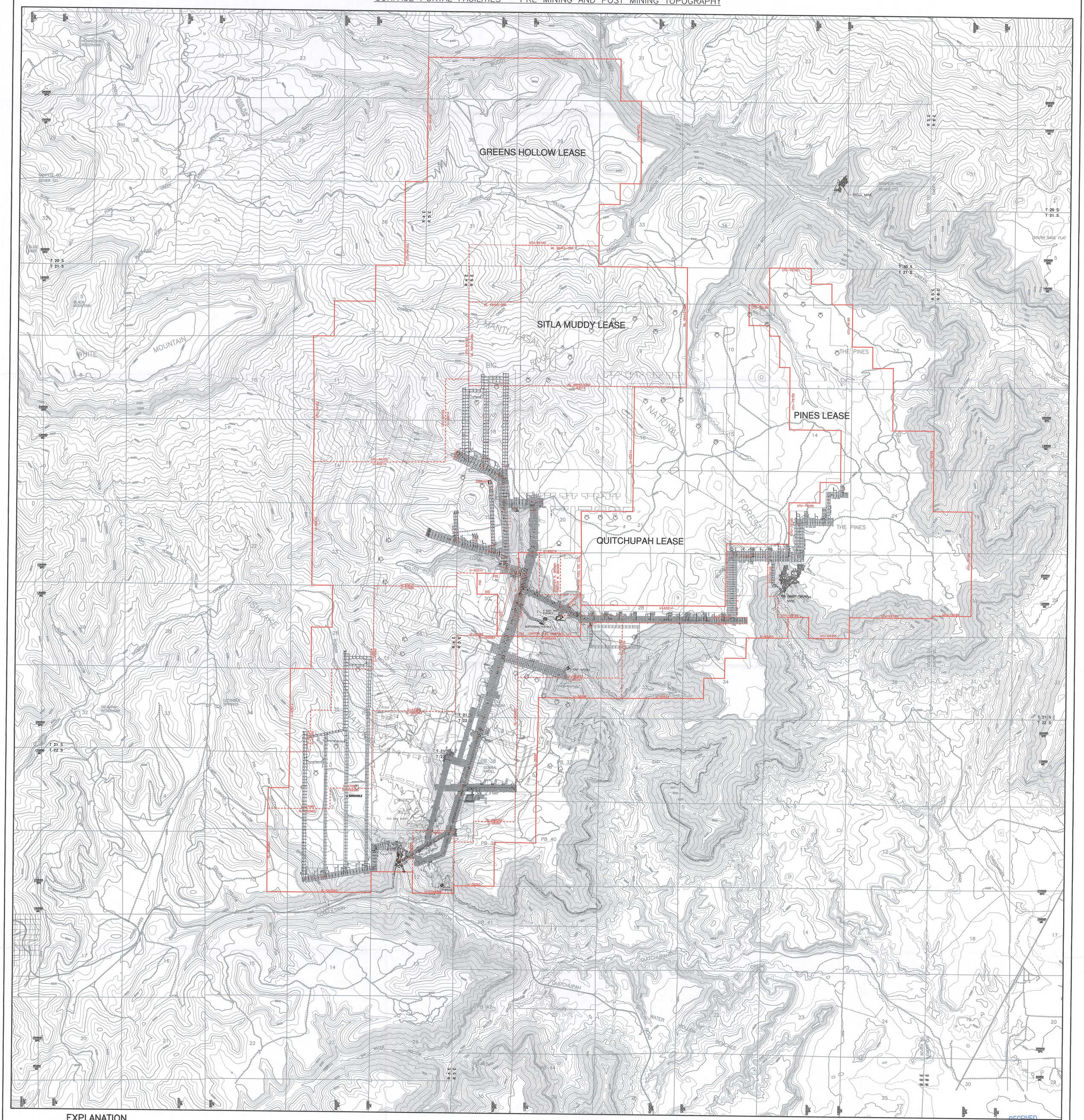


4 EAST FAN PORTALS
SCALE: 1" = 100'

SURFACE PORTAL FACILITIES – PRE MINING AND POST MINING TOPOGRAPHY



EXPLANATION

- SUFCO EXTERIOR LEASE BOUNDARY
- SUFCO INTERIOR LEASE BOUNDARY
- MINE COORDINATES
- STATE PLANE COORDINATES
- STREAM
- ESCARPEMENT
- OUTCROP
- PERENNIAL STREAM
- DISTURBED AREA BOUNDARY
- DISTURBED AREA BOUNDARY MARKER
- DRAIN LINE
- ALTERNATE SEDIMENT CONTROL AREA (ASCA)

PROFESSIONAL ENGINEER No. 9073281 JACOB D. SMITH STATE OF UTAH

I CERTIFY THE ITEMS SHOWN ON THIS DRAWING ARE ACCURATE TO THE BEST OF MY KNOWLEDGE

2000 0 2000

RECEIVED JUL 31 2017 DIV. OF OIL, GAS & MINING

REVISIONS				
NO.	DATE	REQ. BY	DWG. BY	REMARKS
10	03/02/15	V.M	T.R.B.	ADDED 70 ACRE R.O.W AREA FOR 5 WEST
11	07/13/16	V.M.	J.G.C.	ADDED GREENS HOLLW & SOUTH FORK LEASE BOUNDARY
12	12/15/16	V.M.	T.L.M.	REMOVED SOUTH FORK LEASE BOUNDRAY
13	4/13/2017	V.M.	B.R.	GREENS HOLLOW

Canyon Fuel Company, LLC
SUFCO Mine
597 South SR 24 – Salina, UT 84654
(435) 286-4880 Phone
(435) 286-4499 Fax

DETAIL OF PORTAL SURFACE FACILITIES

PEN TBL:	SCALE:	DATE:	DRAWN BY:	ENGINEER:	CHECKED BY:	SHEET NO.
:Shsd-SUFDNP1.ctb	1" = 2,000'	7/21/2017	B.D.H.		M.L.D.	PLATE 5-2C
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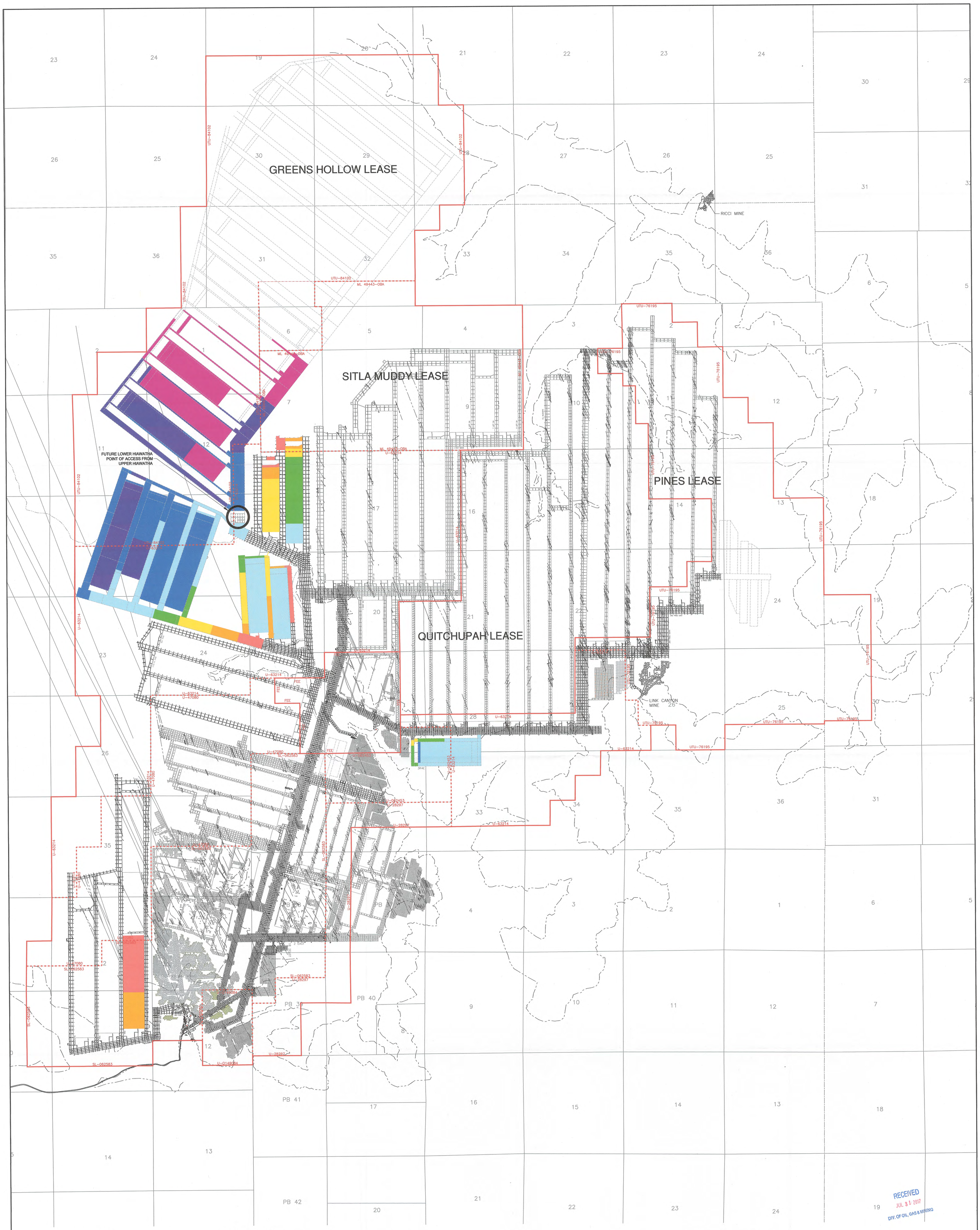

EXPLANATION

- SUFCO EXTERIOR LEASE BOUNDARY
- SUFCO INTERIOR LEASE BOUNDARY
- ESCARPEMENT
- OUTCROP

MINING LEGEND

- 1ST QUARTER 2017
- 2ND QUARTER 2017
- 3RD QUARTER 2017
- 4TH QUARTER 2017
- 2018
- 2019
- 2020
- 2021

NOTES:

1. GREENS HOLLOW PROJECTIONS ARE SUBJECT TO FUTURE PERMITTING OF THE GREENS HOLLOW TRACT.

2. ANY PROJECTED MINING SHOWN BEYOND EXISTING LEASE BOUNDARY LINES IS SUBJECT TO FUTURE LEASE MODIFICATIONS AND APPROVALS.

PROFESSIONAL ENGINEER No. 9073281 JACOB D. SMITH STATE OF UTAH

I CERTIFY THE ITEMS SHOWN ON THIS DRAWING ARE ACCURATE TO THE BEST OF MY KNOWLEDGE

1500 0 1500

REVISIONS				
NO.	DATE	REQ. BY	DWG. BY	REMARKS
1	1/20/2017	V.M.	J.G.C.	4East Ammendment

Canyon Fuel Company, LLC
SUFCO Mine
597 South SR 24 – Salina, UT 84654
(435) 286-4880 Phone
(435) 286-4499 Fax

SUFCO MINE PLAN 5 YEAR PROJECTION

PEN TBL:	SCALE:	DATE:	DRAWN BY:	ENGINEER:	CHECKED BY:	SHEET NO.
_15ndvd-SUFDIP1.ctb	1" = 1,500'	1/23/2017	J.G.C.	JDB	VM	PLATE 5-7 4East
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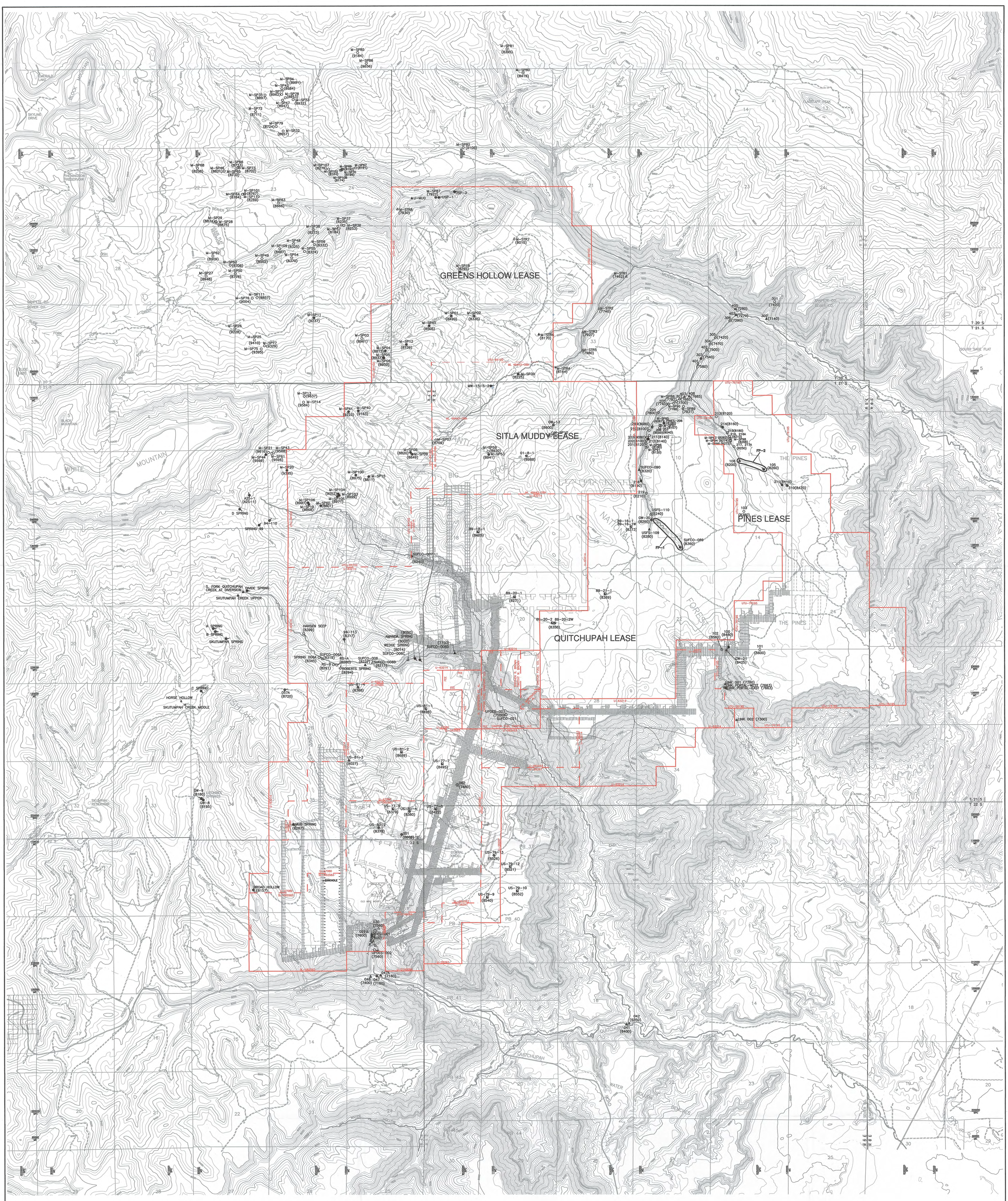

NOTES:

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	△	HISTORIC STREAM	⬡	UPDES MONITORING POINT
	SUFCO MINE INTERIOR LEASE BOUNDARY	▲	STREAM MONITORING	(U)	IN MINE MONITORING SITE
100000 MC	MINE COORDINATES		HISTORIC MONITORING WELL	(7600)	ELEVATION OF SITE
2020000 SPC	STATE PLANE COORDINATES		MONITORING WELL SITE		PERENNIAL FLOW LOCATION MONITORING POINT
		○	HISTORIC SPRING MONITORING SITE		PERENNIAL FLOWS
			SPRING MONITORING		SPRING NOT MONITORED

PROFESSIONAL ENGINEER No. 9073281 JACOB D. SMITH STATE OF UTAH

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JUL 31 2017
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REVISIONS

NO.	DATE	REQ. BY	DWG. BY	REMARKS
19	03/02/2015	V.M.	T.R.D.	ADDED 70 ACRE R.O.W. AREA FOR 5 WEST
20	07/14/2016	V.M.	J.G.C.	ADD GREENS HOLLOW & SOUTH FORK LEASE BOUNDARIES
21	12/15/2016	V.M.	T.L.M.	REMOVED SOUTH FORK LEASE BOUNDARY
22	04/12/2014	V.M.	J.G.C.	GREENS HOLLOW
	7/25/2017	VM	BN	3R4E

Canyon Fuel Company, LLC
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(435) 286-4499 Fax

HYDROLOGIC MONITORING STATIONS

PEN TBL:	SCALE:	DATE:	DRAWN BY:	ENGINEER:	CHECKED BY:	SHEET NO.
_ISlnd-SUFDP1.ctb	1" = 1,000'	7/25/2017	JMB/TRB	J.D.B.	V.M.	PLATE 7-3
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