

January 23, 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

JAN 24 2017

DIV. OF OIL, GAS & MINING

Re: 3 Right 4 East Panel(s) 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 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.

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.

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

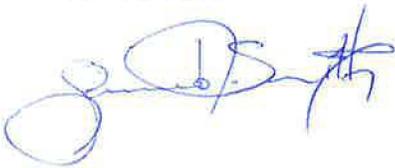
Appendix 7-17 of the Sufco permit contains the PHC for the Quitchupah Tract/Lease area. Chapter 7 text discusses hydrologic information for the area of the proposed 3 Right 4 East panel(s).

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.

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 blue 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 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: Sufco Mine

Permit Number: C/041/0002

Title: Amendment to MRP to Address the mining of the 3Right 4East 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.

- | | |
|---|---|
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. Change in the size of the Permit Area? Acres: _____ Disturbed Area: _____ <input type="checkbox"/> increase <input type="checkbox"/> decrease. |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 2. Is the application submitted as a result of a Division Order? DO# _____ |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 4. Does the application include operations in hydrologic basins other than as currently approved? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 6. Does the application require or include public notice publication? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 7. Does the application require or include ownership, control, right-of-entry, or compliance information? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 9. Is the application submitted as a result of a Violation? NOV # _____ |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 10. Is the application submitted as a result of other laws or regulations or policies?
<i>Explain:</i> _____ |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 11. Does the application affect the surface landowner or change the post mining land use? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2) |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 13. Does the application require or include collection and reporting of any baseline information? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 15. Does the application require or include soil removal, storage or placement? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 16. Does the application require or include vegetation monitoring, removal or revegetation activities? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 17. Does the application require or include construction, modification, or removal of surface facilities? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 18. Does the application require or include water monitoring, sediment or drainage control measures? |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 19. Does the application require or include certified designs, maps or calculation? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 20. Does the application require or include subsidence control or monitoring? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 21. Have reclamation costs for bonding been provided? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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.

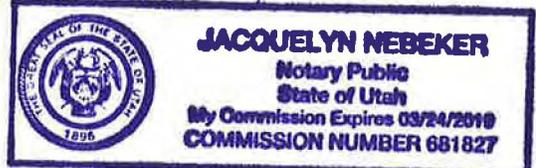
Jacob D. Smith
Print Name

Robert A. Engle, Mgr., 1/23/17
Sign Name, Position, Date

Subscribed and sworn to before me this 23 day of January, 2017

Jacquelyn Nebeker
Notary Public

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



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Received by Oil, Gas & Mining

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JAN 24 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

8K 816 (REDIFORM)®

RECEIPT				Date <u>19 July 1989</u>	No <u>4289</u>
Received From <u>Southern Utah Fuel Company</u>					
Address _____					
				Dollars \$ <u>5.00</u>	
For <u>Quitchupah Lease Addition</u>					
<u>Permit Fee</u>					
ACCOUNT		HOW PAID			
AMT. OF ACCOUNT		CASH	<u>5.00</u>		
AMT. PAID		CHECK			
BALANCE DUE		MONEY ORDER		BY <u>Donald Paulson Little</u>	

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 SUFCA 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

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 is associated with the mining of the 3 Right 4 East panel(s).

APPENDIX 2-7

Quitcupah 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. 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 R. Nielson
Director

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

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
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CHAPTER 3

BIOLOGY

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A raptor survey conducted April 14, 1987, located three Golden Eagle nests (Appendix 3-4). Two of the nests were tended and contained greenery, the third had an adult eagle incubating eggs.

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 SUFCA 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 SUFCA 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 are summarized in Appendix 3-13.

3 Right 4 East Panel(s)

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 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 four nests in the canyon was active in 2015, the same nest appeared tended in 2014 and 2016. The other nests were inactive during the three year survey period. The nests will be re-surveyed in 2017 should mining be approved for the 3 Right 4 East Panel(s). No other TES species are known to inhabit the tract.

According to the DWR in 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 an elk migration route, providing access to and from the winter range from the plateau top.

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.

In May, while there was still snow on the ground, considerable fresh elk sign (pellets and tracks) was found around the Acord Lakes. By June 5, 1980, when access was available to the other areas, elk tracks were concentrated in the ponderosa, mahogany, aspen and manzanita communities along the ridges and rims of the canyon, plus in the canyons such as Duncan's Draw and Lizonbee Springs. During the summer the elk and elk signs were sighted near the top of Duncan Mountain and at the head of the South Fork of Quitchupah. It seems that the elk in question do not always winter on the rims nor the plateau but in the lower elevation areas to the southeast. This observation was substantiated by a conversation with a local forest ranger out of

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 SUFACO 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 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 Quitcupah Canyon and Link Canyon is known 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.

or wildlife. Credibility to this statement comes from the lack of detectable differences in terrestrial vertebrates in comparable habitats in expansion areas.

Subterranean changes, however, are not currently fully understood. There is the possibility that when subsidence occurs, it will disrupt burrow systems and underground aquifers. The loss of the burrow system will destroy the home and habitat of fossorial mammals, reptiles and amphibians and possibly cause death to some species in the immediate area at the time of collapse. If subsidence were to occur simultaneously and non-uniformly over the entire area of concern, this would be a major problem not only for the prey species, but particularly for predators dependent upon the prey base. However, since subsidence will occur systematically and in small areas at a given time, only localized populations will be impacted and only for a short while. Reproductive potential coupled with dispersal will facilitate almost immediate recovery and negate the temporary population reduction. There are no threatened nor endangered species present in the area, so none will be impacted. It has also been observed that burrowing mammals frequently make new dwellings along subsidence induced fractures.

The question of underground aquifer disruption is not easily dismissed. The geology and hydrological system in this area has been studied for several years. Surface waters and habitats are significant resources to elk and deer during the late summer months when water becomes the limiting resource to habitat utilization. Alteration of the groundwater resources would be serious, not to the perpetuation of the population and herds as an entity, but to harvestable productivity. Such habitat loss would also be detrimental to amphibians and aquatic dependent reptiles.

3.3.3 Plan to Minimize Disturbances and Adverse Impacts

In new mine operations it is easy to suggest, provide and implement mitigative measures. But in the case of the SUFCA Mine, preconstruction design and associated mitigation does not apply nor can it be implemented without major additions or modifications. The mine has been operating approximately 55 years, and little can or should now be done to change the design of the portal facilities to lessen the impacts. Any significant change now would increase impacts. Any species inhabiting and utilizing the area of concern have likely habituated to the present facilities and

consequently adjusted their behavior including migration so that change would be more impacting than status quo.

Construction of additional ventilation portals could potentially cause problems. These portals will be opened to the outside from the underground mine entries. Chainlink fence is placed over the portal opening, to protect wildlife from harm. These portals will be placed so that no major big game migration trails are interrupted and no caves or natural cougar denning or resting ledges are destroyed.

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 exhaust fans are at the mine site and at the 4 East Portal in Quitcupah Canyon.

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. SUFCA 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:

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, SUFCA 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 Quitchupah 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.

3.5.8.4 Replacement of Wetland and Riparian Vegetation

No riparian habitat has been disturbed.

3.5.8.5 Manmade Wildlife Protection Measure

Electric Power Lines. All 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". Various correspondence regarding the Applicant's modification of power lines is presented in Appendix 3-7. The locations of mine site power poles are shown on Plate 5-5.

Potential Barriers. The mine has been operating approximately 55 years and little should now be done to change the design of the portal facilities to lessen the impacts. The wildlife inhabiting and utilizing the area of concern have likely acclimated to the present facilities and consequently adjusted their behavior including migration so that a modification of the facilities to providing corridors would be more adverse than leaving the facilities as they are.

Pond Protection. Fences or other appropriate methods will be used to exclude wildlife from ponds containing hazardous concentrations of toxic-forming materials. However, at this time the applicant has no ponds containing hazardous concentrations of toxic-forming materials.

REFERENCES:

Blumer, Ralph J., 1979. Environmental Analysis, pp 25-26.

Hennessy, S. P., 1978. Ecological relationships of accipters in northern Utah -- with special emphasis on the effects of human disturbance. MS thesis, unpubl., Utah State Univ., p 66.

USDA, Forest Service, Intermountain Region 1988. Environmental Assessment for SUFCO Mine Coal Lease Application U-63214 Quitchupah Tract.

APPENDIX 3-4

Raptor and General Avifauna Studies

Add to Confidential Folder

CHAPTER 4

LAND USE AND AIR QUALITY

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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 SUFACO 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 SUFACO 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 SUFCO 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 SUFCO 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 SUFCO 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 SUFCO 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 SUFCA 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 SUFCA Mine Quitcupah 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."

A portion of the surface area is grazed by cattle under the Quitchupah Grazing Association allotment (Fishlake National Forest). The allotment covers approximately 43,156 acres, it presently supports 813 head of cattle from June 11 through September 30, for a total of 2,981 cow months (Bob Tuttle, Fishlake National Forest).

The Emery allotment (Manti-La Sal Forest) supports 1,300 head of cattle. This allotment is under an intensive rest-rotation management system, placing the cattle in the mine area for approximately one month a year. Several ranches in Emery County are dependent on the allotment. Structural range improvements include one watering trough (spring fed) and two cattle guards on the access route into the lease.

The number of hunters in the Salina Planning Unit increased 122 percent from 1969 to 1972 (U.S. Forest Service, 1976). In Deer Unit #43/45 (Salina) 9,383 hunters were recorded afield during the 1990 hunting season. The Fishlake Elk Herd Unit #14 hosted 4,027 hunters during the 1990 season. Additional hunter use information reported by the Utah Division of Wildlife Resources can be found in the Utah Big Game Annual Report for 1991 (Appendix 4-1).

Pines Tract Area

The existing land uses in the Pines Tract area include: timber production, livestock grazing, wildlife habitat, recreation, transportation corridors and underground coal mining (SUFCO Mine). The existing land uses not previously discussed are the transportation corridors and underground coal mining (SUFCO Mine, Quitchupah Lease). The roads/transportation corridors are generally single-lane native surface forest development roads which are passable during the drier months of the year. The forest development roads connect with local roads that access major highways.

In the late 1970s two Roadless Area Review and Evaluation (RARE) II areas were inventoried. Neither area was designated as wilderness, nor were they classified as roadless or semi-primitive recreation management areas under the Forest Plan in 1986 (Pines Tract Project EIS, 1999).

The Pines grazing unit is part of the Emery C&H grazing allotment. The Pines unit supports 1,387 head of cattle during the early grazing season. Eight ponds for livestock and wildlife use have been developed in the Pines Tract area (see Chapter 3, Appendix 3-9, Figure 2 - Springs, Seeps and

Riparian Areas). The Link Canyon troughs and the Joe Mill ponds are the most reliable sources of developed water within the 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.

The Sevier County Zoning Resolution designates the area as GRF-1. The primary uses designated for GRF-1 areas include gravel pits, clay pits, rock quarries, oil and gas wells, mines, mineral reduction, processing structures and facilities. There are no oil or gas leases associated with the Pines Tract area.

Muddy Tract Area

The existing land uses in the SITLA Muddy Tract area include: timber production, livestock grazing, wildlife habitat, recreation, transportation corridors and underground coal mining (SUFCO Mine).
The

roads/transportation corridors are generally single-lane native surface forest development and maintenance roads which are passable during the drier months of the year. The roads are classified by the Forest as Level 2 roads and generally no restrictions are placed on these roads for public use. The Forest does recommend the use of high clearance vehicles for most of the roads in the SITLA Muddy Tract area and to avoid use when the road surfaces are wet. However, if the permittee is using the roads for other than periodic monitoring, special use permits must be obtained from the Forest. Many of the forest development roads connect with local roads that access major highways.

In the late 1970s two Roadless Area Review and Evaluation (RARE) II areas within the SITLA Muddy Tract region were inventoried. Neither area was designated as wilderness, nor were they classified as roadless or semi-primitive recreation management areas under the 1986 Forest Plan Revision (Pines Tract Project EIS, 1999). Recent re-inventories (July 2004) of Roadless Areas by the Manti LaSal National Forest as part of their Forest Plan Revision to be completed by the end of 2006 have included nearly all of the SITLA Muddy Tract as potentially "roadless". This designation excludes the existing Forest Development Roads 044, 2033, and 010 that lie within the eastern and northern portions of the SITLA Muddy Tract. Only a small segment of land west and north of the Main Fork of Box Canyon and western SITLA Muddy Tract boundary, east of Forest Road 044, and south of the southern boundary of sections 2, 3, and 4 of T 21 S., R 5 E., SLM is identified as not being included in the proposed roadless area. Currently, the Forest typically administers most of the areas identified as having "roadless" characteristics as though the areas 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 Quitcupah 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.

In 1992 a cultural survey (UT-92-AF-381f) was performed by AERC on the north canyon rim above North Fork Quitcupah Creek. Three sites were identified, one in each of two adjoining sections and one straddling the section line of the two. According to SHPO, these sites have not been listed with the National Register. 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).

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 Quitcupah 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 paleontological 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 paleontological 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 affected by the SUFACO Mine (See Appendix 4-6 for a description). The Applicant agrees, however,

to notify the regulatory authority and the Utah State Historical Society of previously unidentified cultural resources discovered in the course of mining operations. The Applicant also agrees to have any such cultural resources evaluated in terms of National Register of Historic Places eligibility criteria. Protection of eligible cultural resources will be in accordance with regulatory authority and Utah SHPO requirements. The Applicant will also instruct its employees that it is a violation of federal and state laws to collect individual artifacts or to otherwise disturb cultural resources.

150 Acre Incidental Boundary Change

Cultural and Historic Information. Cultural resource information and maps identifying cultural and historical study areas are located in Appendix 4-2. Dr. Richard Hauck of AERC conducted an intensive evaluation of the 150 acre IBC. Four new sites were discovered and recorded during the evaluation. All the sites are located on or near the east rim of Box Canyon. The sites include two significant rock shelters (42SV 2492 and 42SV 2495), a significant ceramic scatter (42SV 2493), and a non-significant kill-butcherer locus (42SV 2494).

Site 42 SV 2492 - The site consists of a rock shelter. This site is considered to be a significant resource and excellent potential for National Register classification. The site is 15 meter wide with a sandstone arched roof and is susceptible to surface subsidence.

Site 42 SV 2493 - The site consists of ceramic scatter occupying an area of 20 to 30 meters on the bedrock top at the canyon rim. This site is considered to be a significant resource and has the potential for National Register classification. This site is not considered to be at-risk or susceptible to surface subsidence.

Site 42 SV 2494 - The site consists of a dispersed scatter of debris and lithic tool fragments and is situated on the bedrock on the east rim overlooking Box Canyon. This site is not considered to be a significant resources and lacks potential for National Register classification.

Site 42 SV 2495 - The site consists of a scatter of debris primarily on the north facing slope below the base of a shallow shelter under a sandstone ledge. The site is considered to be a significant resource and has limited potential for National Register classification. This site is not considered to be at-risk or susceptible to surface subsidence.

The Applicant agrees, however, to notify the regulatory authority and the Utah State Historical Society of previously unidentified cultural resources discovered in the course of mining operations. The Applicant also agrees to have any such cultural resources evaluated in terms of National Register of Historic Places eligibility criteria. Protection of eligible cultural resources will be in

accordance with regulatory authority and Utah SHPO requirements. The Applicant will also instruct its employees that it is a violation of federal and state laws to collect individual artifacts or to otherwise disturb cultural resources.

Pines Tract Area

Cultural and Historic Information. Cultural resource information and maps identifying cultural and historical study areas are located in Appendix 4-2. Dr. Richard Hauck of AERC made a record search at the State Historic Preservation office, National Register of Historic Places and conducted field investigations under state project numbers UT-96-AF-0443f and UT-97-AF-0598f. AERC coordinated the research and field investigations with SHPO.

Information concerning the potential of specific sites as to being either in the subsidence zone or out of the zone or being evaluated or unevaluated is contained in the Memorandum of Agreement between Federal and State agencies.

The monitoring, treatment plans and mitigation of the cultural resource sites will be in accordance with the Memorandum of Agreement (MOA) 00-MU-11041000-017, and any amendment to it, between the USFS - Manti-La Sal, USHPO, the Advisory Council on Historic Places, UDOGM, and the SUFACO Mine located in Appendix 4-5.

Sufco intends to undermine portions of the East Fork of Box Canyon beginning in the Fall of 2003 as they extract coal from the 3LPE and 4LPE longwall panels. This change in the mining plan will change the required monitoring schedule in accordance with the Memorandum of Agreement for site 42SV2430/ML-3446 - Elusive Peacock which will be undermined under the 3LPE longwall panel. In accordance with pages 11-12 of the MOA the required monitoring schedule of this site will change from Monitor Schedule A (Sites in areas that will be mined using full-support methods) to Monitor Schedule B (Sites in areas which will be mined under and subsided) requiring the implementation of additional monitoring of the site. Monitoring results will be provided in DOGM Annual Reports. (2003, 2004, 2005, 2006, and indefinitely until movement ceases)

Historic properties documented in the Pines Tract area include 42SV2424, a sawmill, and site 42SV2391 a complex of trash scatters. Both sites are considered ineligible for the NRHP.

The Applicant agrees, however, to notify the regulatory authority and the Utah State Historical Preservation Office (SHPO) of previously unidentified cultural resources discovered in the course of mining operations. The Applicant also agrees to have any such cultural resources evaluated in terms of National Register of Historic Places eligibility criteria.

Muddy Creek Coal Tract Area

Cultural and Historic Information. Cultural resource information and maps identifying cultural and historical study areas are located in Appendix 4-2. Cirrus Ecological Solutions, LC conducted an intensive evaluation of the Muddy Tract Area. Thirty-four sites were documented during the evaluation. Refer to Confidential Appendix 4-2, "Muddy Creek Technical Report, Heritage Resources".

The three sites located in the SITLA Muddy Tract lease area are located on or near the east rim of Box Canyon. The sites include two significant lithic scatters (42SV2554 and 42SV2597), and a non-significant lithic scatter (42SV2594). None of these three sites will be undermined under the present mine plan.

The Applicant agrees, however, to notify the regulatory authority and the Utah State Historical Preservation Office (SHPO) of previously unidentified cultural resources discovered in the course of mining operations. The Applicant also agrees to have any such cultural resources evaluated in terms of National Register of Historic Places eligibility criteria.

Results from USDA Manti-La Sal National Forest, Price Ranger District, Project #ML-02-1033, Utah State Project #U-02-MM-0311f, s, b, p

Site #	Site Type	Evaluation (Cirrus Ecological Solutions, LC)	Undermined/potential for impact by mining	Date Surveyed
42SV2584*	LS, RS,C	Significant	No/Not expected	1966(PI 1976)
42SV2596	LS, RS	Non-significant	No/Not expected	1966(PI 1976)
42SV2597	LS	Non-significant	No/Not expected	1966
42SV2554	LS	Significant	No/Not expected	1966
42SV2492	LS	Non-significant	No/Not expected	1966

LS - Lithic Scatter RS- Rock Shelter C-Ceramics

* Re-recorded on IMACS form, lumped ML#s 2281 and 2282 with this.

Site 42SV2584 and 42SV2596 lie within the boundary of the SITLA lease expansion (Section 32, T 20 S, R 5 E). According to a report prepared for the Manti-La Sal Forest by Cirrus Ecological Solutions, LC, site 42SV2584 is considered significant, while 42SV2596 is considered non-significant. In the current Sufco five year mine plan no mining is planned beneath either location and they do not lie within the angle-of-draw (Plate 5-10A), therefore no impact is anticipated to

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.

These sites include 42SV2690 which consists of a lithic scatter and 42SV3464 which consists of a lithic scatter associated with a small rock shelter. Both sites will be undermined under the present mine plan. This shelter is more of a terrace overhang that measures approximately 1.5 meters high and 4 meters wide at the opening and extends 1.5 meters beneath the rock to a tapered edge. The shelter shows signs of modern disturbance and it appears that some of the fill material has been disturbed by minor looting activities.

A cultural resource investigation plan for the 42SV3464 rock shelter was requested and approved between the U.S. Forest Service, Utah State Historic Preservation Office (SHPO), EnviroWest, LLC and Canyon Fuel Company, LLC since the shelter appeared to have been disturbed. Testing of the rock shelter for significance was conducted by EnviroWest and Fishlake National Forest Archaeologist in the fall of 2012. While the site was initially evaluated as being eligible for listing in the National Register of Historic Places, subsequent testing has found it to be ineligible for listing due to disturbance. A copy of the cultural resource investigation testing report and the Determination of Significance and Effect form are located in Appendix 4-2 in the Confidential folder of the M&RP. No further testing of the 42SV2690 lithic scatter was required.

South Fork of Quitcupah Canyon - 2013 Inventory (October 2014)

During July and August 2013 a file search of archeological/cultural resource records and a pedestrian inventory of the study area was performed by EnviroWest LLC. The report is located in Appendix 4-2, Confidential Folder (2013). During the pedestrian inventory five new cultural resource sites were documented, three consisted of lithic scatters located on the bench area and two rock shelters in the canyon. The lithic scatters were recommended by EnviroWest LLC as ineligible for listing in the National Register of Historic Places (NRHP), whereas the two rock shelters were recommended to be eligible for listing in the NRHP. Upon consideration of the EnviroWest LLC report recommendations and a mine plan prepared by Sufco showing several panels to be mined to the north of 3R2S panel a "Determination of Significance and Effect" was prepared by Forest Service Archeologist Charmaine Thompson and signed by SHPO representative in 2013 showing a finding of "adverse effect", Appendix 4-2, Confidential (2013)

Due to a change in Sufco's mine plan and further evaluations by an engineer and geologist it was determined the potential for impact to either shelter by subsidence associated with mining was unlikely. A drawing included in Appendix 4-2, Tension Cracks(2 South) illustrates the location of the shelters in proximity to the 3R2S panel and showed surveyed surface cracks as a result of mining in the 2R2S panel. Evaluation of the cracks from past mining(2R2S, Pines) illustrates that surface cracking associated with subsidence primarily occurs within the mined panel area and well within the anticipated angle of draw of subsidence. Therefore, it is believed that the information and maps provided in Appendix 4-2 demonstrate that the two shelters 42SV3550 and 42SV3551 should not be affected by the mining.

The additional information was provided to Manti-La Sal Forest Service Archeologist Charmaine Thompson. During a second review of the information pertaining to mining activities in relation to the two shelters (Forest Service Project - ML-13-1452, Appendix 4-2) and a visit to the study area, Ms. Thompson revised her earlier determination to be "no adverse effect" to the shelters listed in the report. Ms. Thompson's evaluation letter and determination were forwarded to the Utah State Historical Society, with a request for concurrence with the decision of "no adverse effect", concurrence was given by Chris Merritt, Senior Preservation Specialist. The documentation of the decision and concurrence is located in Confidential Appendix 4-2.

In accordance with previous commitments the mine has made in previous sections of this M&RP, protection of eligible cultural resources will be in accordance with regulatory authority and Utah SHPO requirements. The Applicant will also instruct its employees that it is a violation of federal and state laws to collect individual artifacts or to otherwise disturb cultural resources.

The Applicant agrees to notify the regulatory authority and the Utah State Historical Preservation Office (SHPO) of previously unidentified cultural resources discovered in the course of mining operations. The Applicant also agrees to have any such cultural resources evaluated in terms of National Register of Historic Places eligibility criteria.

4.1.1.2 Previous Mining Activity

Portions of the mine plan area were mined prior to the filing of this permit application. SUFCA Mine began a small operation mining the Upper Hiawatha Coal seam in 1941. There was no previous mining activity prior to the 1941 SUFCA operation.

From 1941 through 1974, the coal was removed by conventional mining techniques. From 1974 through 1978, both conventional and continuous mining methods were used. From 1978 until October 1985, all mining used continuous mining methods. Since October 1985 both continuous mining and longwall mining methods have been used. The portion of the seam mined by conventional methods was only partially extracted leaving all pillars for support. The majority of the mining done has been full extraction. All longwall mining is full extraction.

The quantity of coal mined prior to this permit application was approximately 37,058,100 tons. The earlier workings are shown on Plate 5-1 as an integral part of the mining operation.

Use of the land preceding mining was primarily grazing. The area also supported limited timbering in the Ponderosa stands and hunting.

4.1.2 Reclamation Plan

4.1.2.1 Postmining Land Use Plan

All uses of the land immediately prior to mining and the capability of the land to support prior alternate uses will remain equally available throughout the life of the mine without impact from underground mining except on insignificant levels. The infinitesimal effect of underground mining on surface use is accounted for as follows:

1. Isolated facilities in use for duration of the mine, including portal and associated buildings, comprise only 48.432 of the 27,605.17 acres under consideration, which is too small to adversely affect general land use.
2. Gradual and even subsidence over most of the lease and permit areas is too imperceptible to affect general land use. The ultimate subsidence affect over the lease will be "uniform." As a qualification, there probably will be an uneven arching effect on the surface over the full-extraction mining areas during actual mining operations which will stabilize in uniform subsidence once the entire area has been mined. The total subsidence effect should be minor so as to not affect general land use.

The Applicant intends that the postmining land uses will be consistent with the land use plans prepared by the Forest Service. Final reclamation activities such as grading and seeding as detailed within this M&RP will be completed in a manner to provide uses of the lands consistent with those uses required by the U.S. Forest Service land use plans. Retention of pre-SMCRA highwalls is discussed in Section 5.5.3.6.

The SUFCO Mine lease areas are predominantly U.S. Forest Service land managed under the multiple use and sustained yield concepts. Present management emphasizes livestock grazing, wildlife, timber and watershed development.

The land use plans for the lease areas developed by the U.S. Forest Service includes eight different management prescriptions (U.S. Forest Service 1986):

- a. Management prescription MMA. Emphasis is on leaseable minerals development. Land surface is to be made available for existing and potential major mineral

developments. In units where mineral development is pending, renewable resource activities strive to be compatible with the management goals of adjacent management units. Long-term investments, such as timber planting, generally are not made. However, short-term investments, such as range and wildlife revegetation projects, may be made on these units. As the developments are removed and restoration is completed, these areas may be changed to other appropriate management units.

- b. Management prescription TBR. Emphasis is on wood-fiber production and harvest. The harvest methods by Forest cover type are single tree and group selection and shelterwood in Englemann spruce-subalpine fir, Douglas-fir, ponderosa pine, mixed conifers, and clear cutting in aspen. Wildlife habitat diversity may be enhanced by vegetative manipulation. Livestock grazing may be permitted. Water yield could be altered through vegetation management, as well as decrease evapotranspiration and maximize snow retention in small openings on low energy slopes. Dispersed recreation opportunities vary between semiprimitive non-motorized and roaded natural appearing.
- c. Management prescription RNG. Emphasis is on production of forage and cover for domestic livestock and wildlife. Intensive grazing management systems are generally favored. Nonstructural restoration practices include a full spectrum of treatments such as plowing, seeding, cutting, chaining, burning, spraying with herbicides, crushing, pitting, furrowing, and fertilization. Dispersed recreation opportunities vary between semiprimitive non-motorized and roaded natural appearing. Management activities are evident, but harmonize with the natural setting.
- d. Management prescription GWR. Management emphasis is on providing general big-game winter range. These are areas wildlife traditionally use. Treatments of various types are applied to increase forage production and plant species composition. This may include chaining, cutting, prescribed burning, seeding, spraying, planting, and other treatments. Selected browse species are regenerated to maintain a variety of age classes. Permanent roads and special uses may be

permitted. Short-term or temporary roads are obliterated and rehabilitated within one year after intended use. Motorized use is managed as appropriate to prevent unacceptable stress on big-game animals during the primary use season.

- e. Management prescription 4B. Management emphasis is on habitat for management indicator species. The goal is to optimize habitat capability, and thus numbers of the species. Investments in other compatible resource uses may occur but will be secondary to habitat requirements. Recreation and other human activities are regulated to favor the needs of the designated species. Roaded-natural recreation opportunities are provided along forest arterial and collector roads. Local roads and trails are either open or closed to public motorized travel. Management activities may dominate in foreground and middleground, but harmonize and blend with the natural setting.
- f. Management prescription 6B. Management emphasis is on livestock grazing intensive range resource management is applied. Condition is improved through use of vegetation and soil restoration practices, improved livestock management, and regulation of other resource activities. Dispersed recreational opportunities vary between semi-primitive non-motorized and roaded natural. Management activities are evident but harmonize and blend with the natural setting.
- g. Management prescription 9F. Management emphasis is on improving watershed condition. This will be achieved by protection, seeding, cultural treatment or any combination of other methods that will accomplish the objectives. Management activities in the foreground, middleground, and background may dominate, but should be designed to harmonize and blend with the natural setting to the extent possible. Motorized travel is prohibited except for over-snow machines and for designated routes.
- h. Management prescription KWR. Management emphasis is on providing key big-game winter range. These areas are essential to wildlife. Motorized use is managed as appropriate to prevent unacceptable stress on big-game animals during the primary use season.

4.1.2.2 Land Owner or Surface Manager Comments

Surface owner approval of the Applicant's proposed postmining land use will be confirmed by the approval of this Mining and Reclamation Plan by the respective Forest Service units for those federal lands that they administer. The private landowner comments concerning the postmining land use are contained in the UNELCO letter in Appendix 1-1.

4.1.2.3 Suitability and Capability

Final fills will not contain excess spoils.

4.1.3 Performance Standards

The performance standards for the areas to be reclaimed for postmining land use are contained in this section.

4.1.3.1 Postmining Land Use

The proposed postmining land uses will be identical to the premining land uses and the land will be capable of supporting such land uses.

4.1.3.2 Determining Premining Uses of Land

The Applicant plans for the same postmining land uses as existed before the operation began.

4.1.3.3 Criteria for Alternative Postmining Land Uses

No alternative postmining land uses have been planned.

4.1.4 Alternative Land Use

No alternative postmining land uses have been planned.

4.20 Air Quality

This section includes descriptions of plans to comply with the Clean Air Act and applicable Utah or federal statutes and regulations pertaining to air quality standards.

4.2.1 Air Quality Standards

SUFCO Mine's mining activities are being conducted in compliance with the requirements of the Clean Air Act and the Utah Air Quality Regulations.

4.2.2 Compliance Efforts

The state of air quality control of the SUFCO Mine is generally excellent except the control of fugitive dust in the product loadout area. Watering of this area is done in accordance with stipulations in the Air Quality Permit.

- a. Access road - The access road is paved and free of mud and potholes. Access to the road is limited by the surrounding terrain which leaves it free of carried-on mud or dirt by vehicles. Emissions from the access road are minimal.
- b. Service area - Fugitive Emissions. The service area is compact and efficient in size and layout. The area in front of the portal and office building as well as the area in front of the shop is paved. Traffic to and from the mine is limited by the small parking area available (approximately 25 car capacity). Personnel are transported to and from the work site by company bus and van pools. Dust emissions caused by personnel and mining support operations are minimal in spite of the partially unpaved parking area. The SUFCO Mine currently employs approximately 234 people. Based-on an average round trip of 62 miles per day, 3.0 million miles of personal car transportation is saved annually by the use of company transportation. This represents an extremely significant limitation of vehicular emissions.

Fugitive dust emissions from the load out area are moderate. Coal load out operations are the source of most of the fugitive dust emissions. Trucks are routed near the emergency coal storage area. Because some stored material must be loaded with a front end loader, physical separation of the driveway and the storage area is not feasible. Trucks encroach upon the coal storage piles resulting in a thin layer of pulverized coal dust. This emission source is controlled through regular water applications. The area is within the sediment pond collection system.

- c. Coal crushing and conveying - All crushing is conducted in closed areas. The main conveyor belts are covered, as are most lifts and drop points. Fugitive emissions

observed are extremely low. The low emissions were evidenced even during winds of approximately 15 miles per hour. The extremely good dust control in this area is attributed to the excellent condition of covers and seals and to the relatively high water content of the product.

- d. Truck loading - Loading is primarily accomplished by dropping the product from a bin-hopper into the haul trucks. Drop points are well protected from the prevailing wind directions. Loading is accomplished almost immediately after the product is removed from the mine and the water content of the product is assumed responsible for severely limiting dust emissions. Loading of temporarily stored material by front end loader results in significantly increased fugitive emissions. The limited use of this method of loading allows discounting its overall contribution.

The operator controls fugitive dust by application of water to areas where needed. An assessment of the particulate emissions at the mine site are included as Appendix 4-3.

Due to the general excellent air quality and the Pines Tract area's high air mixing, cumulative impacts on the quality of the ambient air are minimal (Pines Tract Project EIS, 1999).

4.2.3 Monitoring Program

The UDOGM does not require an air monitoring program for the SUFCO underground mine at this time. The mine currently operates under Division of Air Quality Approval Order DAQE-AN0106650013-11 SUFCO Mine site dated March 30, 2011 and Small Source Registration DAQE-EN0106590004-11 Waste Rock Disposal Site dated March 31, 2011 found in Appendix 4-4.

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SUFCA Mine

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CHAPTER 5
ENGINEERING

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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 SUFCA Mine only the right to mine the Upper Hiawatha seam.

The Quitchupah Tract Resource Recovery and Protection Plan (R2P2) for Canyon Fuel Company, LLC SUFCA 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 SUFCA Mine.

The Pines Tract Resource Recovery and Protection Plan (R2P2) for Canyon Fuel Company, LLC SUFCA 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 SUFCA Mine.

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

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.

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.

CHAPTER 7

HYDROLOGY

LIST OF PLATES

Plate

7-1 (Revisions have eliminated this plate)

~~7-2A 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

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 calcareous 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.

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 SUFCO-007 and SUFCO-042)
- South Fork of the North Fork of Quitchupah Creek (as measured at station SUFCO-006)
- Quitchupah Creek (as measured at stations SUFCO-041 and SUFCO-046)
- Box Canyon, including East Fork Box Canyon (as measured at stations SUFCO-090, Pines 403, Pines 407 and Pines 408)
- Muddy Creek (as measured at stations Pines 405 and Pines 406)
- Cowboy Creek (as measured at station M-STR4)

According to Thiros and Cordy (1991), Link Canyon contains an ephemeral stream. Two small areas of riparian vegetation are supported in the canyon by discharge from springs near the head of the canyon (Link Canyon Spring GW-21, Plate 7-3) and the abandoned Link Canyon Mine

drainage cuts through the Blackhawk Formation and the upper Star Point Sandstone. This reach is typified by alternating sandstone ledges and shaley slopes with little to no soil cover. The channel contains large boulders, cobbles and gravel and at times is poorly defined. Surface water above the mine portals has only been observed in this reach during and shortly after significant storm events. Surface water flows downstream of the portals for a distance typically less than 500 feet. Riparian vegetation is located slightly upstream and for approximately 800 feet below the Link Canyon portals. This vegetation is typified by willow, alder, stinging nettle, rose, horsetail, carex, Kentucky Bluegrass, rush, and clematis. As in segment 2, the riparian vegetation is typically limited to the bottom of the channel or a short distance up the channel walls. This suggests that the water source for these plants is the water discharged from the mine into the channel and not an areal extensive aquifer discharging to the channel at numerous locations and elevations.

The final reach of the drainage, Segment 4, described herein runs from a point beginning approximately 250 feet below the portals to the USFS boundary and the south section line of Section 26, or approximately 2600 feet. The slope of the gradient in this reach is approximately 10 percent. The drainage channel cuts through the Mancos shale in this reach and typically has a floor of sandstone cobbles and boulders resting in fine to coarse sand and silt. The channel itself can be incised in the minimal soil cover or be broad and flat where bedrock is exposed and little soil cover is found. Surface water would flow in this reach only after significant precipitation events. However, in five years of monitoring the two sites, Link 001 (located near the base of the third stream segment) and 002 (located near the base of the fourth stream segment), surface water has not been observed in the channel.

Station locations are indicated on Plate 7-3. All other streams within the permit and adjacent areas are ephemeral.

Based on channel-geometry measurements and a technique described by Fields (1975), Waddell et al. (1981) estimated that the historic average annual flow of Quitchupah Creek is approximately 3800 acre-feet immediately above the confluence with Link Canyon. With a drainage area of 85.4 square miles (Waddell et al., 1981), this results in a unit-area average annual streamflow of 44.5 acre-feet per square mile per year (AF/mi²/yr) for Quitchupah Creek above Link Canyon.

The U.S. Geological Survey collected streamflow data from Ivie Creek from 1951 through 1961 at a station located approximately 11 miles south of the mine surface facilities. During the period of record, data published by the U.S. Geological Survey indicate that the average annual streamflow at this station was 2830 AF/yr. Based on a published drainage area of 50 mi², the unit-area average annual streamflow of upper Ivie Creek was 56.6 AF/mi²/yr. This compares favorably with the unit-area yield of Quitcupah Creek and with the mean annual water yields presented by the Utah Division of Water Resources (1977).

Seasonal variations in historic streamflow in the vicinity of the lease area are portrayed graphically in Figure 7-5. The Muddy Creek station is located approximately 6 miles downstream from the confluence of Box Canyon and Muddy Creek while the Ivie Creek station was located about 11 miles south of the mine surface facilities. These trends (which are considered representative of perennial streams in the permit and adjacent areas) indicate that peak monthly stream flows in the area generally occur in May or June, probably as a result of snowmelt runoff. The Ivie Creek data also indicate that an additional rise in the monthly hydrograph occurs in July or August, probably as a result of summer thunderstorm activity.

Even though selected stations have been monitored for over eight years, no streamflow data are available for ephemeral drainages in the permit and adjacent area. When it does occur, ephemeral runoff in the area is expected to occur predominantly in the months of July, August, and September as a result of thunderstorm activity. These storms are expected to result in runoff with a short duration and high intensity.

Several small catchment ponds have been constructed in the permit and adjacent areas to capture water for stock watering. Those catchment ponds where water rights applications have been filed are located as shown on Plate 7-2. The catchment ponds capture water either from an adjacent spring or from snowmelt.

The SUFCA mine has three UPDES discharge monitoring points. The locations of these points are shown on Plate 7-3.

UPDES monitoring point 001 represents an emergency mine discharge point that is used only in the event of a failure of the mine dewatering system. To discharge from this point, the emergency in-mine pump must be started and the valve on the discharge pipe must be manually opened. When the point is used, water is discharged into the East Spring Canyon 72-inch bypass culvert shown on Plate 7-6.

UPDES monitoring point 002 represents discharge from the East Spring Canyon sedimentation pond. Discharge from this point occurs only infrequently as a result of pond dewatering.

UPDES monitoring point 003 (equivalent to hydrologic monitoring station SUFCA-021) represents normal discharge from the underground workings into the North Fork of Quitchupah Creek. As indicated in the 1990 annual report, discharge at this point averaged approximately 550 gpm during the period of 1983 through 1990. From 1988 through 1990, this discharge rate generally increased from a pre-1988 rate of about 450 gpm to about 1,000 gpm (see Figure 7-6). Discharge rates tend to relate to coal production rates and are not seasonally affected.

Note that the waste-rock disposal area sedimentation pond does not have a UPDES permit since this is a total-containment, non-discharge facility (see Volume 3 of this M&RP).

WATER QUALITY

Surface-water quality samples have been collected in the permit and adjacent areas from stations located on Quitchupah Creek, the North and South Forks of Quitchupah Creek, mine discharges into the North Fork of Quitchupah Creek, and Box Canyon. Historical data from these sources are summarized in Appendices 7-4, 7-17 and 7-18.

Historical data collected from stations SUFCA-006 (upper South Fork of Quitchupah Creek) and SUFCA-007 (upper North Fork of Quitchupah Creek) indicate that water in the upper reaches of this drainage is predominantly a calcium-bicarbonate chemical type with an average TDS concentration that varies from about 330 to 470 mg/l. The pH of this water is slightly alkaline, averaging 7.9 to 8.0. Total iron concentrations at these stations typically ranges from 1.7 to 3.0 mg/l, with dissolved iron concentrations averaging 0.03 to 0.04 mg/l. Total manganese

(Figure 7-5)

Streamflow Probability of Selected Streams

concentrations at these stations average 0.11 to 0.12 mg/l, with dissolved manganese concentrations averaging 0.02 to 0.05 mg/l.

Alkalinity typically exceeds acidity at these upper stations by a factor of approximately 25. TDS concentrations tend to be inversely proportional to flow, while total iron and manganese concentrations are typically directly proportional to flow. Consistent seasonal variations in pH, dissolved iron, and dissolved manganese concentrations are not apparent.

The historical mine discharge at SUFCO-021 (UPDES monitoring station 003) is a calcium-bicarbonate-sulfate water with an average TDS concentration of 603 mg/l and an average pH of 7.4. Sulfate concentrations in the mine-water discharge average 236 mg/l. This compares with an average sulfate concentration of 81 mg/l between stations SUFCO-006 and -007 and an average of 66 mg/l in the mine inflow (station SUFCO-062). This increase in sulfate (and TDS) in the mine-water discharge as compared with adjacent surface and underground water may be the result of dissolution of the calcium-sulfate based rock dust used in the mine.

Total and dissolved iron concentrations in the mine-water discharge average 0.08 and 0.03 mg/l, respectively. Total and dissolved manganese concentrations in this water average 0.02 and 0.01 mg/l, respectively. On the average, the alkalinity exceeds the acidity by a factor of approximately 20. The chemical data have not exhibited consistent seasonal variations.

At the mouth of the North Fork of Quitchupah Creek (SUFCO-042), the predominant ions are calcium, bicarbonate, and sulfate. The average historical TDS concentration at this location is 518 mg/l, with an average pH of 7.9. Total and dissolved iron concentrations at this station average 3.4 and 0.03 mg/l, respectively, with total and dissolved manganese concentrations averaging 0.08 and 0.01 mg/l, respectively. Alkalinity exceeds acidity by a factor of more than 20.

TDS concentrations at SUFCO-042 are generally inversely proportional to flow, while total iron and manganese concentrations are directly proportional to flow. Seasonal variations in pH, dissolved iron, and dissolved manganese are not apparent.

Stations SUFACO-046 and SUFACO-041 monitor Quitchupah Creek above East Spring Canyon and above the North Fork of Quitchupah Creek, respectively. Average historical TDS concentrations at these stations vary from 697 to 685 mg/l, with pH averaging 7.6 to 8.0. Water in Quitchupah Creek is of mixed chemical type. Average total iron concentrations range from 0.28 mg/l at the upstream station to 3.76 mg/l at the downstream station. Average dissolved iron concentrations range from 0.03 to 0.04 mg/l at the two stations. Total manganese averages 0.08 at both stations, with dissolved manganese ranging from 0.06 mg/l at the upstream station to 0.02 mg/l at the downstream station.

Alkalinity typically exceeds acidity in Quitchupah Creek by a factor of at least 25. Flow-TDS and flow-total metal relationships are as indicated above. Seasonal variations in pH, dissolved iron, and dissolved manganese are not apparent.

The historical chemical quality of surface water in East Spring Canyon at station SUFACO-047A is similar to that of Quitchupah Creek at SUFACO-046. The water is of mixed chemical type, with an average TDS concentration of 724 mg/l and an average pH of 7.4. Total and dissolved iron concentrations average 0.43 and 0.04, respectively, with total and dissolved manganese concentrations averaging 0.04 and 0.02, respectively. Alkalinity typically exceeds acidity in East Spring Canyon by a factor of approximately 20. Flow-TDS and flow-total metal relationships are as indicated above. Seasonal variations in pH, dissolved iron, and dissolved manganese are not apparent.

The historical chemical quality of streamflow in Box Canyon (as monitored at station SUFACO-090) contains an average TDS concentration of 93 mg/l and an average pH of 7.1. No total iron or manganese data are available. However, dissolved iron and manganese concentrations have averaged 0.27 and 0.04 at the station, respectively. The data base is insufficient to assess seasonal variations. However, trends between flow, TDS, and total metals are anticipated to be as described for the North and South Forks of Quitchupah Creek. Data collected from monitoring sites Pines 407 and Pines 408 are included in Appendices 7-17 and 7-18.

In the area of the Link Canyon Portal and Link Canyon Substation No. 1 and No. 2 pads and access roads, sediment yield from the disturbed areas will be controlled with berms and/or silt fences. The calculations supporting the use of berms and /or silt fences for these areas are presented in Appendix 7-15. Undisturbed runoff from above the Link Canyon Portal pad area that naturally flowed down the Link Canyon drainage will be diverted under the pad area by the use of a diversion culvert and will be channeled back into the existing Link Canyon drainage. Undisturbed runoff from above the substation pad areas that naturally flowed directly into the existing Link Canyon Road inside ditch will be diverted around the substation pad areas by the use of a diversion ditch and will be channeled back into the existing Link Canyon Road inside ditch. Sediment yield from the undisturbed drainage ditch will be controlled with a silt fence. From the point that the Substation No. 2 undisturbed drainage reenters the existing Link Canyon Road ditch the existing road ditch drainage flows for about 30' along the inside of the road before the flow is diverted across the road by an existing water bar where the flow is directed toward the channel at the bottom of Link Canyon. This drainage is by Division definition an intermittent stream. However, water only flows in this canyon in the substation areas as the result of snow melt runoff or the occasional summer thunderstorm.

Acidity, Total Suspended Solids, and Total Dissolved Solids. Probable impacts of mining and reclamation operations to the acidity and total suspended solids concentrations of surface and groundwater in the permit and adjacent areas were addressed previously in this section. Impacts to water quality parameters within the Pines Tract area are addressed in Appendix 7-18.

Data presented in Appendix 7-4 and summarized in Section 7.2.4.1 of this M&RP indicate that the average TDS concentration of water entering the mine (as measured at SUFCO-062) is 397 mg/l. This is a calcium-bicarbonate water with an average sulfate concentration of 63 mg/l. As noted in Section 7.2.4.2, the average TDS concentration of water discharging from the mine (as measured at SUFCO-021) is 667 mg/l (with a historical range of 350 to 970 mg/l). This is a calcium-bicarbonate-sulfate water with an average sulfate concentration of 277 mg/l (with a historical range of 40 to 469 mg/l).

These data indicate that the TDS concentration of water flowing through the mine increases by a factor of approximately 1.6. The sulfate concentration of this water increases by a factor of about 3.5. As noted in Section 7.2.4.2, this increase in TDS and sulfate concentrations may be the result of dissolution of calcium-sulfate rock dust used in the mine.

Subsidence may cause some surface water to be diverted into the groundwater. As the water flows slowly through the ground, the water dissolves the salts available in the formations and TDS concentrations increase. When the diverted water is later discharged to the surface, TDS concentrations may be higher than if it had flowed over the surface. Due to the nature of ephemeral streamflow, these subsidence-caused diversions would be small in volume. When a fracture becomes sealed with bentonitic materials available in the lease area (Thiros and Cordy, 1991), the diversion either ceases or flows into a higher stratigraphic unit. Thus, potential impacts would be minor and not of significant concern.

The impact of the TDS and sulfate concentration increases on surface-water resources in the permit and adjacent areas is considered minimal for three reasons. First, surface water in the permit and adjacent areas has been classified in the Utah Department of Environmental Quality Wastewater Disposal Regulations as Class 3a and 4 water (protected for cold water aquatic life and agricultural uses, respectively). No sulfate discharge standard exists for either of these two classifications. The only TDS standard is for Class 4 water, with a discharge limitation of 1200 mg/l. Thus, the mine water does not exceed the applicable discharge standard and small amounts of surface water diverted through the groundwater system would not cause exceedances of the applicable standards.

Second, according to data presented in Section 7.2.4.2, although the discharge of mine water into the North Fork of Quitchupah Creek increases the TDS and sulfate concentrations of the receiving water (compare data from SUFCO-006, SUFCO-007 and SUFCO-042), the TDS concentration of the discharge water is less than that of Quitchupah Creek above the influence of the mining operation (compare data from SUFCO-046). As a result of these factors, the impacts of increased TDS and sulfate concentrations in the mine-water discharge relative to the adjacent natural water are not considered significant.

Finally, as indicated on Plate 6-1, surface water in the North Fork of Quitchupah Creek flows across Mancos Shale immediately downstream from the mine discharge point. Similarly, Quitchupah Creek crosses Mancos Shale immediately downstream from the confluence with East Spring Canyon. Since the Mancos Shale is a gypsiferous formation, sulfate and TDS concentrations are naturally high in areas underlain by this unit. Thus, the additional input of these constituents from the mine waters to local streams is considered minimal.

As indicated previously, tension cracks created by subsidence may locally increase the rate of downward percolation of groundwater. However, as indicated by Mayo in Appendix 7-17, the potential for increased vertical percolation of groundwater due to subsidence is not considered to be significant and should have no impact on mine discharge water quality.

No subsidence is anticipated to occur in the Link Canyon Substation pad area. Therefore, disturbance in this area is not anticipated to adversely effect groundwater. Surface water will not be adversely effected in this area since runoff will be treated prior to discharge, thus limiting the amount of total suspended solids. Additionally, the soils in the area are not toxic or acid forming and the total increase of dissolved solids added to the runoff from the limited area of the pad will not be significant. The receiving waters pass over large areas of exposed Mancos Shale before it is put to beneficial use. Therefore, the contribution of TSS and TDS from the pad area when compared to the contribution of the in-place soils and shale bedrock will be insignificant.

Flooding or Streamflow Alteration. Runoff from all disturbed areas is treated through sedimentation ponds or other sediment-control devices prior to discharge to adjacent undisturbed drainages. Three factors indicate that these sediment-control devices minimize or preclude flooding impacts to downstream areas as a result of mining operations:

1. The sediment-control facilities have been designed and constructed to be geotechnically stable. Thus the potential is minimized for breaches of the sediment-control devices to occur that could cause downstream flooding.

2. The flow routing that occurs through these sediment-control devices reduces peak flows from the disturbed areas. This precludes flooding impacts to downstream areas.
3. By retaining sediment on site in the sediment-control devices, the bottom elevations of stream channels downstream from the disturbed areas are not artificially raised. Thus, the hydraulic capacity of the streams channels is not altered.

Following reclamation, stream channels will be returned to a stable state (see Section 5.4.2.2). The reclamation channels have been designed to safely pass the peak flow resulting from the 100-year, 24-hour storm. Thus, flooding in the reclaimed areas will be precluded. Interim sediment-control measures and maintenance of the reclaimed areas during the post-mining period will preclude deposition of significant amounts of sediment in downstream channels following reclamation, thus maintaining the hydraulic capacity of the channels and precluding adverse flooding impacts.

The mine has been designed to minimize subsidence impacts to perennial streams (see Section 5.2.5.1). Any material damage to the stream channel will be mitigated. Streamflow volume in the North Fork of Quitchupah Creek will, however, increase due to mine water discharge.

Mine water discharge to the North Fork of Quitchupah Creek has increased streamflow by over 1000 gpm (2.25 cfs). Waters encountered in the Pines Tract will be pumped to the Quitchupah discharge point. The worst case flow increase is estimated to be approximately 3.75 cfs. Once mining has ceased, the mine will be sealed and no discharges will occur. The streamflow volume will return to pre-mining discharge levels. Increased flow to the North Fork of Quitchupah during seasonal flow conditions are addressed by Mayo in Appendix 7-17.

Subsidence tension cracks that propagate to the surface, will increase the secondary porosity of the formations overlying the SUFACO mine. Thiros and Cordy (1991) state that bentonitic shale and plastic flow in mudstone within the perching layers could possibly slow or stop the downward movement of groundwater. If these cracks do not become blocked with bentonite, recharge to

aquifers that feed spring flow may increase. Thus, subsidence may contribute to increases in streamflow.

Subsidence may decrease spring flow if the perched aquifer which supplies the spring is intersected by tension cracks, allowing groundwater to drain to underlying strata (Thiros and Cordy, 1991). Subsidence has occurred beneath East Spring (monitoring station 001), but no major changes in flow rate or water quality have been detected from 1985 to 1986 (Thiros and Cordy, 1991). Groundwater monitoring data (Appendices 7-4 and 7-17) indicate that flow rates of this spring have declined from 1987 to 1995. This decline in flow, however, is likely due to the drought conditions of the last several years (Appendix 7-5). Flow rates from other springs currently monitored by SUFCA, but located in unsubsided areas (057A and FS-109), have also declined during the last several years (Appendices 7-4 and 7-17).

Subsidence will occur in areas occupied by ephemeral and perennial stream channels. According to Thiros and Cordy (1991), surface water flow to natural drainages has the potential of being intercepted by subsidence fractures that extend to the land surface. In addition, the broad depressions created by subsidence may locally retain runoff that would normally discharge from an area. Although surface cracks that result from subsidence in the lease area tend to heal with time (see Appendix 5-4), stream flows may be partially intercepted prior to completion of the healing process. However, the following factors indicate that the impact of subsidence on streamflow will be minimal:

1. Bentonitic shale and plastic flow in mudstone within perching layers could possibly slow or stop the downward movement of previously perched groundwater (Thiros and Cordy, 1991).
2. Field observations indicate that there are no sustained above normal inflows in the mine. Thus, flow along fractures is either from a relatively small source, or the conduits become sealed quickly.
3. Ephemeral streamflow in the area is sporadic, allowing significant periods of time which may allow for surface cracks to heal between flow events.

4. Ephemeral streamflow typically carries a high sediment load. During precipitation runoff events, perennial streams will also carry a high sediment load. This sediment will fill remaining cracks. As the cracks heal, the potential for interception of streamflow is minimized.

5. The depressions created by subsidence are sufficiently broad that changes in slope are not typically of an ample magnitude to cause ponding in anything other than local areas. If ponding does occur, the shallow depressions will fill with sediment quickly due to the periodic high sediment load of streams and the drainage will return to the previous pattern.

Groundwater and Surface Water Availability. The potential impacts of mining on reductions in surface-water availability are discussed above. As indicated, these impacts are not considered to be significant.

As noted in Section 7.2.4.2, groundwater is encountered in the SUFCO mine and pumped to the surface, generally into the North Fork of Quitcupah Creek at UPDES station 003.

According to Mayo (Appendix 7-17), the rate of discharge from the mine has increased since 1987 from approximately 1.0 cfs (450 gpm) to about 3.56 cfs (1,600 gpm).

The increase in flow into and out of the mine is considered to be the result of increased coal production. The primary method of mining converted from room-and-pillar to longwall in October 1985. As a result of this change, production in the mine increased (see Figure 7-6). With the increase in production, new areas were mined at an increasingly higher rate. According to Mayo (Appendix 7-17), the mine discharge hydrograph shows that the rate of mine water discharge does not increase as the total area of the mine increases, but rather, the rate of discharge is related to the amount of recently mined areas.

As indicated in Section 5.2.3 of this M&RP, long-term production from the SUFCO mine is expected to average about 6 million tons. Projecting this production rate and the mine discharge rate on

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

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 SUFCA 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 prefix "GW - ". During the baseline surveys, several springs identified in the publication could not be found as illustrated on the document maps or by using the printed location descriptions. It is assumed the springs that could not be found have a) stopped flowing; b) were miss mapped; or c) were in close proximity to springs found during the baseline surveys but could not be positively identified as USGS located springs and were therefore given new number designations.

Baseline data collected for the Muddy Tract area is located in the "Coal Tract Evaluations on the Manti-La Sal National Forest" report prepared for the Manti-La Sal National Forest by Cirrus Ecological Solutions, LC. Those springs identified and found within the Muddy Tract in the above referenced publication are labeled on Plate 7-3 with the prefix "M-".

Sampling for the SUFCA Mine and adjacent areas is accomplished in accordance with the schedule outlined on Tables 7-2 through 7-5A. Sampling for the waste rock disposal site is accomplished in accordance with the schedule outlined in Table 4.7.2-1 and the parameter list as outlined on Table 4.7.2-2 in Volume 3 of this M&RP. Groundwater monitoring data are submitted to UDOGM by the end of the quarter following sampling. Monitoring data are submitted in an annual summary by March 31 of the subsequent year.

Groundwater monitoring will continue through the mining and post-mining periods until bond release. The monitoring requirements, including the analytical parameters and the sampling frequency may be modified in the future in consultation with the UDOGM if the data demonstrates that such a modification is justified.

Groundwater monitoring wells US-77-7, US-77-8, US-77-9, US-79-9, US-79-10, US-79-12, US-81-1, US-81-2, US-81-3, 89-16-1, 89-16-1W, 89-18-1, 89-20-1, 89-20-2, and 89-21-1 have been removed from the operational monitoring plan and are listed as historic monitoring wells because these are old baseline wells, wells that have been discontinued or wells the water level measurements are not possible due to the collapse or blockage of the casing. These historic monitoring wells will be permanently sealed along with all the operational groundwater monitoring wells during the final reclamation of the mine in accordance with Sections 6.3.1 and 7.4.8.

In addition to gathering ground water samples from seeps and springs at the surface, SUFCA will obtain a ground water sample, if ground water is encountered, in-mine within the proposed 150 acre lease expansion located in T21S, R5E, Section 10. This sample will be taken shortly after the start-up of the longwall and will be age-dated using isotopic analysis methods. After the longwall advances through approximately 50% of the panel length within the 150 acre lease expansion, a second ground water sample will be obtained from the face and analyzed

TABLE 7-2
Water Monitoring Program

<u>Monitoring Wells</u>	<u>Protocol</u>	<u>Comments</u>
US-80-2	A	Screened in Castlegate Sandstone
US-80-4	B	Screened in Castlegate Sandstone
89-20-2W	A	Screened in Castlegate Sandstone
US-79-13	B	Screened in Blackhawk Formation
US-81-3	A	Screened in Blackhawk Formation
US-81-4	A	Screened in Blackhawk Formation
01-8-1	A	Screened in Blackhawk Formation
 <u>Streams</u>		
SUFCO 006	C,2	Upper South Fork Quitchupah Creek
SUFCO 006A	F,1	Upper South Fork Quitchupah Creek
SUFCO 006B	F,1	Upper South Fork Quitchupah Creek
SUFCO 006C	F,1	Upper South Fork Quitchupah Creek
SUFCO 006D	F,1	Upper South Fork Quitchupah Creek
SUFCO 007	C,2	Upper North Fork Quitchupah Creek
SUFCO 041	C,2	Lower Quitchupah Creek
SUFCO 042	C,2	Lower North Fork Quitchupah Creek
SUFCO 046	C,2	Upper Quitchupah Creek
SUFCO 047A	C,2	Lower East Spring Canyon Creek
SUFCO 090	C,1	Upper Box Canyon Creek
Pines 106	C,2	Upper East Fork Box Canyon
Pines 302	C,1	Muddy Creek-Last Water Creek Confluence
Pines 403	C,2	Lower Box Canyon Creek
Pines 405	C,1	Muddy Creek - Box Creek Confluence
Pines 406b*	C,1	Lower Muddy Creek
Pines 407	C,1	Box Canyon Creek
Pines 408	C,1	East Fork Box Canyon Creek

Canyon Fuel Company, LLC
SUFCA Mine

January 24, 2017 (July 15, 2016) ~~November 15, 2016~~ December 20, 1991

USFS-109	C,1	Upper Main Fork of Box Canyon Creek
Link 001	C,2	Link Canyon Drainage
Link 002	C,2	Link Canyon Drainage
FP-1	G,6	East Fork of Main Fork of Box Canyon
FP-2	G,6	East Fork of East Fork of Box Canyon
M-STR4	C,1	Cowboy Creek

*Monitoring point Pines 406 was moved downstream to the USGS monitoring point in 1999 and renumbered as Pines 406b. The point is located in the NW1/4NE1/4, Sec. 21, T21S. R6E.

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 (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

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Canyon Fuel Company, LLC
SUFCO Mine

January 24, 2017 (~~July November 15, 2016~~) December 20, 1991
Mining and Reclamation Plan

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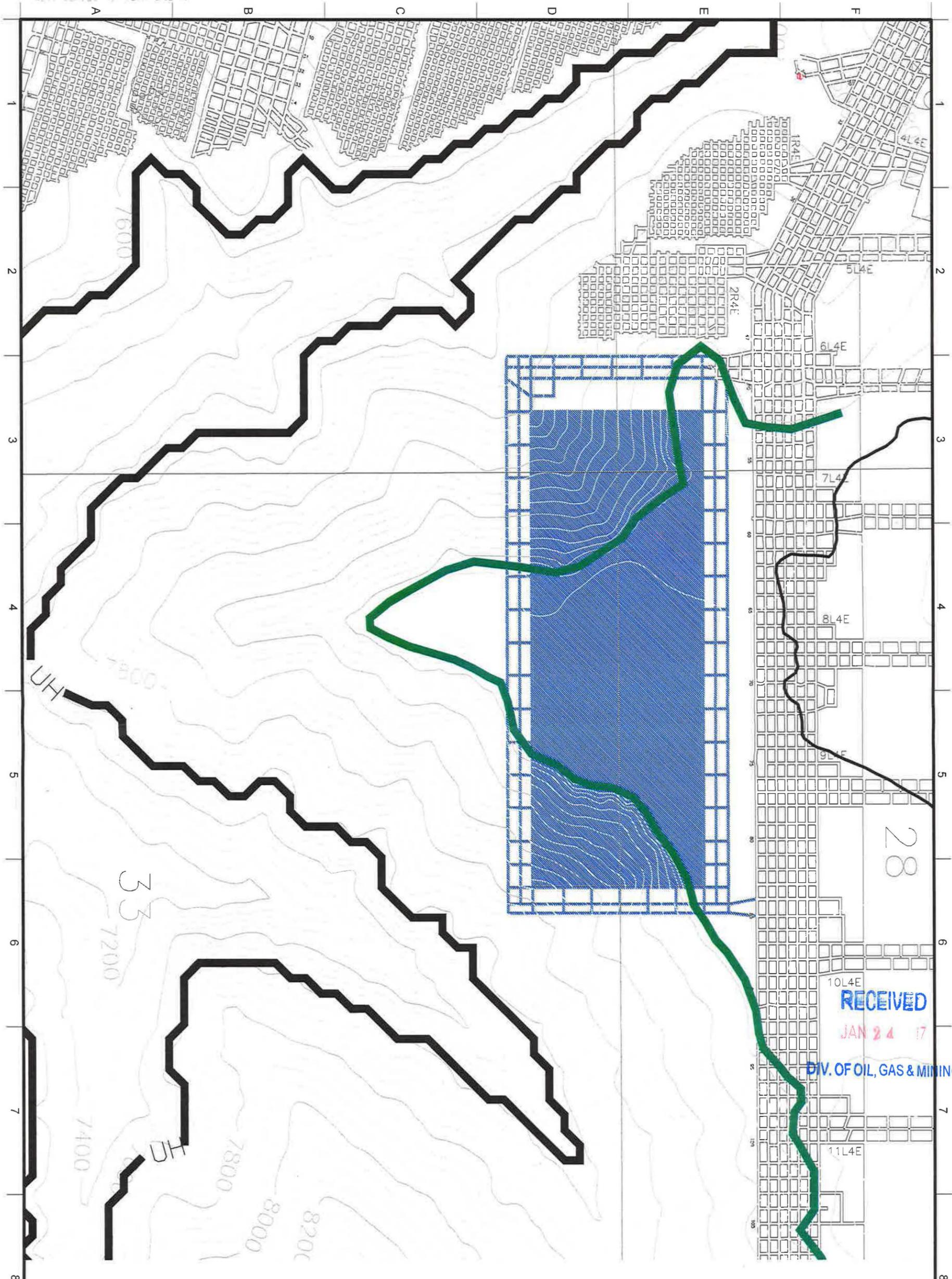
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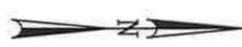
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- UH OUTCROP
- ESCARPMENT
- ROAD
- PROPOSED PANEL



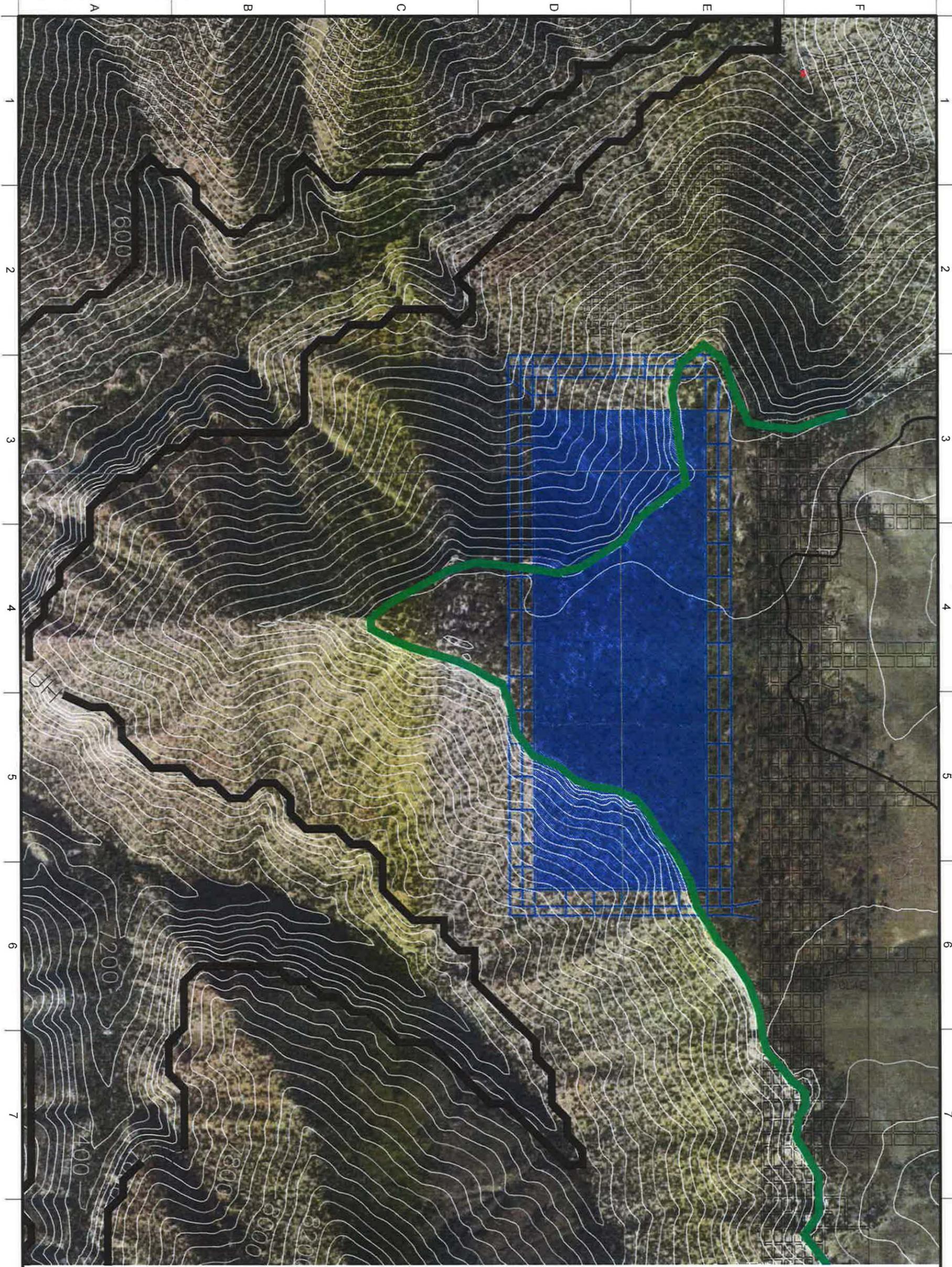
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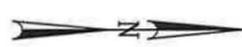
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DRAWN BY: AMR	ENGINEER: AMR	CHECKED BY:						

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SUFACO Mine
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 (435) 286-4880 Phone
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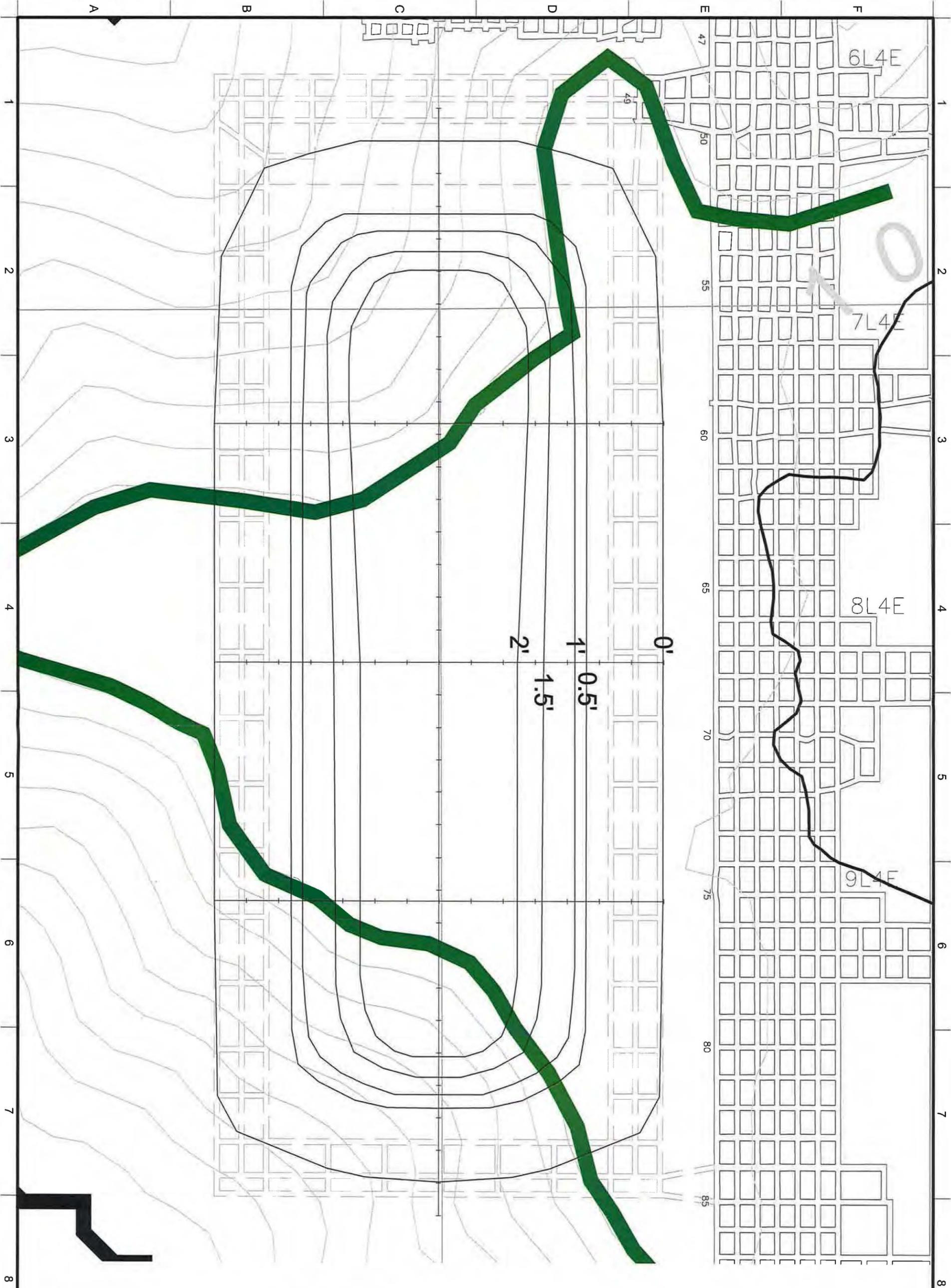


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- ESCARPMENT
- ROAD
- PROPOSED PANEL

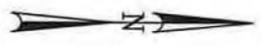


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- UH OUTCROP
- ESCARPMENT
- ROAD
- PROJECTED SUBSIDENCE CONTORS



1	SUFCO MINE		REVISIONS				
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	PROJECTED SUBSIDENCE						
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GREENS HOLLOW LEASE

SITLA MUDDY LEASE

PINES LEASE

QUITCHUPAH LEASE

FUTURE LOWER HIAWATHA
POINT OF ACCESS FROM
UPPER HIAWATHA

LINK CANYON MINE

RICCI MINE

EXPLANATION

MINING LEGEND

- SUFCO EXTERIOR LEASE BOUNDARY
- SUFCO INTERIOR LEASE BOUNDARY
- ESCARPMENT
- OUTCROP

- 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.



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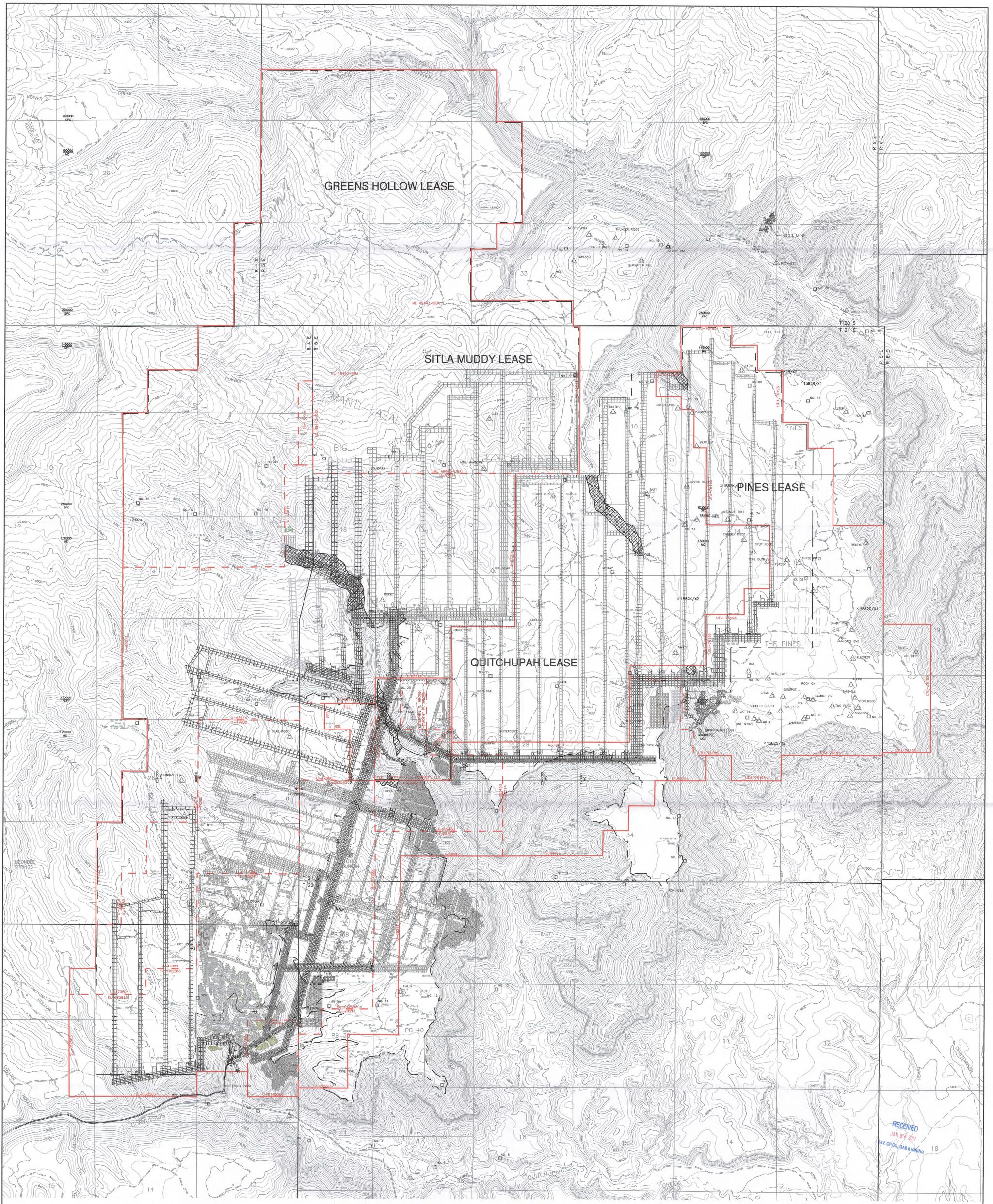
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SUFCO MINE PLAN
5 YEAR PROJECTION

SHEET NO. **42East**
PLATE 5-7



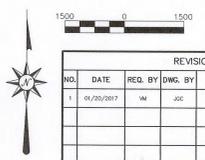
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EXPLANATION

- 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



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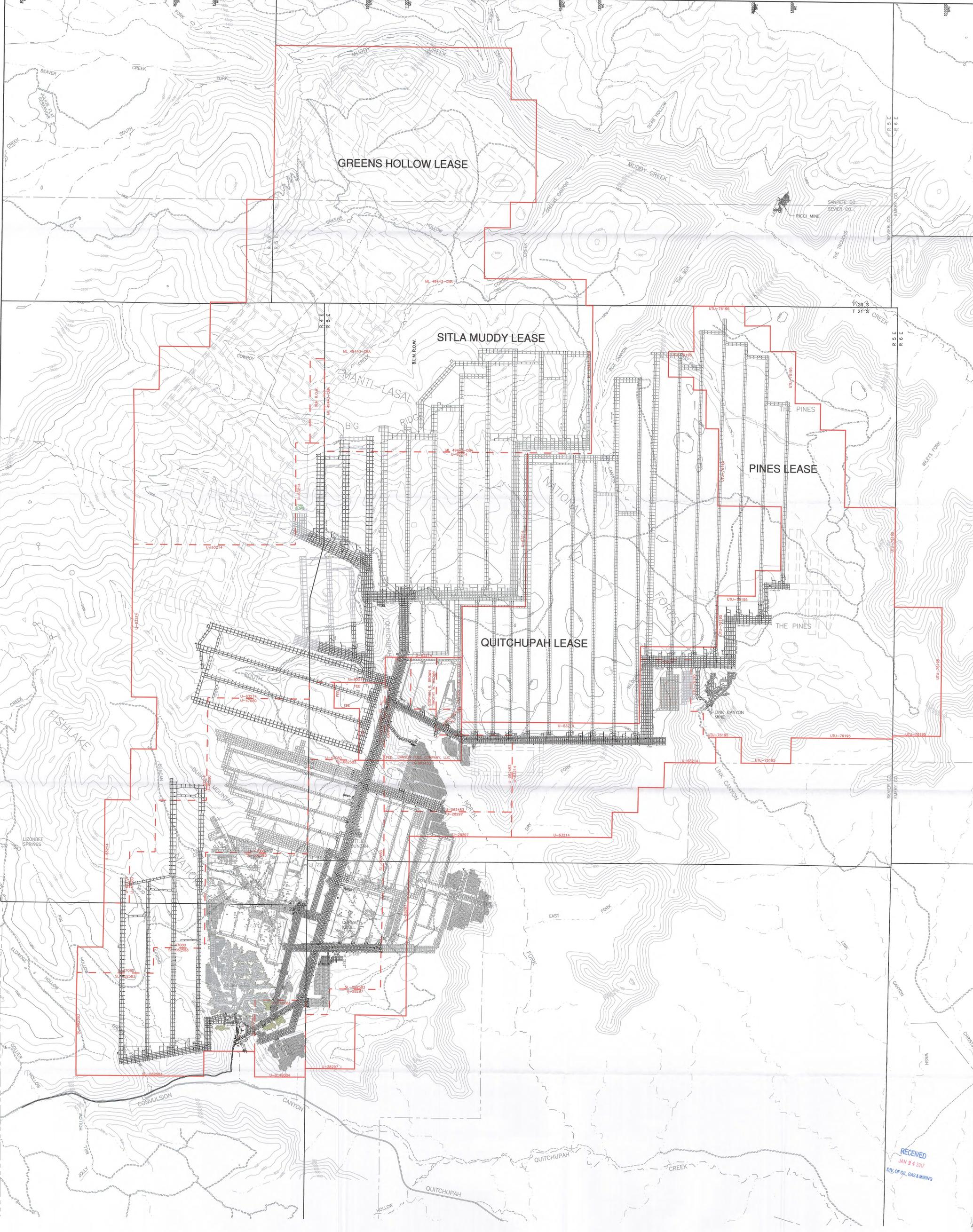


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NO.	DATE	REQ. BY	DWG. BY
1	01/20/2017	WM	JDC

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SUFCO Mine
 597 South SR 24 • Carbon, UT 84054
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POTENTIAL SUBSIDENCE LIMITS
SUFCO MINE SHEET NO. **PLATE 5-10**
 4East

SCALE: 1" = 1500'
 DATE: 01/20/2017
 DRAWN BY: JDC
 CHECKED BY: JBS
 SHEET NO.: 4East
 FILE NAME: H:\DRAWINGS\MSP\PLATES\PLATE 5-10 - 4East.dwg



GREENS HOLLOW LEASE

SITLA MUDDY LEASE

PINES LEASE

QUITCHUPAH LEASE

EXPLANATION

- SUFCO EXTERIOR LEASE BOUNDARY
- - - SUFCO INTERIOR LEASE BOUNDARY
- MINE COORDINATES
- STATE PLANE COORDINATES



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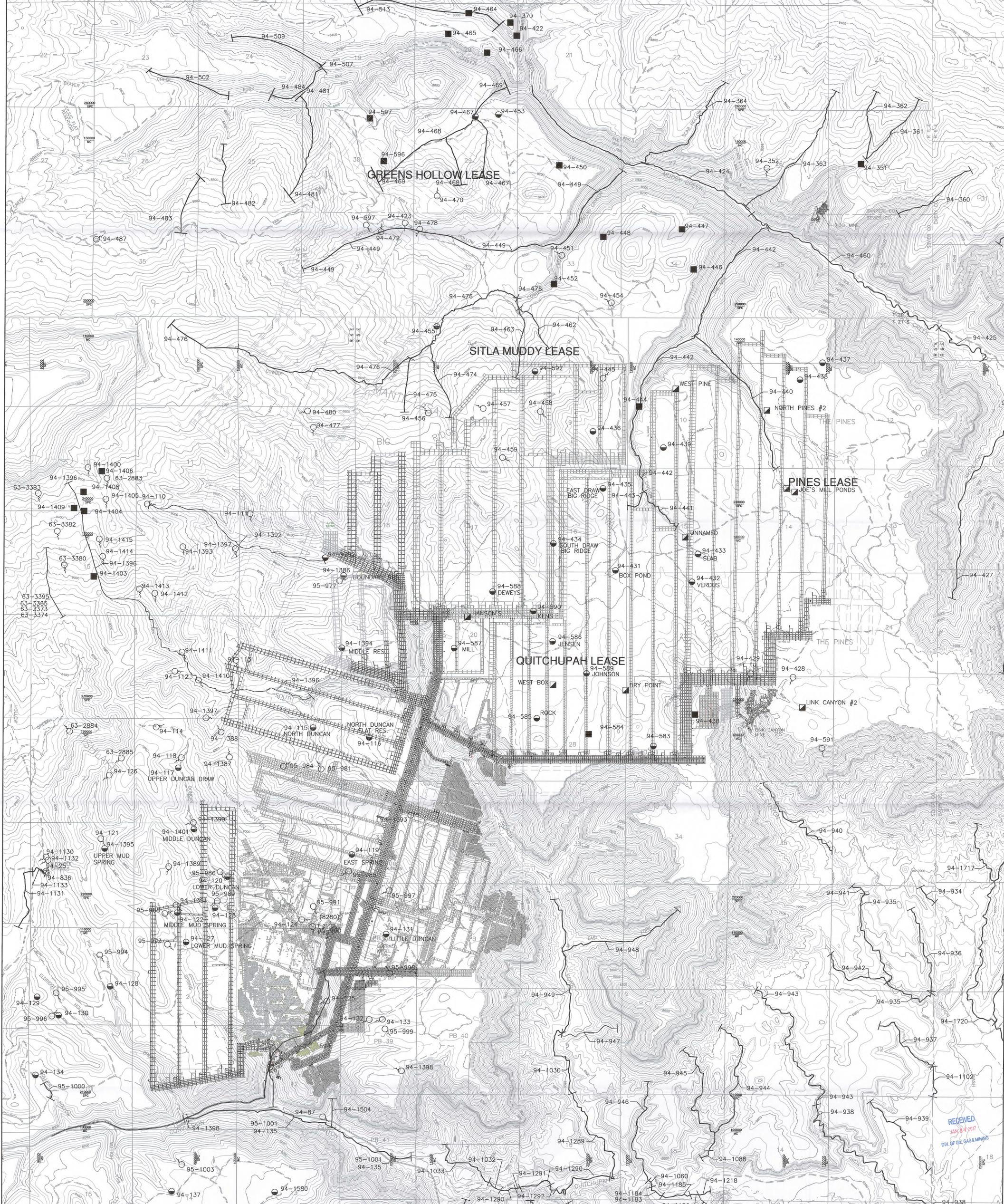


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1	02/20/2017	J.M.	J.D.C.	4East Amendment

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OVERBURDEN ISOPACH MAP

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EXPLANATION

- SUFCO EXTERIOR LEASE BOUNDARY
 - - - SUFCO INTERIOR LEASE BOUNDARY
 - 10000
5000
20000 MINE COORDINATES
 - 100000
200000 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, CATLEMEN 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	PHN HOLLOW RES.	
94-129	ELNDORGE HOLLOW RES. #1	
94-130	ELNDORGE HOLLOW RES. #2	
94-131	LITTLE DUNCAN RES.	
94-134	COLLIER RES.	
94-137	GOLLY MILL POINT RES.	
94-430	UNNAMED RES.	LINK CANYON #1
94-431	UNNAMED RES.	BOX POND
94-434	UNNAMED RES.	SOUTH DRAW BIG RIDGE
94-436	UNNAMED RES.	EAST DRAW BIG RIDGE
94-439	UNNAMED RES.	

QUITCHUPAH TRACT		
CATCHMENT PONDS WITH WATER RIGHTS NUMBER	CURRENT COMMON NAME USED BY USFS, CATLEMEN AND OTHERS	OTHER HISTORICAL NAMES USED FOR CATCHMENT PONDS
94-444	UNNAMED RES.	
94-583	DRY POINT RES.	
94-584	SEEPS POND	
94-585	WHITE KNOLL RES.	ROCK POND
94-588	BOX CANYON RES.	JENSEN
94-587	HILL RES.	HILL POND
94-588	DEWEYS RES.	DEWEYS POND
94-589	SAGE CREEK RES.	JOHNSON POND
94-590	KENS RES.	JENSEN, SAGE GROUSE POND
94-592	BOX POND RES.	
94-730	QUITCHUPAH RES. #1	QUITCHUPAH RES. #1
94-1388	BOUNDARY RES.	
94-1394	MIDDLE RES.	
94-1396	UPPER MUD SPRINGS RES.	
94-1401	MIDDLE DUNCAN RES.	
94-1850	JOLLY MILL GUZZLER RES.	

OTHER CATCHMENT PONDS WITHOUT WATER RIGHTS

DRY POINT
HANSON'S POND
JOHNSON, HANS



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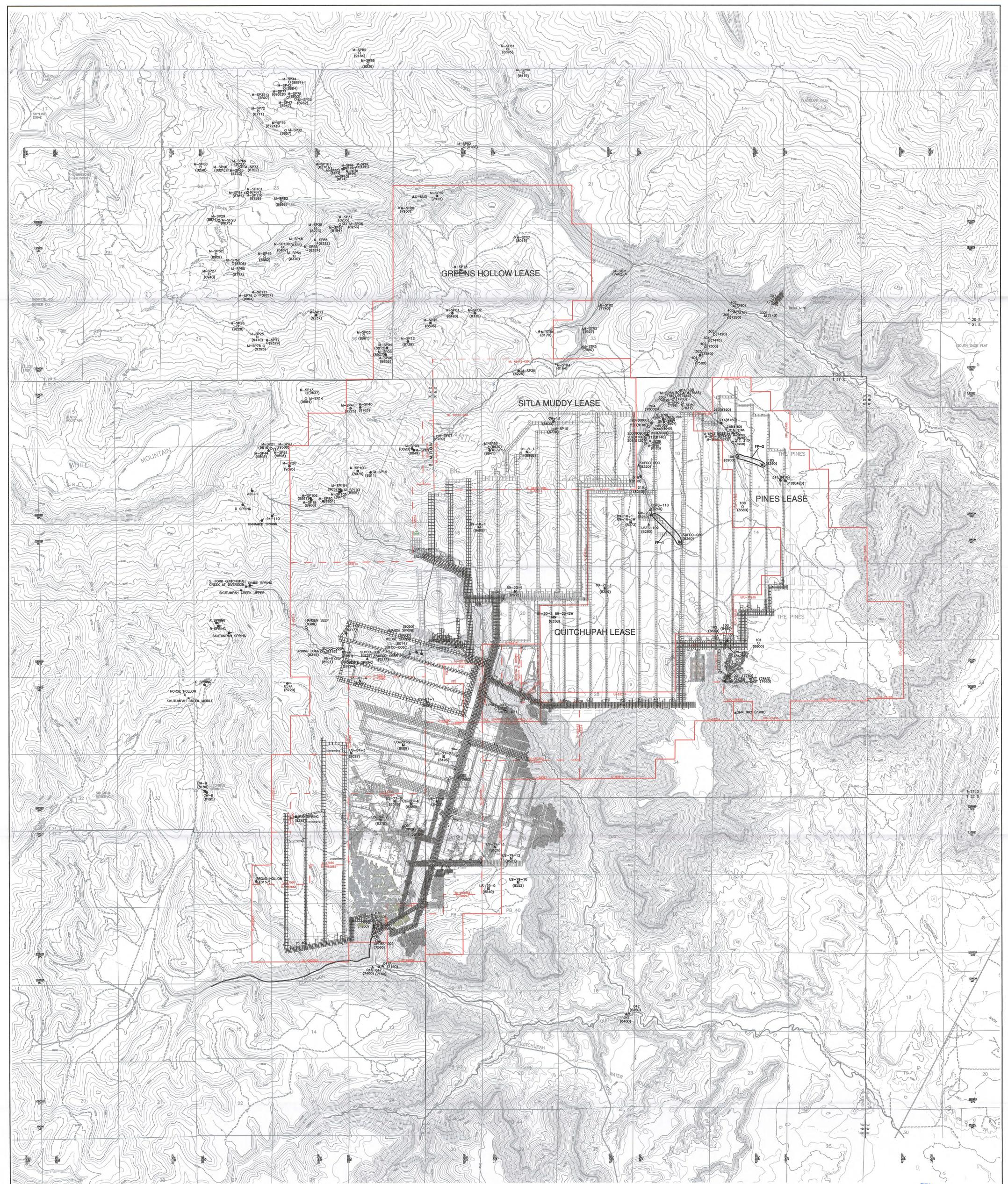
NO.	DATE	REV. BY	DWG. BY	REVISIONS	REMARKS
1	1/29/2017	V.M.	J.G.C.	4	Client Approval

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SURFACE AND GROUNDWATER RIGHTS SUFCO MINE

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 ENGINEER: V.M.
 CHECKED BY: V.M.
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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
- - - SUFCO MINE INTERIOR LEASE BOUNDARY
- MINE COORDINATES
- STATE PLANE COORDINATES
- HISTORIC STREAM
- ▲ STREAM MONITORING
- HISTORIC MONITORING WELL
- HISTORIC SPRING MONITORING SITE
- SPRING MONITORING
- UPDES MONITORING POINT
- IN MINE MONITORING SITE
- ELEVATION OF SITE (7600)
- PERENNIAL FLOW LOCATION MONITORING POINT
- PERENNIAL FLOW
- SPRING NOT MONITORED



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Canyon Fuel Company, LLC
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HYDROLOGIC MONITORING STATIONS

PER. TEL: JBS
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 DATE: 1/20/2017
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 PROJECT NUMBER: ###
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